QST

December 1970
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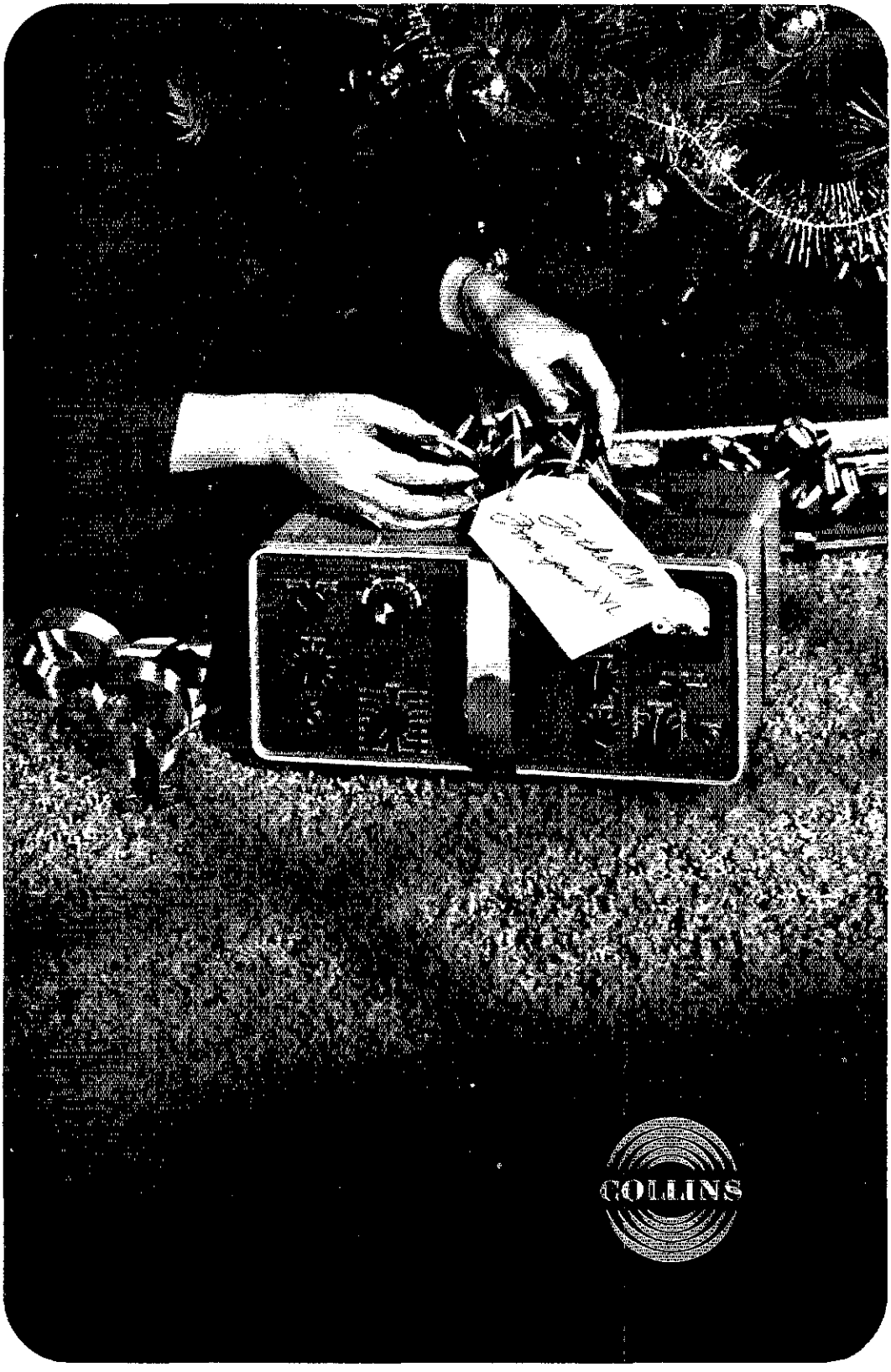
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OUR COVER

Adjusting antennas can be tricky — especially from a 12-foot ladder. Ed Kalin, WA1JZC, snapped this shot of W1FBY last July. See page 33 for the antenna story.

—CONTENTS—

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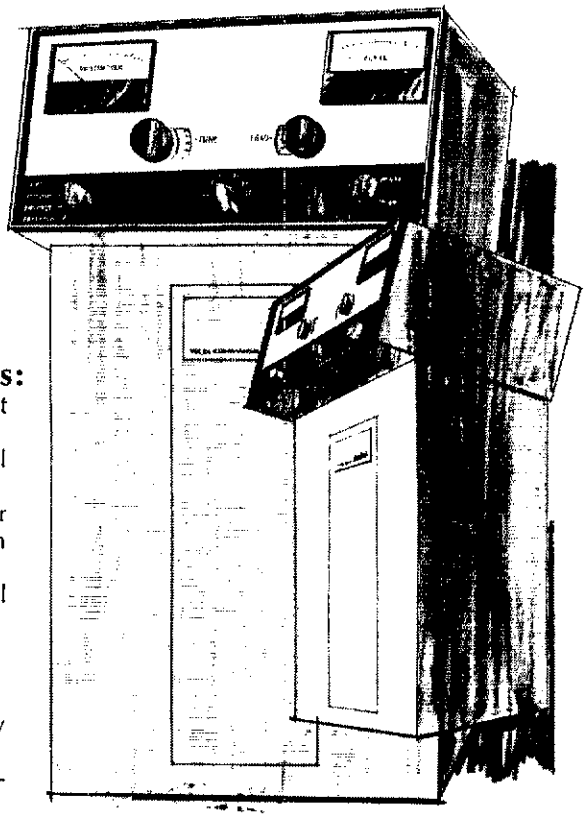

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports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

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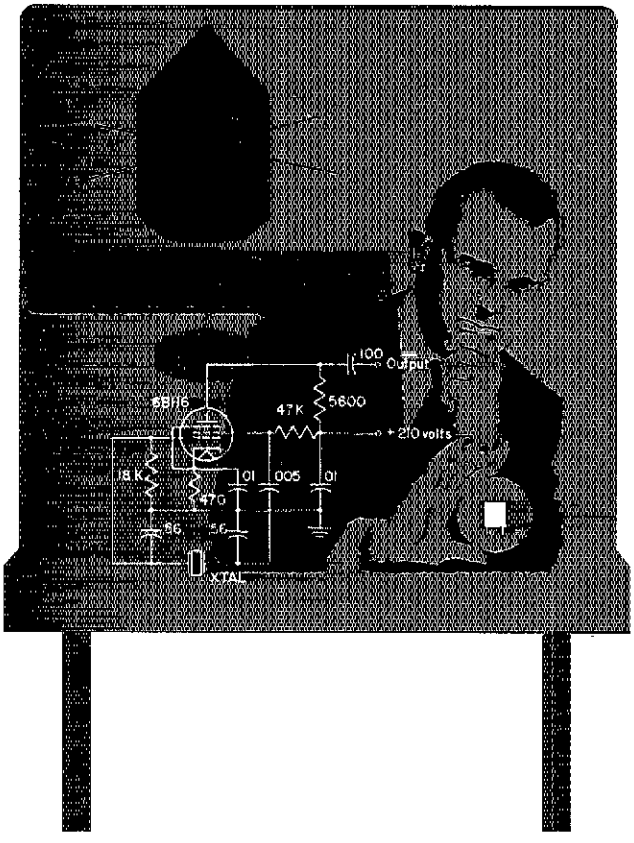

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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

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

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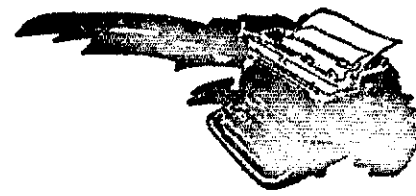

WASHINGTON LOBBY?

MORE OFTEN than not when we get into a discussion of representation of the amateur service (as we did on this page last month), one or more hams will argue that we need stronger coverage domestically. Specifically, they mean a lobbyist in Washington.

At first blush this idea seems to have a lot going for it. And it appeals to our sense of importance, our sense of power. We'd have someone down there daily calling on Congressmen and telling them the amateur radio story. After all, Washington is the place where the action is, eh? Where all the big decisions are made?

Surely. But there is a major clinker in this concept which on careful examination suggests that a paid, registered Washington lobbyist is really a pointless idea, certainly expensive out of proportion – and conceivably a dangerous one.

The main point is that Congressmen are the first to admit they do not have adequate familiarity with the techniques and many other aspects of radio communication, nor the time to acquire necessary background on which to make intelligent decisions in many detailed matters. As in the case of a number of other specialized fields (e.g., railroads, aviation), Congress has taken the approach of setting up a special agency for administrative and regulatory purposes. This is, of course, the Federal Communications Commission. Congress has delegated to FCC most of the basic power to regulate the use of radio (among other things) in interstate commerce.

Indeed, when a Congressman gets a letter from a ham inquiring or complaining about this or that, his office usually forwards it to FCC with a request to provide information sufficient to prepare an answer.

Oh, our elected representatives keep an eye on things, most surely. They especially watch and guide decisions in basic policy areas and those of more direct public involvement. These include broadcasting, the satellite consortium, pay and cable TV, and so on. But when it comes to specialized problem areas in two-way communication for ships, aircraft, amateurs, police, etc., the Congressmen pretty well leave such matters *entirely* up to the Commission and its staff of experts.

Thus a Washington lobbyist would have a high old time, at our expense, calling on, entertaining – and possibly irritating – a lot of people who are much too busy with other matters to be concerned about whether the amateur code speed test should be 13 or zero wpm, or whether Technicians should be allowed on ten meters.

There are a number of Washington agencies involved with telecommunications whose policies and actions affect amateur radio in one way or another: FCC, of course, with several branches of direct interest and concern to us. The military. The Department of Transportation. The Office of Telecommunications Policy. The Office of Emergency Planning. The Telecommunications Division of the Department of State. And so on.

These are the places to tell our story. These are the places where most decisions are made affecting the amateur radio service. These places, not in Congress.

Drumbeaters for a Washington lobby for amateur radio delight in claiming the League's rejection of such proposals is in fear of loss of income tax exemption and mailing privileges. You may have heard – or more likely, read – that "it is highly illegal for the ARRL counsel to lobby for amateur radio in Congress." This is a distortion of truth. The League cannot set up influence on legislation as its *primary* objective; but there is no bar whatsoever to speaking up when amateur interests are involved.

The Goldwater bill for reciprocal operating privileges was one example; the League was the only amateur group which showed up in Congressional hearings in support. Just last month President WØDX testified in favor of another K7UGA effort, to license aliens here intending to become citizens. Another example was testimony in support of the FCC-sponsored bill to give the Commission greater control over radio frequency interference. And, a couple of years ago, we bird-dogged a special resolution through Congress to permit alien Boy Scouts to operate K7WSJ.

We amateurs have no need for a true lobbyist. If it is really Washington *liaison* the drumbeaters have in mind, we're superbly covered there: a General Counsel with offices in Washington; regular trips there by ARRL officers and Hq. staff personnel; two

(Continued on page 104)

League Lines . . .

Word from overseas through IARU and other channels indicates some of the countries attending the 1971 space conference will be inclined to support additional privileges for amateur satellite work. Such proposals are being made because a restrictive interpretation of the present regulations suggests 144-146 MHz is the only portion of the spectrum where such activity is permitted.

Preparing both the DXCC Honor Roll and the annual listing for the same issue has simply become too big a project all at once. We're slipping the "yearend" listing to the January issue this time, with the HR regularly in March and September henceforth, to spread the load.

Both black and red ink have been used to record financial results of League activities the past ten or dozen years, but there's been too much red of late. This is despite an increase in dues several years ago, and reduction in the publication costs of QST. Advertising rates and manual prices have recently been raised so as to carry their fair share. If and when a dues rise is inevitable, would it be appropriate to set up special classes of membership as many other associations do (patron, sponsor, etc.), raising the rates for such classes substantially but keeping the base $6.50? The concept is that those who can easily afford more, pay more; but it doesn't cut off the member to whom dues are already a burden. Let's hear from you, please.

WNØ--, who wishes to remain anonymous, advises fellow Novices not to trust penciled frequencies on crystal holders -- as he found out the hard way. Without an xtal calibrator, his receiver didn't catch the error either. FCC did. And we add our own warning concerning "variable" crystal oscillators advertised to Novices; FCC has said such units are not contemplated within the intent of the rules and likely would result in increased violation by Novices.

Mark December 31 on your calendar for a New Year's Eve stay-at-home special. It's "straight key" night -- 8 PM to 1 AM local time. No prizes, but when sending Hq. a list of stations worked, nominate one of 'em for best fist.

Meanwhile, our sincere wishes for the very Merriest of Christmases and a Happy and Prosperous 1971 from the Hq. crew, which includes:

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A Second-Generation MOSFET Receiver

BY WES HAYWARD,* W7ZOI

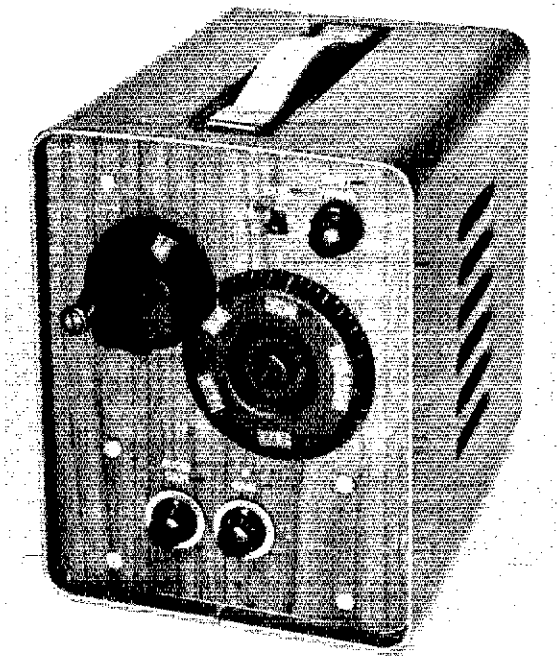
SEVERAL YEARS ago, the author collaborated with WB6AIG and WA6RDZ in describing a single-conversion, solid-state receiver of modern design.[1] The major objective of that project was to solve the cross-modulation problem inherent with many solid-state receivers. The solution was found in the use of a MOSFET (metal-oxide silicon field-effect transistor) as a mixer-type front end. In the period since the earlier article, several developments have occurred to alter the design options available to the amateur receiver builder. Now, a large variety of high-quality MOSFETs, JFETs, and integrated circuits are available at astonishingly low prices.

Amateur receivers of recent vintage have predominantly been of two types: Some enterprising amateurs have aimed at ultimate performance, notable examples being the work of Sabin[2] and Fischer[3]. At the other extreme has been work with very simple receivers of the direct-conversion design.[4,5] This article describes a compromise approach. MOSFETs and ICs are used freely in order to obtain the desired performance. However, following the lesson learned from direct-conversion receiver experiments, the design has been simplified by obtaining a large portion of the receiver's gain at audio frequencies. This results in a unit which is exceptionally free from spurious responses, and which exhibits adequate sensitivity, selectivity and stability, while being devoid of the complications which often make receiver construction terrifying to some amateurs.

It should be emphasized that this paper is intended to be a presentation of ideas and design philosophy rather than a bona fide construction article. While sufficient data are given to allow duplication by the competent amateur experimenter, it is the author's hope that the prospective builder will modify and innovate around the basic design to suit his own needs. Quoting the present vernacular, "Do your own thing."

The Circuit

In the interest of simplicity, the author's receiver tunes only two bands, 80 and 20 meters. By using a 9-MHz i-f and a local oscillator which tunes from 5 to 5.5 MHz, both bands are received by switching only the antenna input circuits. Shown in Fig. 1 is the front end of the receiver. Following the original design, no rf stage is used, and the signals from the antenna are injected directly upon the gate of a 3N140 dual-gate MOSFET mixer. Toroidal-wound antenna coupling transformers are used, and band selection is accomplished easily with a dpdt slide switch.



Exterior view of the W7ZOI 80- and 20-meter solid-state receiver. The Command-receiver dial and tuning mechanism provides a low-cost approach for obtaining good oscillator stability and simple readout. The front panel of the Porta-Cab is covered with wood-grain contact paper.

In order to maintain a fairly high conversion gain in the mixer front end, a local oscillator injection level of 1 volt rms is used. This is higher than the 200- to 300-mV level suggested by Timmann[6] as being optimum for minimum cross modulation. One problem which arose because of the relatively high local-oscillator injection was the appearance of "birdies" from broadcast stations. This was a result of second harmonics of the local oscillator being generated within the mixer. These spurious responses were eliminated by placing a high-pass filter (L7, L8 and associated capacitors) in the antenna circuit. This filter was designed for a 5-pole Chebishev response with a cutoff of 3 MHz, a maximum passband ripple of 2dB, and a 50-ohm input and output impedance.

Although precise measurements have not been made at this time, the performance of the front end appears to be completely adequate. The signal-to-noise ratio of the receiver is determined solely by the antenna noise, which is often as meaningful in practice as a more precise measure-

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[1]See references at end of article.

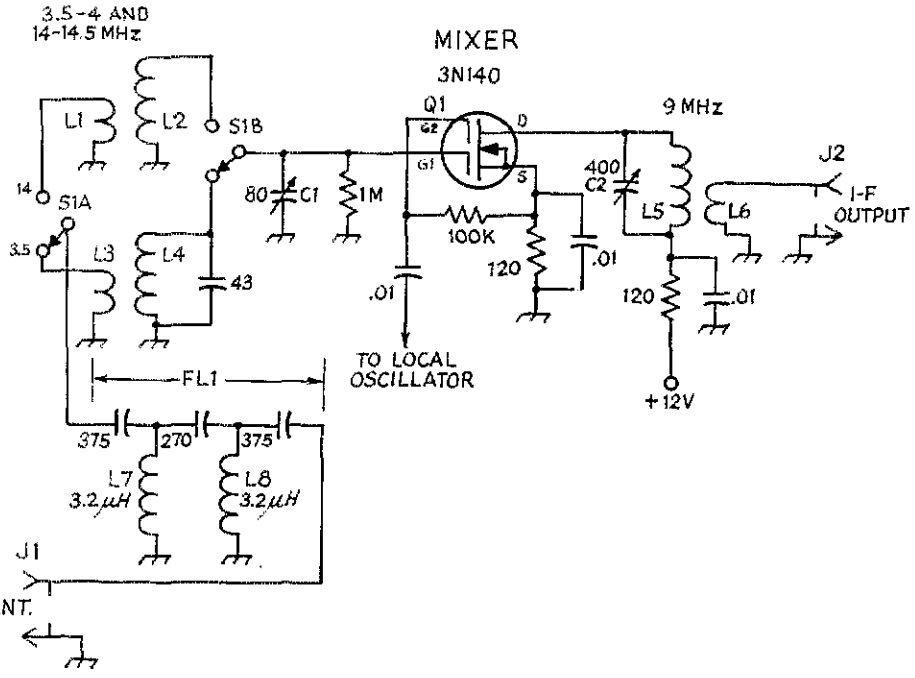


Fig. 1 — In this and all succeeding schematic diagrams of this article capacitance is in pF, except for decimal-value capacitances, which are in μF. Resistance is in ohms, K = 1000, M = megohms. Fixed-value resistors are 1/2-watt carbon unless noted differently. Fixed-value capacitors are disk ceramic unless otherwise indicated. Capacitors with polarity marking are electrolytic. This diagram shows the circuit for the mixer front end.

C1 - 80-pF variable.
C2 — 400-pF padder.
FL1 — See text.
J1, J2 — Phono jack.
L1 — 2 turns insulated No. 22 wire over L2.
L2 — 25 turns No. 22 enam. on Amidon T-50-6 toroid core.
L3 — 3 turns insulated No. 22 wire over L4.
L4 — 60 turns No. 28 enam. wire on Amidon T-68-2 toroid core.
L5 — 18 turns No. 22 enam. wire on Amidon T-50-6 toroid core.
L6 — 3 turns No. 22 insulated wire over L5 winding.
L7, L8 — 3.2-μH inductor (J.W. Miller 74F336AP with one turn removed).
Q1 — RCA dual-gate MOSFET.
S1 — Dpdt slide switch.

ment. The devoted DX hound might, however, consider an rf amplifier (to sooth his fear of missing a rare one). No cross-modulation problems have been encountered. Crude experiments with an uncalibrated signal generator suggest that the performance is similar to that obtained with the earlier MOSFET receiver. One deficiency of the front end is its marginal image rejection, which is most apparent when using a 14-MHz antenna to monitor 80 meters. A Transmatch would clear up this minor problem. In some locations, a 9-MHz trap in the antenna line might also be desirable to eliminate i-f feedthrough problems; it has not been included in the author's unit.

Oscillator Design

The local-oscillator system for the receiver is shown in Fig. 2. The oscillator is very similar to the unit described by Hanchett[7] except that a JFET is substituted for the original MOSFET. Although a JFET oscillator will function without the clamping diode shown, CR1, the stability is severely degraded. When observing the gate voltage with a high-frequency scope, it was found that without the diode, the gate potential increased to the power supply potential of 6.8 volts on positive peaks. The diode clamps positive excursions at +0.7 volts, thus preventing conduction in the gate of the FET.

Silver-mica and tubular ceramic NP0-type capacitors are used in the oscillator. Probably the most critical component in the circuit is the inductor, L6. A 3/8-inch diameter ceramic form is used with the slug removed. The turns are pruned to provide the proper inductance. The form is soldered directly to the copper-clad circuit board. Thermal stability is much better than that realized with several toroid forms tried.

An output signal is taken from the source of the FET through a 10-pF capacitor and applied to a simple buffer amplifier. In order to remove harmonics generated in the buffer, the output signal is filtered by a 5-pole low-pass filter. This

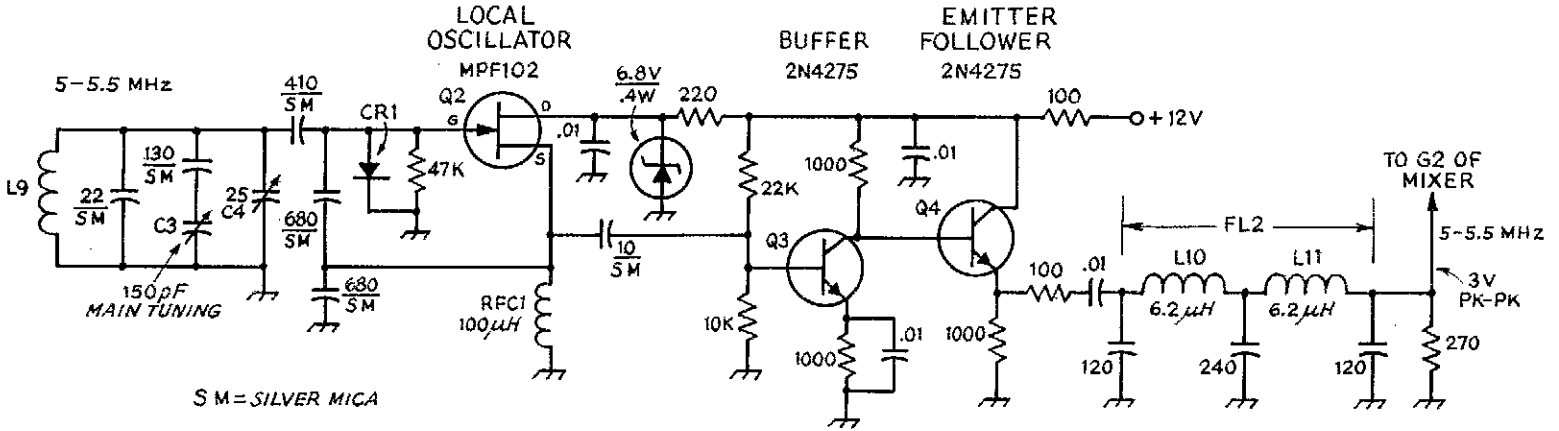


Fig. 2 — Diagram of the local-oscillator circuit. See caption of Fig. 1 for component designations.

C3 — 150-pF variable. Type used here was taken from a surplus Command-set receiver.
C4 — 25-pF air-dielectric trimmer.
CR1 — 1N4152 diode.
CR2 — 6.8-volt, 0.4-watt Zener diode.
L9 — Approximately 3.4 μH (see text).
L10, L11 — 6.2-μH inductor (J.W. Miller 4610 choke, or 34 turns No. 28 enam. on Amidon T-50-2 toroid core).
RFC1 — 100-μH rf choke (J.W. Miller 73F104AF or equiv.).

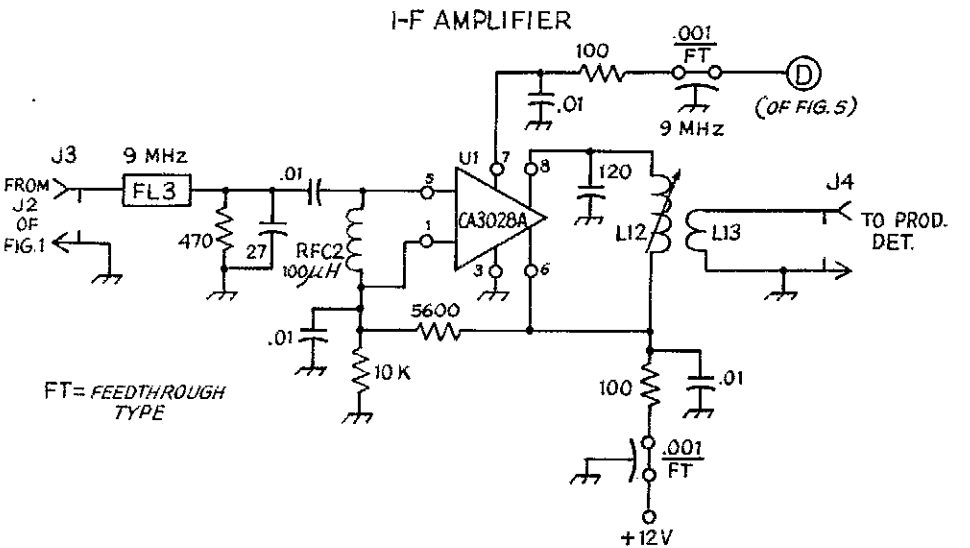


Fig. 3 — Schematic diagram of the i-f amplifier. See Fig. 1 caption for component designators.

FL3 — KVG XF-9M 500-Hz lattice filter (Spectrum International, P.O. Box 87, Topsfield, Mass. 01983).
J3, J4 — Phono jack.
L12 — 2.5-μH (nominal) slug-tuned inductor (J.W. Miller 4503 suitable)
L13 — 4 turns insulated wire over low-Z end of L12.
RFC2 — 100-μH rf choke (J.W. Miller 73F104AF or equiv.).
U1 — RCA CA3028A integrated circuit.

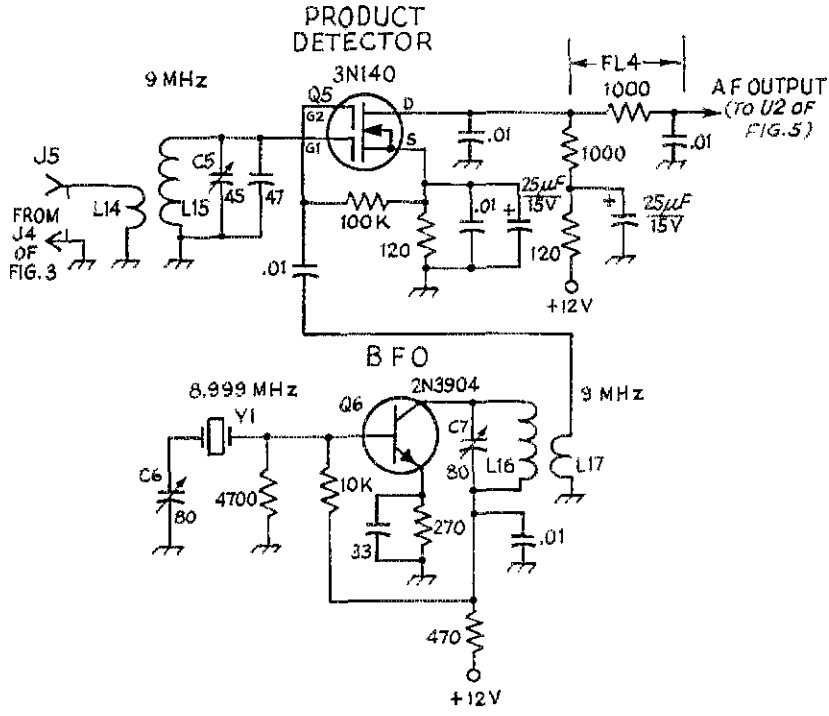


Fig. 4 — Diagram of the product detector and BFO section of the W7ZOI receiver. See caption of Fig. 1 for component designations.
C5 — 45-pF trimmer.
C6, C7 - 80-pF trimmer.
J5 — phono jack.
L14 — 2 turns insulated wire wound over L15.
L15 — 29 turns No. 22 enam. wire on Amidon T-50-6 toroid core.
L16 — 40 turns No. 28 enam. wire on Amidon T-50-6 toroid core.
L17 — 8 turns insulated wire over L16 winding.
Y1 — 8.999-MHz crystal (KVG XF-903 used here).

circuit was designed for a cutoff of about 6 MHz, and a termination resistance of 250 ohms. The output is constant over the tuning range within about 0.5 dB. The waveform is sinusoidal when observed on a 50-MHz oscilloscope.

The stability of the oscillator appears consistent with that reported by Hanchett. After a one-minute warm-up interval, the oscillator drifted about 50-Hz in a half-hour period. Shorting the output with a six-inch hookup wire produced a frequency shift of about 30 Hz. The mechanical stability is also excellent, resulting from the use of a well-built surplus tuning pacitor, Fig. 2. Although this capacitor is excellent in its own right, more significantly it leads to simplification in construction. Such measures substantially reduce the time required to build a receiver.

Shown in Fig. 3 is the i-f section of the receiver. One of the inexpensive KVG crystal lattice filters is used, and it does an excellent job. The author's receiver uses a 500-Hz bandwidth cw filter, but an ssb filter could be substituted. While a 30-pF trimmer capacitor is specified by the manufacturer to terminate the filter, a fixed-value capacitor was found to be adequate. The input termination was arrived at empirically. A shield was placed between the filter terminals to minimize stray coupling across the filter.

i-f gain control is provided by a single RCA CA3028A IC which is operated as a differential amplifier. Although up to 32 dB of gain is possible with this IC, much less gain was realized in the circuit of Fig. 3. This is due, predominantly, to improper impedance matching at the input. However, the rated 65 dB of gain control of the IC is realized (which is one of the major functions of the i-f amplifier). Because of the relatively low gain, the usual amplifier stability problems are absent. A slug-tuned form is used at L1, but a toroid could be used here. The amplifier is built in a small aluminum box with the input and output coaxial terminations using feedthrough capacitors for the B-plus and gain-control lines.

The product detector and BFO circuits are shown in Fig. 4. The BFO is crystal controlled and uses one KVG crystal. The capacitor in series with the crystal will provide about 5-kHz shift in BFO frequency. The simple product detector shown was suggested by W7HCV, and is one of the better circuits the author has tried. This detector differs from the one described by DeMaw[8] in that a *resistive* drain load is used. With 10 mV of rf applied at the input (from a 50-ohm source) 500 mV of audio output was measured. The BFO injection is about 1.5 volts rms.

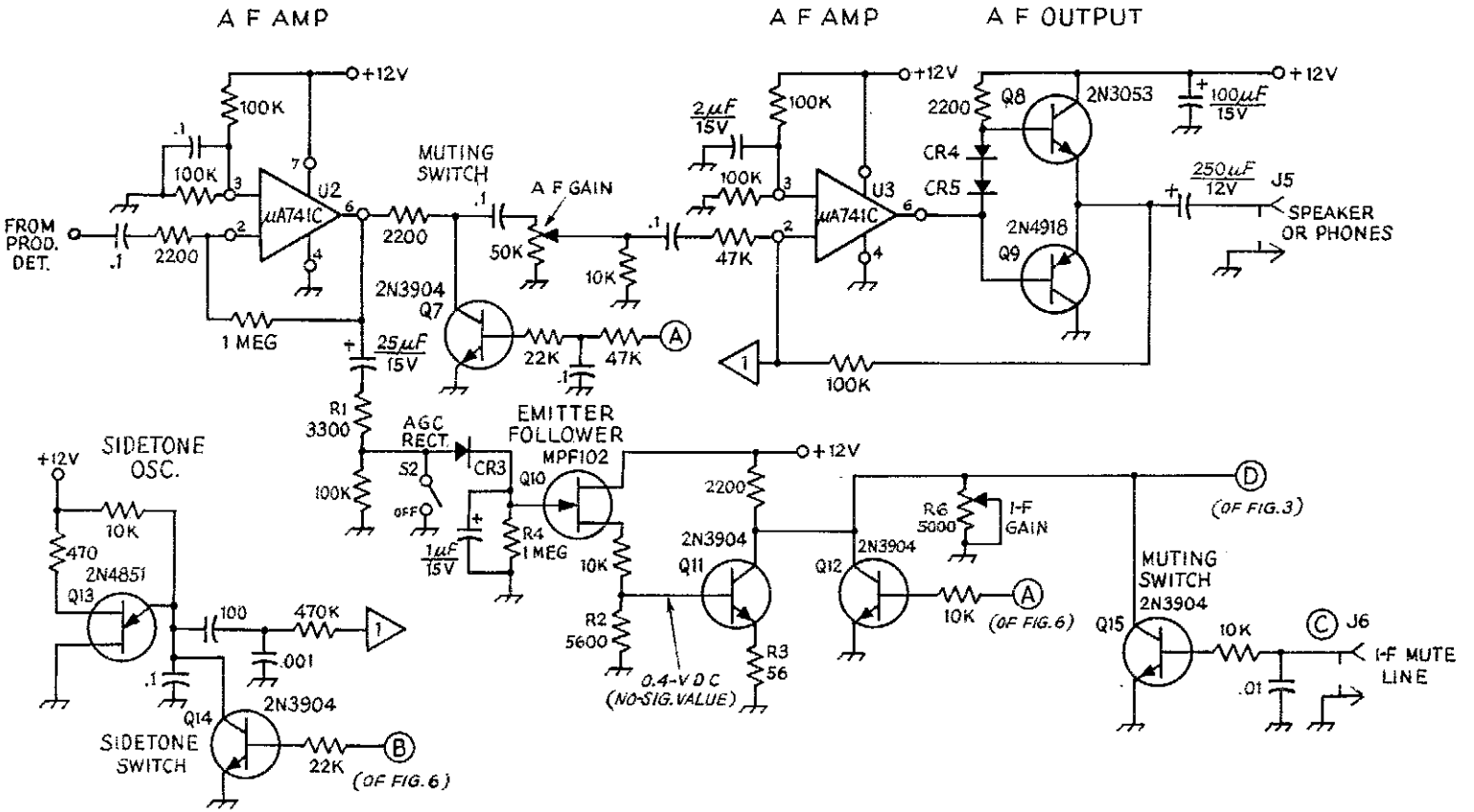
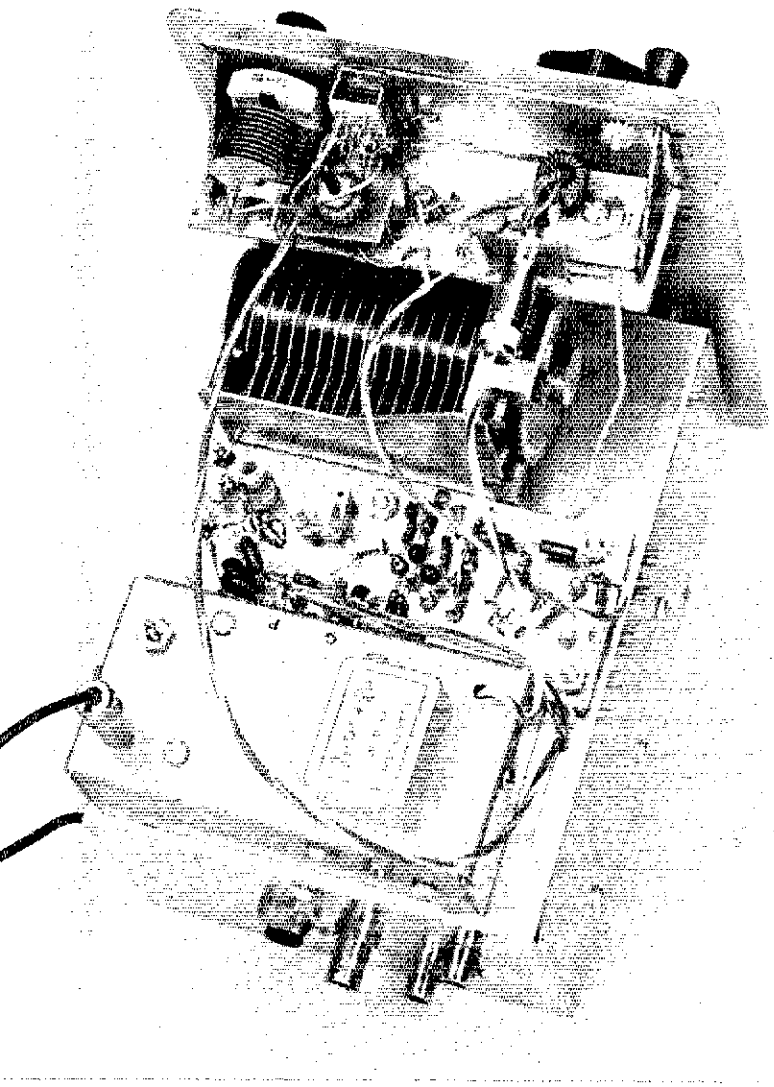


Fig. 5 — Circuit for the audio and agc section of the receiver. See Fig. 1 caption for component designations.

CR3 — Silicon diode. 1N4152 suitable.
CR4, CR5 — Same as CR3.
J5 — Phone jack.
J6 — Phono jack.
R1-R4, Incl. — Labeled for text reference.
R5 — 50,000-ohm linear-taper carbon control.
R6 — 5000-ohm linear-taper carbon control.
S2 — Spst switch.
U2, U3 — Fairchild μA741C integrated circuit (Motorola MC1741CG suitable).



Top view of the chassis (3 X 5 X 7 inches). Shown at the left is the i-f amplifier module. The local-oscillator system is in the center with the tuning capacitor toward the front panel. The mixer front end is built on a small shelf which is mounted above the main tuning capacitor. Small-diameter 50-ohm coax cable (RG-174 or equivalent) is used for module interconnection.

Audio Circuitry

Shown in Fig. 5 is the high-gain audio system for the receiver, including the age detector and control circuit, a few transistors for receiver muting, and a side-tone oscillator. Many of the control functions were included for reasons of compatibility with a variety of cw transmitters. In the interest of simplicity, they could be eliminated by the prospective builder with no change in receiver performance.

The major portion of the audio gain is provided by U2, an operational amplifier operating with a closed-loop voltage gain of about 300. If necessary, the gain of this stage may be reduced by increasing the ohmic value of the input resistor in the feedback loop. This is easily done by adding resistance between the product detector and the audio section. The 2200-ohm resistor at the output of U2 is used to increase the output impedance of the stage for muting purposes. (The optional muting circuitry will be described later.) The output of U2 is applied to a 50,000-ohm linear-taper potentiometer which serves as the audio gain control. The 10,000-ohm resistor at the control alters the characteristic to more closely resemble an audio taper. A signal from the gain control is applied to U3 which, along with Q8 and Q9, serves as the audio output stage. This circuit is a modification of the output amplifier described by W7HCV[9]. Two diodes and a resistor were added in order to provide forward bias for the complementary-output transistors. This was done to eliminate crossover distortion. While this minor distortion was no problem when using a speaker, it was very objectionable when using sensitive, low-impedance stereo headphones. (Audio fidelity is quite important when working with very weak signals.) Negative feedback is used to control the voltage gain at 2. As presented, the amplifier is very clean at outputs up to about 250 mW, which is an adequate level in most instances. If more output is desired, the builder should consider one of the 1-watt audio ICs on the market.[10]

Audio voltage is taken from the output of U2 to drive the delayed, hang-age system. The audio signal is rectified by a silicon switching diode and the resulting dc is applied to a 1-μF capacitor. The voltage on this capacitor is sensed by the gate of Q10, a junction FET, which is operated as a

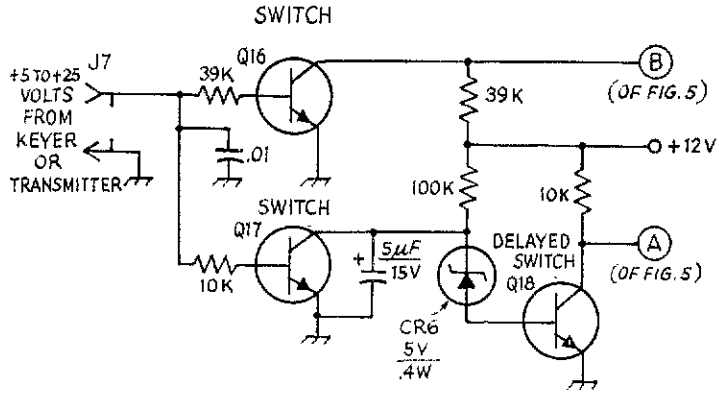


Fig. 6 — Schematic diagram of the control system used in the Hayward receiver. J7 is a phono jack. The three transistors are 2N3904s.

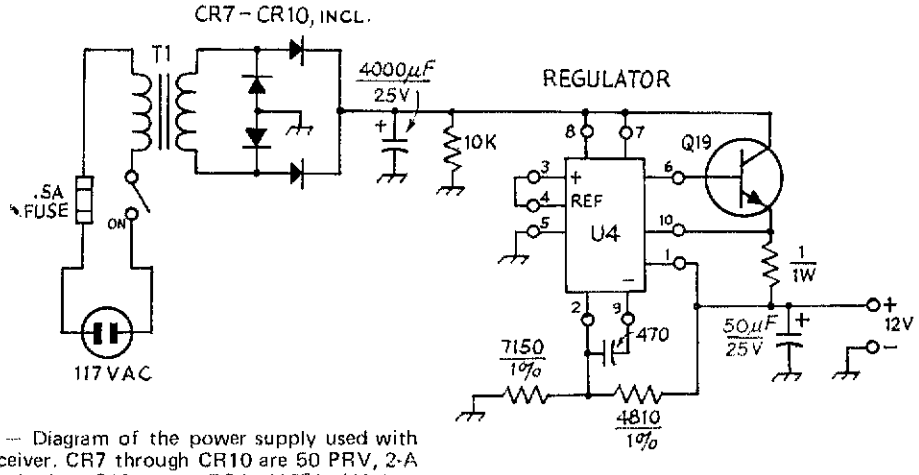


Fig. 7 — Diagram of the power supply used with this receiver. CR7 through CR10 are 50 PRV, 2-A silicon diodes. Q19 is an RCA 40251. U4 is a μA723C IC (Fairchild). This IC is housed in a TO-5 package. T1 is a 12-volt, 2-ampere filament transformer.

source-follower. Resistor R2 in the source of Q10 is chosen such that the voltage on the base of Q11 is 0.4 volt with no signal present. Hence, Q11 is not conducting in this condition. Resistor R2 can vary between 1000 and 56,000 ohms, depending upon the JFET used at Q10. Under no-signal conditions, the voltage on the collector of Q11 is determined by the manual i-f gain control setting. This voltage is applied to the gain-control point on the i-f amplifier.

When a signal is applied to the receiver, the dc voltage across R2 increases. When it reaches about 0.55 volt Q11 begins to conduct and the control voltage to the i-f decreases, thus decreasing the gain. Resistor R3 in the emitter of Q11, adds degeneration to this stage, which aids in stabilizing the control loop. R1 limits the attack time of the circuit, while R4 controls the decay time. A switch is shown in Fig. 5. It shorts out the age loop, although this feature has not yet been added permanently to the author's unit.

The optional muting and side-tone system consisting of transistors Q7, and Q12 through Q18, is easily explained with reference to Figs. 5 and 6. Two modes of receiver muting are provided. In one mode, a dc potential of 5 to 25 volts is derived from a transmitter and is applied to point C (J6) in the receiver. This voltage saturates Q15 to decrease the i-f amplifier gain to its minimum value. The other muting mode is applicable with transmitters capable of semibreak-in operation. In this muting mode, a potential of 5 to 25 volts is derived from an electronic keyer (or the transmitter) and is applied to J7 during key-down periods. This voltage causes Q16 and Q17 (Fig. 6) to saturate. As a result, two things happen. Q14 is now cut off, allowing the unjunction transistor side-tone oscillator, Q13, to start. Simultaneously, point A

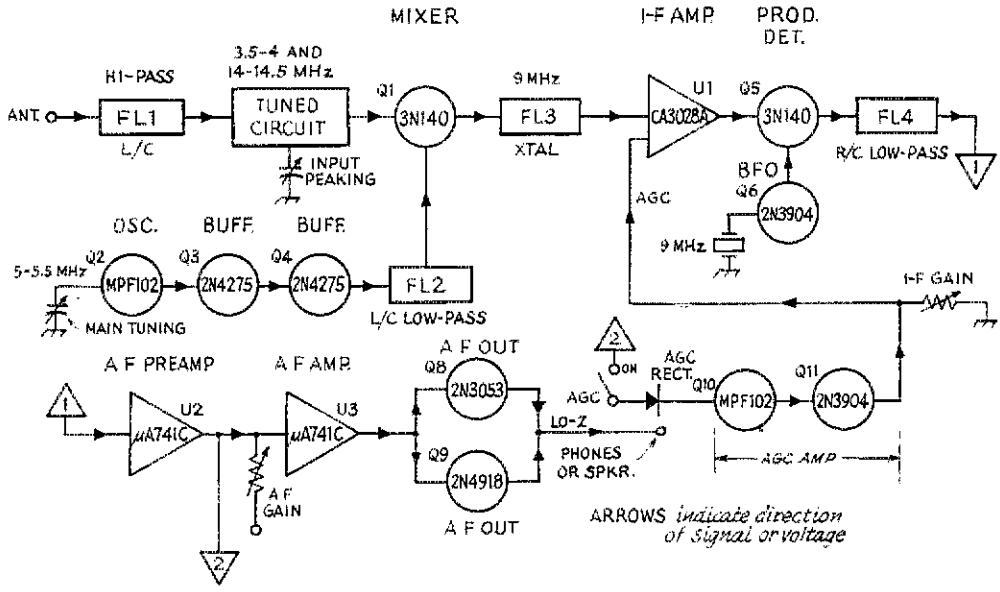


Fig. 8 — Block diagram of the W7ZOI receiver. The circuit employs FETs, bipolar transistors, and ICs.

becomes positive. This causes Q12 to saturate, decreasing the i-f gain. This condition also causes Q17 to saturate, which in turn shunts the audio output from U2 to ground. When the control signal at J7 is removed, a pulse-stretching circuit at the base of Q18 keeps the receiver muted for about 0.5 second. The side-tone level is determined by the 470,000-ohm resistor at the input to U3. This value was chosen for comfortable headphone monitoring.

The power supply is shown in Fig. 7. This unit is built on a separate chassis from the rest of the receiver to provide convenience in experimenting. (The number of power supplies needed by the experimenter always seems to exceed the number available by a quantity of at least 1.) The unit is quite husky and can be used for companion QRP transmitters.

As shown in the schematic, the heart of the power supply is one of the new IC regulators. This single IC contains a temperature-compensated 7-volt reference, an operational amplifier to serve as an error amplifier, a medium-current pass transistor, and a transistor for current limiting. An external pass transistor, Q19, is used in the author's unit to allow for larger currents. With the 1-ohm resistor in the emitter of Q19, the short-circuit current is about 650 mA. The output voltage is set by R6 and R5. Although 1-percent resistors are specified, R6 may be replaced by a 10-percent, 47,000-ohm unit, and R5 may be replaced by a fixed-value resistor and a 5000-ohm control. The output is then adjusted to 12 volts. Q19 is husky, so the chassis serves as an adequate heat sink.

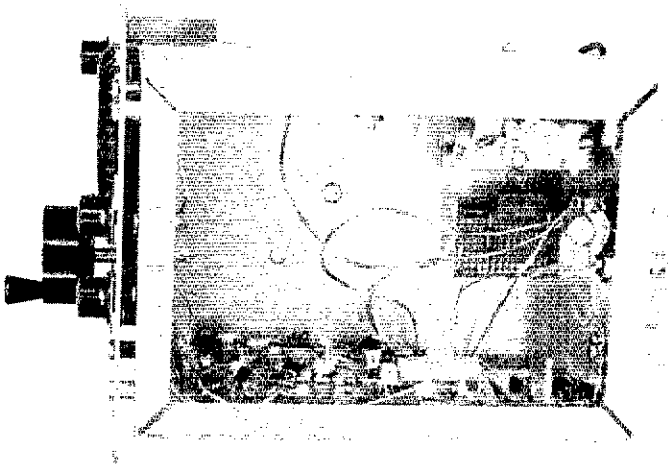
The output of the supply is exceptionally stable and free of ripple. It is the only supply the author has built which is clean enough for use with direct-conversion receivers[11]. The superhet described here normally requires about 100 mA, depending upon the audio output level.

Additional Thoughts

Although detailed construction procedures are left to the builder, the methods used by the author are shown in the photographs. Double-sided printed-circuit board was used for most of the units, although only the BFO/product detector and the audio-section boards were etched. The front end is built on a small shelf which was secured to the front panel by the antenna trimmer capacitor and one bolt. The band switch is soldered to the board as shown in the photos, and small push-in Teflon terminals (H. H. Smith type 92-1000) are used for connections. The i-f amplifier and the local oscillator were built on circuit board with rivet-in terminals (Useco type 1280B) for connections. The only reason for using the variety of techniques was to gain experience with the various methods.

Shown in Fig. 8 is a functional block diagram of the completed receiver. The arrows indicate the direction of signal flow. Generally, the various circuit modules are interconnected with small-diameter 50-ohm cable (RG-174U or similar).

It is often tempting to "over design" when starting a receiver project. As an example, a multiband version of this receiver was considered, and presents no fundamental problems. Those interested should review the earlier papers.[1] However, a multiband receiver involves many mechanical problems, increased experimental time for circuit debugging and adjustment, and possibly a compromise in performance. For example, the unit described in this paper exhibits superb



Under-chassis view. Shown bolted to the side of the chassis is the printed circuit of the audio and agc system (see Fig. 5). The adjacent perforated board is part of the muting system (Fig. 6). The high-pass Chebishev filter is mounted on a bracket which is held to the back wall of the chassis with the BNC input connector. Banana jacks are used for the 12-volt power input. The BFO is isolated by a shield made from printed circuit material.

frequency stability, making a companion transmitter (for transceiving) a distinct possibility. It would be much more difficult to duplicate this stability in a multiband unit. The prospective builder should carefully review his needs and his spare time before starting a receiver project. A more complex multiband superhet is of little utility when it sits on the shelf, partially completed.

Similarly, extreme miniaturization should be avoided unless the smaller size is necessary. If the builder wants the most compact format possible, he should plan on spending up to twice as much construction time. The smaller parts are generally more expensive, also. The receiver described in this paper (once started) was built in about a month of spare time. The cost for duplication should be well under $100, especially when the "scrounging" ability of the typical radio amateur is considered.

Many hams indicate an interest in building a receiver, but hesitate on the basis that they have inadequate test equipment. While test gear certainly enhances a receiver project, the lack of sophisticated measurement capability does not prevent successful conclusion of the effort. Test gear used in building this receiver included a Heath VTVM with an rf probe, a homemade one-transistor signal generator, and a crystal calibrator with 10-kHz markers. Although a Tektronix 647 oscilloscope was used for circuit study and evaluation, this unit is a recently acquired luxury and is by no means necessary for building a receiver of such minimal complexity. A truly state-of-the-art unit such as the Fischer receiver would probably require a considerable amount of high-quality test gear.

Probably the most useful piece of test gear was the receiver itself. If construction is started with the power supply and audio sections, other modules may then be added serially and checked out for system performance, stage by stage. The less fundamental functions such as agc and muting systems should be the last to be built.

Modern technology has provided the radio amateur with a tremendous variety of high-quality, inexpensive semiconductors. While these devices advance the state of the art, they are much more significant to the amateur in the possible simplification and economy they provide. The ability of the modern ham to build high-performance equipment should be limited only by his desire to do so, and by his level of curiosity.

Acknowledgments

The writer gratefully acknowledges the comments and suggestions of many of his friends with special thanks going to W7BKN, W7FSO, and K7TBQ. Denton Bramwell, K7OWJ, took the photographs. Many enjoyable discussions with Dick Preiss, W7HCV, have contributed significantly to the project. QST

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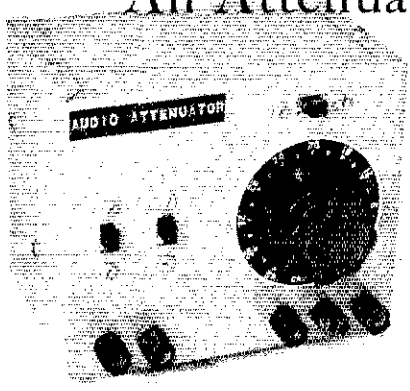
11Since most direct-conversion receivers require a considerable amount of audio amplification to assure suitable overall receiver gain, hum can easily be introduced into the audio channel if the dc voltages are not well filtered. — *Editor.*

An Attenuator Box for Audio



BY STAN OEHMEN,* W2HG

HERE IS a handy piece of equipment for measuring amplifier gain, distortion, and noise. Units similar to this one have been used for many years in broadcast stations and laboratories.

Fig. 1 shows a block diagram of the attenuator. If all impedances are equal and the generator output is applied to the amplifier, the gain can be read directly from the settings on the attenuator box when the output voltage is the same as that from the generator. Assume, for example, that both 20-dB pads are switched in and the variable T-pad is set down 8 dB. The amplifier is now making up the difference, or showing a gain of 48 dB.

Frequency runs can be made by reading the number of dB required to be reinstated in the attenuator box to keep the output level constant as the frequency of the generator is changed. The amplifier output must be held well below saturation to make response readings valid. Transistor amplifiers will fail if anything near full output is held during sine-wave testing.

The attenuator is composed of three pads in a 600-ohm unbalanced circuit, feeding a 1-to-1 transformer so that both balanced and unbalanced leads can be connected. The fixed pads can be switched in or out, and the variable pad can be turned down 40 dB in 2 dB steps. The maximum reduction is 80 dB. A variable pad with detents is ideal for this device. New mixing consoles are being built for broadcasters with slider-type controls, and the rotary types are available at some surplus houses.

The fixed 20-dB pads are made with 1/2-watt carbon resistors and the 490-ohm series arms are made from 470-ohm units that read near 490 ohms on an ohmmeter.

Shielded wire must be used from the output of the box to the input of the amplifier to eliminate hum or rf pickup. The signal level at this point is normally very low.

Fig. 3 shows how to feed a single sideband transmitter for audio response measurements, from the microphone input to the output rf load. The curve will include both audio-amplifier and rf-filter responses. QST

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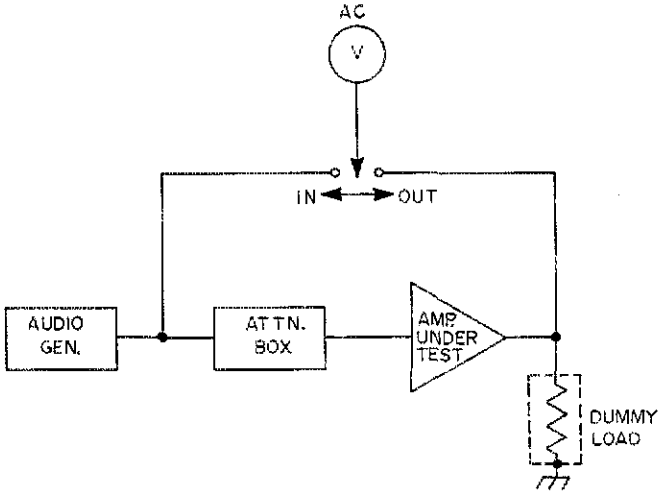


Fig. 1—Block diagram showing a typical set-up for testing an amplifier.

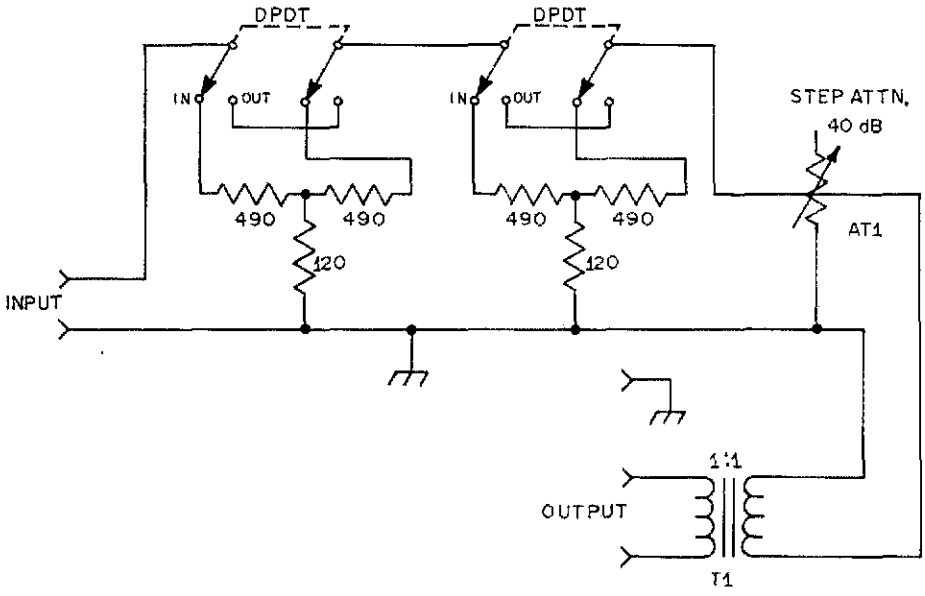


Fig. 2 — Circuit diagram. All resistors are 1/2 watt. The step attenuator is manufactured by Daven. Several models are available (T255, T256G, T257G, T320G) on the market, any of which should do the job. The transformer is a UTC A20.

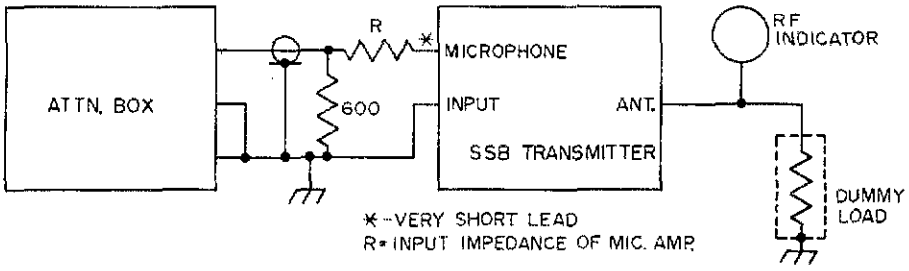
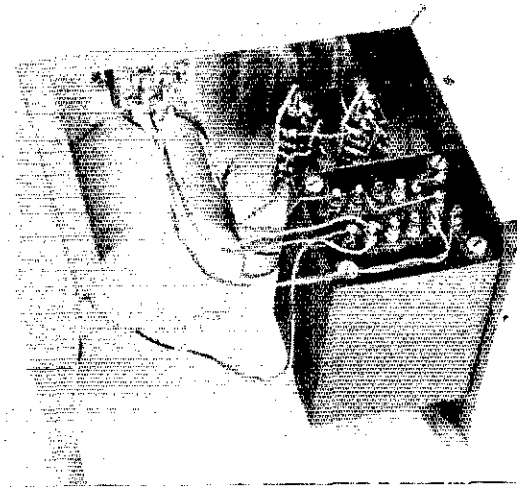
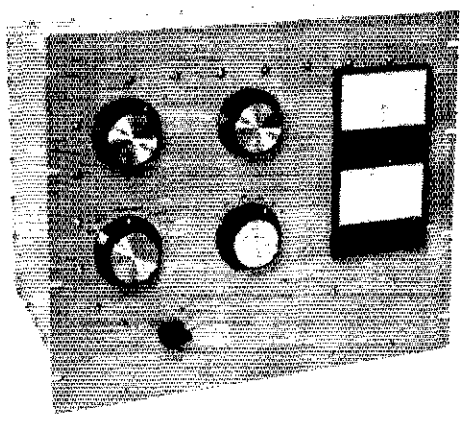


Fig. 3 — Typical set up for testing a single sideband transmitter.



Two small terminal boards are attached to the slide switches. The variable pad can be seen on the left. The transformer used in this particular unit had several secondary taps so a switch was mounted above the variable attenuator to allow the device to be used with either 150 ohms or 600 ohms. This switch is not a necessary feature.

Want to build your kW Amplifier? Or improve the one you have? Then read on!



The front panel of the 2 kW, 3-1000Z amplifier has the controls grouped at the left. The panel has been sprayed with gray enamel paint, and black decals identify the controls. Hardware visible in this photograph secures the TVI shielding.

Some Notes on the Design and Construction of Grounded-Grid Linear Amplifiers

BY DOUGLAS A. BLAKESLEE,* WIKLK AND CARL E. SMITH,** W1ETU/4

THE LINEAR amplifier remains the one major project that an amateur can build at home and come out spending less than, or close to, the cost of comparable commercial gear. Anyone with a good junk box and catalogs from the major surplus houses can probably produce a finished amplifier at a substantial dollar saving, while enjoying that special feeling that only comes from the construction and use of homemade gear. One of the main advantages of constructing an amplifier yourself is that different components and ideas can be tried in the search for improved performance. The authors have built, tried, and rebuilt the rigs shown in the accompanying photographs, always looking for the elusive "perfect" kilowatt amplifier for ham use. This article covers the design and hardware ideas that paid off in improved efficiency, as well as the construction and alignment of the final models. In many instances different approaches have been used to solve a design problem – the final selection of circuits and tubes is left to the reader.

Tubes

The choice of tubes for a "linear" is primarily determined by the cost and the level of intermodulation distortion (IMD) that is tolerable. Television sweep tubes are distinguished by their low initial cost, but they are also the best distortion generators among the popular amplifier tubes. Power tetrodes, such as the 4-250A, 4-400A and 4-1000A can often be obtained as surplus or through MARS channels. The zero-bias power triodes designed for ssb service – 3-400Z, 3-500Z, and 3-1000Z – must usually be purchased new. The triodes have somewhat better IMD performance and lower drive requirements than do the tetrodes listed above when operated in grounded-grid service.[1] Obviously, cost will be the primary factor for most amateurs.

Going first class, the 3-1000Z, 4-1000A, 3-400Z and 3-500Z were all tried by the authors. When designing an amplifier for service at 2-kW peak-envelope-power input, the cost for tubes will be less if two 3-500Zs are used, in preference to a single 3-1000Z, but the large single tube will give slightly less IM distortion. Multiple-tube arrangements will always have poorer IMD performance because it is impossible to exactly match the operating characteristics of tubes.

Grounded Grid

The basic grounded-grid circuit is shown in Fig. 1. As most amateur hf ssb transmitters and transceivers currently being marketed have 100-watts PEP or more output, and as the legal power input for the amateur service is 1000 watts indicated input (which may be up to 2 kW PEP or more, depending on individual voice characteristics), the grounded-grid circuit has become a "standard" for ham hf linear amplifiers. With the tubes mentioned above, this circuit has the re-

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[1] For an excellent discussion of distortion generated by linear amplifiers, see Pappenfus, Bruene and Schoenike, *Single Sideband Principles and Circuits*, McGraw-Hill, 1964, Chapter 12.

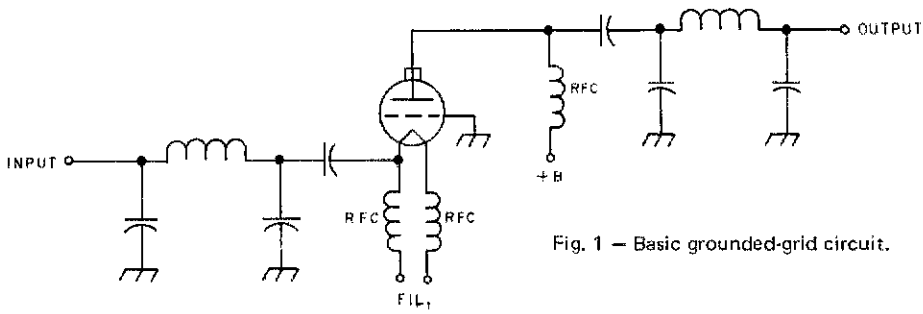


Fig. 1 — Basic grounded-grid circuit.

quired gain, seldom requires neutralization when operated below 30 MHz, and, with most tubes, eliminates the need for bias and screen supplies. On a watts-per-dollar basis, grounded grid is hard to beat!

Drive to the tube (or parallel-connected tubes) is applied between the grid and cathode. Tuned circuits are used to match the output of an exciter to the tube cathode and to match the operating plate impedance of the tube to a load. These tank circuits are also used to reduce harmonic output to an acceptable level (and, in the case of the input network, to reduce the amount of IMD produced). Both tank circuits will be detailed in this article. As most of the tubes used in kilowatt-level service have no separate cathode, a filament choke is required so that the drive signal will not be shorted out by the low rf impedance of the filament transformer.

Input Circuit

The input network of a grounded-grid amplifier has two jobs to do: It lowers the IMD products generated by the tube and provides an impedance match between the exciter and the tube cathode.[2] To check the actual advantage of the input circuit, the 3-1000Z amplifier shown in Fig. 3 was checked in the ARRL Lab with and without the pi-section input network. These checks indicated that this particular amplifier required 20 percent more drive power and produced 5 dB more intermodulation distortion when the input tank circuit was removed. Obviously, in spite of the additional cost and complexity of including an input circuit, it is worthwhile.

The cathode impedance for a tube may be obtained from manufacturer's specification sheets or approximated by the formula:

$$Z = \frac{(\text{peak rf driving voltage})^2}{2 \times \text{driving power}}$$

The 3-1000Z has a cathode impedance of about 65 ohms, and a pair of 3-500Zs exhibit about 120 ohms. Designing an input network to match these tubes isn't difficult. A low-Q pi-section network is a good choice, as it will be sufficiently broad in tuning that no readjustment will be required when changing frequency within a band. Many of the "shortcut" design techniques for pi networks in engineering texts are not valid for Qs of less than 10. As only a Q of 2 or 3 is desired, the technique of designing two back-to-back L networks is an easy approach.[3]

Once the input network has been built, it can be checked "cold" as shown in Fig. 5. An antenna impedance bridge (such as described in *The Radio Amateur's Handbook*[4]), a grid-dip oscillator, and a load resistor are all that is required. After being tuned up independently the cathode network requires only a touch-up adjustment after it is installed in the amplifier.

In experimenting with the input circuits, two additional items of interest were noted. The

[2]Orr, Rinaudo and Sutherland, "The Grounded-Grid Linear Amplifier," *QST*, August, 1961, and *Single Sideband for the Radio Amateur*, Fifth Edition.

[3]Grammer, "Simplified Design of Impedance-Matching Networks," in three parts, *QST*, March, April and May, 1957.

[4]*The Radio Amateur's Handbook*, Chapter 21.

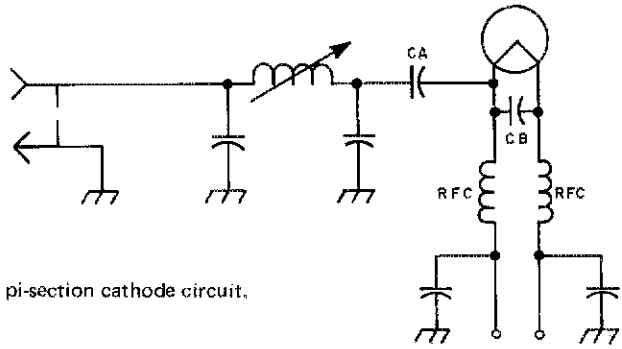


Fig. 2 — A pi-section cathode circuit.

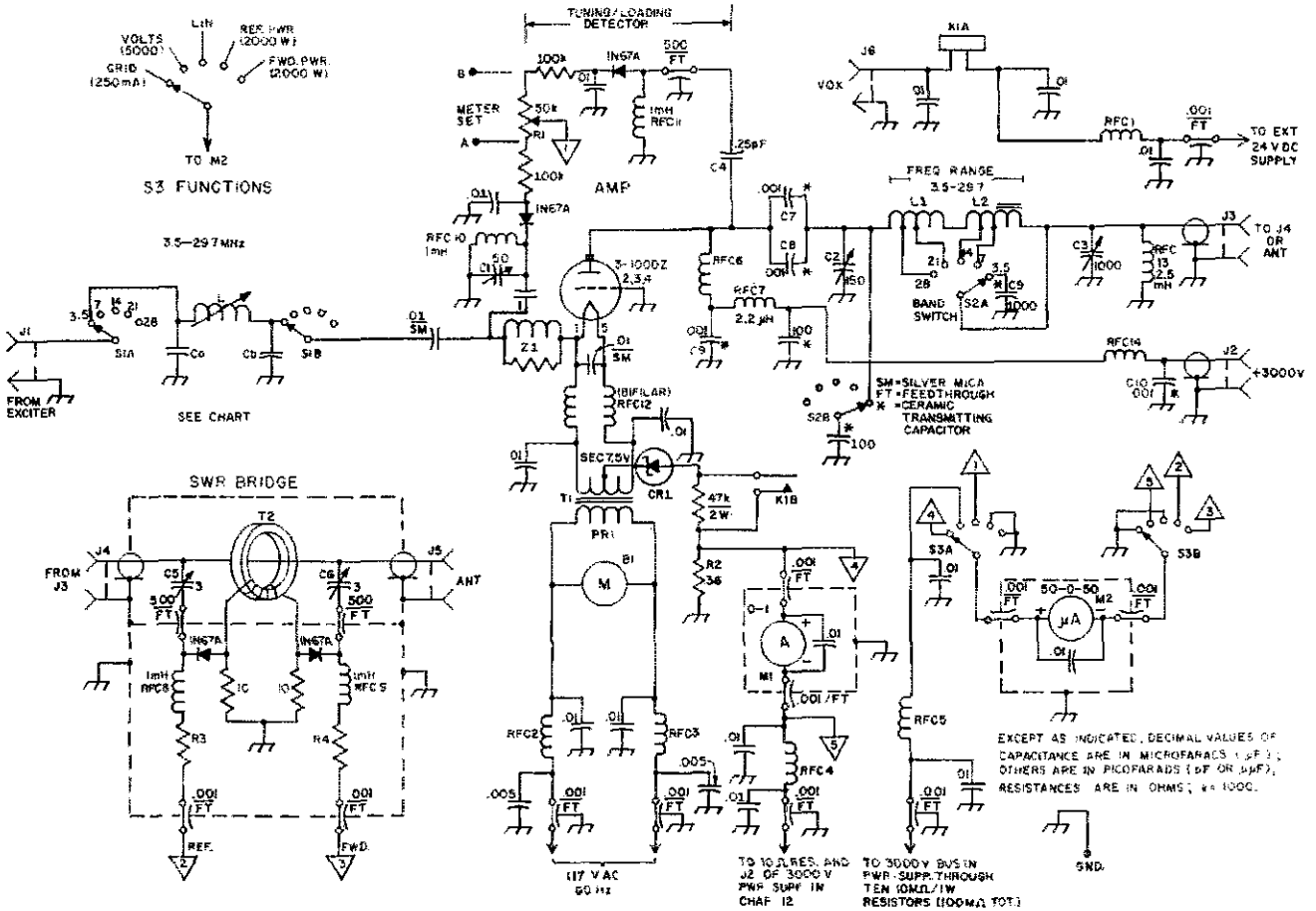


Fig. 3 — Schematic diagram of the 3-1000Z amplifier. The circuit used with the 3-500Zs is similar, except for the plate-circuit changes shown in Fig. 7.

B1 — 115-V ac, 100-ft³/min blower (Burstein-Applebee 41A4003).
Ca, Cb — See table.
C1 — Trimmer, 8-50 pF (Centralab 822AN).
C2 — Transmitting air variable, 150 pF (Johnson 154-15).
C3 — Transmitting air variable, 100 pf (Johnson 154-30).
C4 — See text.
C5, C6 — Piston trimmer, 0.5 to 3 pF (JFD 25G).
C7-C9, incl. — Transmitting type (Centralab 858S-1000).
J1, J6 — Phono jack, panel mount.
J3, J4, J5 — SO-239-style chassis-mount connector.
J7 — HV coaxial connector, chassis mount, type HN.
K1 — Spst 24-volt dc relay.
L — See coil table.
L1 — 11 turns, 1/4-inch dia. copper tubing, 1 1/2 inches inside dia., space turns so that the entire coil is 3 1/4 inches long. Tap at 5 turns for 28 MHz and 9 turns for 21 MHz.
L2 — 10 turns, 1/4-inch dia. copper tubing, 3 1/2 inches inside dia., space turns so that the entire coil is 4 inches long. Tap at 2 turns for 14 MHz, 7 turns for 7 MHz, and use the entire coil for 3.5 MHz. Inside the 3.5-MHz end of the coil is a package of eight 2-inch long, 1/2-inch dia. ferrite rods (cut from stock specified for RFC12).
M1 — 0- to 1-A meter (Simpson 17565).
M2 — 50-0-50-μA meter (Simpson 17597).
R1 — 50,000-ohm linear-taper composition control.
R2 — 0.36 ohms, 25 turns of No. 30 enam. wire on the body of a 1/2-watt composition resistor.
R3, R4 — Selected to give full-scale deflection (forward power) on M2 at 2000 watts. (See text for details.)
RFC1, RFC4, RFC5 — Rf choke, 18 turns No. 14 enam. wire, close-wound 1/2-inch dia.
RFC2, RFC3 — Rf choke, 26 turns No. 14 enam. wire, close-wound, 1/2-inch dia.
RFC6 — Rf choke (National Radio R-175A or B & W 800).
RFC7 — 2.2-mH rf choke (Miller 4584 or equiv.).
RFC8, RFC9 — 1-mH rf choke (Millen J300-1000).
RFC10, RFC11 — 1-mH rf choke (Miller 4652).
RFC12 — Bifilar filament choke, 28 turns of No. 10 enam. wire, close-wound on 1/2 X 7 1/2-inch ferrite rod (Newark Electronics 59F1521 ferrite rod suitable).
RFC13 — 2.5 mH rf choke (National R-100 or equiv.).
S1 — Ceramic rotary switch, 2-section, 6 position (5 used), 2 pole, nonshorting contacts (Centralab 2511).
S2 — Ceramic rotary power sw.tch, 2 pole, 1 section, 8 position (5 used), nonshorting contacts (Centralab JV-9033).
T1 — Filament transformer, 7.5 volts, 21 A (Triad F28U).
T2 — Toroidal transformer (see text).
Z1 — Rf choke, 6 turns No. 16 wire on body of a 100-ohm 1-watt composition resistor.

1/2-inch slug-tuned coils used, even with an operating Q of 2, heated considerably with extended use. Locating the input-circuit coils where they receive some air from the tube-cooling fan or blower will minimize this problem. The other observation involved the input coupling capacitors, Ca and Cb in Fig. 2. The purpose of Cb is to insure that equal drive is applied to both sides of the filament. Some designers have reported an advantage in using a value for Cb twice (or more) as large as Ca, typically .02μF and .01μF. The authors could find no discernible difference in using either .01-, .02- or .04-μF capacitors for Cb when using .01-μF for Ca.

The use of an input network presents some mechanical problems for the builder if a single-knob band switch is desired. The 3-500Z amplifier uses a Millen 10012 right-angle drive to do the job — see Fig. 7. The first model of the 3-1000Z amplifier had the cathode network mounted on the rear wall of the amplifier housing. This subassembly was connected to the output-circuit band switch with a 1/4-inch diameter fiber shaft. The "give" in the shaft and shaft couplings was just enough so that on two occasions the two switches got out of synchronization (once in the middle of the ARRL DX contest). Correcting this trouble required the complete disassembly of the amplifier, so twice was enough! The second model has the cathode-network switch brought out to the front panel separately. In operation, the extra band switch has little effect on the total time required to tune up.

Output Tank Circuit

The design of a pi-section output circuit confuses many amateurs. Although the basic purpose — to match the optimum load impedance for the tube (which is determined by the plate voltage and current used) to a 50- or 70-ohm load — is clear enough, a practical circuit to accomplish this objective from 3.5 to 30 MHz presents some problems. The first step in any design is to determine the load impedance that the tube would like to "see." The formula,

$$\textit{Load Resistance} = \frac{\textit{Plate Voltage}}{2 \times \textit{Plate Current in Amperes}}$$

yields an approximation of the optimum load impedance. However, the value derived from this formula may not agree with the tube manufacturer's recommendations. For example, Eimac suggests a load impedance of 2400 ohms in their specification sheet on the 3-1000Z, when the tube is operated at 2-kW PEP input (667 mA at 3000 V). The formula works out to 2250 ohms for the same voltage and current. The formula is not far off, but it is best to use the manufacturer's recommendation, when available, in any tank-circuit calculations.

It is also important that the values of voltage and current "plugged into" the formula should be for the maximum input to be reached, usually 2 kW PEP. This leaves the avid contester, or any other amateur in search of optimum operation, in a dilemma. Should he select a tank circuit that is

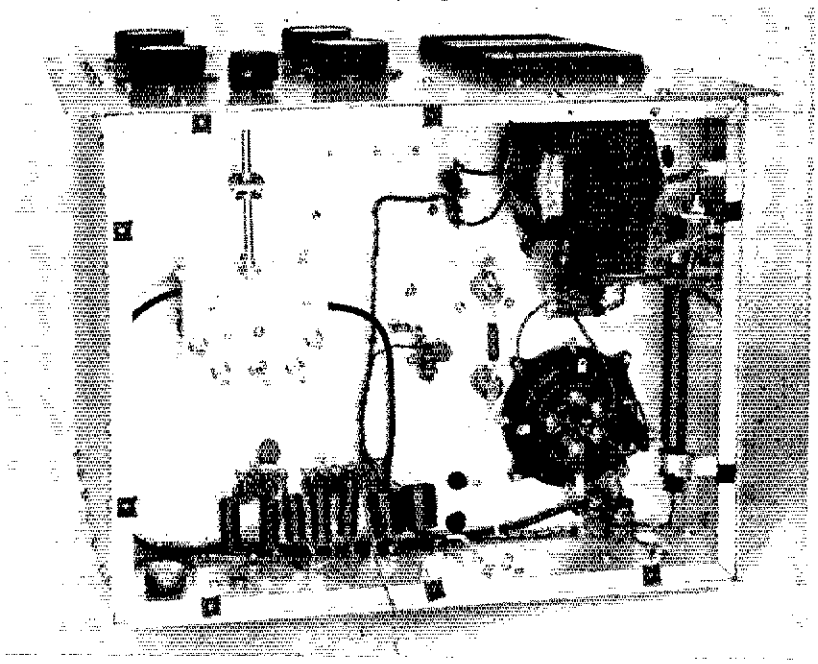


Fig. 4 — In this bottom view of the 3-1000Z amplifier, the filament transformer is visible at the upper right, just above the filament choke which runs along the right wall of the chassis. Relay K1 is located between the transformer and the tube socket. The slug-tuned coils of the cathode network are at the left, with the pi-section filters for the power leads just below. A ceramic feedthrough bushing is used to carry the 3000-volt lead up through the chassis.

optimum for 1-kW input for cw service, or for the 2-kW PEP level that will be used in ssb service? Obviously, the optimum load impedance for one operating condition is quite different than that required for the other. More about this problem later.

The other major decision that a designer must make is to choose the operating Q of his tank circuit. A Q of 10 or more is adequate for linear-amplifier service. High Qs are to be avoided, as the circulating tank current, and thus the tank circuit losses, increase with Q. The circulating current is approximately Q times the plate current in A or about 6.6 amperes for the 2-kW-input linear used as the example above. Raising the operating Q to 15 or 20 will produce additional attenuation of harmonic energy, but the harmonic suppression gained is usually not worth the additional tank-circuit losses caused by increased circulating current.

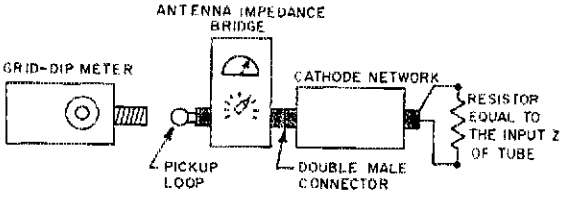


Fig. 5 — An antenna-impedance bridge and grid-dip meter are used to align the cathode network. A resistor, equal in value to the input impedance of the cathode-driven tube, is placed on one side of the network. The grid-dip oscillator is tuned to the center of the band to be adjusted and coupled to the pick-up loop on the impedance bridge. With the bridge set for 50-ohms, the pi-section coil is tuned for a null (nearly zero reading) on the bridge meter. This procedure is repeated for each band.

Up to this point, the discussion has been about tank operating Q, which is determined by the LC values chosen and the load impedances used. The unloaded Q of the tank coil itself is a measure of the coil quality, and it is also important. There is a definite relationship which can be determined by the formula,

$$\textit{Tank Efficiency} = \left(1 - \frac{\textit{Loaded } Q}{\textit{Unloaded } Q}\right) \times 100$$

of the ratio of unloaded-to-loaded Q to the efficiency of the tank circuit. Obviously, the better the unloaded Q of a coil, the better tank-circuit component it will make.

With the operating Q chosen, the popular design formulas[5] or the charts in *The Radio Amateur's Handbook*[6] can be used to determine the values of coil and capacitors needed for each hf amateur band. However, finding commercially-made components to fit the calculated values can be a tough problem. For pi networks with input impedances in the 1500- to 3000-ohm range, the input variable capacitor will often have too high a minimum capacitance for operation on 28 MHz if it has sufficient capacitance for a Q of 10 on 3.5 MHz. Making the situation worse, the grid-to-plate capacitance of the tube is in parallel with the pi-section tuning capacitor, adding 8 to 10 pF to the circuit.

The builder has three ways to design around this problem: A low-minimum-capacitance air variable, 150-pF or less, can be used on 7 to 30 MHz, and an additional fixed-value capacitor can be switched in for operation on 3.5 MHz. Alternatively, extra inductance can be used for the 80-meter band. This approach is popular in commercially-made gear, as the trade-off is made at 3.5-4 MHz where a less-than-optimum tube load

[5] Henneberry, *Single Sideband Handbook*, Technical Materiel Corporation, 1964, Chapter 8.

[6] *The Radio Amateur's Handbook*, Chapter 6.

impedance can be best tolerated. The third choice is the expensive approach using a vacuum-variable capacitor which has a wider range of minimum-to-maximum capacitance than the transmitting-type air variables.

Both early models of the kW amplifiers were built using commercially-manufactured tank-coil assemblies. The results were disappointing. Power output was down on 15 and 10 meters and, in a "sock-it-to-'em" power test with the 3-1000Z amplifier, the coils heated enough to deform their plastic support rods. After winding the tank inductors for the later models at home, the authors are convinced that this is one area where a ham can save quite a bit of money while ending up with coils that are the correct size for his layout. The losses caused by long leads from the band switch to the pi-network coil can be substantial on the 20-, 15- and 10-meter bands. Homemade coils can be made to fit so that the critical rf leads can be kept short.

To have the optimum load impedance for 1-kW cw operation and 2-kW ssb service, the 3-500Z amplifier was built with a 10-position band switch. The details of this tank design can be seen in Figs. 7 and 8. Two coil taps are used on each band, one for phone (2 kW PEP) and one for cw (1 kW). A 300-pF vacuum-variable capacitor and 1500-pF air variable complete the pi-network. This no-compromise approach costs a little more, but the investment will be worthwhile for the avid DXer or contester. Some amateur equipment manufacturers

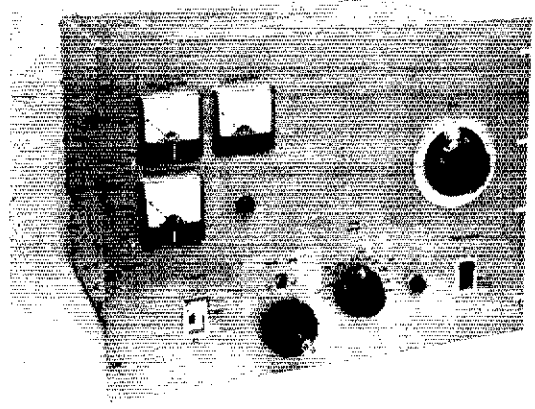


Fig. 6 — Front view of the 3-500Z amplifier. A 10-position band switch selects the correct tank-circuit tap for 1-kW or 2-kW operation. The dial counter on the vacuum-variable capacitor is from a surplus BC-610 antenna tuner.

using 3-500Zs drop the plate voltage to about 2000 volts for cw operation. This is another way of getting around the plate-load problem, but extra drive is required with the lower plate voltage, resulting in grid current close to the rated maximum for the tubes. A slight tuning error can ruin a 3-500Z, so the low-voltage approach is probably best left to others.

The 3-1000Z design, on the other hand, uses an extra switch section on the band switch to add additional fixed-value capacitance on the 3.5- to

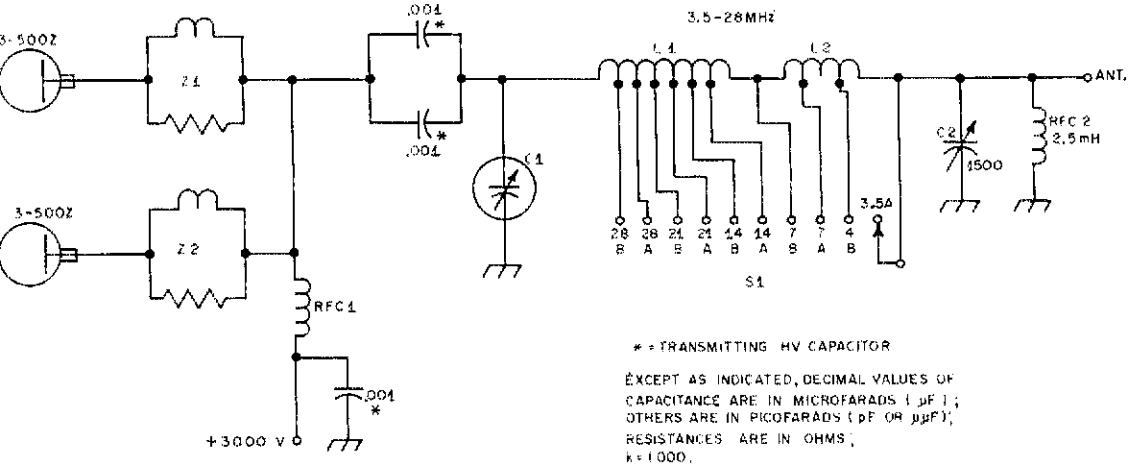


Fig. 7 — Output tank circuit used in the 3-500Z amplifier. Fixed-value capacitors are 1000-volt disk ceramic unless otherwise indicated. Capacitors marked with an asterisk are 5000-volt transmitting types.

C1 — Vacuum variable, 300 pF (Jennings — ITT).

C2 — 1500-pF transmitting variable (104-12 from LaPointe Industries, Rockville, CT 06066).

L1 — 11 1/2 turns of 1/4-inch copper tubing, 2 1/4 inches inside diameter, approx. 1/8-inch spacing between turns. Tap at 1 1/4 turns in from the amplifier tube end for 28B, 3 1/4 turns for 28A, 3 1/2 turns for 21B, 5 1/2 turns for 21A, 5 3/4 turns for 14B, 8 1/2 turns for 14A, and full coil for 7B.

L2 — 15 turns, No. 12 wire, 6 tpi, 2 1/2-inch diameter, tapped at 6 turns in from the junction with L1 for 7A, 8 turns for 4B, and full coil used for 3.5A (Polycoil type 1774).

RFC1 — Transmitting rf choke (National Radio R-175A or B & W 800).

RFC2 — 2.5mH, 150-mA rf choke.

S1 — Ceramic rotary power switch, 1 pole, 17 position (10 used), 1 section, nonshorting contacts (Centralab JV-9001).

Z1, Z2 — Homemade parasitic choke consisting of 2 turns of 3/8-inch flat copper or brass strap around a Workman FRT-1 thermistor.

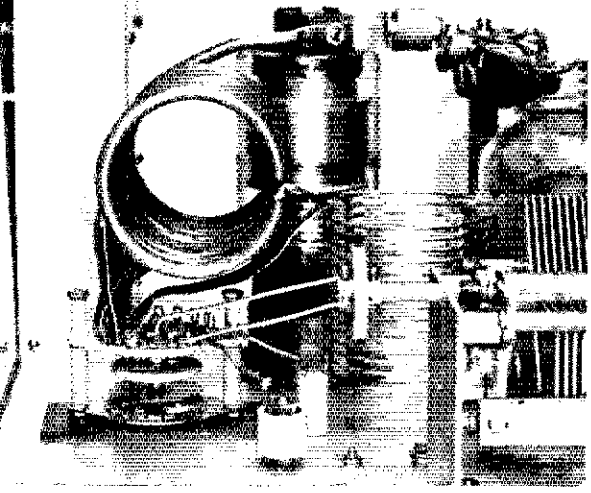


Fig. 8 — Close-up view of the 3-500Z tank circuit. The vacuum variable capacitor can be seen behind the coils.

4-MHz range. Air variables are used for both the TUNING and LOADING controls. Tubing, 1/4-inch in diameter, is wound to form the tank coils. To keep the 40/80-meter section to a practical size, a package of eight 2-inch ferrite rods has been cemented inside the coil to increase the inductance. A number of rods are required to prevent saturation of the ferrite material at the 2-kW input level. A smaller coil that is placed next to the band switch provides the required inductance for 14- to 30-MHz operation.

Again, it is most useful to be able to check the operation of a tank-circuit design "cold." Fig. 9 shows two test setups, using an *Rx* meter or antenna impedance bridge. In either case, the input and output tuning capacitors should be set to their calculated values and the proper tap on the tank coil found experimentally. The 10-meter band should be set first, followed by the other amateur bands in descending order. This adjustment method takes into account lead and switch inductances plus stray capacitance. Often on a first try, very little coil will be used on 10 meters — an indication that the "strays" must be reduced, or even that the tank circuit layout must be changed. This tinkering will pay off in increased power output later, so it is well worth the effort.

Cooling and Distortion

Although the relationship may not be obvious, amplifier cooling, IMD level and efficiency are interrelated when using the 3Z-series tubes. The authors' early models operated with the 3-500Zs and 3-1000Z at zero bias. Cooling was provided by a 100 ft^3/min Muffin fan. At 3000 V, the resting plate current resulted in a plate dissipation of 600 to 800 watts — a real heating problem. At 1-kW input, the amplifiers actually ran cooler key down than key up (with key down the plate dissipation was only about 375 watts). The fan just didn't remove the heat efficiently, even though the plate current was cut off during standby periods.

The later models used 100-ft^3/min squirrel-cage blowers, which proved to be far more effective against the back pressure created by the tube-and-socket combination. Following a suggestion from W6UOV, a bit of bias was tried on the amplifier. With high-transconductance (μ) triodes, a few volts of bias produce a large change in plate current, reducing the standby plate dissipation to 300 watts or less. However, the application of bias will increase the amount of drive required, and as the tube moves closer to Class C operation, the level of IMD produced also increases. The builder is left with a tradeoff between heating (which can shorten the life of expensive tubes) and increased drive and IMD levels. To investigate the effect of various levels of bias, tests were run in the ARRL lab on the 3-1000Z amplifier, the results of which are shown in Fig. 10.

It is apparent from the spectrum photographs that a moderate value of additional IMD can be accepted for the lower resting plate current desired. The small increases in required drive is more than offset by a gain in power output. If only cw operation is contemplated, the tube can be biased to plate-current cutoff. As the bias is provided by a high-wattage Zener diode in the center-tap return of the filament transformer, it would not be difficult to use a 7.5-volt Zener for ssb operation and switch to a 27-volt unit when on cw.

When using a pair of 3-500Zs, the application of bias may bring the level of distortion products up to -28 dB or so if less than 3000 volts is used on the plate. As -30 dB distortion is a desirable limit, both the Heath Company and R. L. Drake introduce some negative feedback to reduce IM distor-

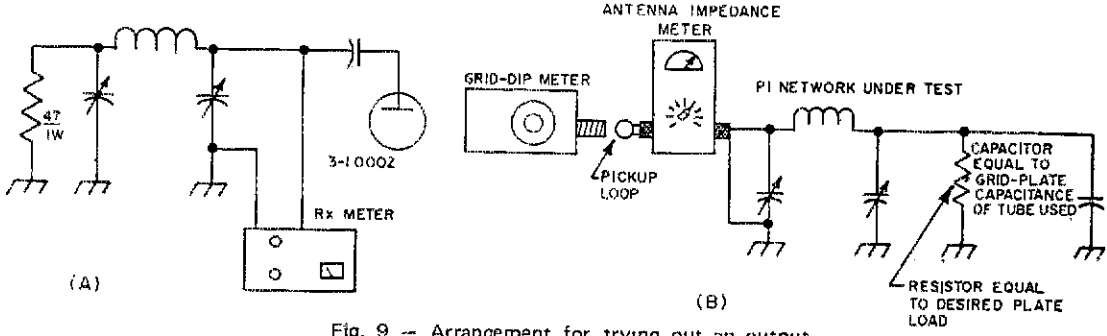
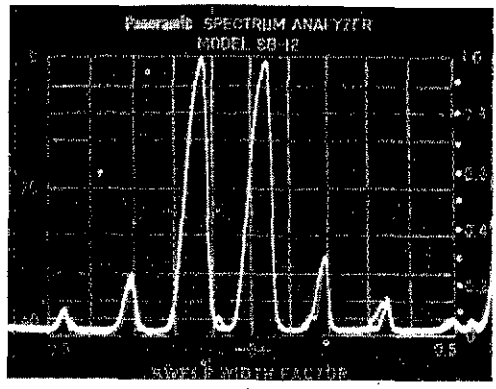
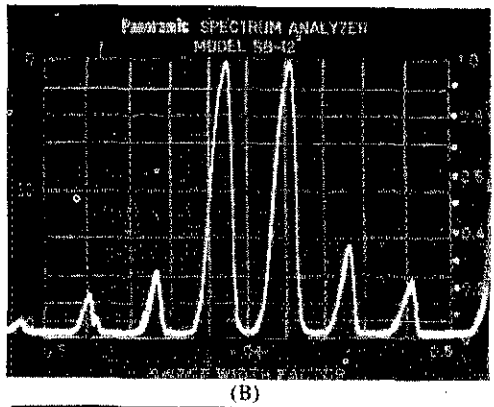


Fig. 9 — Arrangement for trying out an output network before applying power. At A, an *Rx* meter such as the Hewlett-Packard 250A is used.

Fig. 10 — Spectrum photographs of the output from the 3-1000Z amplifier operated at various bias levels. The two-tone test pattern reveals the level of third- and fifth-order distortion products produced. The scale is calibrated in dB below a single tone (for the dB-below-a-two-tone-test rating used by amateur equipment manufacturers, subtract 6 dB from the indicated values). Using a plate voltage of 2500 volts and maintaining an indicated dc power input of one kilowatt, operating conditions were varied as follows: (A) zero bias (200-mA resting plate current), 22 watts drive produced an output of 960 watts PEP; (B) 4 volts bias (120-mA resting current), 30 watts drive produced a power output of 1000 watts PEP; (C) 7.8 volts bias (70-mA resting current), 32-watts drive produced 1050 watts PEP output; (D) 11.5 volts bias (60-mA resting current), 35 watts drive produced 1120 watts PEP output.



(A)



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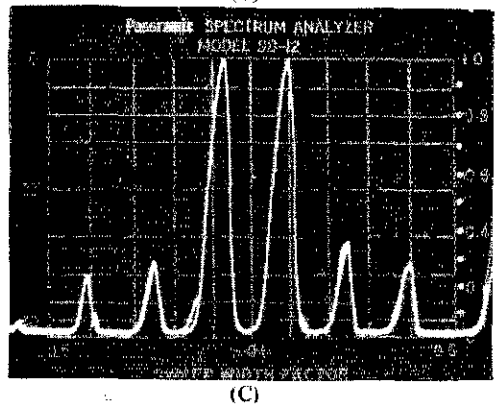

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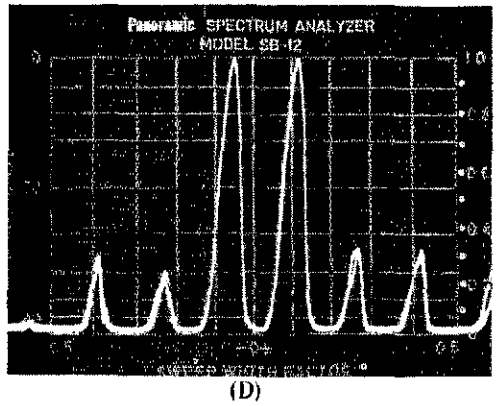

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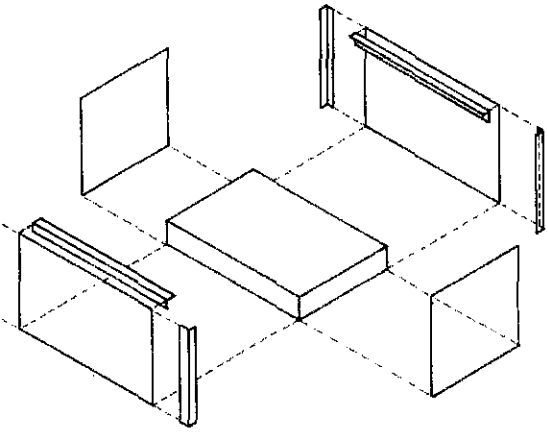


Fig. 11 — Exploded view of the homemade cabinet.

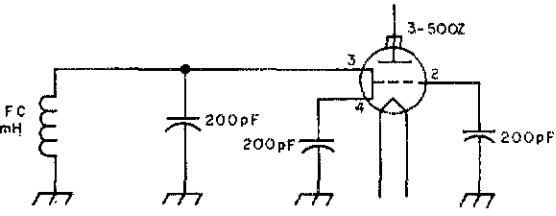


Fig. 12 — An *LC* combination added to the grid return of the cathode-driven stage reduces the level of IMD products produced. Such a circuit is used by R. L. Drake and Heath Company in their 3-500Z linear amplifiers.

tion by inserting a low-value impedance between the grid and ground. A typical circuit appears in Fig. 12 – a good idea to keep in mind.

Construction

Another area where the home constructor can beat the "store-bought" models is in TVI suppression. Many of the amplifiers now on the market simply do not have sufficient shielding to prevent the radiation of TVI-producing harmonic energy.

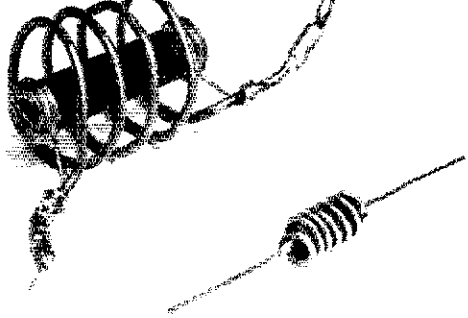


Fig. 13 — Before and after! The original parasitic choke (at the left) discussed in the text is next to the smaller choke used in the cathode lead.

This direct leakage of harmonics renders low-pass filters ineffective, as many amateurs have found out the hard way. Building an rf-tight box around a linear amplifier isn't a difficult project, although it will take some time. Sheet and angle aluminum stock purchased at a hardware store, along with a standard chassis and a rack panel, can be assembled using hand tools. Rf energy is like water – it will leak out of any available hole. A liberal supply of screws (one every 1 1/2 inches or so) should be used to fasten the various panels to the main frame. An exploded view of the 3-1000Z amplifier cabinet is shown in Fig. 11.

Once a good box has been built, it is necessary to cut the holes for control shafts, meters and connectors. Each hole in the outer cabinet should be considered a potential source of difficulty, as radiation through meters and around control shafts can be particularly troublesome. Meters should be shielded from the amplifier compartment; a Minibox will do the job, as can be seen in Fig. 14. Connections into the meter box should be made with feedthrough capacitors. Each shaft coming out of the amplifier should use a panel bushing. To complete the job of "bottling up" harmonic energy, each power and control lead should be individually filtered. A pi-section filter with a resonant frequency well below 3.5 MHz will do an effective job (see Fig. 3). On leads carrying 117-V ac power, the total capacitance across each leg to ground should not exceed .01-μF or a shock hazard can result.

If the grid of the tube used is properly grounded the completed amplifier will show no signs of oscillation on the fundamental operating frequency. The Eimac sockets have a slotted hole just above each connection pin. A strap or large ground lug can be slipped through this hole and soldered to the pin, making a very low-inductance lead to ground.

Parasitic Suppression

Parasitic vhf oscillation is another problem. High-μ tubes like the 3-500Z or 3-1000Z will often "take off" between 80 and 120 MHz with some setting of the tuning control. The sure cure for this trouble is first to make the amplifier "go parasitic" under controlled conditions, and then to kill the parasitic tendency with a choke. The amplifier should be tested at a low plate voltage, 800 to 1500 volts, so that when the tube goes into oscillation on the parasitic frequency the rated plate dissipation will not be exceeded. No connection should be made to either the rf input or output jacks. Starting with the band switch set for 10-meter operation, various settings of the TUNING and LOADING capacitors should be tried until a jump in plate or grid current indicates parasitic oscillation has started. A wavemeter check will spot the frequency of the parasitic.

At this point, the usual technique for grounded-grid amplifiers is to wind a coil with a self-resonant frequency close to that of the parasitic, and then to shunt the coil with a non-inductive resistor. This choke is then put in the plate circuit as close as possible to the tube anode connection. This technique was used in the first model of the 3-1000Z amplifier, effectively killing the parasitic oscillation. However, it was noted after lengthy operating on the 10- or 15-meter bands that the Globar resistor used was extremely hot. Some of the output power was being used up as heat in the parasitic choke.

To see just how bad the situation was, the amplifier was run key down at 2-kW dc input on 28 MHz (into a dummy load). After 15 minutes of this severe test, the Globar resistor fell apart.

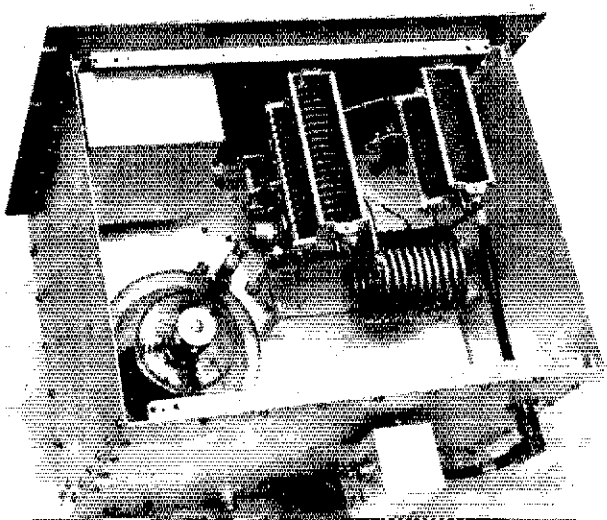
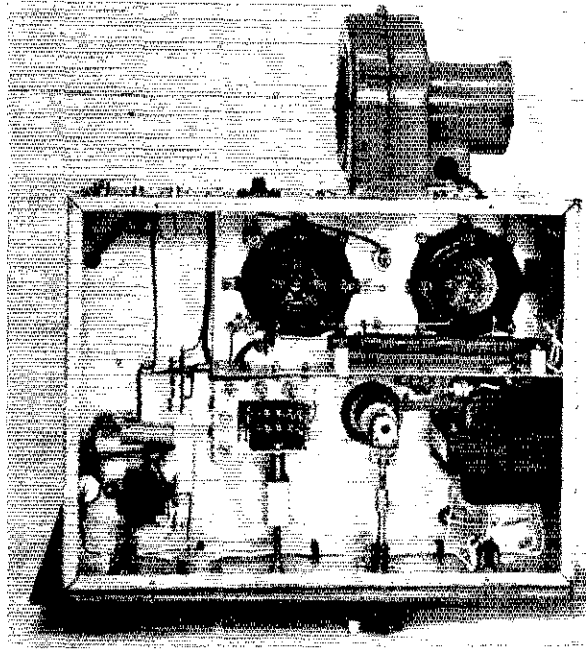


Fig. 14 — Inside view of the high-power amplifier. The panel meters are shielded by a Minibox. To the right of the 3-1000Z is the larger of the two homemade tank coils — the other is partially hidden behind the plate-tuning capacitor. The power meter/SWR bridge is located in the small Minibox attached to the rear deck. The band switch is mounted back from the front panel on an aluminum bracket. A perforated-aluminum cover bolts to the L brackets along the front and rear panels and to the sides.

Fig. 16 — (A) Looking into the top of the amplifier, the vacuum capacitor is mounted at the center, in front of the two 3-500Zs. The loading capacitor is at the far-left side of the chassis. *Hidden behind the homemade tank coil is the plate* band switch. Eimac sockets and chimneys are used with the tubes, and air is forced into the pressurized chassis by the 100-ft3/min blower on the rear deck. A box encloses the panel meters (on the right-hand side of the front panel). Full shielding of the meters is required to prevent stray radiation that could cause TVI. (B) On the under side of the chassis, the filament transformer is at the lower right. The filament choke is inside the shielded partition that closes off the tube-socket compartment. *A right-angle drive, Millen 10012, drives S1* and S2 (it is visible at the center-front partion of the chassis). The power supply for the relays and alc system is at the front-left side. The blower is mounted on the rear deck, with a piece of foam insulation between the blower housing and the chassis to reduce vibration and noise. A full bottom cover is required.



(A)

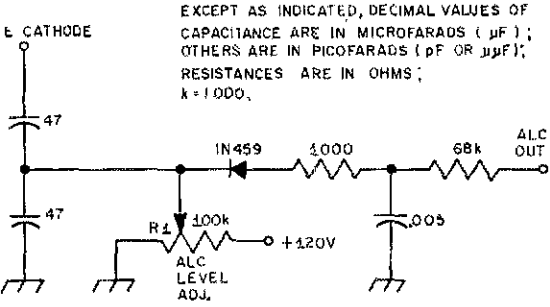
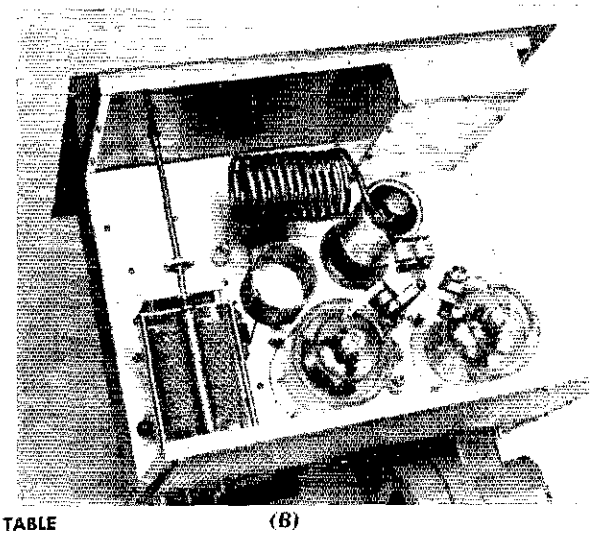


Fig. 15 — A simple alc circuit which may be added to a cathode-driven amplifier to limit power input. R1 is a linear-taper control used to set the level at which the 1N459 starts to conduct, producing alc voltage.



(B)

COIL TABLE

Band (MHz)	*Ca*	*Cb*	*L (Close-wound)*
3.5	1800 pF	1800 pF	16 turns No. 16 enam.
7	1000 pF	1000 pF	12 turns No. 10 enam.
14	470 pF	470 pF	8 turns No. 10 enam.
21	330 pF	330 pF	5 turns No. 10 enam.
28	220 pF	220 pF	4 turns No. 10 enam.

All capacitors are 1000-volt silver mica. Coils are wound on James Millen 69046 iron-slug forms. Place SWR meter between exciter and J_1, then adjust coil slugs for 1:1 SWR.

Using a hint from an earlier *QST* article, a choke wound on a 2-watt resistor was tried in the cathode circuit.[7] It did the trick, without the power loss encountered in the larger plate-circuit choke. A comparison of the two chokes is given in Fig. 13. A stubborn case of parasitic trouble might respond to the use of chokes in both the plate and cathode circuits, if neither alone will do the job. Several chokes may have to be tried, adding or subtracting turns, to find a unit that will allow the amplifier to be set on any band (with *any* combination of the TUNING and LOADING controls) *without evidence of instability. Once the* correct choke has been found and inserted, the

[7] Anderson, "The Evolution of an Amplifier," *QST*, April, 1969.

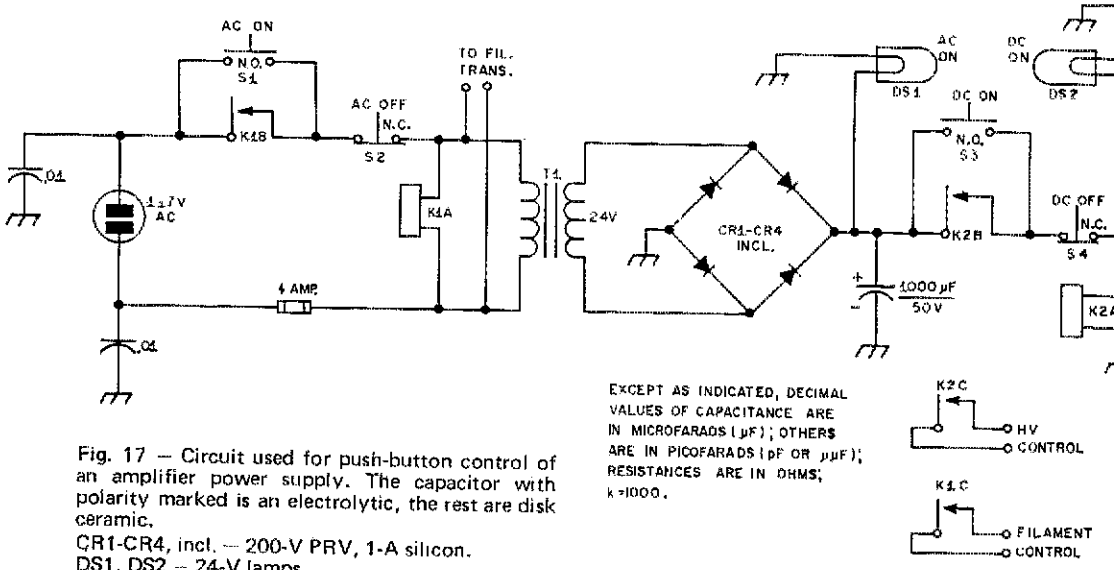


Fig. 17 — Circuit used for push-button control of an amplifier power supply. The capacitor with polarity marked is an electrolytic, the rest are disk ceramic.
CR1-CR4, incl. — 200-V PRV, 1-A silicon.
DS1, DS2 — 24-V lamps.
K1 — Dpdt relay, 117-V ac coil.
K2 — Dpdt power relay, 24-volt coil, minimum contact rating of 30A.
S1, S3 — Spst push-button switch (Switchcraft BX-1).
S2, S4 — Spdt push-button switch (Switchcraft BX-3).
T1 — 24-V, 1-A filament transformer.

amplifier should be tried with full plate voltage. Keep a hand on the plate-power switch during this test. If the amplifier is found to be stable at 1500 volts, it will probably be stable at 3000 volts, but one should check!

Other Features

"Extras" include an rf power meter,[8] and a tuning/loading indicator.[9] As these features have been previously described in *QST*, the details will not be repeated here. Alc output from the amplifier is also a desirable feature. Strictly speaking, alc is not required to prevent the amplifier from being driven to plate current saturation (flat-topping), as it would be necessary to exceed the maximum amateur power-input limit before saturation will occur. However, alc action can be useful to limit the final power input to the FCC limit, while providing a 1- to 2-dB increase in average power-output level. A sample of the cathode signal, rectified, can be used for this purpose (Fig. 15). Back bias on the rectifier diode can be adjusted by means of R1, setting the level at which alc action starts.

The 3000-volt power supply required can take several forms. December 1969 *QST* carried a suitable design. For the 3-1000Z amplifier, push-button remote control of the power supply was desired. A surplus IBM push-button panel was obtained,[10] although individual push-button switches, such as the Switchcraft "Box" models would be suitable. Such a control system is shown in Fig. 17.

The finished models of both the 3-500Z and 3-1000Z amplifiers have been given heavy use in several contests, and the performance obtained has been outstanding. By any measure, these units rank with the best "homebrew" and commercial designs. QST

[8]"In-Line RF Power Metering," *QST*, December, 1969.

[9]"Tuning Indicators for the Linear Amplifier," *QST*, April, 1970.

[10]Purchased from the G. E. Reed Company, Middletown, CT 06457.

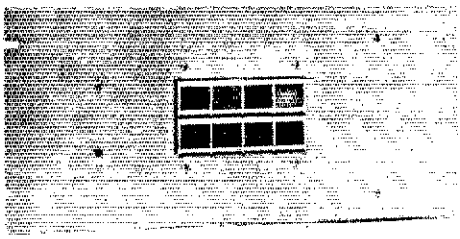


Fig. 18 — Power control panel using a surplus IBM push-button-switch/indicator-lamp assembly. (see text.)

A Wide-Sp[illegible] Multieleme[illegible]

BY ROBERT M. MYERS,* W1FBY

AS FAR as multiband hf antennas are concerned, whether they are quads, Yagis, or Delta Loops, the amateur's requirements are usually the same. He wants three-band operation with a single feed system that offers a good match for the transmission line. There have been numerous triband beams constructed since the original W3DZZ article appeared in *QST*.[1] Some of these tribanders have been well-designed, while others leave a great deal to be desired.

Drawbacks of Trap Beams

A beam antenna will provide the most gain when the parasitic elements are properly tuned and spaced. The word "properly" is the clinker when it comes to designing a beam, particularly a triбander. As a matter of interest, the maximum gain that can be obtained with a three-element monoband beam is about 8 dB as compared to a half-wave dipole (not an isotropic radiator!). This maximum-gain point comes with a director spacing of approximately 0.18 wavelength when the reflector is spaced 0.2 wavelength from the driven element. Any major decrease in these spacings will adversely affect the gain, lower the input impedance, and reduce the bandwidth.

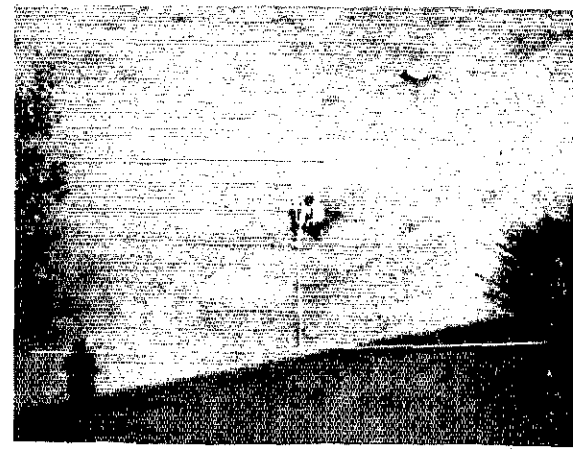
With a three-element triband beam having a boom length of 14 feet, the approximate element spacing for ten meters is 0.21 wavelength, for 15 meters is 0.16 wavelength and for 20 meters is 0.10 wavelength (assuming equal spacing of director and reflector). What really causes a problem is that on ten meters the input impedance is relatively high, and on 20 meters it is quite low. Designing a matching system that provides a low SWR with the different impedances encountered on the three bands is difficult, since matching transformers, tuning stubs, and similar devices show different characteristics (if they work at all) on different bands. One way to change the input impedance, however, is to alter the dimensions of the parasitic elements. With a little luck and a lot of cut-and-try element adjustment, a compromise point can be reached which will give a reasonable match on all three bands. But, for this reasonable match, we must accept incorrectly tuned parasitic elements and reduced gain.

Consideration must also be given to ohmic losses in the traps. If the operating frequency is below that of the trap, the trap becomes a part of the radiating element. Any loss in these traps reduces the overall efficiency of the system.

Overcoming The Problems

Something less than a super-size rotor can be used to turn a three-element triбander. Such an antenna is lighter in weight, and is available at a reasonable price. But for these reduced-weight features, the amateur must accept trap losses, poor spacing, and detuned parasitic elements. Some of the larger tribanders tend to overcome the inadequacies of the three-element version by using wider spacing, but a compromise still exists.

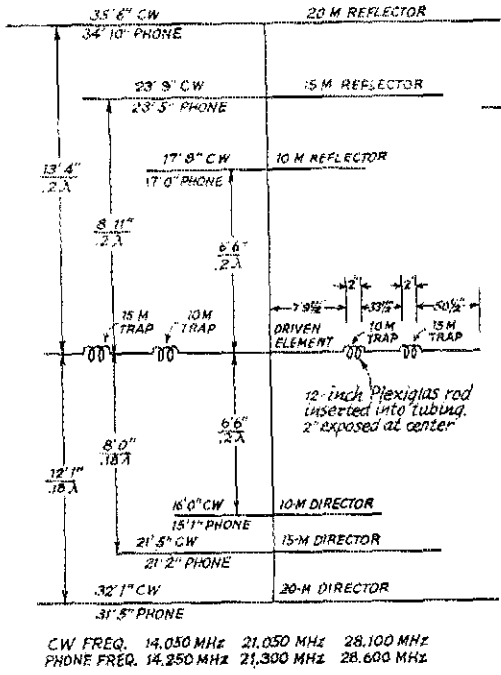
The beam described in this article was built in an attempt to overcome the drawbacks associated



All seven elements can be seen in this photograph. The driven element is at the center with reflectors at the bottom and directors at the top.

* Assistant Technical Editor.

[1] Buchanan, "The Multimatch Antenna System," *QST*, March, 1955.



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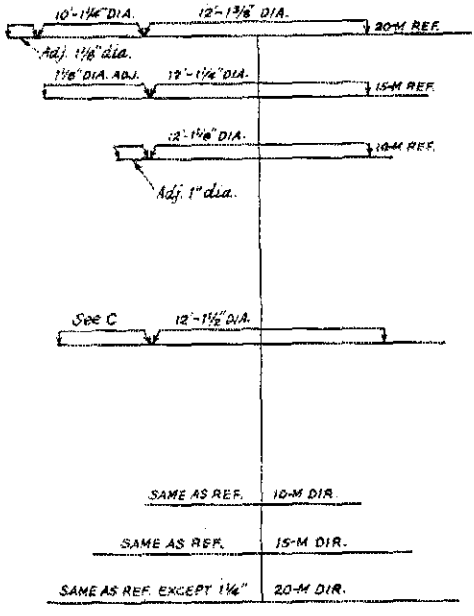

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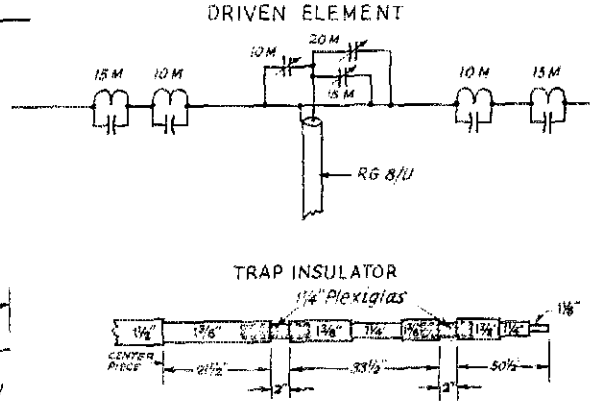


(1C)

Fig. 1 — Antenna dimensions. (A) Spacing between elements and overall length of each element. (B) Diameter of aluminum along with the length of each piece. The twelve-foot element sections are centered with six feet on each side of the boom. (C) Various sizes and lengths required for the driven element.

with many triband antennas. The use of separate full-size parasitic elements on each band solves two of the big problems. Number one: the traps in the parasitic elements can be eliminated, reducing the total number of traps from 12 (in a typical tribander) to 4. Number two: the use of separate parasitic elements on each band allows wide spacing on all three bands. Reducing the number of traps reduces the ohmic losses, and the wide spacing provides a workable input impedance on each band.

This is a heavy antenna and it has high wind-loading properties. These features not only place a large strain on the tower, but also require a rotor that is capable of holding and turning the array in high winds and during heavy icing. More on this later.

Element Construction

The mechanical features of the antenna can be seen in the photographs. The beam consists of separate reflectors and directors for each band, and uses a single driven element with four traps. Dimensions and spacings are given in Fig. 1.

Special consideration has been given to trap construction in an effort to minimize power loss. The traps are constructed of 7/16-inch diameter aluminum tubing which is mounted on 1 1/4-inch diameter solid Plexiglas rod. Plexiglas rod is manufactured in two different ways, cast and extruded. For maximum strength, the cast rod is preferred. If holes are drilled in either type of rod, the durability of the material will be greatly diminished. Therefore, the constructional technique shown here was used.

An adjustable capacitor is needed to resonate the traps. But an adjustable capacitor that will handle the voltage and current produced by a kilowatt transmitter is hard to find. Coax cable sections (RG-8/U), serving as fixed-value capacitors appeared to offer a solution, but there was the question of whether or not the cable would stand the voltage when the trap was acting as a trap and not just as a part of the radiating element. Using a two-kilowatt amplifier and a short piece of trans-

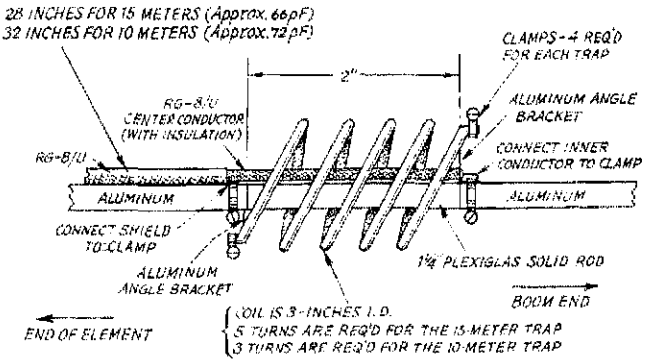


Fig. 2 — The RG-8/U should be attached to the driven element and run from the trap towards the end of the element. In other words, the capacitor for the 10-meter trap should be attached to 15-meter portion of the element, and the 15-meter capacitor should be fastened to the 20-meter portion.

mission line, the maximum legal power on ssb and cw was applied to the antenna for extended periods of time. There were no indications of voltage or heating breakdown. For this reason, RG-8/U cable was used for the capacitors in the final model. Although the capacitor dimensions are listed in Fig. 2, the builder should start with a piece of cable which is several inches longer than required. Prune the coax cable to resonate the coil approximately 800 kHz below the operating frequency. A grid-dip oscillator should be used to make sure the 10-meter traps are resonant near 27.2 MHz. The 15-meter traps should be resonant at 20.2 MHz. Assemble the driven element before adjusting the traps. Contrary to popular belief, adjusting the traps separately does *not* produce the same results obtained when adjusting the traps after they are installed in the element.

Another popular belief (and one this writer found to be true) is that the traps must be resonant somewhat lower in frequency than the operating band. When the traps were made resonant for the center of each band, the bandwidth of the antenna (on 10 and 15 meters) was greatly restricted. After retuning the traps to a frequency *below* the band, *the SWR curve broadened out considerably.*

The Boom

The boom is 25 feet, 3 inches long. It is constructed from two pieces of 2-inch diameter, .083-wall aluminum tubing, each being 12-feet long. Both of these sections slide 18 inches into a center piece which is 4 feet, 3 inches long. There is

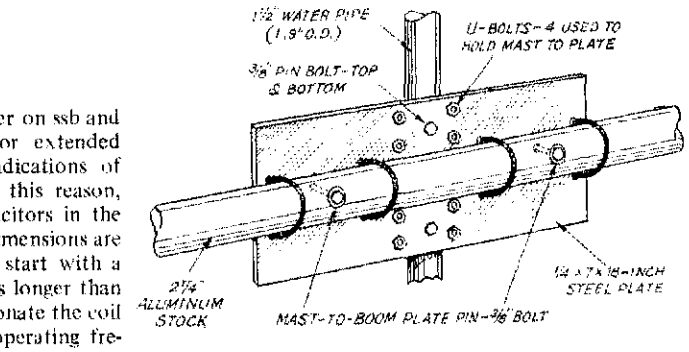
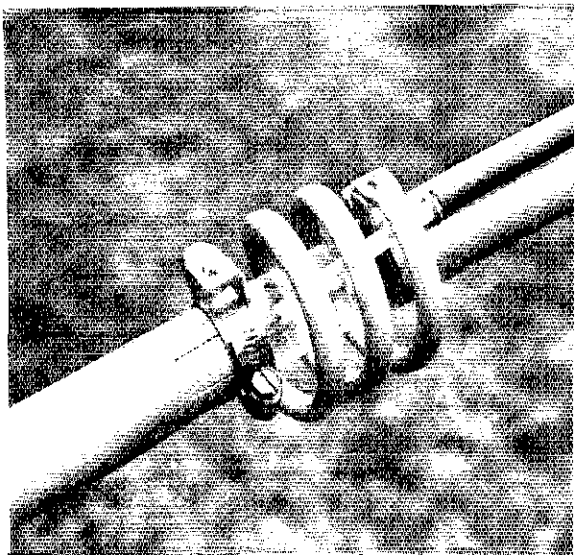


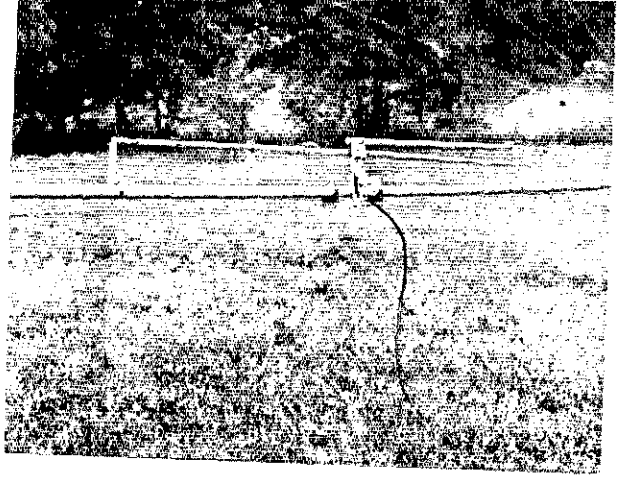
Fig. 3 — Mast-to-boom mounting plate.

an .084-inch difference between the OD of the 2-inch stock and the ID of the 2 1/4-inch material. Eight slits are cut at each end of the center piece to allow it to be tightly compressed (using large hose clamps) against the 2-inch tubing.[2] The boom-to-mast bracket is made from a piece of 1/2-inch-thick cold-rolled steel which was acquired from a local fabricator. After drilling the holes in the plate, it was coated with two layers of antirust paint.

[2]McCoy, "Aluminum Tubing — What Sizes Are Available," *QST*, June, 1969.



The 10-meter trap consists of three turns of 7/16-inch diameter aluminum tubing. The turns are wound on a 3-inch diameter form. The coaxial capacitor is mounted by using the hardware which supports the coil. After the trap is tuned, the ends of the RG-8/U should be sealed with rubber cement.



Shown here is the driven element with the gamma-match hardware mounted in place.

Elements

Fig. 1B shows the diameter and length of each piece of aluminum used for the elements. The choice of tubing diameter was based on building a rugged antenna. It is the opinion of this writer that unless extremely rough weather (heavy icing) is anticipated, the larger element diameters could be reduced by at least 1/4 inch. This beam is located on a windy, snow-swept hilltop in Connecticut, and the writer's opinion may change by next Spring!

The element-to-boom clamps for the parasitic elements are manufactured by Kirk Electronics.[3] Since the gamma-matching network is attached to the driven element, a homemade plate must be used at this point.

The lengths for the various parts of the driven element were determined through cut-and-try tests. The builder should be able to obtain acceptable results by using the dimensions given in Fig. 1C, provided the general design shown there is followed. Thermos-bottle corks were used to seal the ends of the elements. A generous amount of rubber cement was applied to the corks to hold them in place.

[3]Kirk Electronics, 116 Westpark Road, Dayton, OH 45459.

The Gamma Match

Mechanically, the gamma match is relatively simple. Fig. 4 shows the dimensions used. Each rod is made from aluminum-tubing sections of three different diameters; the only significant difference is the length of the capacitor section. Polystyrene tubing should be used for the gamma capacitor dielectric. The original matching-section capacitor was built with nylon tubing as an insulator, but this turned out to be very unsatisfactory.[4]

It is desirable to place the 10-meter rod on one side, and the 15- and 20-meter rods on the opposite side of the driven element. There is no interaction in adjustment between 15 and 20 meters. Care must be taken, however, to keep the 15-meter rod long enough so that it will not act as a 10-meter rod, and to keep the 10-meter rod short enough so that it will not function as a 15-meter rod. The length of the driven element has a pronounced effect on the position of the tap, so some juggling of driven-element lengths may be necessary to get the matching section to operate correctly. According to Healey,a driven element should resonate slightly above the operating frequency for proper gamma-match operation.[5]

The Truss

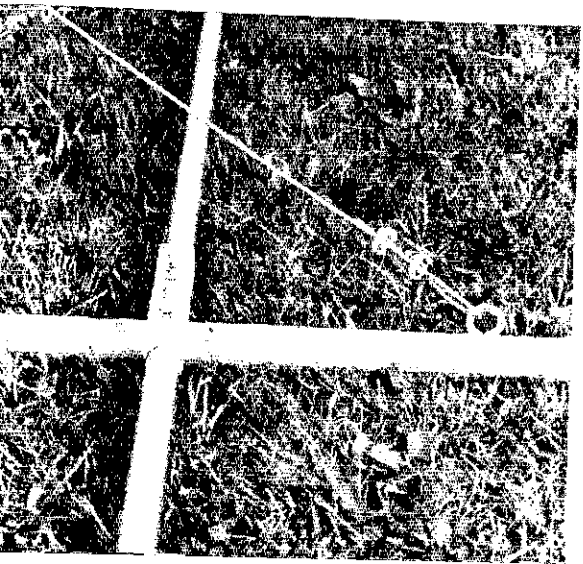
As shown in the photograph, a supporting wire is attached to the boom by means of eye hooks, each of which is mounted at the balance point on the two halves of the boom. The wire is 3/16-inch diameter galvanized steel. Although attaching the truss at the ends of the boom might ease the strain a bit, a balanced section is desirable when swinging the boom and its elements around the guy wires when hoisting it up the tower.

The truss turnbuckles used at the top of the mast are made by Rohn Mfg. Co.[6] They are about 16 inches long when fully extended. The guy-wire length was cut short enough to allow the turnbuckles to be tightened to the point where there is a *slight* upward bend in the boom. After the truss is tightened, a stiff wire (copperweld or galvanized steel) run through the eyes and buckles will lock them in place.

[4]"Some Insulation Problems," Hints and Kinks, *QST*, November, 1970.

[5]Healey, "An Examination of the Gamma Match," *QST*, April, 1969.

[6]Rohn Mfg. Co., P.O. Box 2000, Peoria, IL 61601.



Both 12-foot boom sections have an eye hook placed at a point which allows the section to balance after the parasitic elements are clamped in place.

The Mast and Rotor

Special consideration should be given to the mast and rotor when an antenna of this size is to be turned. Since a 14-foot mast is used, the rotor can be mounted 10 feet down inside the top section of the tower. A little more than 3 feet of mast extends above the boom to support the truss. Galvanized water pipe makes excellent mast material – a 1 1/2-inch pipe has an outside diameter which is slightly under 2 inches. It fits nicely into the rotor and top section of the tower.

The main purpose for mounting the rotor ten feet down inside the tower is to allow the use of a long mast which will absorb most of the torsion developed in starting or stopping the antenna's rotation. This also helps during high winds. If the rotor has a brake, and the mast is short, the torque is transferred to the tower (not always a good thing!); but if the tower is well guyed and the mast is short, the rotor will have to handle these pressures. This is what breaks gears! The place to relieve the torsion is in the mast, where it can't do any damage. As an additional precaution (perhaps unnecessary), a switch has been installed at the control box to hold the brake mechanism open after rotation, allowing the antenna to coast a bit before slamming on the brake.

Mast slippage at the rotor can be a problem, so a clearance hole for a 3/8-inch bolt was drilled through the connecting plate, the mast, and the rotor housing. A 3/8 X 4 1/2-inch steel bolt serves as a locking pin.

Hardware

Compression clamps are used to secure the slit ends of the element sections, to hold the traps in place, fasten the coaxial capacitors to the driven element, and to lock the gamma rods in place after final adjustment. Automobile muffler clamps are used to clasp the driven-element plate to the boom. Since there are many styles of muffler clamps, some shopping at automotive stores may be necessary. The U-channel version seemed to be the best suited to this job. The rest of the hardware consists of 3/8-inch steel bolts which range from 3 1/2 to 4 1/2 inches in length.

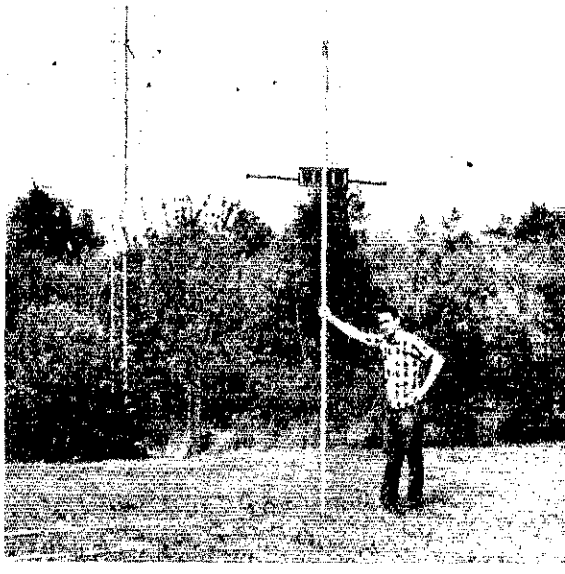
Antenna Adjustment

After spending considerable time attempting to adjust the gamma rods with the antenna only four feet above the ground, it was concluded that this was not the way to do things! After mounting this array 12 feet above ground, measurements and adjustments became easier.

When tuning this system, start on 20 meters. Connect an SWR meter in the coax cable near the antenna. With the 20-meter rod attached (the 10 and 15-meter rods removed), adjust the tap point and the capacitor for minimum SWR. Next, install the 15-meter rod and adjust it in the same manner. Finally, the 10-meter rod should be installed and adjusted. A perfect match may not be obtainable with the antenna close to the ground, so the adjustments should be for the best match – not necessarily a perfect match. A slight touchup of the 20- and 15-meter rods may be necessary after the antenna is raised to its final height.

Installation

When installing an antenna, certain precautions are necessary. Safety cannot be emphasized enough. No one should be at the bottom of the



The mast is 14 feet long, and is made from 1 1/2" (ID) galvanized water pipe. The center section of the boom is clamped to the mast-to-boom plate.

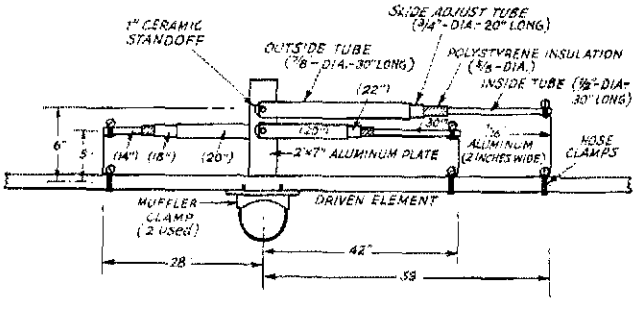


Fig. 4 – The gamma rods are mounted on ceramic standoff insulators which are attached to a 2 X 7-inch plate. The 15- and 10-meter rods are mounted on opposite ends of a ceramic feedthrough insulator. All three rods use the same diameter tubing. Only the 20-meter rod is labeled.

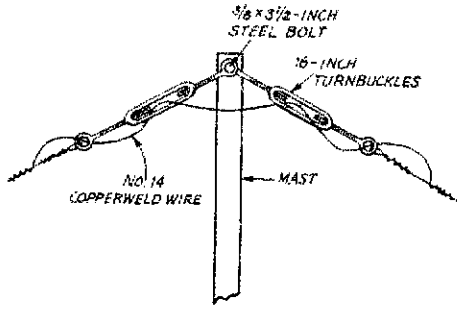


Fig. 5 — To keep the mast turnbuckles from unscrewing, a wire must be run through the eye and center piece of each turnbuckle.

tower when someone is working on top. A dropped screwdriver, nut, or bolt comes down with quite a force!

When raising the antenna up the tower, the guy wires present an obstacle. There is little doubt that this antenna could have been installed in one piece if there were no guy wires on the tower.

As the photographs show, the antenna assembles in four pieces: the mast, a driven element, and two boom sections. Each boom section, with its eyebolt placed at the balance point, can be manuevered easily around the guy wires while hoisting the section to the top of the tower.

Operation

Since the driven element was adjusted at a height of 12 feet, a change was expected in the resonant frequency when the antenna was placed at the higher level. The SWR did go up a bit, but it was returned to the original value with a slight adjustment of the gamma capacitor.

Antenna performance is difficult to evaluate in absolute numbers, so no specific gain claims will be made. It appears, however, that this antenna is at least equal to a three element 20-meter monobander (16-foot boom), and is certainly better than the three-element tribander used previously at the same location. The front-to-back ratio (using an S-meter) appears to be better than 25 dB. Competition with local stations indicates the antenna is doing its job.

Reducing the Cost

As with most projects, the cost can be kept low if the builder looks for bargains and uses a little ingenuity. Used monoband beams and tribanders are available at reasonable prices (especially after a rough winter!). By using the aluminum from a 20-meter monobander, and from a tribander, most of the parasitic elements can be built. Then a 25-foot boom can be constructed, and the three-band driven element can be used intact.

A recent *QST* article mentioned how aluminum prices vary all over the ball park.[7] If selective shopping is done, and the size of the material is reduced, this antenna can be built for under $200.

[7]Fenwick, "A Lightweight 10- and 15-Meter Beam with 5 El. on Each Band," *QST*, May, '70.

December 1945

. . . We have an enthusiastic editorial telling how we are really getting going. The armed forces are working hard to get their services out of our bands. We expect to have the whole works back again shortly. We are enjoined to make a clean start in our operating procedures. Boy, I remember that "clean start." Tell you later.

. . . The front cover shows an S.H.F. Magnetron, the device that made Radar successful. While Radar as such is fairly old, it took the development of a powerful signal generator operating in the centimeter wavelength region to really "go to town." Some of these devices develop about a megawatt. Better read this one.

. . . The fundamental principles of Loran are given by Alexander McKenzie, W1BPI. This makes highly interesting reading and gives us a real working knowledge about the system.

. . . Byron Goodman, W1JPE, describes his four-band 125 watt transmitter. It uses the new 4D32 tetrode.

. . . Ed Tilton, W1HDQ, shows how to get 300 watts on 50 and 144. You'll be hearing more about this rig and what it did a little later.

. . . A reasonably simple rig that can be used for either a.m. or narrow-band f.m. is described by Major J. C. Geist, W3CPG.

December 1920

. . . We have an unsigned editorial telling about some threatened legislation introduced into Congress by Sen. Poindexter of the State of Washington. This is an attempt to put through legislation that would practically sound the deathknell of amateur wireless by giving autocratic powers to a commission, without any hearings, etc. Members are urged to protest to their Senators immediately. A sample letter is given. The Bill never became law.

. . . We have some dope on self-rectifying c.w. sets. These sounded pretty good if one had a 500-cycle source of power. My own rig of this type worked on straight 60 cycles. Not too bad a note either!

. . . J.G. Ruckelshaus, 2GF, describes an A.C. operated radiophone which has no rectifiers. He admits there is some hum but states the hum does not carry as far as the speech. Say that again?

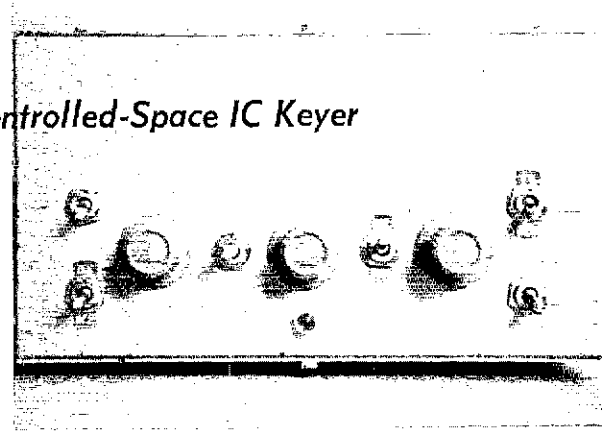
. . . It appears that the Young Squirt got a rise out of the Old Man in his second epistle, for this month T.O.M. takes letter writers to task but good — especially those who think they are humorous.

. . . S. Kruse reports further on the Bureau of Standards-ARRL fading tests and presents a flock of graphs. The tests were conducted three nights a week during June and July. He concludes that fading is caused by varying reflection and refraction of the waves. He also says that c.w. signals fade less than damped signals which can often be brought back again by careful retuning. Hmmm! — *W1ANA*

SPAKEY

A Controlled-Space IC Keyer

BY KENNETH STONE,* K8ORD



Front view of one version of Spakey. Some of the panel controls used are not the same as the unit described.

Using a hand key, an operator has complete control over the dot and dash lengths he sends, as well as the spaces in between them. The purpose of the electronic keyer is to make keying easier by allowing an operator to produce a string of dots or dashes with a single hand motion. Most keyers control the first space following the dot or dash. Spakey controls the space length between letters as well as words. The operator closes his key at approximately-correct times, and the keyer operates a reed relay at exactly-correct times for perfect spacing. An electronic counter times a space after a dot or dash and allows the next character to start at a predetermined time.

A second reed relay is included for break-in. Its contacts are normally held closed. As the dot or dash starts, these contacts open. After the dot or dash ends, a preset time delay takes place and then the contacts close. These contacts can be used to mute a receiver directly or to activate a monitor mixer.

Using our original keyer, which had no dot memory, dots were missed in letters that started with a dot-dash sequence. The trouble occurred during the longer lengths between words and was caused by releasing the dot lever and prematurely closing the dash lever. A dot memory was included in Spakey to insure that a dot will start if the dot lever is closed momentarily at any time.

The method of forming dots and dashes is similar to that used in the Micro-TO Keyer.[1] Integrated circuits are used throughout, replacing the individual components in the Micro-TO.

The concept of 1 and 0 signals is used in the explanation.[2] A 1 signal is a steady voltage of more than 1 volt dc and a 0 signal is a steady voltage of 0.8 volt dc or less.

In the inverter (Fig. 1A), a 1 signal to the input produces a 0 signal at the output. A 0 signal at the input allows a 1 signal at the output.

For the two-input gate (Fig. 1B), a 1 signal at either input produces a 0 signal at the output. The same gate can be used in a different way. If signals to both inputs are 0, the output will be a 1 signal. In this type of gate the output signal is not the same as the input signal, thus the names NOR (not-or) or NAND (not-and).

The JK flip-flop is represented by the symbol and truth tables of Fig. 1C. A steady 1 signal to the C_d input will hold the flip-flop clear ($Q = 0$) regardless of other inputs. This signal applied momentarily will leave the flip-flop in the clear condition until changed by other inputs. The JK changes state only with a 1 to 0 transition at terminal T. At the time of this transition, if $S = 1$ and $C = 0$ the JK will be set ($Q = 1$); if $S = 0$ and $C = 1$ the JK will clear ($Q = 0$). If both C and S inputs are 0 the JK will complement (reverse output state) with each 1 to 0 transition at terminal T. No output change takes place if $S = 1$ and $C = 1$. It can be seen that the condition of the S and C terminals must be set up before the 1 to 0 transition takes place at terminal T.

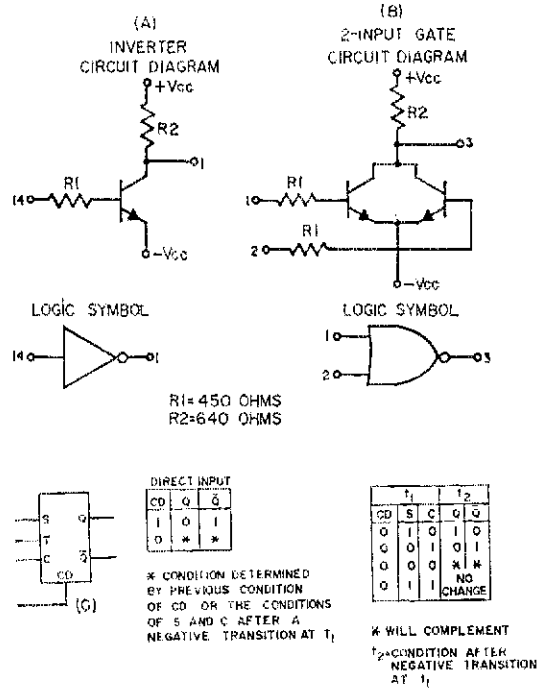


Fig. 1—Symbol and typical schematic diagram of (A) an inverter and (B) a 2-input NOR gate. (C) Logic symbol and truth tables for the JK-type flip-flop.

*2374 Brenthaven Drive, Bloomfield Hills, Michigan 48013.

[1] Opal, "The Micro-To Keyer," *QST*, August, 1967 — *Editor.*

[2] For more information on basic logic devices, see Pos, "Digital Logic Devices," *QST*, July, 1968 — *Editor.*

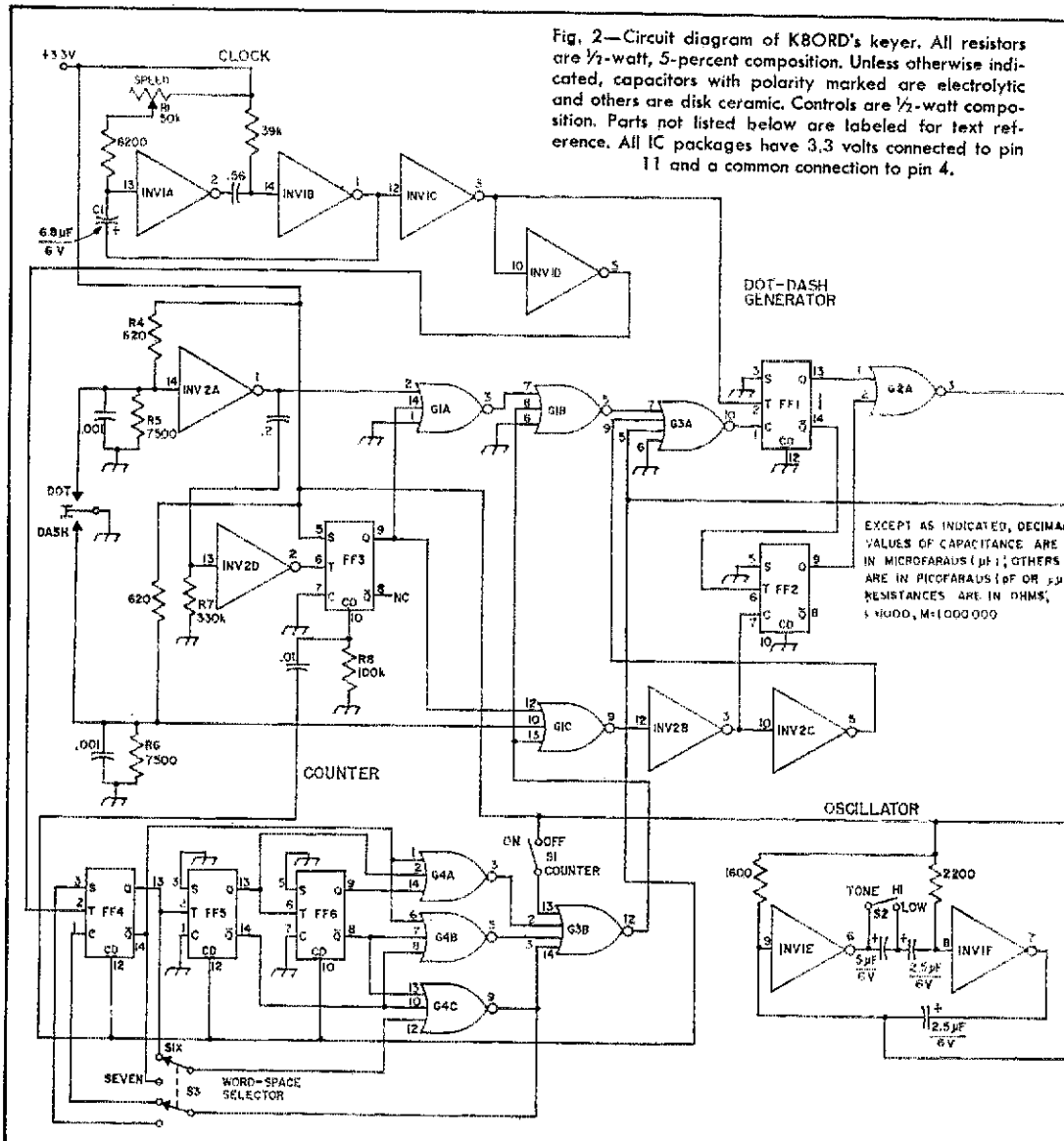


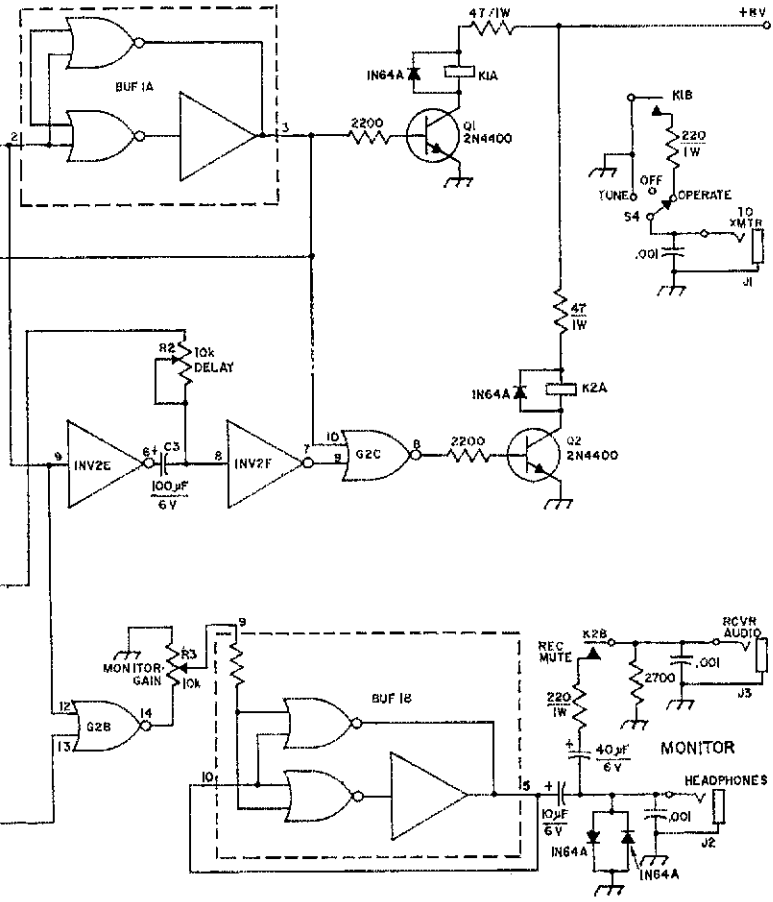
Fig. 2—Circuit diagram of K8ORD's keyer. All resistors are ½-watt, 5-percent composition. Unless otherwise indicated, capacitors with polarity marked are electrolytic and others are disk ceramic. Controls are ½-watt composition. Parts not listed below are labeled for text reference. All IC packages have 3,3 volts connected to pin 11 and a common connection to pin 4.

The Circuit

When power is applied, the keyer will run through a sequence and flip-flops FF_1 and FF_2 (Fig. 2) will be clear ($Q = 0$). Other flip-flops will be in the condition of time t_6 (Fig. 4). Inverters INV_{1A}, and INV_{1B} are connected as a free-running multivibrator feeding square-wave pulses to inverter INV_{1C}, which acts as a buffer. The combination of inverters INV_{1A}, INV_{1B}, and INV_{1C} is called the clock.

The dot chain consists of the series of gates INV_{2A}, G_{1A}, G_{1B} and G_{3A}. Each gate is used either to place the signal at the proper level or to introduce a control function into the circuit. Resistors R_4 and R_5 were chosen so that the junction of the resistors and the dot key contact is at a potential of 2.6 volts (a 1 signal). This makes the output of $INV_{2A} = 0$, $G_{1A} = 1$, $G_{1B} = 0$ and $G_{3A} = 1$. The C terminal of FF_1 is connected to the 1 output of G_{3A} and the S terminal is connected to the common (which is the same as a 0 signal) so input pulses to T of FF_1 can only cause this flip-flop to have a Q output of 0. When the dot lever is closed it shorts out R_5, bringing the input of INV_{2A} to 0. All gates in the dot chain reverse their output states and there is a 0 signal present at the output of G_{3A} which will cause FF_1 to complement with the next negative-going transition from the clock buffer INV_{1C}. The Q output of FF_1 goes to 1, making the output of $G_{2A} = 0$ and output of

BUF_1—Dual buffer (Motorola MC798P).
C_1—Tantalum.
C_2—Mylar.
FF_1–FF_6, incl.—JK flip-flop (3 each Motorola MC790P).
G_1, G_4—Triple 3-input gate (Motorola MC792P).
G_2—Quad 2-input gate (Motorola MC724P).
G_3—Dual 4-input gate (Motorola MC725P).
INV_1–INV_2—Hex inverter (Motorola MC789P).
J_1–J_3, incl.—Phone type.
K_1, K_2—Dry-reed relay, 6-volt, 150-ohm coil, spst (Potter and Brumfield JR1020).
R_1—Reverse-log taper control.
R_2—Audio taper.
R_3—Audio taper.
S_1, S_2—Spst toggle.
S_3—Dpdt toggle.
S_4—Spdt toggle, center off.



$BUF_{1A} = 1$. The transistor, Q_1, conducts, closing relay K_1 and keying the transmitter. At the same time, the output of BUF_{1A} is fed back to G_{3A} so that the dot lever may be released. The next negative-going clock pulse will cause FF_1 to complement again, and the change in its output state will make the output of $G_{2A} = 1$ and the output of $BUF_{1A} = 0$, causing the relay to open. Thus, the dot is formed between two negative-going clock pulses.

The dash chain consists of the series of gates G_{1C}, INV_{2B}, and INV_{2C}. Closing the dash lever shorts out R_3, bringing the input of G_{1C} to 0 and its output to 1. Outputs of INV_{2B}, INV_{2C}, and G_{3A} reverse, starting the same action that starts a dot. A connection is made from the output of INV_{2B} to the C terminal of FF_2 placing this flip-flop in a position to complement with the next negative-going transition from the Q terminal of FF_1. The clock causes FF_1 to complement and FF_2 complements practically at the same time. Both inputs to G_{2A} are 1 and its output is 0. With the next negative-going transition from the clock, FF_1 complements but FF_2 continues to hold the output of G_{2A} at 0. The next negative-going transition from the clock complements FF_1 and FF_2, leaving a 1 signal from FF_1 only holding the output of G_{2A} at 0. Another negative-going transition causes FF_1 to complement and the circuit to return to its rest state. Three dot lengths have occurred, a dash has been sent, and the keying output has ended.

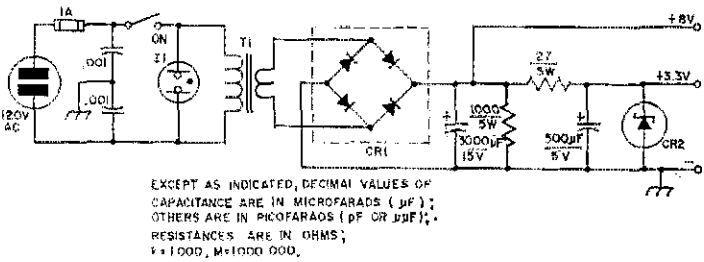


Fig. 3—Power supply for Spakey. Resistors are wire-wound and capacitors are electrolytic.

CR_1—Silicon rectifier bridge assembly, containing four 100-volt PIV, 500-mA diodes (International Rectifier DD175).

CR_2—3.3-volt, 1-watt Zener (Motorola 1N4728).

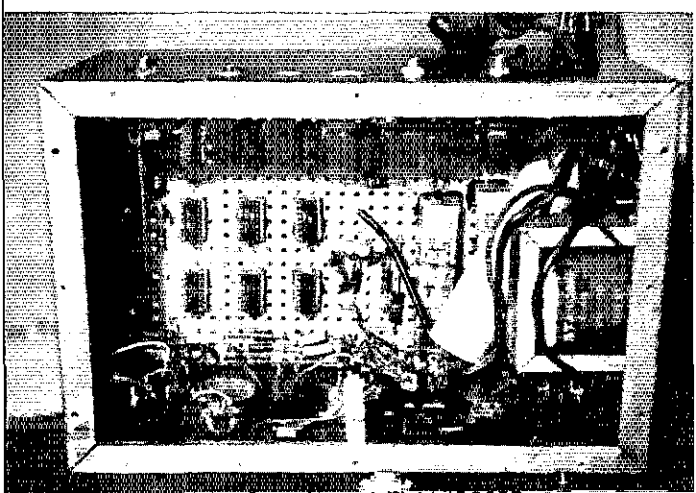
I_1—Neon ac panel-mount indicator, 117 volt.

T_1—Filament transformer, 6.3 volts, 1.2A or more (Stancor P6466).

Counter

The counter is a three-stage binary type consisting of flip-flops FF_4, FF_5, and FF_6. Output condition of the counter is read out by gates G_{4A}, G_{4B}, and G_{4C}, with gate G_{3B} combining these outputs to act on gate G_{1B} in the dot chain and G_{1C} in the dash chain. Space lengths are determined by the approximate closing times of the levers, but output can only occur at exact times due to the combined output from the clock and counter. Signals at the inputs of G_{1B} in the dot chain or G_{1C} in the dash chain must be 0 in order for a dot or dash to start.

The following conditions exist when a dot follows a dot, producing correct inter-letter, letter, and word spacing. When the dot key is closed, the signal from the counter output gate, G_{3B}, must be 0. The G_{3B} signal must be 0 two dot-lengths later to make another dot. Another way of stating this is to say that the G_{3B} signal must be 0 one dot length after the first dot ends. For letter spacing, the G_{3B} signal must be 0 two dot-lengths after the first dot ends. For word spacing, the G_{3B} signal must be 0 at 6 (or 7) dot lengths after the first dot ends. Dot action is initiated by closing the dot lever, making the inputs of $INV_{2A} = 0$, $G_{1A} = 1$, $G_{1B} = 0$, and $G_{3A} = 1$. For stable operation, the 0 signal from the counter output gate G_{3B} should be present at gate G_{1B} before the signal from the dot lever arrives. This is accomplished by inverting the output from clock buffer INV_{1C} (which starts dot action), using inverter INV_{1D}. This stage is used to drive the counter one-half dot-length ahead of the time that a dot is to start. The outputs of the counter flip-flops will produce the timing diagram shown in Fig. 4. As the dot starts, the output from BUF_{1A} is 1, and this signal is used to place all counter flip-flop Q outputs at 0, as it is connected to the C_D terminals of these flip-flops. When the dot ends, the output of BUF_{1A} drops to 0, leaving the counter flip-flops free to act on any T input signals. Because all S and C inputs are 0, with the next negative-going transition from inverter INV_{1D}, flip-flop FF_4 complements and its Q output goes to 1. The time is now one-half dot length ahead of t_0, which is the correct spacing for inter-letter dot space. The readout gate, G_{4A}, is used as an AND-NOT gate, and all of its input signals must be 0 to allow an output of 1. From the timing diagram it can be determined that G_{4A} inputs must be from the Q output of FF_4 and the Q outputs of FF_5 and FF_6. With the output from G_{4A} at 1, the output from gate G_{3B} is 0. The next dot in a letter starting with dot-dot will start if the lever is closed ahead of t_1. There is no output from the G_{4A}-C gates at t_2, so another dot can not start. Before t_3, gate G_{4B} is operated and a



Top view of the keyer. The power supply is mounted on the wall of the cabinet to the right. Sockets are used to mount ICs on a piece of electronic pegboard. Push-in terminals are used to hold other small components and bring leads out to the front-panel controls.

dot may start in the sequence of dot-letter-space-dot if the lever has been closed, released, and then closed again after t_1 but before t_3. A switch has been included that will allow a space of six or seven dot lengths between words. Assuming the switch is set at 6, the output of G_{4C} will be 1 preceding t_6 for word spacing. Counter action is stopped by a connection from the output of G_{4C} to the C input of FF_4. Since the Q output of FF_4 is 0 preceding t_8, a condition of $C = 1$ $S = 0$ will cause the Q output to be 0 after a negative-going transition from the clock. The Q output is already 0 so no change in the output state of FF_4 takes place, and the counter stops. Connections to the switch in the 7 position will have the same effect at t_7. This assures that the counter will come to rest in a condition to allow the next dot in a new transmission to start in the shortest time period. A disadvantage of this method is that it allows a word space that is not accurate if the dot key was closed after t_8 (or t_7) and word space was intended. It was found in using the keyer that the longer interval between words was not hard to estimate, and the key was always closed in advance of t_6.

Monitor

Inverters INV_{1E} and INV_{1F} are connected as a free-running multivibrator with output at an audio frequency. The output is a series of pulses fed to AND-NOT gate G_{2B}. The other input to G_{2B} is connected to G_{2A} which has a 0 output during the time the keying relay is operated. Thus the audio signal from INV_{1E}-INV_{1F} is allowed to pass gate G_{2B} only during the time the transmitter is keyed. Buffer gate BUF_{1B} is used to amplify the multivibrator output to headphone volume. A connection is made from the output of BUF_{1B} back to its second input to reduce key clicks.

Dot Memory

The dot memory consists of inverter INV_{2D} and flip-flop FF_3. The set and clear actions of FF_3 depend on the capacitor-resistor combinations connected to the input of INV_{2D} and the C_3 input of FF_3. The capacitor acts as a short circuit to a change in voltage and the resistor connected in series with it will pass a current when a voltage (1 signal) is connected to the combination. As the capacitor charges, the voltage across the resistor falls back to 0. Whenever the dot lever is closed, the output of INV_{2A} goes to 1, causing a 1 signal to appear across the 330k-ohm resistor, R_7. This signal causes the output of INV_{2D} and the T terminal of FF_3 to go from 1 to 0, setting FF_3. The resulting 1 signal from the Q output of FF_3 is connected to NOR gate G_{1A} in the dot chain, assuring that a dot will start. The Q output is also connected to gate G_{1C} in the dash chain, not allowing a dash to start until FF_3 is cleared. As the memorized dot starts output from the buffer, BUF_{1A} goes from 0 to 1 presenting a voltage which is capacitively-coupled to R_8. The voltage present across R_8 is connected to the C_4 terminal of FF_3, causing it

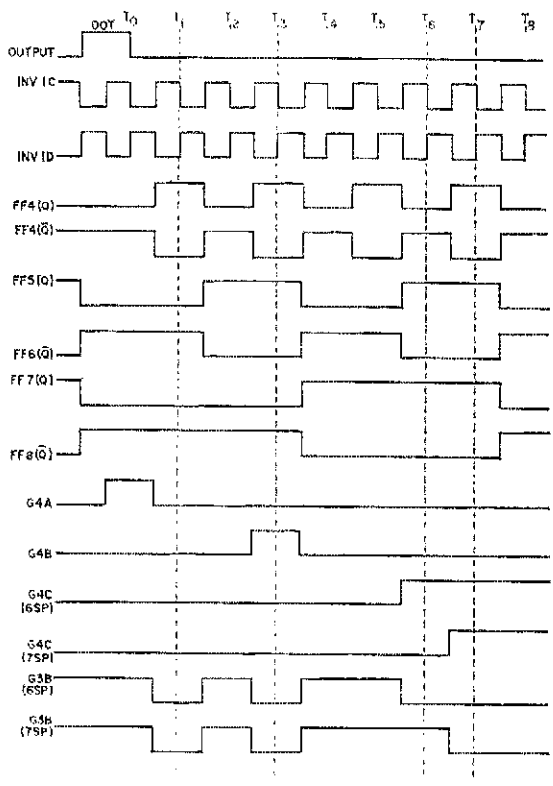


Fig. 4—Timing sequence during a word space after a dot has been sent.

to clear. Its Q output drops to 0, allowing a dash to start, when the dash lever is closed. A dot can be memorized any time after the transmitter is keyed or the keyer is at rest. For squeeze keying, a single dot can be inserted during a series of dashes.

Delay

For break-in it is desirable to blank the receiver input to the headphones during the time the transmitter is keyed, and have the receiver input return to full volume after an adjustable time delay. The 1 output of BUF_{1A} (during transmitter keying) is applied to NAND gate G_{2C}, causing its output to be 0. Transistor Q_2 then has a low voltage between its base and emitter, and relay K_2 in its collector circuit, will open, disconnecting receiver output to the headphones. While the transmitter is keyed, gate G_{2A} has a 0 output which is applied to inverter INV_{2E}, giving an output of 1. This 1 causes capacitor C_5 to discharge through resistor R_2 down to 0.1 volt. When the transmitter keying has ended, the output of G_{2A} goes to 1, the output of INV_{2E} goes to 0, and capacitor C_5 charges through R_2. During the charging period the voltage across R_2 drops from a high value to a low value, causing the output of inverter INV_{2F} to go from 0 to 1. This causes the output of G_{2C} to be 0, which holds Q_2 off, holding the K_2

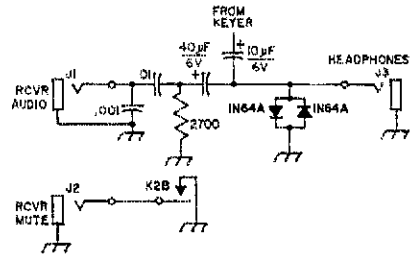


Fig. 5—Alternate receiver-muting circuit. The grounded K_2 contact may be brought out separately, if desired, to switch in a "hot" circuit. Jacks are the phone type, and capacitors are electrolytic.

contacts open. After the discharge delay of C_3-R_{11}, the output of IV_{2F} returns to 0 and the relay contacts close.

Blanking Receiver Output

Two methods for blanking receiver output are shown. One method simply disconnects the headphones from the receiver during keying (Fig. 2). In the second method, shown in Fig. 5, the headphones are left connected and the receiver output is muted by opening a circuit in the receiver itself. If it is desired to have the K_2 contacts close as the transmitter is keyed, spare gate G_{2D} can be connected between G_{2C} and the input to transistor Q_2.

The power supply (Fig. 4) is of conventional design with outputs of 8 volts (dropped to 6 volts by series resistors) for the relays, and 5 volts for the ICs. A 5-volt Zener diode regulates the IC voltage output.

Construction

The keyer was built on a perforated circuit board using sockets for the ICs and transistors. Push-in terminals were used for tie points. All components were housed in a $6 \times 9 \times 5$-inch Minibox to assure adequate shielding. However, it was found that rf from a 275-watt transmitter did not affect keying with the top and bottom covers removed. The IC and transistor sockets are fastened to a piece of electronic pegboard with Elmer's Glue-All. Relays were held in place with a loop of copper wire. Push-in terminals were used to mount all resistors and capacitors and all wiring was done on the bottom side of the board. The other components were mounted topside. Wiring was done from a connection list made up from the schematic (much the same way as kit wiring instructions are prepared). Common connections on the individual ICs were made first, using bare copper wire where a third connection was required. Before the board was mounted on small brackets in the box, short lengths of wire were soldered to tie points for runs to the panel-mounted components. The power supply was wired on a small board and mounted to the side of the box.

All common connections are made to bare bus wire, which is connected to the cabinet only at one point. All .001-μF bypass capacitors are installed as close as possible to the point where external leads enter the cabinet. These techniques are necessary to prevent rf leakage getting in and causing false keying.

Parts placement should present no problem. The first keyer was built on a foot-square board and haywired together with jumper wires, and it worked as well as the finished model.

Notes

The keyer is now being used on the air with very favorable comments received from all stations worked. No malfunctions have occurred in over a year of operation, although so far it has only been operated by the author. A very short time was required to get the feel of the unit.

Design was in the true amateur tradition, a lot of study along with experimentation on the circuit. No tests have been made except the unit's ability to produce code that sounds good.

No doubt, values of components could be improved by proper design methods. A transformer not shown on the diagram is being used between the receiver's speaker output and the keyer to match the headphones. The power supply regulates the voltage well but produces a little hum. The speed control shown on the diagram is not the one being used in the keyer; a later modification being used has a switch which shorts out resistors for three speed ranges. QST

NEW BOOKS

RCA Linear Integrated Circuits, Tech. Series IC-42, published by RCA Solid-State Div., Somerville, NJ. Paperback, 8-3/8 X 5-3/8 inches, 416 pages including index. Price: $2.50.

This latest edition of *RCA Linear Integrated Circuits* is somewhat meatier than previous copies of the booklet. It covers IC types CA3000 through CA3065, and gives technical data on each type.

The front section of the book contains 32 pages which deal with the basics – physical and electrical – of ICs. This part of the book is followed by 303 pages of down-to-earth theory and practical circuit examples relative to many of the ICs listed in the technical-data section at the back of the book.

This publication should be useful to beginners and experienced solid-state enthusiasts alike. Many of the circuit examples are adaptable to amateur radio applications, and in many instances one need only to change the *LC* constants to obtain ham band performance.

Among the circuit examples given are: Rf and i-f amplifers, mixers, balanced modulators, limiting amplifiers, converters, product detectors, and video amplifiers. Additional circuit examples deal with audio amplifiers, fm limiter/detectors, solid-state switches and controls, and pulse generators.

Another section of the book covers fabrication, packaging, and mounting of integrated circuits. Information is given on thermal considerations, and techniques are shown for connecting the ICs to the circuits being used. In the final analysis, this book can do much toward improving the reference library of any amateur station. – *WICER*.

Technical Correspondence

MORE ON OPERATIONAL AMPLIFIERS

Technical Editor, *QST*:

Reference is made to the recent article by WA0TCU.[1] The following circuits may interest hams looking for additional information on integrated-circuit operational amplifiers. Fig. 1 shows an astable multivibrator. This generates clean, symmetrical square waves, the frequency being determined essentially by the time constant *RC*. When the voltage at A (V_A) is rising, it is coupled through R1-R2 to the noninverting input, causing V_A to rise still further until it saturates at +V, the supply voltage. Capacitor *C* now charges through *R* towards +V, but since *C* is connected to the inverting input, the output voltage V_A starts to fall when V_E becomes nearly equal to V_B. Because of the coupling from A to B, the output voltage keeps falling until it saturates at -V. The charging of *C* is now towards -V, and the process reverses itself, completing the cycle. The frequency of the square wave is approximately equal to

$$2\ RC\ \log_e\ (\ 1 + 2\frac{R1}{R2}\ )$$

The circuit produces square waves of 24 V pk-pk, frequency from 120 to 3000 Hz. A triangular wave of the same frequency as the square wave can be tapped from E. This wave arises from integration of the square wave. Its amplitude, however, is frequency-dependent. A triggering or synchronizing signal may be applied at the "sync" input.

[1] Pike, "The Operational Amplifier," in two parts, *QST*, August and September, 1970.

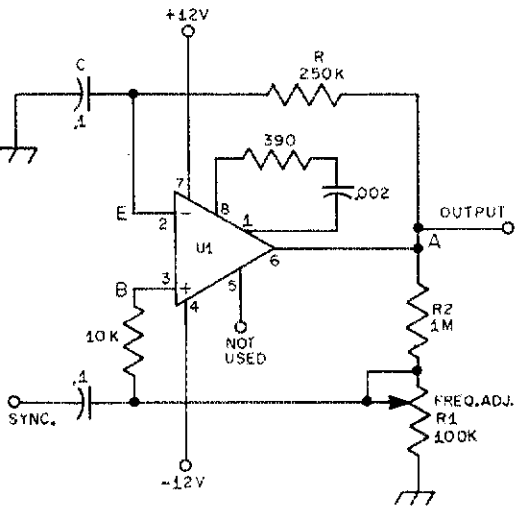


Fig. 1 — Astable multivibrator. Here and in Fig. 2 resistances are in ohms, K = 1000 and M = 1,000,000. Capacitances are in microfarads (μF). U1 - Integrated-circuit operational amplifier, Motorola MC1439G, Fairchild μA709, or 709C or equiv. All other part designations are provided for text reference.

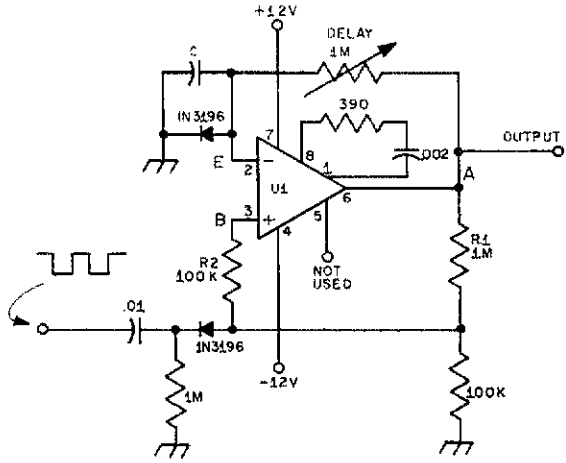


Fig. 2 — Monostable multivibrator.

Fig. 2 shows a monostable multivibrator. This circuit has a stable state where V_A is at positive saturation. This is because the diode across C clamps its voltage at +0.6 volt on the positive side. When V_E is caused to go negative, the diode has no effect and the circuit behaves the same way as the astable multivibrator. An incoming negative pulse drives B negative, causing V_A to fall rapidly to negative saturation (because A is coupled to B through the divider R1-R2). There it remains, until the capacitor voltage V_E overtakes V_B, causing the circuit to switch back to the stable state with V_A at positive saturation. The capacitor cannot charge to V_A this time because it is clamped by the diode. Thus, this circuit, on being "flipped" to its unstable state by a negative pulse, stays there for a certain time interval, and then "flops" back to the stable state. With a value of 1 μF for *C*, the time delay can be varied from 0.8 to 135 milliseconds. — *Bhaskar Balakrishnan, VU2QV/W2, Physics Dept., State Univ. of N.Y., Stonybrook, NY 11790.*

Strays

Feedback

Arrow Electronics, Inc., of Farmingdale, NY, was listed incorrectly in the table on page 14 of October *QST*. The firm's name is Arrow Electronics, Inc., and not Arrow Electronic Supply. Their response to our poll indicated that catalogs were available, "while the supply lasts." They have informed us that catalogs are no longer available. — *WICER*

— • • • —

In October *QST*, page 40, Fig. 1, "A Combination Wattmeter, Voltmeter and Field-Strength Meter for VHF," there is an error in the placement of resistors on S1A and S1B. The resistors on S1A should be on S1B and those on S1B should be on S1A.

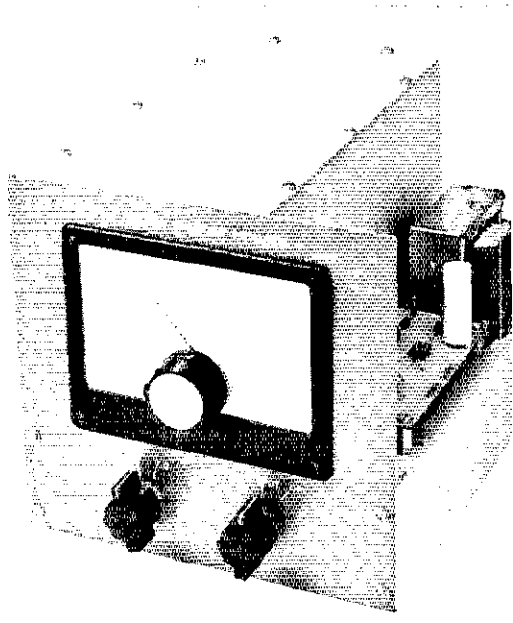
— • • • —

The 2N5060 specified for Q1, Fig. 1 on page 48 of *QST* for November 1970, is *not* a UJT. A suitable type, however, *is* 2N4871.

• *Beginner and Novice*

A High-Output VFO for a Beginner's Transmitter

BY PETER ZILLIOX, WA3EQK*



Front view of WA3EQK's VFO. The unit operates on 3.5 to 4 and 7 to 7.3 MHz. Included are a 2-watt amplifier and broadband rf transformers so that the VFO can drive tube-type transmitters directly.

WHEN A Novice graduates to a higher-class license, he wants to take advantage of his new privileges as soon as possible, including the use of a variable-frequency oscillator. A VFO will permit the operator to control his transmitter operating frequency without investing in a bank of crystals. Most of the beginners' transmitters use tubes, and the first stage of such a rig requires 15 volts or more drive from a VFO. The solid-state variable-frequency oscillators described in ham publications have a number of outstanding features, but have only one or two volts output - not nearly enough to drive a tube-type transmitter.

The unit shown in the photographs is based on a collection of proven circuits from past *QST* articles.[1] It is possible to use the VFO as an 80/40-meter QRP transmitter. As such, it will deliver up to 2 watts into a 50-ohm load by omitting the output impedance-matching transformers. In a trial, the VFO was keyed by breaking the 13-volt lead from the power supply. Surprisingly, no chirp resulted. The daring may wish to try this approach, but a keying filter should be added to prevent clicks. Those interested in a QRP VFO-controlled rig, however, should add a second buffer stage such as shown in "Once More with QRP" (*QST*, August, 1970).

Circuit Data

The circuit is given in Fig. 1. The VFO and buffer stages are identical to those previously described in *QST* for June, 1970. In the oscillator stage, the base bias resistor, R1, was changed to 15,000 ohms. This modification reduces the sensitivity of the oscillator to variations in supply voltage. Also, the buffer stage is coupled to the power amplifier through a .001-μF disk ceramic capacitor, instead of the 47-pF unit specified originally.

The power amplifier stage is identical to a design that appeared in *QST* (June 1969), and in the 1970 edition of *The Radio Amateur's Handbook*. The output half-wave filter is designed to match 50-ohms at each end. The input impedance of a tube operated in Class C is high, usually in the range of 5000 to 50,000 ohms. An impedance transformer consisting of L9-L10 for 7 MHz and L11-L12 for 3.5 MHz matches the low-impedance output of the VFO to the first stage of a transmitter. The capacitance of the output cable (36 inches of RG-58/U) tunes the output transformers, producing a broadly-peaked response centered at 3.7 and 7.15 MHz. If a different length of connecting cable is used, the builder will have to add or subtract turns on L10 and L12 to set the resonant frequency of the transformers at the center of the 40- and 80-meter bands, respectively.

A regulated power supply provides the positive voltage required for the transistors. A 24-volt transformer, a full-wave rectifier, and a Darlington-connected pass transistor are employed. The supply has excellent regulation and filtering, which is a necessity for any VFO.

*Room 410, Beaver Terrace Apartments, State College, PA 16801

[1] DeMaw, "The 'QRP 80-40' C.W. Transmitter," *QST*, June, 1969; DeMaw, "Building a Simple Two Band VFO," *QST*, June, 1970.

Going General? Here is a VFO with sufficient output to drive most of the popular two- and three-tube cw transmitters.

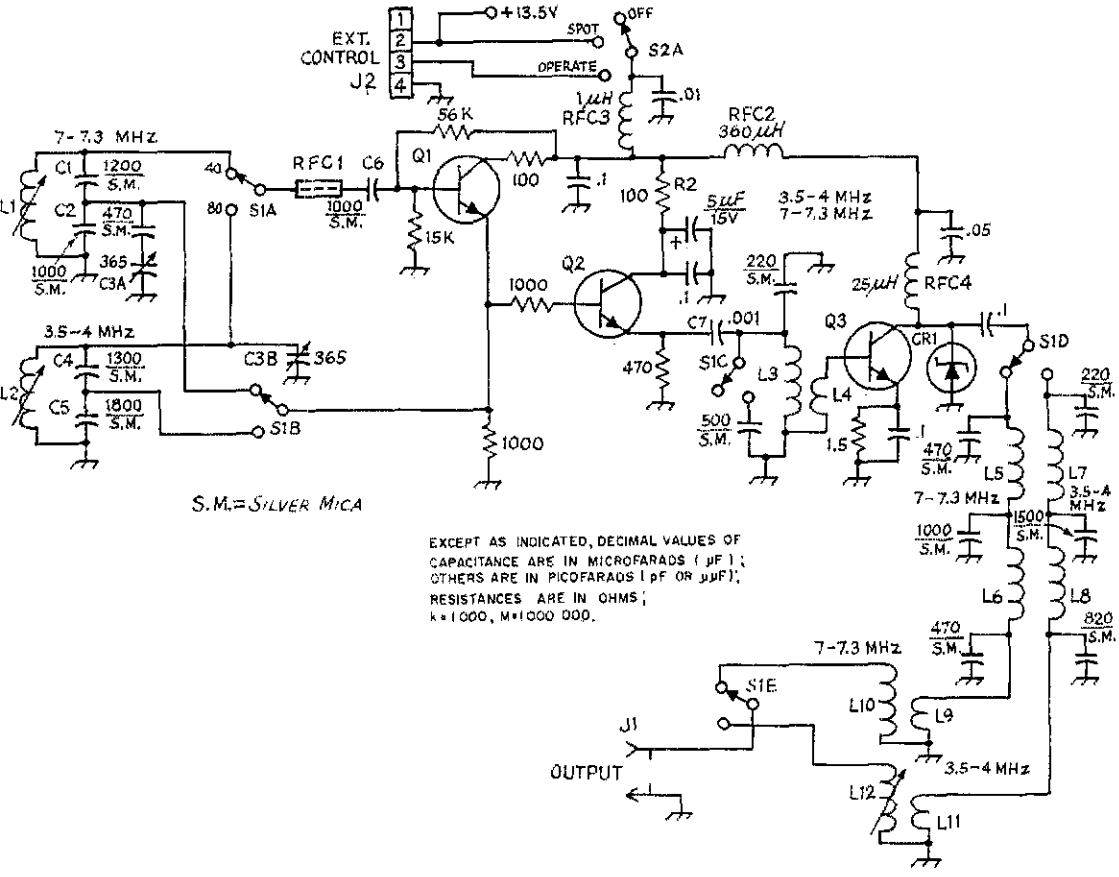
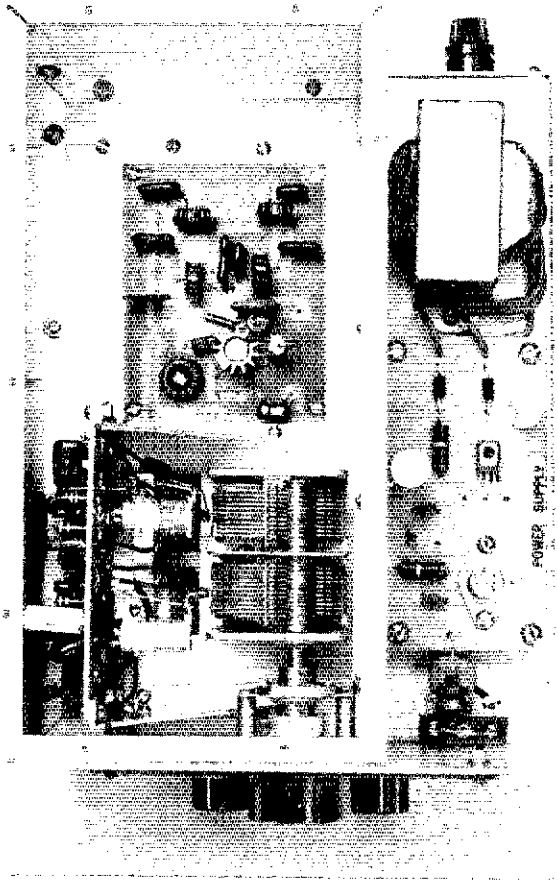


Fig. 1 — Schematic diagram of the VFO. Resistors are 1/2-watt composition; capacitors, except those marked as silver mica, are disk ceramic. Parts not listed below are marked for text reference.

C3 — Dual-section air variable, 365 pF per section (Miller 2112).
CR1 — Zener, 36 V, 1W.
J1 — Phono connector, panel mount.
J2 — 4-terminal ceramic strip (Millen E-304).
L1 — 0.68-1.25 μH, slug tuned (Miller 42A106CBI).
L2 — 2.2-4.1 μH, slug tuned (Miller 42A336CBI).
L3 — 2 μH, 25 turns of No. 24 enam. wire on Amidon T-50-2 toroid core (Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607).
L4 — 12 turns No. 22 hook-up wire over L3.
L5, L6 — 13 turns of No. 20 enam. wire on Amidon T-68-2 core.
L7, L8 — 18 turns of No. 20 enam. wire on Amidon T-68-2 core.
L9 — 7 turns of No. 26 enam wire over L10.
L10 — Approx. 3 μH, Miller 4405 with the slug and 4 turns removed.
L11 — 7 turns No. 26 enam. wire over L12.
L12 — 23 μH (Miller 4407).
Q1 — HEP-55.
Q2 — HEP-758.
Q3 — 2N2102.
RFC1 — Three Amidon ferrite beads on a 1/2-inch length of No. 22 wire. A 15-ohm resistor may serve as a substitute.
RFC2 — Miniature choke (Millen J300-360).
RFC3 — Miniature choke (Millen 34300).
RFC4 — 2.5 μH rf choke (Millen J300-25).
S1 — Home-assembled switch made from a Centralab PA-272 kit and 3 Centralab RRD sections.
S2 — Ceramic rotary switch, 2 pole, 3 position, one section, non-shorting contacts (Mallory 3223J).

Construction

The VFO is built on a 7 X 9 X 2-inch homemade chassis, but a Bud AC-409 can be used. The oscillator and buffer stages are constructed on an etched circuit board. A template for the oscillator board appeared in the original *QST* article. Positioning of the circuit board is important, as short leads are necessary to the variable capacitor and band switch. Two holes are cut in the shielding box that surrounds the oscillator compartment, allowing access to the VFO tank coils for alignment purposes. The shield is cut from sheet aluminum and is bent to fit over most of the chassis, allowing a space along one side for the power-supply components. A shield is necessary to protect the low-level circuits from rf fields and to improve the mechanical rigidity of the chassis.



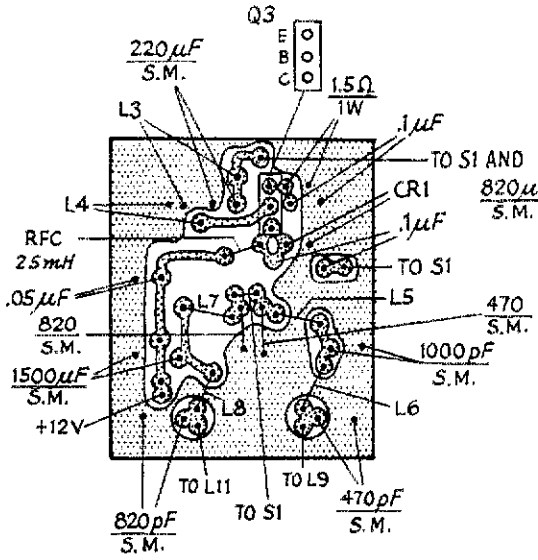
Top view, with the cover removed, of the rf compartment. The VFO board is mounted on two aluminum brackets. All leads from this circuit board should be made with heavy wire to minimize mechanical instability from vibration. The amplifier board is flush-mounted on the chassis. The dual-section broadcast-variable capacitor is driven by a Miller MD-4 dial. L1 and L2 are adjusted through holes cut in the left side of the shielded compartment.

A template for the power-amplifier etched board is shown in Fig. 2. This component mounts over a 2 1/2 X 3 1/2-inch hole cut in the chassis. The hole is smaller than the board to provide enough lip overhang to pass the mounting bolts. Lock washers must be employed between the board and the chassis to insure a good electrical connection.

The band switch, S1, is a custom-built assembly made up of Centralab RRD wafer sections and a PA-272 kit. One end of the switch is supported by the front panel, while the center and end sections are held rigidly in place by homemade aluminum brackets (see Fig. 5). The power supply components, with the exception of the transformer, are mounted on a third circuit board. Point-to-point wiring can be used, if desired. A template for the power-supply circuit is illustrated in Fig. 3.

Be careful when mounting the TR-23C pass transistor to insure that the bolts used do not short to ground on the circuit board. The case of the TR-23C is internally connected to its collector. One mounting screw is used as the collector connection to the foil lead on the board, while the other is left "floating." The completed supply should deliver about 13 volts, and a 20-percent variation in line voltage should not affect the 13-volt output level.

A Miller MD-4 vernier dial provides a dual rate for the TUNING capacitor. A ratio of 6-to-1 is used for quick excursions across a band, while a 36-to-1 tuning rate is available for smooth "zeroing in."



NOTE - *S.M. = Silver Mica*

Fig. 2 — Half-scale template for the 2-watt amplifier stage, as seen from the foil side.

Alignment and Operation

L1 and L2 are used to set the 40- and 80-meter dial calibration, respectively. A well-calibrated receiver can be used to spot the VFO output while marking the dial face. The 20-, 15- and 10-meter bands are reached by frequency multiplication of the 40-meter VFO output in the succeeding transmitter stages, and can be marked on the dial below the 7- to 7.3-MHz hash marks. L12 and L10 are adjusted at 3.7 and 7.15 MHz, respectively, for maximum drive to the transmitter.

If the transmitter to be VFO controlled doesn't have provisions for an external oscillator input, circuit changes may be necessary in its first stage. The feedback in the tube-type oscillator shown in Fig. 4A is supplied by the plate-to-grid capacitance in the tube. If the drive from the VFO is applied directly to this stage through the crystal socket, spurious oscillation can result. One cure for this problem is to load the grid by shunting a composition resistor, 680 to 1500 ohms, across the

(continued on page 63)

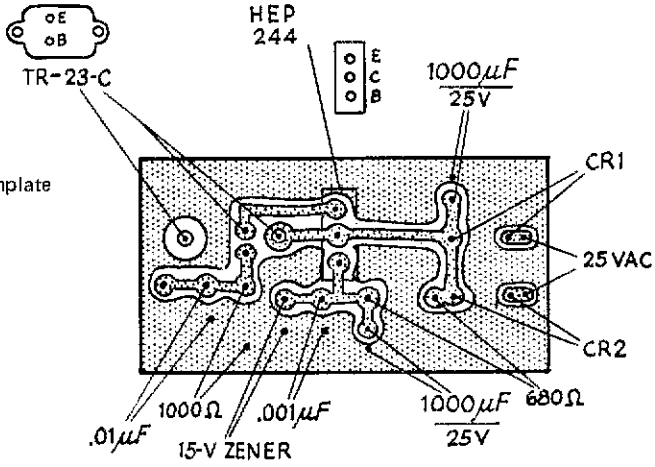


Fig. 3 — Foil side, half-scale template for the VFO power supply.

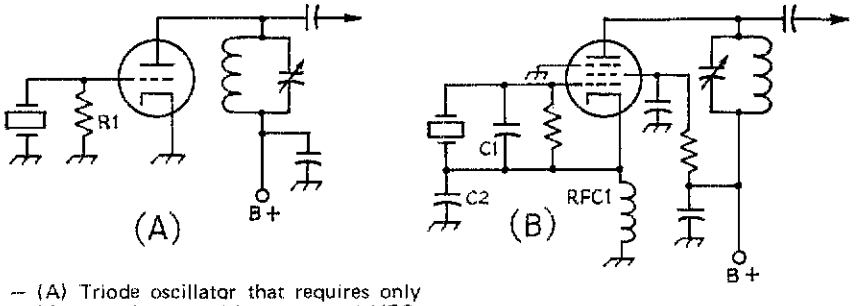


Fig. 4 — (A) Triode oscillator that requires only slight modification for use with an external VFO. (B) The circuit using a pentode tube must be modified by grounding the cathode, shorting out RFC1 and C2. Parts labeled are for text reference.

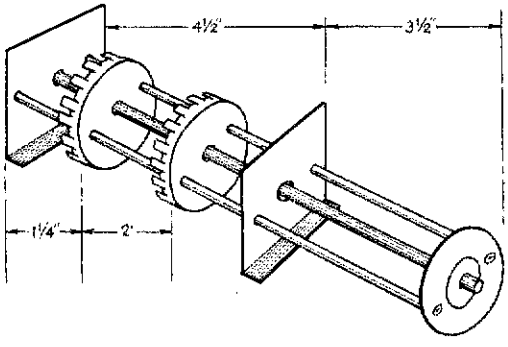
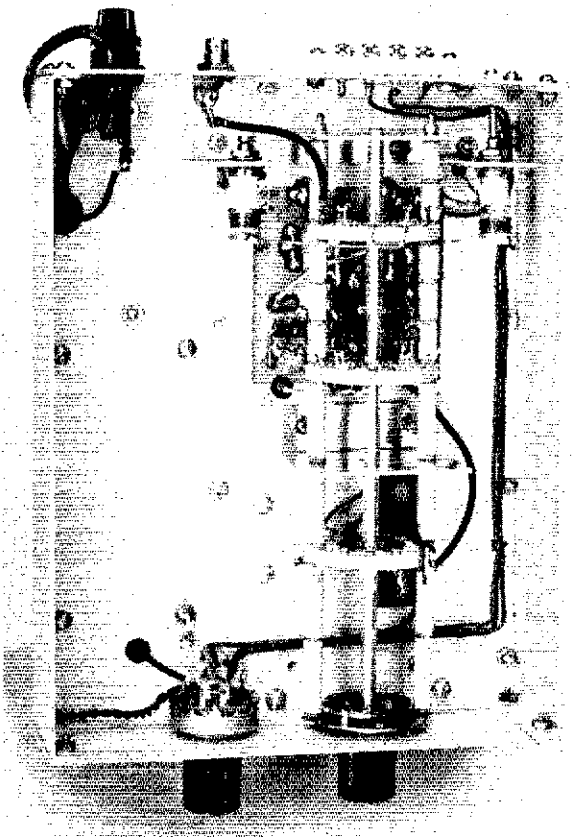


Fig. 5 — Detail of switch assembly — see text.

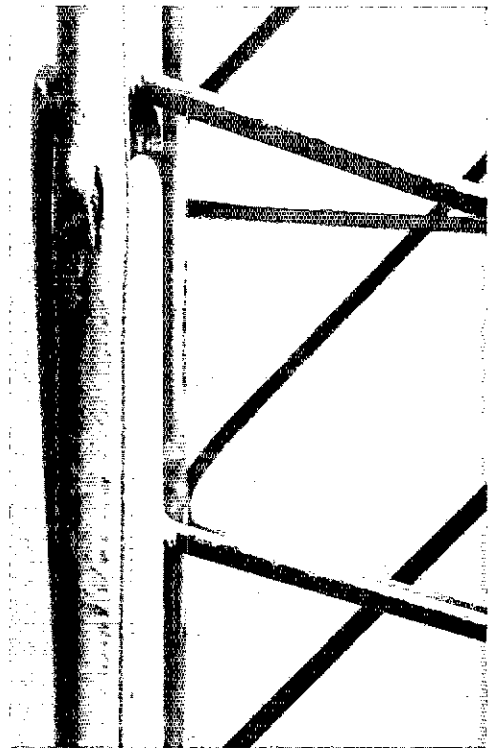


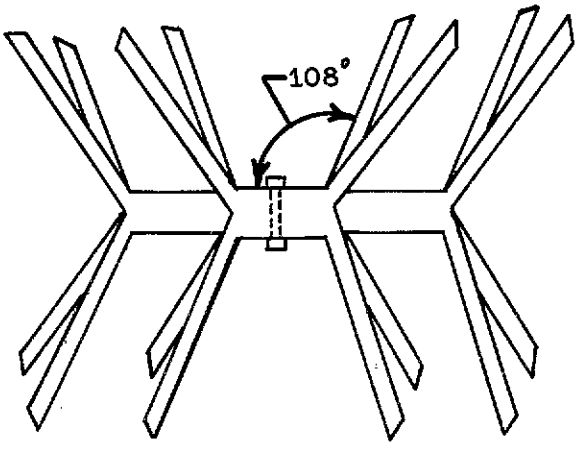
The bottom view of the VFO shows only the two switches and the output transformers — other components are mounted on the etched-circuit boards "topside."

Hints and Kinks For the Experimenter

SPIDER QUAD MOUNT: SIMPLIFIED

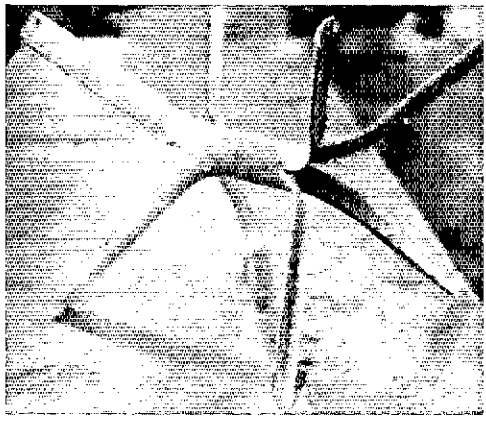
There seems to be a growing interest in the spider quad. The photograph shows my version of a hub or "spider" mount. Using a 2-foot length of 2-inch diameter steel pipe, a mount can be constructed easily. Two cuts, 10 inches long, are made through the diameter at each end of the pipe. This leaves 4 inches in the middle for the boom. The cut ends are then bent to an angle to suit the desired spacing. The unit shown in the photograph is bent to 108 degrees. The spreaders may be attached to the boom mount with hose clamps, bolts, or wire.





The beauty of this design is that it can be made to any size desired. Also, it can be enlarged to a four-element version as shown in the sketch.

One of these spider mounts is in use at KP4DJI (constructed by KP4DIO and KP4DJI) using bamboo spreaders. The results have been excellent. *Lynda B. Crowley, KP4DIP*



SEALING TOWER LEGS

Fold-over towers that have steel tubing for legs can be damaged by water accumulation. When my tower folds over, the open ends of the legs are exposed and rainwater can collect therein. In winter, the water could freeze and split the tower legs.

Certain precautions should be taken when the tower is installed. First, the tower sections should be checked to insure that there are no obstructions which might block any water or condensation. Then, the exposed ends of the legs at the hinge section should be sealed. I used corks which were first soaked in spar varnish. – *Dr. Ben Sloan, WA5WOT.*

KEYER CORD

If, when a new telephone is installed, the standard 8-foot receiver cord is replaced by a longer extension (an accessory available from most telephone companies), the original cord is usually left behind. This 8-foot cord makes a good keyer lead, headphone wire, or equipment interconnecting cable. – *Kurt T. Meyers, WA2LDX/W8IBX.*

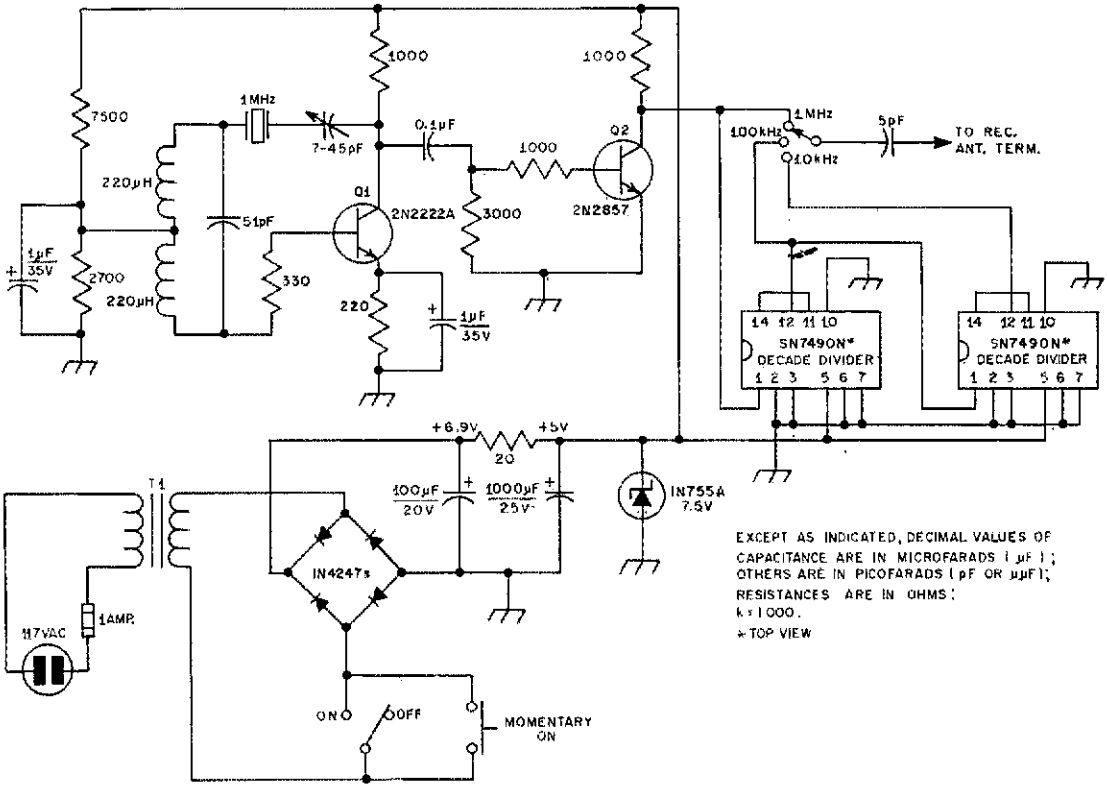


Diagram of the crystal calibrator. T1 is a Stancor PC134. All resistors are 1/2 watt composition.

A HOMEMADE TELEPHONE COUPLER

In some areas of the country where the operating telephone company is not part of the Bell System, voice couplers for the interconnection of ham phone patches are still not available. The amateur can build his own coupler; a schematic diagram for a unit similar to Bell's QKT is shown here. But, the user should obtain permission and cooperation from the local phone company before installing the unit. – *J. B. Berry, Jr., W4PME*

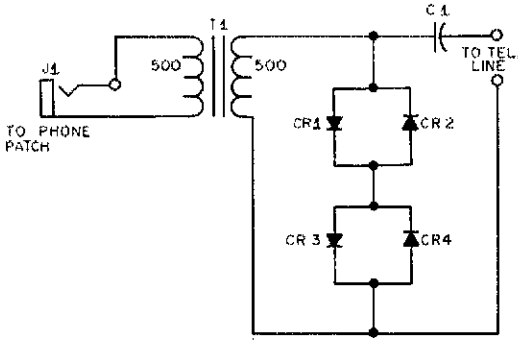


Diagram of the protective coupler for telephone interconnection. C1 is a 2- to 4-μF nonpolarized paper capacitor with a working voltage of 200 or more. The diodes, CR1 to CR4, incl., are 100-PRV, 1-A silicons. J1 is a phone connector (panel mount), and T1 is a 500- to 500-ohm miniature transformer (Lafayette AR162).

A CRYSTAL CALIBRATOR FOR GENERAL-COVERAGE RECEIVERS

When using a general-coverage receiver it is sometimes difficult to find a specific frequency on the higher bands. With the fast tuning rate and close-spaced dial divisions found on many receivers, the operator has difficulty determining which of the 100-kHz calibrator points is the desired one. Using the calibrator shown in the diagram, 1-MHz points can be spotted easily. From that point it is an easy matter to find any 100-kHz segment, and then any 10-kHz frequency marker.

I find it advantageous to have only one crystal to beat against WWV. The 7.5-volt Zener does not conduct under ordinary circumstances, but was included to protect the SN7490s in case one of them should become defective and let the dc bus rise above the allowable maximum of eight volts.

Since there is no warmup time required, a push-button switch is included for quick checks. Shielded wire should be used between the switch and the SN7490. – *Glen D. Benskin*

BUG CONTAINER

A handy carrier for your bug is an old lunch box. That's how I take mine to Field Day. – *Jack Nelson, W2FW.*

Midlatitude Intense Sporadic-E Propagation *In Two Parts*

Part I – Causes and Results

BY MELVIN S. WILSON,* W1DEI/W2BOC

SPORADIC E-layer propagation has been observed and studied for well over 30 years, but its highly complex nature has so far defied complete explanation. There are many types and intensities of abnormal E-layer ionization which are classified as E_s, and the vhf radio observer may find scientific literature difficult to interpret. Most vhf skip is associated with the very complex internal structure, not the general formation, of E_s. Fortunately, vhf amateurs need only an understanding of the general mechanism of skip phenomena and the practical behavior of intense E_s occurring in the temperate latitudes.

Similar E-layer skip phenomena, also called E_s are observed at polar and equatorial latitudes, but these are associated with distinctly different mechanisms. At very high latitudes, E_s can be caused by charged-particle precipitation along geomagnetic field lines. At the magnetic equator, daytime E_s is associated with the equatorial electrojet.

Midlatitude E_s appears in many complex forms, but good vhf skip propagation takes place only during *intense* E_s. This is a small cloud or turbulence of high density, imbedded in a thin sheet or stratification of ionization at the base of the E layer. In the northern hemisphere it occurs predominantly from May through August, with a minor peak in midwinter. This seasonal character is reversed in the Southern Hemisphere. Though vhf E_s skip occurs most frequently in morning and late afternoon, there is no clear evidence from oblique propagation data that there are two maxima per day. It appears to be generated during daylight hours, but once formed it may continue into darkness, at least in summer. At the beginning and end of the season, the late afternoon seems to be favored. Data from satellites and from some ionospheric stations indicate that intense E_s occurs more frequently over water than land, but this may be a geographical effect.

* 17 Van Cortland Drive, Pittsford, New York 14534.

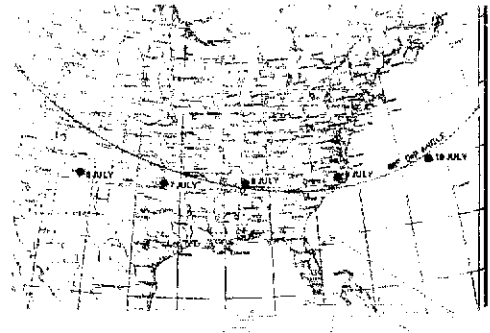


Fig. 1 – Eastward movement of the apparent "birthplace" of intense E_s, obtained from analysis of amateur 50-MHz observations, July 6 through 10, 1964. Movement is quite consistent, and along roughly geographical latitude lines.

Electron-density profiles of E_s indicate an extremely sharp ledge or sheet, where the density may increase by a factor of three or more within a few hundreds of feet, and return to ambient in less than a mile. The height is usually 100 to 110 km. The kind of ion within an E_s layer has been the subject of discussion for many years, and no satisfactory explanation for both daytime and nighttime ion content has been found. Vhf radio data show no difference between the day and night behavior. For the cause of E_s we must look for the interaction of the geomagnetic field, electric potential, and the motion of the ionosphere.

Theory

The presently-accepted mechanism for the formation of E_s is wind shear. This explains ambient ionization being redistributed and compressed into a ledge of high density without the

Mel Wilson must surely hold the record for man-hours spent by an amateur in the investigation of propagation phenomena. He's been at it since the 1930s, and his first discussion of E_s *in* QST *was in the September, 1941, issue. Long-time 6-meter men know him well, for nearly all of them have been subjected to his probing of their experiences and observations.*

An operator as well as a student, Mel has made almost a lifetime game of refining his approach to the explanation and prediction of sporadic-E skip openings. When he talks or writes of his favorite subject, it is with a rare combination of technical insight and typical ham enthusiasm. No vhf man should miss what he has to say here.

need for production of extra ionization. Neutral winds of high velocity, flowing in opposite directions at slightly different altitudes, produce shears and, in the presence of the geomagnetic field, the ions are collected at a particular altitude, forming a thin over-dense layer. Data from rockets penetrating E_S layers confirm the electron density, wind velocities and height parameters.

Simple wind-shear theory is not adequate to account for the seasonal and diurnal changes in the occurrence of sporadic E layer. Horizontal wind profiles have no significant seasonal variations, though daytime data are incomplete. Some other factor must cause the summer peak and winter minor peak. A vertical gradient of electric field can be achieved by a wind shear, and studies of electric polarization fields at E-layer height have shown influence on the peak ionization density, height, and growth rate of E_S. One theory states that an underlying northward electric field, accompanied by an overlying southward electric field, causes an accumulation of ionization due to upward drift from the lower layer and downward drift from the upper one. This condition can be caused by an underlying neutral wind, direc ted toward the east, and an overlying wind directed toward the west. Such fields can explain the observed occurrence of E_S in the Northern and Southern Hemispheres. Vertical current flow above the dynamo region (E layer) can occur along magnetic field lines, and thus produce coupling between the two hemispheres. Since the coupling is a function of solar angle, the diurnal behavior of E_S can be explained on the basis of the observed negative correlation of strong electric fields, which would require the sun to be low on the horizon in the opposite hemisphere.

Sunspot Correlation

Since midlatitude sporadic E is directly associated with terrestrial or meteorological rather than solar phenomena, it is not surprising that the occurrence of intense E_S does *not* show direct correlation with sunspot activity. Attempts to establish one have produced both positive and negative results. Data collected over the past three sunspot cycles, though admittedly short, indicate no direct correlation. Any statistical approach does indicate clearly the advance of vhf technology, and the increase and redistribution of activity. Synoptic coupling between the neutral and plasma components of the earth's atmosphere must be better understood before the relationship of intense E_S and the sun's energy can be identified.

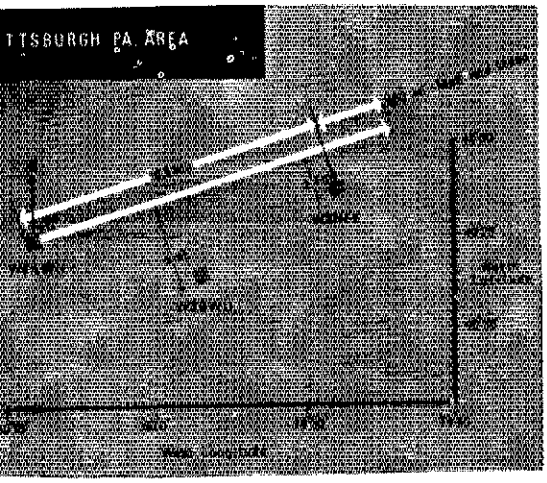


Fig. 2 — Locations of 50-MHz stations W3KWH, W3BWU and W3HFE, whose signals were used in the simultaneous recordings of Fig. 3.

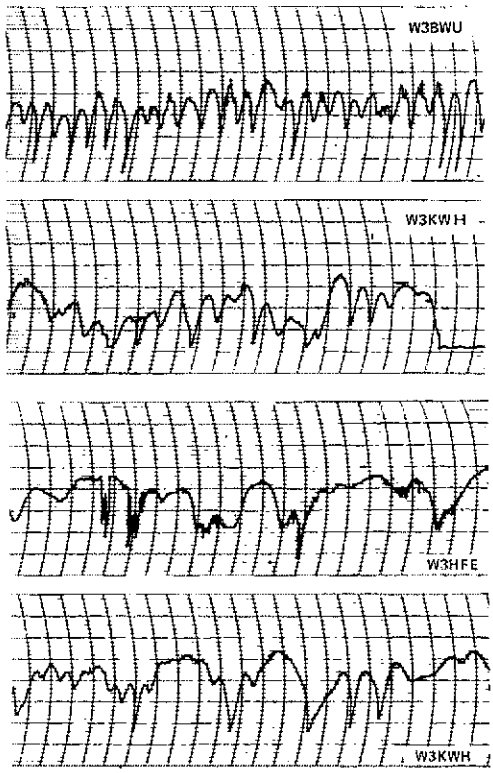


Fig. 3 — Simultaneous fading patterns of W3BWU and W3KWH, upper, and W3HFE and W3KWH, lower, recorded Aug. 1, 1965.

Geomagnetic Activity

The occurrence of intense E_S is markedly reduced at middle latitudes when the earth's magnetic field is disturbed. This effect is pronounced at higher latitudes, and tends to disappear below 30 to 35 degrees. An explanation of this might be the interaction of strong electrostatic fields in the dynamo region, created at great heights and transported along magnetic field lines to the E layer. This is consistent with the theory explaining seasonal variations.

E-layer skip appears during some auroras, and though it behaves like intense E_S it is an entirely different phenomenon. Auroral-charged particles precipitate along the magnetic-field lines to the height of the E layer and the lesser charged

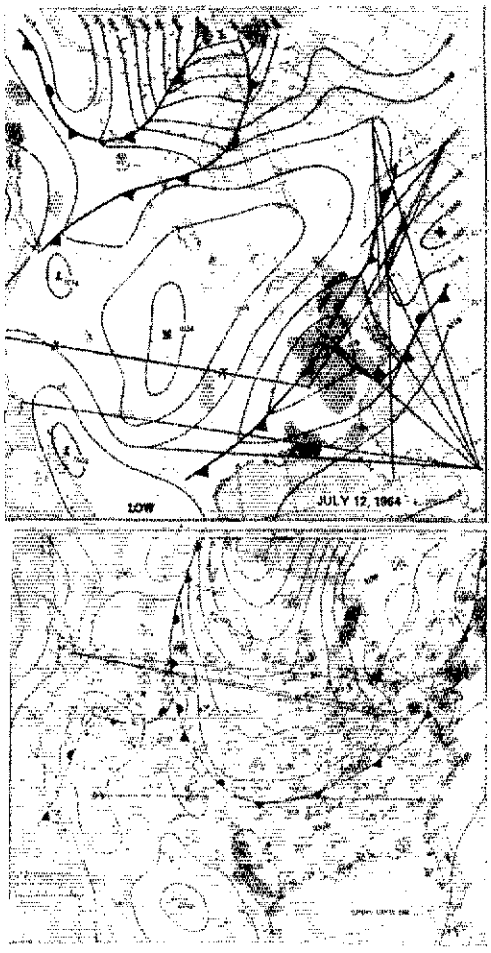


Fig. 4 — The birthplace of intense E_S clouds in regions associated with weather fronts is shown in a general way on surface weather maps for May 29, 1966, A, and July 12, 1964, B. In the latter, the exception of double skip transiting a "high" is discussed in the text.

particles collect in a thin irregular sheet or puddles of ionization, along some magnetic dip-angle contour, usually during the auroral substorm or breakup. It is believed that, if this field-aligned particle precipitation forms a continuous intense ionization strip along a magnetic dip contour, it can act as a duct for the propagation of vhf signals. This sometimes happens over thousands of miles, with signals so propagated having clean modulation characteristics. Experienced 50-MHz observers in northeastern U.S.A. know this condition well, as do the few amateurs who have used the 50-MHz band in the very high latitudes.

Motion of Intense E_S

Vhf radio data indicate that intense E_S clouds are formed at a discrete location, and usually are transported from this birth location until dissipated. During peak periods numerous clouds are produced at the birthplace, in a series. It would appear that the production of intense E_S is the result of eddies or other turbulence at the height of the E_S sheet. This sheet may be mechanically wrinkled and folded over at some critical value of wind shear, forming an intense small volume of ionization. When several birth locations are present, clouds often appear along a series of broken lines. Since both wind and turbulence are present, the former maintaining the latter, the transportation of intense E_S to another location, where it dissipates, can be explained.

Most data indicate that the favored direction of motion of clouds for eastern United States is northwest, at a speed of about 180 mph. Paths appear to be straight lines, and there is no great variation in speed. Tracks have been plotted for more than 6 hours and some 1200 miles in length, using 50-MHz oblique-angle transmission paths.

Over continental U.S.A. the cloud birthplace is often found to move *eastward* at a rate of 10 to 15 degrees longitude per day. This motion, Fig. 1, is not always apparent; clouds may not be formed every day, and there may be other locations of intense E_S to mask this effect. It is significant that the motion follows *geographical*, not geomagnetic latitude lines. Based on very limited data from above the US border, it appears that the approximate average of 12 1/2 degrees per day is independent of latitude. It is probable that this effect is related to the general atmospheric circulation.

Size of Intense E_S *Clouds*

The physical size of individual clouds, as deduced from vhf data, appears to be very small; in the order of tens of feet, horizontally and vertically. Ionosonde, backscatter and rocket techniques do not have sufficient resolution to measure intense blobs, so oblique vhf radio measurements are a very valuable technique. An experiment of this kind was undertaken with transmissions from three closely-spaced 50-MHz amateur stations in the Pittsburgh area, Fig. 2. Two of the three stations were approximately along the line, and two were essentially normal to the transmission path. The receiving location was Medfield, Mass., near Boston. The experiment started when the intense cloud was just west of Scranton, Pa. The short path, 463 miles, was chosen to maximize the geometric effect. Only two stations could be recorded simultaneously, so Fig. 3 shows typical fading rates for two pairs of stations. The obvious difference in fading indicates separate transmission paths and possible multipath effects, implying small-grain differences within a cloud, in both horizontal and vertical dimensions.

Signal Intensity

Signal strength observed over the vhf range does not appear to be frequency-dependent. Professionals say that E_S is frequency-dependent, thought at times a sort of "saturation effect" may make 144-MHz skip signals *seem* as strong as those heard in a normal 50-MHz opening. Direct comparison must include wave-path geometry involved, for proper evaluation. The general condition of low

attenuation at the muf, and lower signal strength at frequencies below the muf, does not apply, except as dictated by wave-path considerations.

Bearing and Angle of Elevation

Skip propagation of vhf waves is via one or more very small clouds, and the elevation angle and bearing of a received signal are determined uniquely by wave-path geometry. The receiving angle of elevation is determined by the distance between the cloud and the observer, varying from essentially zero to greater than 45 degrees. The probability of high angles is small, since it is a function of cloud intensity and distance to the cloud. With a 1000-mile station-to-station distance, the elevation angle may vary up to about 10 degrees.

The bearing of the signal is determined by how far the cloud is from the great-circle path. The deviation has been measured to be as much as 15 degrees for less than 1000-mile paths. This is extreme; usually it will be less than 3 degrees. It must approach the great-circle bearing as the distance approaches 1250 miles, if only a single cloud is involved. In transmitting, it is obvious that the beam should be aimed at the intense E_s cloud or formation.

Frequency Dependence

The muf of intense E_s clouds is a function of their ionization density. The highest frequency which can be propagated obliquely is not known, but it has been reported to approximately 200 MHz, a number of times. From available data it appears that the probability of the muf increasing drops exponentially with frequency, and that the probability of it doubling is about 10 to 12 percent. The probability of a 100-MHz opening is about 10 percent, and a 144-MHz opening about 3 to 4 percent, of the occurrence of 50-MHz openings. The occurrence of high muf varies considerably from year to year. The 2-meter band is not reported open for skip as frequently as it appears that it might be, possibly because of the lack of activity at required times and areas, thus preventing its observation.

Weak signals are propagated slightly above the muf by an enhanced form of scatter, which changes quickly to strong-signal propagation as the muf increases. During an opening signals may be extremely strong and steady, or have rapid fading rates, which are due to cloud-intensity changes and multipath propagation. The horizontal structure of clouds is irregular and turbulent. As the opening continues, fading rates usually change, but this may result from cloud movement and a resulting change in wave-path geometry. As the muf drops below the observing frequency the enhanced-scatter condition returns for a short time.

It is often observed that propagation slightly above the muf of an intense E_s cloud can be accomplished with low attenuation, if more than one cloud is included in the wave path. This anisotropic transmission path is often found in the data, and when clouds form in one or more rows, all reported paths are in the same direction, and are parallel to each other. As the muf increases, intense E_s reflections become isotropic. The reverse takes place as the muf decreases.

Very high muf usually occurs at the birthplace of intense E_s, but only after intense clouds have been produced for an appreciable time. A possible exception may be when intense clouds pass through a second generating location, where data show that existing clouds may be intensified.

Correlation with Weather

Correlation of meteorological phenomena with the appearance of intense E_s was first noticed in the late 1930s. The birthplace (though not necessarily the occurrence) of intense E_s is often associated with an area of precipitation or with a front between two large different air masses. This is especially apparent when double skip is present, and usually cross-country skip occurs when low pressure dominates the transmission path. Conversely, intense E_s has rarely first appeared above a well-developed stable high-pressure air mass during the past 30 years. Even these occasions may be the result of cloud motion, since the data available are not sufficient to establish the birthplace. This correlation is not apparent in the winter peak. A typical weather pattern during cross-country skip is shown in Fig. 4A. A cross-country path transiting a high-pressure area is shown in 4B, but note that no intense E_s is present over the high. Only ground reflection or tropospheric refraction is required for the transmission path.

The relationship between the generation of intense E_s and weather fronts is not always obvious. Often the influx of a warm air mass moving northward, interfacing with cold air from the north (sometimes, but not necessarily, causing thunderstorm activity) coincides with the generation of intense E_s. Such meteorological phenomena may act as a triggering mechanism, involving the interaction of the electrostatic potential gradient and the earth's magnetic field, at the height of the E layer.

Another interesting observation from the 1930s was correlation of intense E_s with the moon. Theories of that day were short-lived, but data gathered since do show a subtle association. Though there is a statistical reduction in the occurrence of intense E_s on the day the moon is between the earth and the sun, the phase of the moon has no correlation with E_s. The importance of the moon is noticed in the time of day E_s appears, rather than *whether* it appears. The probability rises noticeably 2 to 3 hours after moonset, and there is a secondary peak some 2 hours after moonrise. A low probability occurs a few hours after lunar noon. This may be due to gravity tides influencing the mechanism causing the intense E_s, since lunar winds have little effect on the ambient E layer. Lunar tide winds are predominently westward at local times corresponding to statistically-important local hours of occurrence of E_s and thus can form the coupling with the eastward winds to produce the required wind shear.

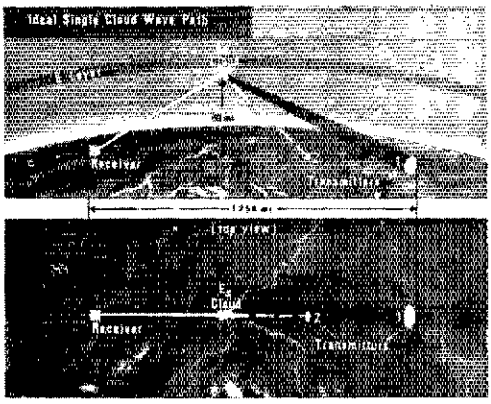


Fig. 5 — Single-cloud wave path, as viewed from a distance, and from above.

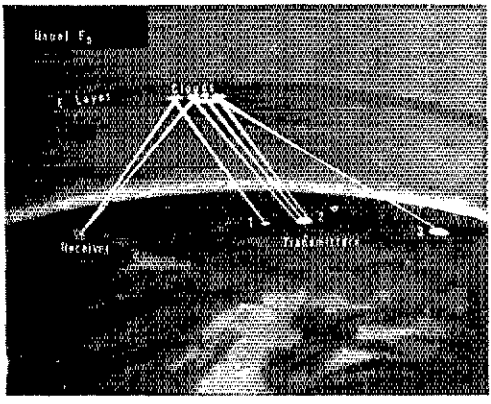


Fig. 6 — A series of clouds, usually along a line, presents a variety of wave paths and fading patterns.

VHF Radio Data

Radio amateurs and TV and fm DXers, employing oblique radio transmission techniques, have observed intense E_S closely for many years, resulting in volumes of data concerning its behavior. This information has complemented data obtained by the scientific community, hopefully leading to an eventual full explanation of E_S phenomena.

The yearly occurrence of intense E_S, as observed via vhf propagation for some 35 years, varies considerably in the number of hours present, geographic extent, intensity, and latitude and longitude. Though the major and minor peaks are centered around the longest and shortest days of the year, it can occur in any month of the year. Some years the summer season begins early, and others begin late, and there is no pattern as to a peak within a season. The first appearance in spring is in the more southerly temperate latitudes, and this repeats at the end of the season. There is no indication of a gradual increase in latitude position during the season.

During the summer season intense E_S has been observed up to nearly 60 degrees north latitude, in North America and Europe, but it has never been reported above about 45 degrees in winter. Long-term data indicate greater occurrence in western continental U.S.A. than in eastern, though there is a significant longitudinal variation from year to year. Since transatlantic double-hop skip has not been reported, it is assumed that the occurrence of intense E_S decreases over the Atlantic Ocean, possibly due to a longitude variation.

When intense E_S occurs, usually many individual clouds form, sometimes in one location, and often in more than one location. When the production and lifetime of these clouds continue for an appreciable time, they may cover very large geographical areas, due to horizontal motion. This condition, reported a number of days each year, results in vhf propagation all day long, in almost all directions, often with double hop, and muf may approach 200 MHz for a short time. We will examine such a day in Part II.

Transmission Paths

Making best use of intense E_S can be a fascinating game, and the vhf enthusiast can greatly increase his enjoyment of it, and the worth of his observations, if he has some understanding of its behavior. From a single observer's point of view the band may open dramatically, with signals from hundreds of miles away stronger than those from some local stations. They may be from one area, and remain in for hours, or they may appear to move in either clockwise or counterclockwise directions. Often the area first heard will reappear many times. The direction of the skip may swing suddenly 180 degrees. To understand why these things happen it is necessary to visualize the geometry of the wave paths and the relative motion of the clouds. This understanding is also vital to an explanation of why certain areas may or may not be heard during an opening.

Since the individual clouds are small, and assuming for the present no atmospheric refraction, the path from a transmitting antenna to a cloud must be a straight line. This implies that the

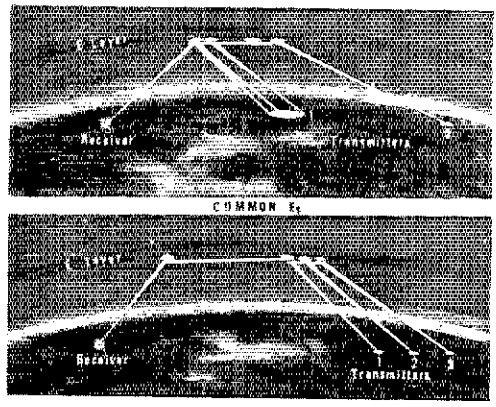


Fig. 7 — A common summer condition is the generation of clouds in more than one area, further complicating the wave-path geometry. Propagation beyond the "single-hop limit" is illustrated.

maximum ground distance to a point below an E_S cloud (at 105 km altitude) cannot exceed about 625 miles, since anything beyond would be below the earth's tangent line. This "radio horizon" can be shortened or extended by atmospheric refraction.

A single-cloud wave path is shown in Fig. 5. More than one cloud is usually present, resulting in numerous wave paths, as in Fig. 6. Here we see how signals from three locations may be heard simultaneously, and how multipath may cause severe fading from one location and not others. When one group of clouds exists, usually along a line, the muf of the group is anisotropic, and most wave paths are parallel.

During summer months more than one generator is present, causing spaced groups of clouds, as in Fig. 7. The wave paths become complicated, and observers in the approximate perpendicular plane containing the clouds can enjoy many combinations of wave paths. One may be from the transmitter to one cloud, to the next cloud, and down, without requiring a reflection from the earth's surface, and still cover greater than the usual limit of 1250 miles for a one-hop path. With this form of "double skip" we may not hear stations at the midpoint.

In the special case of a cloud extremely close to the observer, the bearings for stations only a few miles apart may be quite different. The results of such a high-angle situation are illustrated in Fig. 8. This opening started suddenly as an intense E_S cloud moved inland from the Atlantic, and up over the Connecticut River Valley. Clouds were present over other areas, but are not important to this discussion, which illustrates the mechanism by which one observer hears stations, which another only 15 or 20 miles away cannot hear. Such openings frustrate owners of large, high antennas when they hear low-power small-antenna stations getting better reports and making most of the contacts! In this instance the area illuminated by the low-angle arrays of high directivity was well below the intense cloud. Boston area stations heard only Virginia stations, but they could hear stations in Rhode Island, some 50 miles southwest, working into West Virginia easily.

Stations around Worcester, 35 miles to the west, heard no DX, but envied the Boston and Providence stations, with their unusual short-skip contacts. The solid lines of Fig. 8 show typical short paths. As the E_S began to dissipate, the skip lengthened, and Halifax area stations worked into Knoxville, the path shown in the broken line. Such conditions can explain the misleading indications often obtained in comparing equipment and antennas of stations only a few miles apart. One should not blame his station for occasional poor results in skip work, but rather he should attempt to understand the geometry of the wave paths!

Normal one-hop, single-cloud E_S DX is limited to about 1250 miles, but during the summer season multiple clouds are common, and most propagation is via more than one cloud. With the right distribution, distances up to 2500 miles or more are possible over land. Hawaiian stations have been heard on the East Coast via E_S (but never *worked* – Editor), probably also including ducting over the ocean. A Bermuda fm station near 100 MHz has been heard via double skip, so it *might* be possible to make a transatlantic crossband contact, 50-to-70 MHz, though the longitudinal effect decreases the probability.

Cloud Tracking

Cloud movement can be plotted by an alert operator, and this information can be used to predict when, and from what area, DX may be heard. By applying wave-path constraints the location of the cloud or clouds is approximated, and as more data are obtained refinement in tracking is achieved. This requires only a map and the best data available at the time, to start tracking.

The observer draws a straight line from his location to the station being worked. This is repeated for most of the stations heard. A circle of approximately 625 miles is drawn about each station and, unless there are many clouds, the first approximation of the location of the cloud will be within the area common to the circles. New plots each half hour (use different colors) will show the movement of the cloud, and unless many clouds are present this movement will be obvious. As soon as the direction and velocity (usually northwest, at about 180 mph) are known the approximate location and time can be predicted, assuming the cloud does not dissipate. A ruler can be used to indicate areas which may be heard at any particular time.

The summertime condition, more than one cloud present, complicates plotting, but by no means makes it difficult. The technique is to plot

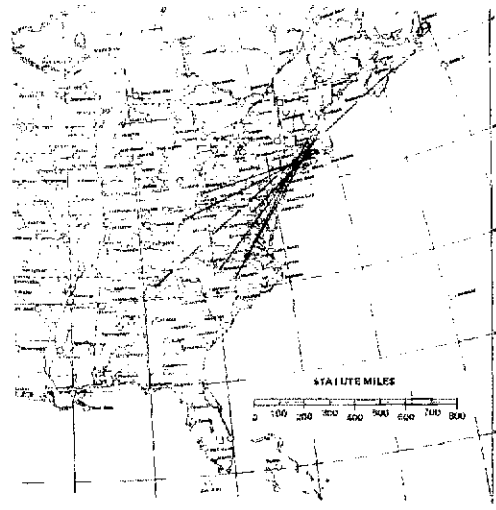


Fig. 8 — Short paths, New England to West Virginia, Virginia and North Carolina, characteristic of an intense E_S cloud close to the observer. The broken line, Nova Scotia to eastern Tennessee, was open in the last phase of this Jan. 4, 1961, opening on 50 MHz.

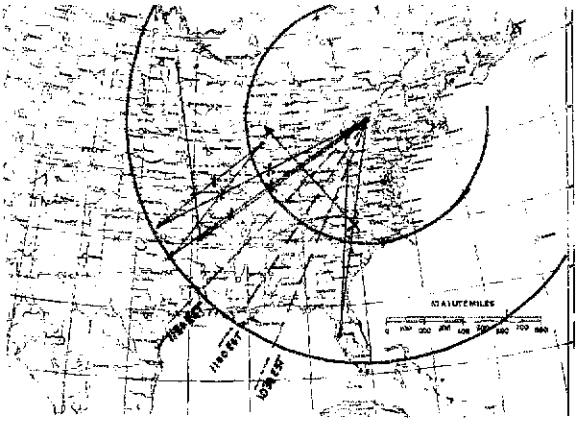


Fig. 9 — Example of E_S cloud tracking from 50-MHz observations July 13, 1969.

each new cloud as it appears, and indicate cloud trains on each track. The widespread distribution of amateurs allows a synoptic view of E_S cloud motions to be established. This may also be applied with TV and fm stations, but with somewhat more difficulty, since no two-way communication is involved.

When most clouds are beyond 625 miles from the observer, tracking becomes difficult, but important, since it may enable stations to be heard beyond single-hop distance. A typical example is shown in Fig. 9.

The observer (Rochester, N.Y.) found the 50-MHz band open at 0850 EST. Plotting was started with WA5RBI, Enid, Okla., working WA9UBI, Marengo, Ill. This relatively short path implied clouds over Missouri, beyond the "radio horizon" from Rochester. Tentatively, one cloud was marked just east of Kansas City, and another within the radio horizon over Illinois. WA5RBI said the band had been open for over two hours, so the observer knew he was dealing with older clouds. The next station heard was in Pampa, Texas, beyond the single-hop distance, corroborating the double-cloud geometry and showing a type of anisotropic propagation.

Suddenly, Ardmore, Okla. was heard working northern Illinois, indicating more than one cloud over Missouri. The observer assumed that clouds might be generating over Missouri, and the sudden appearance of the Ardmore station might mean that a cloud moving northward had reached his radio horizon, southwest of Terre Haute, so an X was marked at that location.

No other stations were heard for about 15 minutes, until W4GJO appeared suddenly at 0920, and a new cloud location was found. Since the only stations heard were in the Tampa Bay area, the observer assumed a single cloud, probably closer to Rochester than the midpoint, since no stations were heard from farther south in Florida. Thus, an X was marked on the map southwest of Greensboro, N.C., the approximate radio horizon from Tampa. Now, a weather correlation: the weather map showed a front from western Tennessee across North Carolina, so the observer could assume that the spot near Greensboro was a birthplace, and a number of clouds would be generated.

After a half hour, clouds above the latitude of Terre Haute had either dissipated or moved away from the radio horizon from Rochester. Only Dallas area stations were now heard from that direction, working stations in Illinois and Kentucky. The observer then knew that clouds over northern Missouri had dissipated, and there would be no chance of hearing stations to the far west. Clouds over southern Missouri probably would not develop into very useful transmission paths for the observer, and this became true.

The observer could now direct attention to clouds to the south. By 1000 EST the Florida stations were working to the west of Rochester, and the skip was beginning to shorten for them. This implied new clouds being generated, and moving in a direction clockwise to the observer. Assuming a northwest direction, a line was drawn and time marks put on, assuming 180 mph. From this track it was predicted that stations should be heard in the Gulf states, with the lead cloud giving a direction of Atlanta about 1030, Nashville about 1100, and Cairo, Illinois, about 1130. Continued listening resulted in hearing WB4HHL, 65 miles south of Atlanta, at 1035, and the New Orleans area at 1107. The New Orleans stations were working XE1PY, and since the direction was right, only a moment was required to tune in the double-skip station. The last cloud generated about 1035, which indicated that XE1PY should be copied until about noon. Actually, he was heard until 1205 EST.

The lead cloud dissipated before reaching the direction of Cairo, but later clouds did reach this direction at 1240 EST, and the Dallas stations were heard again until 1300.

(Part II will appear in a subsequent issue). QST

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Silent Keys

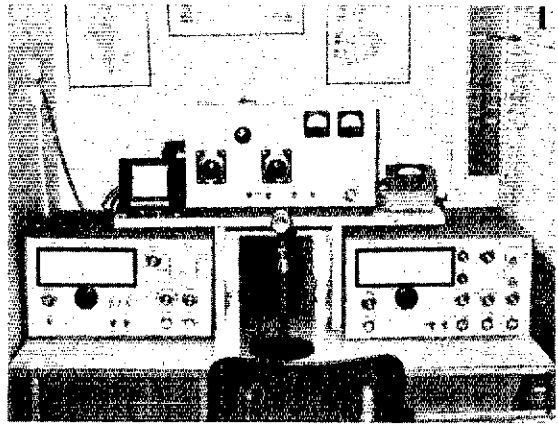
IT IS with deep regret that we record the passing of these amateurs:

W1CL, Harold B. Richmond, Cambridge, MA
ex-W1DWW, Donald A. Dewey, Quincy, MA
W1DZT, Loring C. Woodberry, Stoneham, MA
W1GBE, Dr. Percy L. Spencer, Waban, MA
W1HQY, Thomas W. Bassett, Taunton, MA
WA1JLT, Stephen Simeone, Harwich, MA
WN1LSG, John N. Waterman, Mattapisett, MA
WA1MFM, John C. McManus, Jr., Quincy, MA
W1RPX, Frank C. Richardson, New Canaan, CT
W1TFE, Fred Clark, Ashuelot, NH
W1YMJ, Frank Dawley, Rye, NH
W1ZI, Harris Fahnestock, Concord, MA
W2FCG, Guy Stanley, Johnson City, NY
WA2GWB, George N. Raybin, Bronx, NY
K2PKH, Dolph Gobel, Great Neck, NY
ex-2WA, John K. Keers, Brooklyn, NY
WA2ZGV, J. LeRoy Eschen, Mamaroneck, NY
W3BAK/W4RUK, Edgar L. Hudson, Laurel, DE
K3DHP, David Rothart, Washington, DC
K3DGU, Edith McKenzie, Pittsburgh, PA
WA3DMX, Paul R. Fortin, Havertown, PA
K3EOU, Paul H. Pfleiger, Pennsburg, PA
W3FMI, Paul F. Adams, Carnegie, PA
W3GRV, Edward Taylor, Severn, MD
W3PW/ex-3CM, Joseph C. Van Horn, Havertown, PA
K3SXL, Samuel J. Stocco, Pittsburgh, PA
WB4CDB, James O. Warren, Jr., Dillon SC
K4CKZ, John A. Boone, Meggett, SC
K4GHE/K4SEX, W. A. Gremie-Gremillion, Newnan, GA
W4GJW, Arthur W. Woods, Cullman, AL
K4JMH, Barney D. Bessenger, Columbia, SC
W4KHX, Charles G. Pittman, Louisville, KY
WA4KQP, Herbert E. Bouknight Sr., Columbia, SC
W4VLS, Herbert E. "Buck" Lanier, Nashville, TN
W5ANI, Frank T. Edwards, Jackson, MS
W5CJR, Julius W. Mangum, Hattiesburg, MS
K5IXN, Leo Pratt, Dallas, TX
W5TNM, Newell N. Shaw, Fayetteville, AR
W6GUV, Winston E. Roberts, Chico, CA
K6ID, William D. Van Dyke, Palos Verdes Estates, CA
W6PO, Harold S. Sachs, San Francisco, CA
W7AWO, J. Kenneth Petersen, Spokane, WA
W7FCF, William G. Williamson, Eugene, OR
WA7KIY, Paul Gilbert, Cedar City, UT
W7KYM, O. R. Queen, Phoneix, AZ
W7RH, Walter N. Alfonse, Portland, OR
W7YBZ, Mitchell L. Matthews, Tempe, AZ
W8AG, H. A. "Bud" Oerting, Toledo, OH
W8CQU, Carl R. Seglund, Munising, MI
W8HAO, Howard Darling, Warren, OH
K8KRG, Roy L. Berrington, Oberlin, OH
ex-8OI, Alexander Sparks, Elyria, OH
K8RKN, William L. (Bill) Reterstoff, Muskegon, MI
K9AHD, Glen C. Pollic, Elwood, IN
WN9DMI, E. "Gib" Heizer, Belleville, IL
W9DOK, Vard "Andy" Skinner, Muncie, IN
WA9OLC, Duane Lambright, LaGrange, IN
K9SCI, Joe Klize, Benld, IL
W9SNQ, Leonard M. Chalk, Portland, IN
W9SVL, Robert H. Shoffer, New Castle, IN
WA9UQT, John E. Graham, Milwaukee, WI
W9VHB, Cecil E. Webb, Franklin, IN
W9VL, Luther M. Allman, Des Plaines, IL
WØESA, Edward C. Stockman, Denver, CO
WØFRW, Harold Withers, Loveland, CO
WØGRY, Gerald Zeran, Rockford, IA
KØIDB, Christine A. Farrell, Lemay, MO
WAØKLC, Edward A. Van Vuren, Grand Island, NB
WØRQS, Frank Miller, Omaha, NB
WØSIF, M.F. Omar Jensen, Fergus Falls, MI
WNØTZT, Douglas Peterson, Litchfield, MN
VE1HX, G. F. W. Moore, Perth, NB
VE3AMH, K. D. Burbidge, Orillia, ON

Strays

Stolen Equipment

The following was stolen from my parked car in my own driveway: SB-33, Serial No. 103327 and a Turner 358-D mike. The SB-33 meter face is illuminated by a "square of light" and only the center portion of the scale is lit. Anyone with information is requested to contact me or the Newton, Massachusetts police. Eric E. Falkof, K1NUN, 41 Prentice Rd., Newton Center, MA 02159.

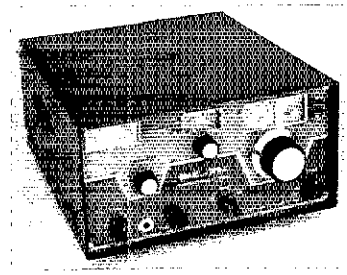


A perfect example of excellent home construction is the station shown here in use at 4X4KM by its owner, Jacob Storfer, of Haifa, Israel. This is certainly a "sanitary" layout, and no doubt one that any amateur would be proud to call his own. Jacob designed and built this complete 800-watt ssb station some four years ago, and reports trouble-free operation since that time. At the left is his receiver; to the right his 100-watt exciter; above is the linear amplifier. Not visible in the photo are his homemade low-pass filter and in-line wattmeter. Who knows, the next time we hear from Jacob he may report that he's using a home-constructed microphone and rotator! — *WICER*

Recent Equipment

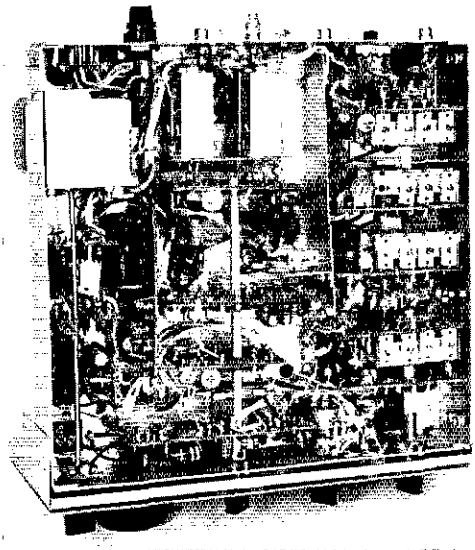
To acquaint you with the technical features of current amateur gear.

The Drake SPR-4 Receiver



THE R.L. DRAKE Company has introduced its first all-solid-state receiver, the SPR-4, a triple-conversion design that retains all of the features (and the basic circuit design) that have made their earlier models popular. The receiver, shown in block-diagram form in Fig. 1, has field-effect transistors substituted for tubes in the rf amplifier, mixers and i-f amplifiers, while bipolars, aided by two JFETs, do the job in the other stages. The unusual features of the SPR-4 are not the basic stages, but rather the ancillary circuits that are required to make the transistor-for-tube swap work effectively.

The SPR-4 is designed to cover from 500 kHz to 30 MHz in 500-kHz steps, plus 150 to 500 KHz. Drake's advertising calls the receiver "programmable," which means that you must buy a crystal for each frequency segment that you want to be able to tune. A "stock" receiver has crystals installed for 150-500 kHz, 0.5-1.0 MHz, 1.0-1.5 MHz, 6.0-6.5 MHz, 7.0-7.5 MHz, 9.5-10.0 MHz, 11.5-12.0 MHz, 15.0-15.5 MHz, 17.5-18.0 MHz, and 21.5-22.0 MHz. Obviously, a crystal kit for the ham bands will be the first "extra" purchased by most amateurs. Other accessories now available include a notch filter, a noise blanker, a 100-kHz crystal calibrator, a broadcast-band direction-finder loop antenna, and an adapter to allow transceive operation with the Drake T-4XB transmitter.



The bottom view of the SPR-4 reveals an unusual assembly technique. Many small circuit boards, each mounted vertically, are employed. PC-mount switch wafers on the various boards are controlled by long shafts running back from the front-panel controls.

Circuits

The rf stage utilizes a Motorola MPF3007 dual-gate MOSFET. Agc is applied to both gates, as will be explained later. On the 150- to 500-kHz and 500- to 1000-kHz tuning ranges, two tuned circuits are switched in ahead of the rf stage, while on the high-frequency ranges a single tuned circuit is employed. To increase the sensitivity when the lf direction-finder loop is in use, a second rf amplifier may be activated. The first mixer consists of two 1IS88 JFETs in an unusual balanced arrangement. See Fig. 2. The manufacturer claims greater dynamic range for this circuit configuration than can be achieved with a single JFET.

The heart of the receiver is the PTO, which was recently described in *QST*.[1] A generous overtravel of approximately 50 kHz on either end of the PTO tuning range allows a peek into adjacent bands. The dial calibration is marked in 1-kHz steps and is accurate to 1 kHz. The output of the PTO is mixed with a signal from crystal oscillator Q2 to produce the required mixer injection frequency. This frequency scheme, known as premixing, reduces the possibility of spurious responses by using a highly selective tunable filter, tracking with the front-end preselector, between the injection mixer, Q5, and the first signal mixer, Q7/Q8.

Image responses can be annoying in receivers using 50-kHz i-f systems. The Drake engineers have positioned a 4-pole crystal filter (with a 6-kHz bandwidth) between the first and second mixers to attenuate all signals outside the desired passband. Mode selectivity is provided by a 50-kHz *LC* filter. Switch-selected bandwidths of 0.4, 2.4, and 4.8

[1] Recent Equipment, "The Drake TR-6 Transceiver," *QST*, July, 1970.

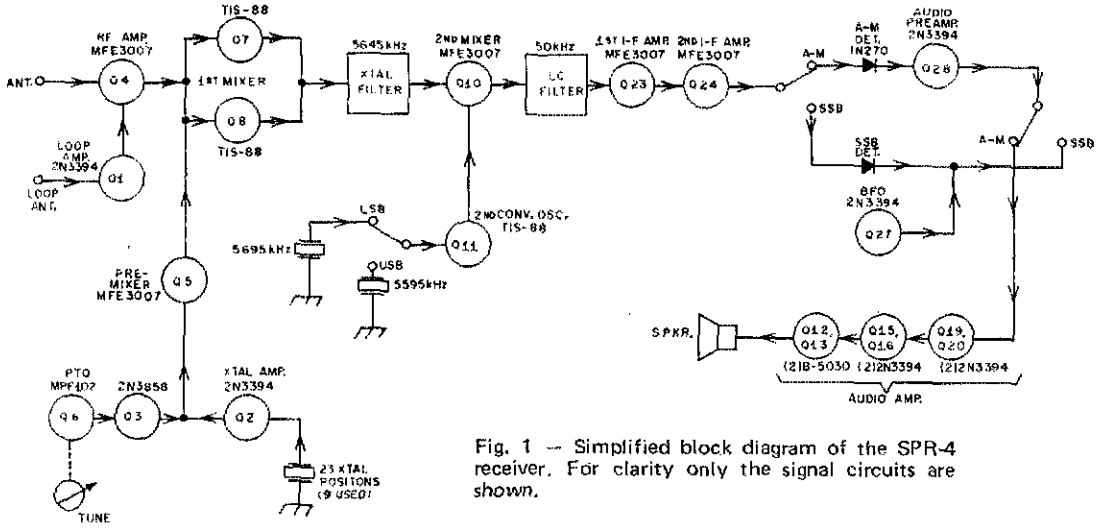


Fig. 1 – Simplified block diagram of the SPR-4 receiver. For clarity only the signal circuits are shown.

kHz are available for cw, ssb and a-m reception, respectively. After further amplification by two dual-gate MOSFETS, the signal passes to simple diode detectors – shown in Fig. 3 – which convert the i-f signal to audio. A quasi-complementary audio amplifier provides up to 3 watts of output power to a built-in speaker, or to low-impedance headphones through a front-panel jack.

Age voltage is produced by amplifying and rectifying a sample of the i-f output signal and applying it to gate 2 of the rf and i-f amplifiers. One design objective for the SPR-4 was that it should operate from a 12-volt dc source, as well as the 117-volt ac line. As -5 volts of bias are required for the age circuit, the output of the second conversion oscillator is amplified (by Q21, Fig. 4), rectified, then filtered and regulated – a novel way to obtain the necessary negative voltage. When an incoming signal reaches a level of 20 dB above S9, additional age control is applied to gate 1 of the rf amplifier. This second age potential is obtained from the S-meter amplifier, as shown in Fig. 5. A sample of the i-f amplifier age line is taken off through a JFET so that, in effect, no load is placed on this high-impedance lead. A high-gain IC drives the S meter and a buffer stage, Q18. When the Q18 output rises above the back bias on CR10, it produces age voltage for the rf amplifier signal gate.

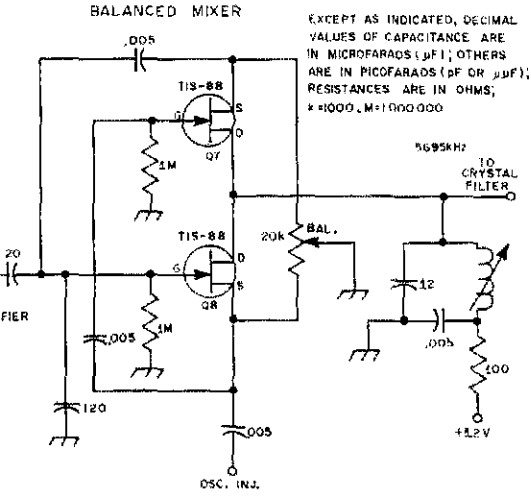
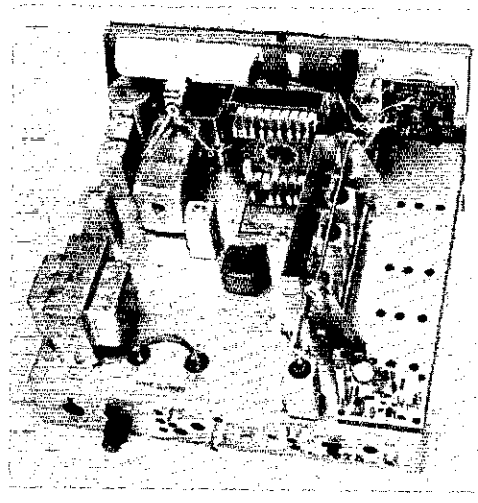


Fig. 2 – Schematic diagram of the balanced mixer. Adjustment of the BALANCE control can provide up to 20 dB attenuation of the oscillator signal in the mixer output tank.



The small circuit board at the lower right is the crystal calibrator accessory. To the left are the jacks for the noise blanker, while the deck of "program" crystals is at the center, just behind the front panel. The transformer cans that run from front to rear contain the permability-tuned preselector and premixer coils.

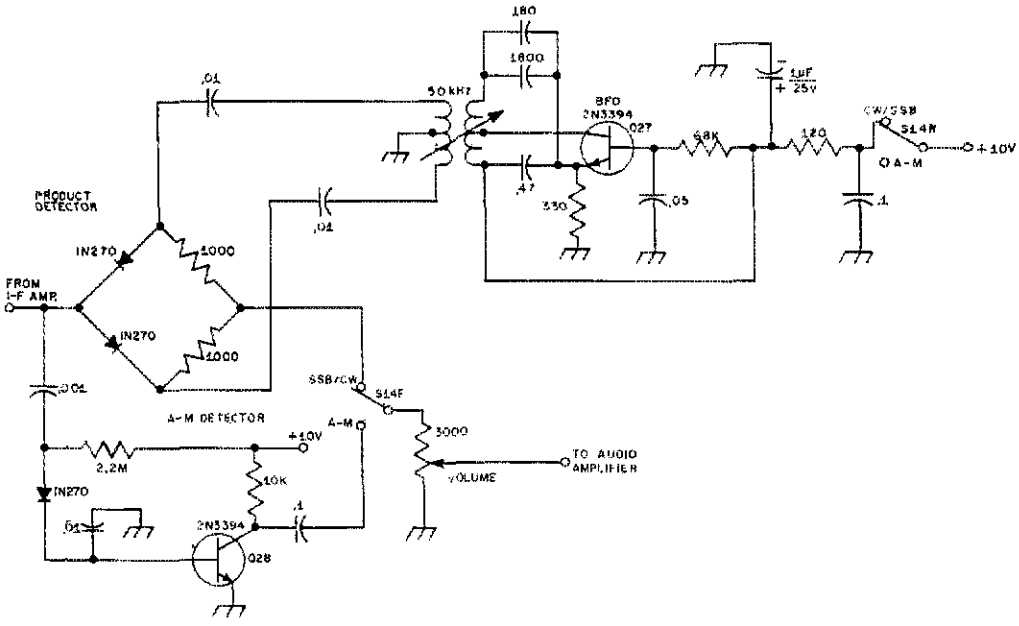


Fig. 3 — Diode product and envelope detectors used in the Drake SPR-4.

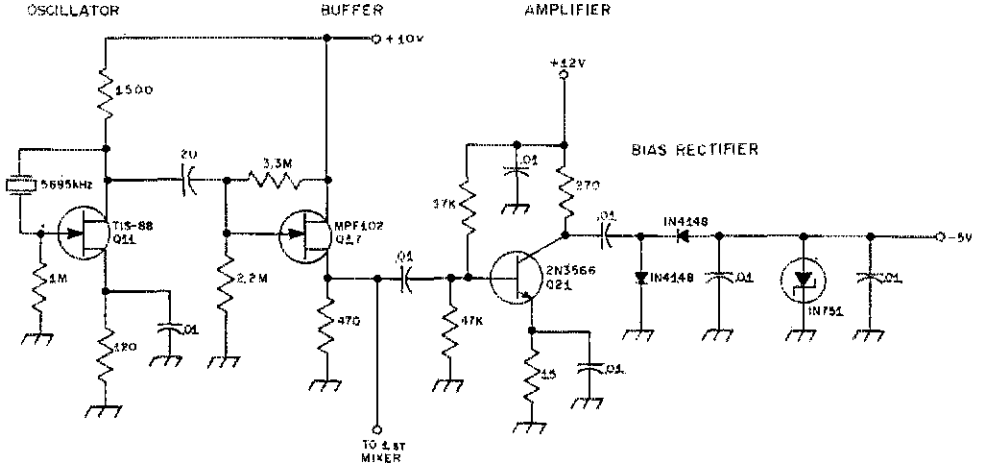


Fig. 4 — Amplifier Q21 samples the output of the second conversion oscillator and raises the level to a point that, when rectified, -5 volts are produced for use in the receiver agc circuit.

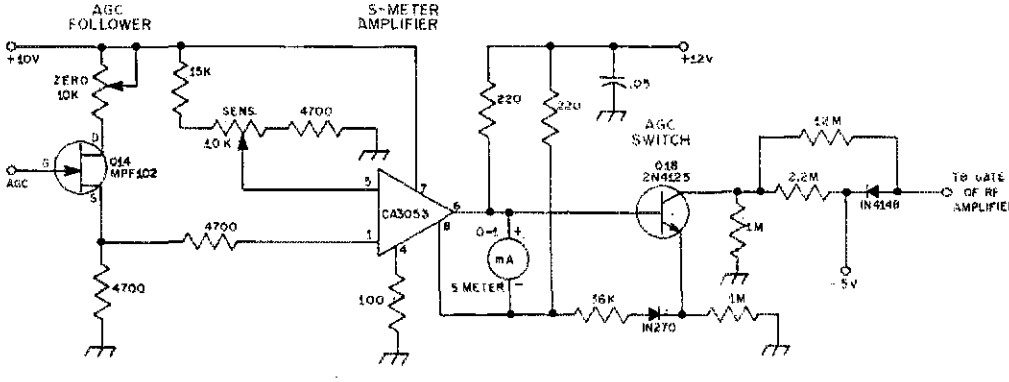


Fig. 5 — S-meter amplifier and delayed agc circuit.

The Drake SPR-4 Receiver

Height: 5 1/2 inches.
Width: 10 3/4 inches.
Depth: 12 1/4 inches.
Weight: 18 pounds.
Power Requirements: 120- or 240-volts ac, or 12-volts dc.
Price Class: $450, less accessories.
Manufacturer: R. L. Drake Company, 540 Richard Street, Miamisburg, Ohio 45342.

Test Results

A close examination of the receiver in the ARRL lab indicates that the age dynamic range and the frequency stability of the SPR-4 are superb. A 100-dB change in input signal produced only a 5 dB difference in the audio output level. Frequency drift over a fifteen-minute period was 10 Hz or less after a 20-minute warm-up. On several frequency-drift runs the total variation was only 2 Hz! Dropping the receiver from about five inches above the bench changed the PTO frequency 10 Hz.

The age has a long decay time which is excellent for ssb reception but which makes the receiver difficult to use for break-in cw. Drake reports, however, that cw buffs can make a simple internal resistor change to alleviate the slow-recovery problem. Lack of dynamic range has long been the major headache in solid-state receiver design. The SPR-4 took 5000 to 7000 μV of input signal before internally-generated spurious signals were observed, better than average for the solid-state receivers that this writer has tested. Skywave signals seldom exceed 2000 μV, so overload should only be a problem for those with neighbors who are active amateurs.

The shoe-box size, lightness of weight, and low power consumption of the Drake "ear piece" are features that should appeal to traveling hams, or to those who operate portable. And, it will double as a DF for boat owners. The initial investment for the unit can be limited by purchasing only the basic receiver and then adding accessories later as financial resources permit. Also, RTTYers who like to listen to the commercial teletype bands, or vhfers who want several megacycles of continuous coverage, might consider the "programmable" feature. As the instruction book contains only operating information, hams who repair their own gear will want to purchase the maintenance manual, which is also an extra-cost item. – *WIKLK*

High-Output VFO

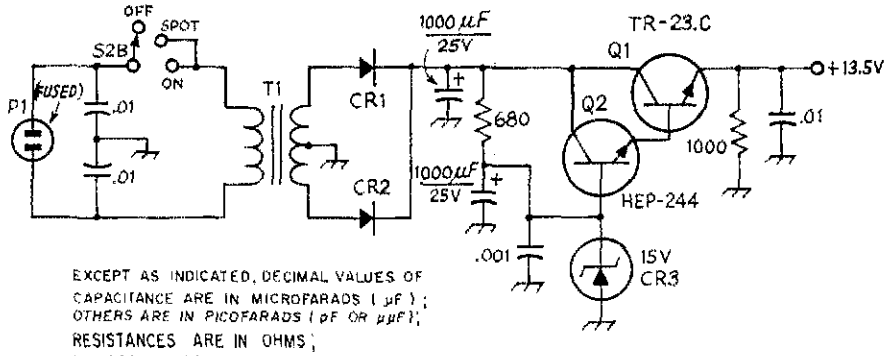
(continued from page 48)

existing grid-return resistor, R1 in Fig. 4A. However, circuits similar to Fig. 4B must be modified by shorting out the cathode rf choke when the VFO signal is injected at the crystal socket. In general, any component that provides feedback for the crystal oscillator should be removed or shorted out, as appropriate, when the VFO is used.

With a 5000-ohm load, the VFO has a measured output in excess of 20 volts rms. This was sufficient drive for all of the two- and three-tube transmitters tried, even on the 10-meter band. Drift tests indicated a shift of less than 30 Hz over any 15-minute period. The drift is of a random nature which can be attributed to thermal changes caused by air currents around the unit.

The solid-state VFO is somewhat more complicated than a comparable tube unit would be. But, in the near future, transmitters in the 50-watt class will use only solid-state active devices, so now is the time to experiment with the techniques of the transistor age. QST

Fig. 6 — Power supply for the solid-state VFO. Capacitors with polarity marked are electrolytic, others are disk ceramic. Resistors are 1/2-watt composition.
CR1, CR2 — 100-PRV, 1-A silicon.
CR3 — Zener, 15 V, 1 W.
P1 — Fused plug (use 1-A 3AG fuses).
Q1 — 40-watt npn power transistor (International Rectifier TR-23C).
Q2 — Motorola HEP-24.
S2 — See Fig. 1.
T1 — Filament transformer, 24 V ct at 1 A.



Australis-Oscar 5 Spacecraft Performance

BY JAN A. KING,* W3GEY

IN THE rather brief lifetime of the Australis-Oscar 5 experiment a number of useful experimental and operational results have been achieved. The satellite was launched on January 23, 1970. As of this writing, 211 formal reports have been received from 27 countries around the world on both telemetry and propagation results. Many other stations were known to have received the satellite, but did not submit quantative data.

Based on reports received, here is a summary of the performance of each system on the AO-5 spacecraft:

Thermal Behavior of AO-5

The temperature of AO-5 at ejection from the second stage of the Delta vehicle was 20 degrees C despite its proximity to the second stage engine and a very cold nitrogen gas jet during launch. The temperature, however, began to rise during orbits 1 through 10 and then stabilized internally at 43 degrees C ± 3 degrees C where it remained for the duration of the satellite's useful life. This temperature is fairly high, although it is within the design temperature range of 19 degrees to 45 degrees C. The effects of this higher temperature were, unfortunately, all adverse. Battery lifetime was somewhat shortened during the initial phase of discharge; but worse than this, the 144.05 MHz beacon power dropped off faster with decreasing supply voltage due to the decreased efficiency of the rf power output transistor.

External temperature measurements were higher in sunlight and cooler during eclipse periods as observed by many reporting stations. As the spacecraft entered the dark portion of the orbit the skin temperature dropped from its 55 degrees C average to 42 degrees C ± 3 degrees C. The internal temperature, however, remained fairly constant, dropping only two to three degrees during the entire eclipse period. Acknowledgement is due Bill Armstrong, WØPGP, John Fox, WØLER, Nastar, K2SS and others for their data in this area. The spin rate about the X-axis in later orbits became quite slow so that the skin sensor located on the +Y surface showed changes in temperature as parts of the satellite rotated in and out of its own shadow. This data was most useful in determining the roll rate about the stabilized axis of the spacecraft. John Goode, W5CAY, reported this data for many orbits between 100 and 250. Skin temperature data indicated a spin period of 7 to 8 minutes about the X-axis after the initial 100 orbits. An example of this data is shown in Fig. 1 for orbits 168, 205, and 206 along with horizon sensor data.[1]

The AO-5 Power System

The spacecraft battery voltage decreased with time faster than predicted by pre-launch testing of individual cells (see Fig. 2).[2] It is now known that the accelerated battery discharge was caused by two factors. First, the higher satellite temperature accelerated the normal chemical reaction in the alkali-manganese batteries. Secondly, an additional 18 mA of current was attributed to a failure of the ten-meter modulator that accured on orbit 3. It was verified that the 18 mA was independent of the ten-meter transmitter itself by commanding the transmitter OFF and observing that the extra current was still present. The ten-meter modulation failure has also been attributed to the higher spacecraft temperature.

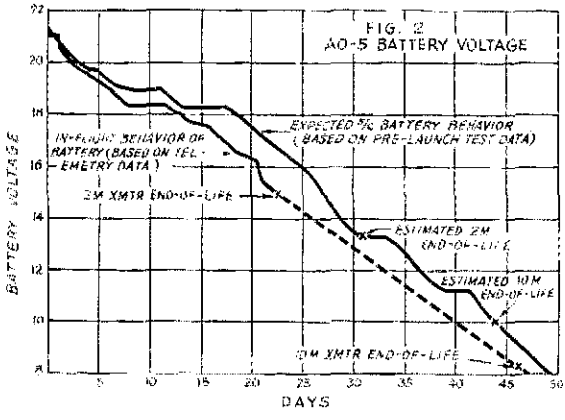
The Magnetic Attitude Stabilization System and the Horizon Sensors

One of the best operating systems on board the satellite was not electronic in nature. The Magnetic Attitude Stabilization System (MASS) functioned more efficiently than some of us had anticipated. Early reports indicated that antenna nulls were occurring on the 144.05 MHz signal once every 15 seconds, making telemetry decoding very difficult. By orbit 100, signal fades had reduced to one or two per station pass (approximately 20 minutes in duration). To the amateur using the spacecraft this is a significant improvement over past satellites in the Oscar series and should prove to be a valuable tool in future amateur spacecraft to achieve the continuous reception of a down-link signal.

The three orthogonal earth or horizon sensors used in the spacecraft were 2N2452 phototransistors operated in a diode mode, having a spectral response between 5000 and 10,500 Å.[3] Each sensor's field of view had been stopped to 5 degrees by a small columation tube. A photometric calibration of these sensors was, unfortunately, not undertaken due to the shortage of time in the test schedule. While the original design of this part of the telemetry system was to give an ON-OFF indication when looking toward or away from the bright earth, the devices were found to be more

*c/o Amsat, P.O. Box 27, Washington DC 20044.

FIG. 2
AO-5 BATTERY VOLTAGE



sensitive and capable of detecting the decreasing brightness of the earth's atmosphere as the sensors viewed the earth-to-space transition. When viewing the bright earth the telemetry output indication was approximately 1450 Hz and during the transition the telemetry frequency gradually decreased to a dark condition of 600 Hz. Amateurs using a fast discriminator to decode the modulation observed during periods of good signal strength, small variations in the frequencies of the telemetry tones as the sensors swept accross the earth's disc. These were attributed to cloud formations. Two examples of this data are shown in Fig. 3. With a discriminator of this type, the Goddard Amateur Radio Club, WA3NAN, decoded telemetry information for all the passes received.[4] Figure 4 shows horizon sensor information for various passes. Each frame shows the maximum rate of change of brightness observed on any of the sensors during a given pass. During orbit 4 the maximum observed rate of frequency change was found to be 700 Hz per second, while pass 192 exhibits a maximum rate of change of only 10 Hz per second. This is indicative of the reduced spin rate of the satellite.

During daytime ascending nodes, after the spacecraft had stabilized, a regular sensor pattern was observed. W5CAY demonstrated this data most effectively (see again Fig. 1). The X-axis shows no true periodic nature, but rather a gradual transition followed by small variations about an average "light" condition. The Y and Z sensors show a periodic behavior characteristic of the satellite's roll rate about the stabilized X-axis. The skin temperature shows a cyclic variation as the +Y face rotated in and out of the spacecraft's own shadow. Of particular significance is to observe that the Z sensor always lags behind the Y sensor (approximately two minutes) in detecting the earth. With the +X-axis pointing north as the satellite crossed the equator, the spacecraft spin was thus clockwise as observed from the north pole of the earth.

The maxima in the external temperature curve were (within experimental error) out of phase with the +Y sensor. Since the T_{EXT} thermistor was located on the +Y face, then the temperature was a minimum during times when the +Y face was viewing the earth. This is, in fact, the time when the +Y face should have been in shadow.

As the spacecraft traveled north from the equator the +X-axis should have begun to dip toward the earth as the strong dipole moment of the satellite (11,800 pole-cm) followed the local geomagnetic field vector which caused it to rotate twice per orbit (see Fig. 5).[5] W5CAY's data showed that the +X sensor did begin to gradually come on shortly after his signal acquisition time over a period of several minutes. This is precisely what one would have predicted as the +X sensor looked deeper into the earth's atmosphere which reflected more and more scattered light into the sensor.

The average roll period observed in this data is 7.5 min. This is thought to be the degree of stabilization that persisted until the termination of the satellite's active life. The effectiveness of this system is best evaluated in terms of the very large

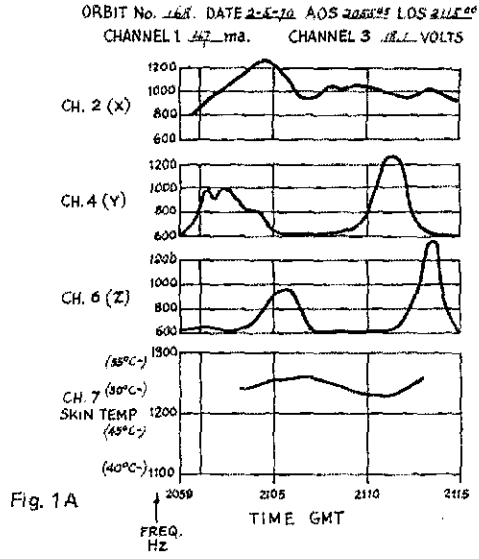


Fig. 1A

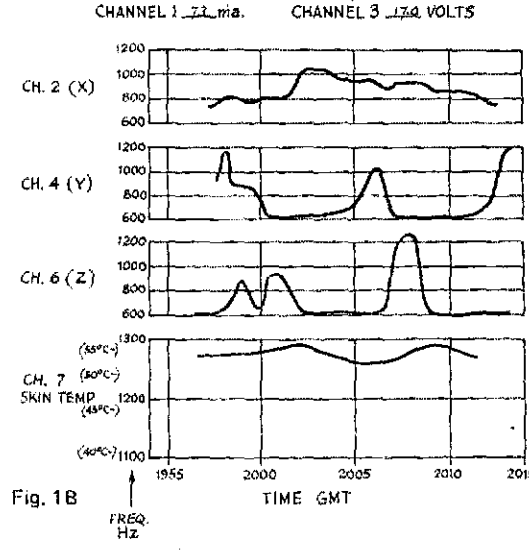


Fig. 1B

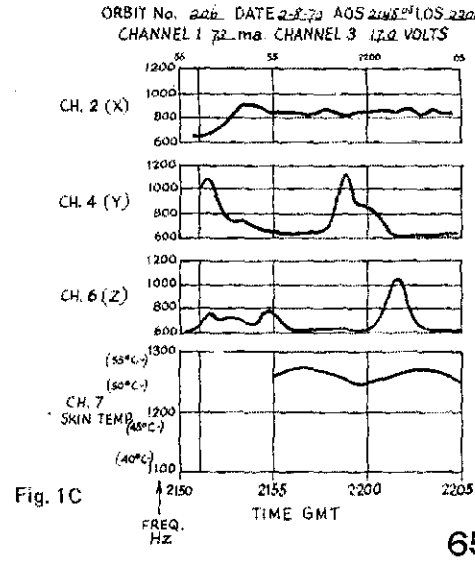


Fig. 1C

TABLE I

Region	*Stations Reporting Useful Data*	*Stations Reporting Telemetry > 50% of Passes*	*Stations Reporting Telemetry < 50% Passes*
I	66	52%	48%
II	114	32%	68%
III	31	45%	55%

reduction in the signal fading rate due to antenna nulls. This, in turn, implies an overall reduction in the loss of spacecraft data. For a satellite in the amateur radio service it is apparent that this method of stabilization is most effective and very easily implemented.

The AO-5 Command System

A telecommand link on two meters was utilized to turn ON and OFF the ten-meter beacon transmitter in an effort to conserve the spacecraft's power supply. An a-m tone modulation technique was employed. The ten-meter beacon which consumed 0.6 W of power, was to be commanded ON during weekends when a maximum number of users was anticipated.

Prior to launch, considerable difficulty was encountered with the spacecraft command receiver due to in-band interference from the 144.05 MHz beacon transmitter. It was only possible to eliminate the interference by adding a steep skirted bandpass filter centered at the command frequency. This filter gave 50 dB of rejection at the beacon frequency, but unfortunately had a relatively high insertion loss when placed in front of the receiver. The result was that the command receiver required a signal of -76 dBm (35.4 μV) under ambient (room) conditions to decode a command. This, to be sure, was considered marginal performance. The problem was further complicated by a detuning of the second i-f stage that occurred during tests under vacuum conditions. This problem could not be traced to a single component in a timely fashion so it was decided to peak the receiver for maximum sensitivity under vacuum conditions. When the receiver was again tested under vacuum conditions the sensitivity was observed to be 10 dB better. Thus, it was expected that the in-flight sensitivity would improve some 10 dB over its ambient condition, giving a final sensitivity figure required to operate the decoder of -86 dBm. The spacecraft was launched with the receiver in this condition.

Fig. 6 shows a plot of the spacecraft total current during the entire lifetime of the two-meter beacon, when telemetry data could be obtained.[6] From this data it is clear when commanding occurred and the status of the ten-meter beacon during the lifetime of the satellite. Table III lists the command transmitter schedule indicating the successfully transmitted commands and the effective radiated power used to execute the command. Although early command attempts were unsuccessful, after orbit 72 it became increasingly less difficult to achieve a successful command and it became possible to maintain the weekend-only operation schedule for the ten-meter beacon as originally planned. It is felt that the increased overall sensitivity of the command system was due to a combination of factors:

a) Spacecraft command antenna orientation favorability (particularly over Australia due to the effectiveness of the magnetic attitude stabilization system.)

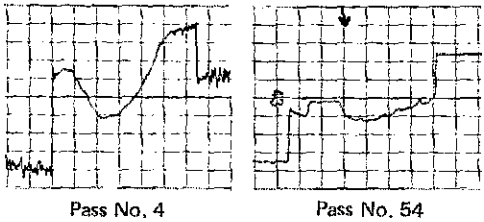
b) Reduction of the interfering signal level (144.05 MHz) as the battery voltage (and hence the power of the beacon) decreased.

c) Stabilization of the command receiver temperature and pressure which improved the sensitivity of the receiver.

The effectiveness of the command system, particularly despite the receiver problems, is of particular significance to future amateur space experiments. It not only demonstrated, for the first time in an amateur satellite, the effectiveness of ground command as a means of switching various experiments ON and OFF, but of greater significance, it represents an effective means of controlling amateur spacecraft emissions so as to prevent interference to other services who may share the amateur bands. This should help assure the continuing usage of amateur space experiments without the need for power flux limitations imposed on the satellite down-link signal.

Spacecraft Lifetime

As previously indicated, the failure of the ten-meter modulator is considered responsible for the increased battery current drain of 18 mA. This additional current drain shortened the lifetime of the satellite. The two-meter beacon could be received through approximately orbit 280 on the 23rd day after launch. The ten-meter beacon was turned ON by command on orbit 261 and was left on continuously until it reached end of life around orbit 560 on the 46th day after launch. The difference in beacon lifetimes is due to the variation in cutoff voltage for the transmitters. The two-meter transmitter power output went to zero



Pass No. 4 Pass No. 54

Fig. 3 — Two examples of variations in the +Y sensor output due to variations in the earth's brightness. Note the sudden increase and decrease in intensity during the frame from pass 54. This is thought to be due to the sensor sweeping across a bright cloud region. Time divisions are 1 sec.

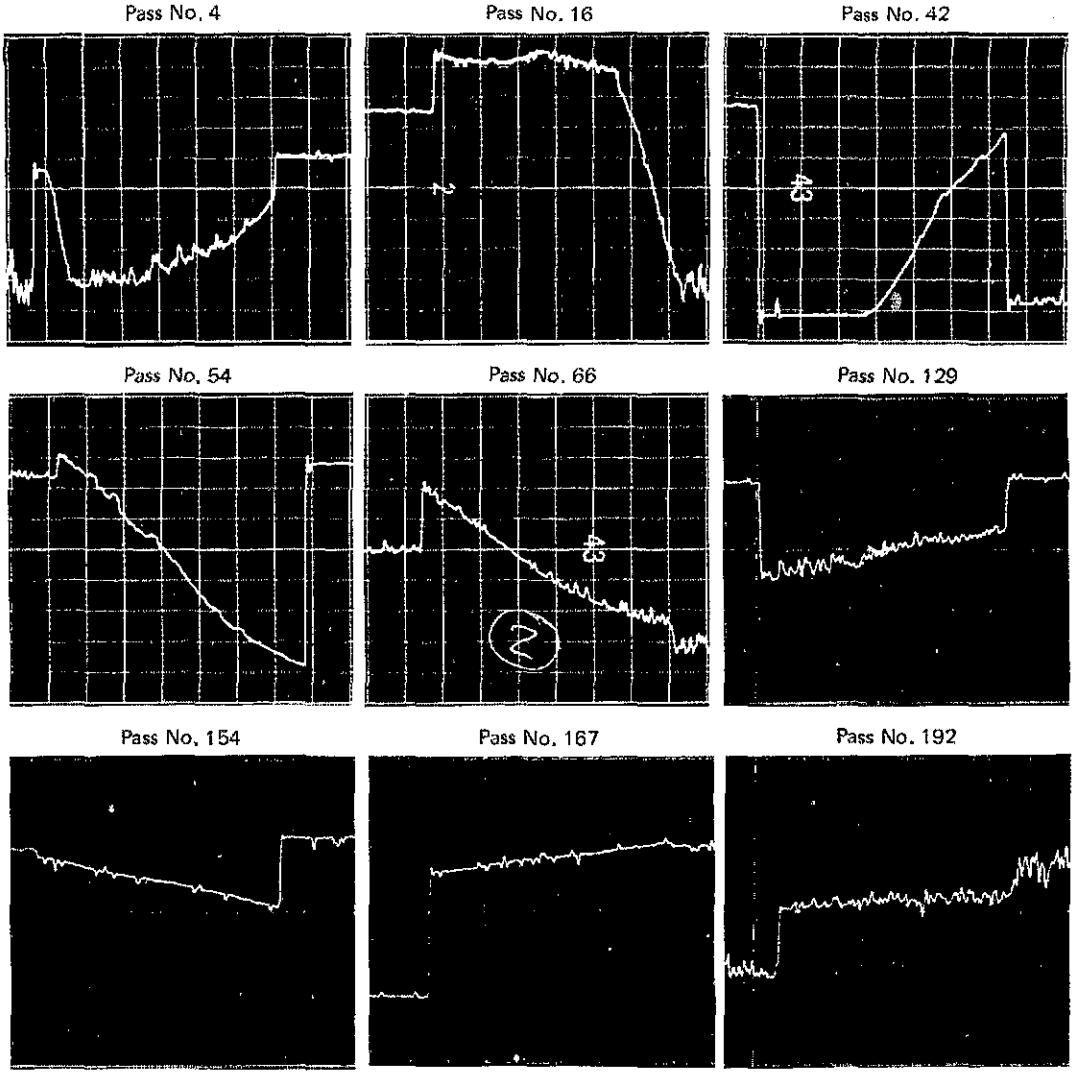


Fig. 4 — The maximum rate of change of the horizon sensors during limb transition for various passes of AO-5. *The date shows a despin factor of 70 in only 15 days. This is a particularly graphic demonstration* of the effectiveness of the stabilization system. Time divisions are 1 sec.

very rapidly at a supply voltage of 15 V while a significant output could be obtained from the ten-meter transmitter even at voltages as low as ten volts. While the spacecraft lifetime on two meters was shorter than the design lifetime of thirty days, a significant quantity of telemetry data was obtained never the less.

The Nature and Reliability of Amateur Reports

An additional feature of the AO-5 experiment was the opportunity to evaluate the performance of amateurs in reporting scientific-type data. After allowing several months to be certain that all late reports had been received, an effort was made to determine what type of information amateurs were most interested in reporting and approximately how much variation in measurement occured from station to station. It was decided to report on the results by ITU regions since different satellite passes were common to these regions (i.e., Region I (Europe & Africa) could generally not hear the same passes as Region II (North & South America) and so forth). Table I lists the number of useful reports received from each region and those which did and did not contain telmetry information. We may infer that stations not reporting telemetry results were primarily interested in other aspects of the experiment or in phenomena such as Doppler measurement. (Only the telemetry results are covered in this report since they were the primary indicator of the spacecraft performance. Another

report prepared by Raphael Soifer, K2QBW, gives a detailed presentation of the ionospheric propagation results of AO-5.[8] Table I indicates that, on a percentage basis, Region I and Region III participated more actively in the telemetry decoding activities. This is somewhat surprising, since it was anticipated that U.S. amateurs would be suitably equipped to make telemetry measurements.

It was of interest to determine the variation in measured values from as many stations as possible during a single pass. Variation in spacecraft parameters for a short period when the satellite passed over a given region, was thought to be quite small (except for skin temperature variation) during daylight passes. The variations in data from reporting stations, then, can be primarily considered as individual station measurement error. In each region a particular pass was chosen for which a maximum number of reports was received.

TABLE II

Call Sign	Channel 1 I(mA)	Channel 3 V(volts)	Channel 5 Tint (C°)	Channel 7 Text (C°)
Region I Pass 51				
G2AOX	72	19.4	38	49
F2DC	80	20	43	55
HB9WB	73	19.6	43.5	47
Δ Values Max.% Error from median	8 5.3%	0.6 1.5%	5.5 6.8%	8.0 7.9%
Insufficient data from Region I. Telemetry reports have not yet been received.				
Region II Pass 17				
WA1JQX	78	20.2	44.5	51
K2SS	78	20.1	45	54
WA3NAN	78	19.8	45	54
WØLER	77	20.5	45	52
W5CAY	77	20	44	53
W3GEX	78	20	–	52
W3QYG	74	20	–	51
K4CG	76	20.4	45	53
WA7GCS	76	20	43	47
W2GAX	76	20	46	53
W1AIM	70	20	40	45
K1OYB	76	20	44	52
K3AKR		20	–	51
K1HTV	79	20	46	49
W1JSM	82	20	49	60
Δ Values Max% error from median	12 7.9%	0.7 1.7%	9 9.9%	11 10%
Region III Pass 21				
VK3A1N	78	20	43	49
ZL1WB	80	20	45	48
VK3AVF	70	20	42	46
ZL3TAU	76	20	42	47
VK8KK	79	20	43	45
ZL2TAR	75	20	41	45
VK7PF	78	20	42	48
VK4ZT	78	20	43	48
Δ Values Max.% Error from median	10 6.7%	0 0%	4 4.7%	4 4.3%

Table II shows data for each station reporting and the range in data as well as the maximum percent of error from the median value. The error observed for the spacecraft battery voltage shows the lowest error due to the relatively "flat" nature of the voltage-to-frequency conversion curve and the fact that most of those reporting rounded off the reported measurement (as called for by the telemetry reporting form). Certain stations (those underlined) were used as control stations for each region since they were known to have better than average decoding equipment.

All regions show comparable data error. The magnitude of the error (less than 10% max.) was approximately the error estimated prior to the launch. This data does not utilize more powerful statistical methods that could be used to more accurately evaluate the data (i.e., a uniform probability density was assumed for all data). The maximum error figure of 10% does indicate that amateurs throughout the world are capable of making significant data measurements with considerable accuracy.

Summary

With the exception of a failure in the modulation of the ten-meter beacon transmitter, all Australis-Oscar 5 mission objectives were met.

a) The spacecraft was effectively stabilized to two revolutions per orbit (geomagnetic alignment) within the lifetime of the satellite.

b) Reliable amateur spacecraft telecommand was demonstrated.

c) The effectiveness of the seven channel telemetry system was verified. Amateur data generally showed less than ±10% variation from median values.

d) Significant results were obtained on propagation effects over the satellite-to-earth link in the ten meter band.[7]

e) Partial success was obtained in achieving the design lifetime of several weeks for both spacecraft transmitters using only chemical batteries.

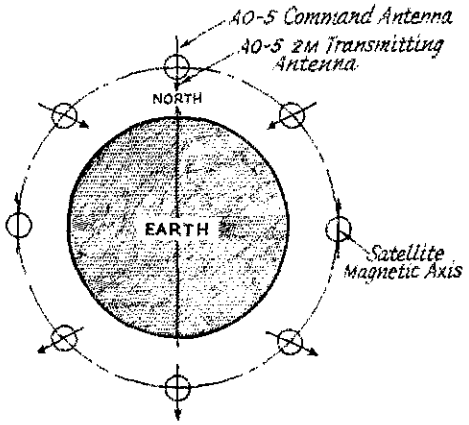


Fig. 5 – Motion of a magnetically oriented satellite in a polar orbit.

TABLE III

Command Number	Station ERP	Station Commanding	Date	Orbit Number	Purpose of the Command (Other Comments)
1	10kW	WA1IOX (USA)	1/28	61	10M Beacon OFF (First command of an Amateur S/C)
2	20kW	VK3ZBJ (Aust.)	1/29	72	10M Beacon ON
3	10kW	VK3ZBJ (Aust.)	1/31	97	Command Receiver Freq. Check (Beacon OFF, ON, OFF,ON)
4	20kW	VK3ZBJ (Aust.)	2/2	123	10M Beacon OFF (Routine)
5	10kW	VK3ZBJ (Aust.)	2/6	172	10M Beacon ON (Routine)
6	10kW	VK3ZBJ (Aust.)	2/9	210	10MBeacon OFF (Routine)
7	20kW	VK3ZBJ (Aust.)	2/13	260	10M Beacon ON (Last command during S/C life-time)

While the response to AO-5 was gratifying (many stations reported it to be the most interesting amateur space activity to date) it does not compare with the level of excitement that was generated by the repeater satellites such as Oscar III. Amsat is presently planning a next generation of Oscars. These satellites will carry two repeaters and an RTTY telemetry system capable of measuring as many as 60 parameters. The design lifetime of these satellites will be one year using a solar cell power source. Whether you are interested in RTTY, fm, a-m, ssb, DX, traffic handling, or even contesting there are activities and special experiments being planned for you with Oscar 6. If you are interested in finding out how you can contribute to this new and exciting chapter in amateur radio write: Amsat, P.O. Box 27, Washington, D.C., 20044.

TABLE IV

U.S. Stations who submitted formal reports to Amsat and Project Australis:

W1AIM, K1CSR, K1HTV, WA1IOX, W1JSM, W1MEP, K1OYB, K1QFD, W1YCO, W2AEF, W2EMV, W2FEN, WA2FLX, W2GAX, W2HZZ, WA2KSB, WB2NHT, K2PEP, W2PNQ, K2QBW, WA2ROJ, K2SS, WB2TFH, W2UTH, *W3ABT*, K3AKR, *W3BDE*, *WA3CPH*, W3GEX, W3HB, W3HI, W3JPT, K3JTE, K3KMV, WA3LOS, WA3NAN, K3OMX, W3QYG, WB4CAP, K4CG, W4DFU, K4EJQ, WA4FHY, W4FJ, K4GCM, W4IUD, WA4JID, W4KFC, W4RHZ, K4SAO, K4SNF, K4SUM, W4TNT, K4TWJ, W5CAY, WA5OQP, WA5PAG, K5PTK, WA5SQO, WA5VWJ, K6BAD, WB6LRV, WB6MVK, W6OYJ, WB6PFJ, W6WJ, K7BBO, WA7DUR, WA7GCS, W7GVX, W7HDD, W7JVF, K7MWC, W7QLC, K7VNU, W7ZC, W8BI, W8FAZ, W8HZR, *WA8JXM*, *WA8LOW*, *W8NWW*, *K8ODW*, W8SMC, W9AXT, W9BHR, W9BZU, WB9CNR, WA9HCZ, K9LCR, K9LQZ, WA9PNS, K9PVW, W9REC, W9TGB, W9VPU, WA9YBT, WØEOZ, WØFIP, WAØFLL, WAØFWN, WØGCH, WØJUV, WØLER, WØLPQ, WØNSB, WØPB, WØPGP, WØPHD, WØRWH, WØWMP, WØWYZ, WØZXX, KL7GLL

Bibliography

1 Data taken from a series of reports on Australis-Oscar 5 submitted to Amsat by John Goode, W5CAY.

2 Data taken from *Australis-Oscar 5 (A Summary Report)* submitted to Amsat by John Fox, WØLER.

3 Data taken from Fairchild Semiconductor Specification information on the 2N986/2N2452 *NPN Planar Phototransistor, 5/62.*

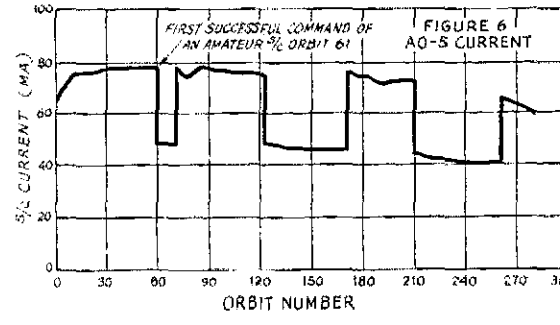
4 Information taken from preliminary data reduced at the Goddard Space Flight Center, NASA, by the Goddard Amateur Radio Club, 4/70.

5 Fischell, Robert E., "Magnetic and Gravity Attitude Stabilization of Earth Satellites," Report CM-996, John Hopkins Univ. Applied Physics Labs, May, 1961, p. 38.

6 Op. Cit., John Fox, WØLER.

7 Soifer, Raphael, "Ionospheric Propagation from Australis-Oscar 5" (A Survey Report to the Radio Amateur Satellite Corporation). *QST* October, 1970, pg. 54.

8 Op. Cit., Soifer.



"Oh, He's Making a List . . .

. . . and Running it Once . . ."

BY JOHN G. TROSTER,* W6ISQ

QRZed CATS Net. Any NCDXCers out there DXing?"

"You get on the list yet?"

"What list? Where?"

"14,237 point 4 . . . big pile-up."

"Omagosh . . . 237 point 4 . . . hope I didn't miss anything. What heading?"

"68.6 degrees. Hurry up and holler your call. They're gonna QRT the list."

"W6 . . . Ittaaalllyyy . . . Spppaaaaaaane . . . Kweeeekekkk . . . over . . ."

"Ok, ok, ok . . . stand by everybody, I got a few more calls. I got K5 . . . WA9 . . . WB2 . . . W6ISQ . . ."

"Hear that Charlie. Made the list. Thanks . . . ahhhh . . . who's the list for?"

"Details, details. Work him first — find out later. Now get down to 203 point 7. There's a W7 taking a list for a 'TD9' who's supposed to show in a few minutes . . ."

"A 'TD9' . . . wheee . . . never even heard one . . . this is my big day."

"Well, hurry up. Not much of a pile-up yet. The 'TD' don't speak english good, so they ain't gonna load him up the first round."

"Ok, ok . . . 302 point ahhhh . . . I get him about point 9 . . . guess that's the W7 there . . . Dubbbbllee yeeeww . . . sssiiikkkss . . . that's Italian String Quartets . . . over . . ."

"All right . . . this is W7 . . . have to cut the list off now. We'll run this one then maybe he can take a few more. I have a VE7 . . . W5 . . . K4 . . . W6ISQ . . ."

Struck again, Charlie . . . thanks a meg . . . luckeeee day. This 'TD' is gonna be a all-time new country . . . been waiting years . . ."

"Never mind . . . get back up to 237 point 4 . . . they're making a final list."

"I'm already on that list."

"No you ain't on the *final* list. First list was to get on a list to get on the . . . ahhh . . . final . . . ahh . . . list."

"Ahhh . . . oooo . . . 237 point 4 you said . . . ittaallyy . . . Spaaaaa . . . you mean Charlie that first list was only a list to get on a . . ."

"There's such a pile-up they's only taking calls in groups of 17 or so . . . maybe they'll pick you up again on the second round."

"Sure hope I don't miss out on . . . ahhh . . . whoever it is we're calling. Hey, how we coming on the "TD" . . . sure don't want to miss that one. I been QRX for 'TD' for 30 years . . . what heading for him?"

"You go back to 237 point 4 and get on that final list and I'll let ya know when the 'TD' shows . . . 306 point 3 degrees."

*82 Belbrook Way, Atherton, CA 94025

"Roger . . ooops, here they come again with the second final list, Charlie . . . Dubbbbllee yeeww . . . Sicks . . Aye . . Ess . . Kew . . ."

"I hear the "TD" . . . good copy . . . okay . . . standby ISQ . . . the W7 is starting down the list for the 'TD' . . . QRX . . . QRX . . . I'm next . . . roger, roger . . . 59 . . 59 . . . 73 . . . just worked me a 'TD' . . . get ready ISQ . . . they're pretty close to you . ."

"Ssssspppaaaaannnnneee . . . Kkwwweeekkeeekkk . . . you say somethin' Charlie?"

"The seven's calling you . . . go go go man go . . . give the 'TD' a report . . . report. . ."

"59 . . 59 . . 59 . . whooo . . . which list . . . 59 . . ."

"Where was ya? The seven stood by for ya. ."

"Aw nooo . . . I was right there . . almost. Maybe he'll pick me up at the end of the list."

"Naw, sorry . . the 'TD' QRTted."

"He whaaaatt . . . ooo . . . the pile-up will be so big tomorrow I'll never even be able to get back on the list. . ."

"There ain't no tomorrow. The seven called ya and stood by. . . then the 'TD' said 'no copy W6ISQ . . now QRT . . . volcano exploding . . . come back 8 years . ."

"Oooo, you mean after 30 years I missed . . . I was there like a split second after . . . hooo me . . . I just fell off the Honor Roll . . .. Well, I'm on the big list anyway. With that pile-up it's gotta be a new country. And say Charlie, who we callin there anyway?"

"Like I say . . . work 'em now . . details later."

"Yeah, I'd best get back up there. He must be that real weak signal there Charlie . . . under the fella calling CQ . . . yeah . . that's it . . . 3 policemen dead beat trying to chase that commercial RTTY off . . . guess I'd have to give him a 59 . . . if I can hear him turn it over to me . . . Must be getting close to me about now . . . glad that MC has a good strong sig . . guess he'll

relay the report . . . ahhh . . both ways . . I . . huh . . I . . ye . . . huh . . . gonna sneeze . . Charlie . . . huh . . huh . . hhhaaahheeefffiiiibbbbaaannnnyyyyeeeeeeyyywwwooowww . . ."

"Congratulations"

"Yeah, thanks for the gazundheit."

"I mean the report."

"What report?"

"The one from the fella you was QRX for."

"When did I work him?"

"You just gave him a 5 by 9 . . . loud and clear."

"I never called nobody . . I sneezed."

"Waalll, the MC called you . . . and I guess . . about that time . . you must of sneezed your VOX . . . anyway you sprayed out a 5 by 9."

"Who did I VOX . . . errr . . sneeze . . must of been a all-time brand new country . . . hope Bob White counts it . ."

"Naw, gave his call . . . WG1GAS . . . seems this is National Gas Week, so they got a special license commemorating a Grand Opening of a gas station someplace . . ."

"Oh no . . I missed the 'TD' because I was taking gas on some list for a . . . cruel world of the DXer . . . I fell off the DXCC Honor Roll for a Grand Opening . . . ooooo . . . it's a Grand *Closing* for my DX career . . . took me 30 years to make Honor Roll . . . now . . I'm a nobody again . . the ignominy . . oh well, maybe that 'WG1' will put me onto the WPX Honor Roll . . yeah, maybe . . better check with John . . oh, that 'TD' . . enough to make me quit DXing . . ."

"CQ Cats . . CQ Cats . . tremendous pile-up on 214 point 9 . . . he's makin' a list . . ."

"You say 214 point 9 Charlie? . . . what heading? . . ." QST

NEW BOOKS

RCA Transistor, Thyristor & Diode Manual, Technical Series SC-14, by RCA electronic components division, Harrison, NJ 07029. Paperback, 5 1/4 X 8 inches. Price $2.50. Contains 656 pages including index.

Here is a book that few solid-state experimenters will want to be without. This manual contains a wealth of up-to-date information on RCA's latest semiconductor devices. It offers basic design information, and numerous practical examples of solid-state circuitry.

The first 216 pages are devoted to plain-talk explanations of how semiconductors are made and employed. The text treats diodes, bipolar transistors, thyristors, tunnel diodes, and MOSFETs. Theory material is keyed to the technician/beginner level, and amateurs should have no difficulty understanding what is spelled out in this section of the book. Important basic data such as biasing, coupling, switching, ratings, and thermal considerations are given. Photoconductive cells and light-emitting diodes are discussed also. There is an in-depth discussion of linear amplification and voltage-controlled attenuators, plus design information on vhf and uhf rf circuits oscillators, frequency multipliers, and amplifiers.

The next 346 pages of the manual are devoted to device selection charts. Presently-manufactured RCA semiconductors (plus many discontinued types) are listed in these charts, and complete electrical specifications are given for each type. A base diagram is given for each semiconductor.

Next come 19 pages of drawings which provide the case profiles and dimensions for the many semiconductors discussed in the book. This portion of the manual also deals with mounting and insulating hardware for diodes and transistors.

The remainder of the text is dedicated to the experimenter who is interested in seeing practical examples of solid-state circuits. There are 40 schematic diagrams that should be of interest to the radio amateur and hi-fi buff. A few of the circuits given are: 12-volt car radio, fm tuner, ham-band preamplifier, 2-meter converter, VFO, audio power amplifiers, CB transmitter, 40-watt 6-meter transmitter, grid-dip meter (or, more aptly "base-dip meter"), electronic keyer, power supplies, and battery chargers.

In the reviewer's opinion this book should occupy a prominent spot in the ham's technical library. It should serve as a valuable adjunct to the ARRL *Radio Amateur's Handbook*, and could prove invaluable when studying for that higher class of amateur license. – *WICER*.

—•••—

Japanese Amateur Radio League Radio Amateur Handbook 1969. CQ Publishing Company, P.O. Box 170, Sugamo 1 Chome 26, toyoshimaku, Tokyo, Japan. 7" x 10", 776 pages, softback 1500 yen ($4.10).

The rhetorical question of what use I would get out of an anateur radio handbook written in Japanese bothered me. However, this book transcends national boundaries through the use of the universal language of symbols and drawings.

One cannot help but notice the "Japanesey" look of the equipment described which is a refreshing departure from the Continental and American look.

Typical chapters are: Fundamental Principles, Receiving and Transmitting Equipment, Vhf Receivers and Transmitters, Ssb, Fm, Transceivers, Propagation, Antennae, Station Accessories, Power Supplies, Trouble Shooting, BCI and TVI, Measurement and Calibration, Operating a Station, Examination to On the Air, Purpose and Organization of *JARL*, and Operating Aids.

A few construction projects described use such tubes as 807, 6AK5, 6Jo, and 3A5, which dates the material, but then there is an abundance of transistorized construction projects to satisfy even the avante garde.

"How it Started" is effectively displayed on the back cover by means of a chronology of ham radio in Japan. The front leaf shows the ham population of the world. *JARL* proudly points out that Japan is now second to the U.S. in ham population and bids fair to approach the U.S. in potential growth.

The material in this handbook reflects the needs of the ham explosion which is largely due to the interest shown by high school students. The biggest power amplifier described uses a pair of 811s in grounded grid. Exotic hints and kinks such as "how to splice a TV ribbon under water" are described.

This publication is a valuable addition to the amateur's library not only as a conversation piece but because of the useful information contained. The staff of *JARL* is to be congratulated for the excellence and originality of the material. – *KH6IJ*

CONTEST PERIODS

Phone		*CW*	
Starts	Ends	Starts	Ends
Feb. 6, 0001 GMT	Feb. 7, 2359 GMT	Feb. 20, 0001 GMT	Feb. 21, 2359 GMT
Mar. 6, 0001 GMT	Mar. 7, 2359 GMT	Mar. 20, 0001 GMT	Mar. 21, 2359 GMT

37th ARRL International DX Competition Announcement

WILL THE 1971 ARRL DX Test break all previous records? Will you QSO that last remaining country for 5BDXCC, that final state for 5BWAS? Will Section or Country leadership fall victim to your commanding signal? The answer to all of the above can be YES, if you participate!

Single-transmitter multioperator entries will be recognized as a distinct category from multi-multi. Rules will be the same as in previous years. As in the past, I hope everyone will be sure to pass on the contest information to their W/K VE/VO or DX friends. Give them the dates on the chance that they may not see this announcement and remind them in your QSOs just prior to the first weekend, lest they forget.

Be sure to send in your log, regardless of score. It will be of definite interest in preparing the contest summarization for *QST*. In the case of foreign entries, it can provide a confirmation of QSO towards DXCC for a W/K or VE/VO station.

Don't forget to comment on conditions in your area, unusual occurences, exceptional QSOs etc, and above all to send us along some good action pictures of your operation, QTH, antennas or anything else you think will be of interest.

As far as reporting goes, here's how: W/K and VE/VO stations send signal report and state or province to DX; DX stations send signal report plus a 3-digit number indicating power input. (E.g.; EI9J DE W1AW 579 Conn BK. W1AW R 559200 DE EI9J K.) Compute your score (see rules following) and send your entry to ARRL Communications Dept., 225 Main St., Newington, Conn. 06111 U.S.A. These entries must be *mailed no later than April 16, 1971; and remember, checkoff sheets* MUST be attached.

The FCC has set forth some guidelines as to which forms of identification of an amateur station will be acceptable for short QSOs such as DX and contest exchanges.

Examples of acceptable end-of-exchange transmissions of less than 30 seconds are:

"DX1DX de W6XYZ 589 CAL BK"
"DX1DX W6XYZ 589 CAL K"
"DX1DX 589 CAL de W6XYZ K"
"DX1DX 589 CAL W6XYZ K"
"589 CAL DX1DX W6XYZ K"

For telephony, the voice equivalent of the foregoing examples may be used, substituting "this is" or "from" for "de", etc.

C U Then. – *WA1KQM.*

DX Restrictions

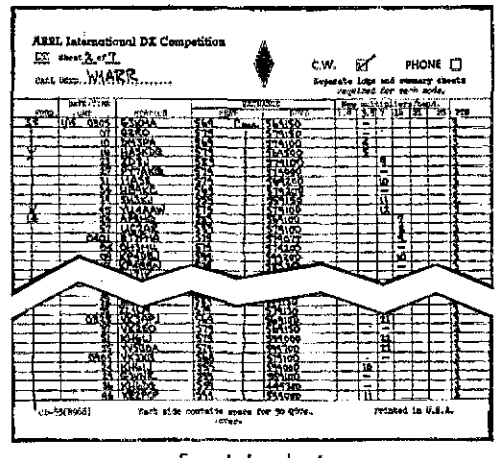
U. S. amateurs licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia and Viet Nam forbid radio communication between their amateur stations and those of other countries. U. S. amateurs should not work XU XV 3W8 or Canadian amateurs may not communicate with Cambodia, Laos, Viet Nam and Jordan. Prefixes to be avoided are JY XU XV XW8 and 3W8.

Rules

1) *Eligibility:* Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.

2) *Object:* Amateurs in the 48 continental United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.


ARRL International DX Competition

C.W. ☑ PHONE ☐

Sample log sheet

Log sheets, summary sheets and DX Checkoff sheets are now available from your ARRL Headquarters. *Unless first-class postage is included with your request, log sheets will be sent by third-class mail.*

3) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

4) *Entry Classifications:* Entry may be made in either or both the phones or cw sections: cw scores are independent of phone scores. Entries will be further classified as single or multiple-operator stations. Single-operator stations are those at which one person performs all the operating, logging and spotting functions. Multiple-operator stations are those obtaining assistance, such as from spotting or relief operators, or in keeping the station log and records. Single-transmitter multioperator entries will be recognized as a distinct category from multi-multi. The use of spotting nets places an entry in the multioperator category.

5) *Contest Periods:* There are four weekends, each 48 hours long: two for phone work and two for cw.

6) *Valid Contacts:* In the phone section, all claimed credits must be made voice-to-voice. In the telegraphy section, only cw contacts count. Crossband contacts may not be counted.

7) *Exchanges:*

a) *Amateurs in the 48 continental U.S. and Canada.* Cw participants will transmit a three-figure number, representing the RST report, plus their state or province. (The latter may consist of an appropriate abbreviation.) Phone participants will transmit a two-figure number consisting of the readability-strength report plus the state or province. *Example:* WA9HHH might transmit "579ILL" on cw, "57 Illinois" on phone.

b) *Amateurs outside* the 48 continental U.S. and Canada will transmit six-figure numbers, each consisting of the RST report plus three "power" numbers; the power indicator will represent the approximate transmitter-power input. Phone contestants will transmit five-figure numbers, each consisting of a readability-strength report and the three "power" numbers. *Example:* KL7AIZ, with 150 watts input, might transmit "569150" on cw, "56150" on phone. If the input power varies considerably on different bands, the "power" number should be changed accordingly. (Note, KH6 and KL7 are considered as DX.)

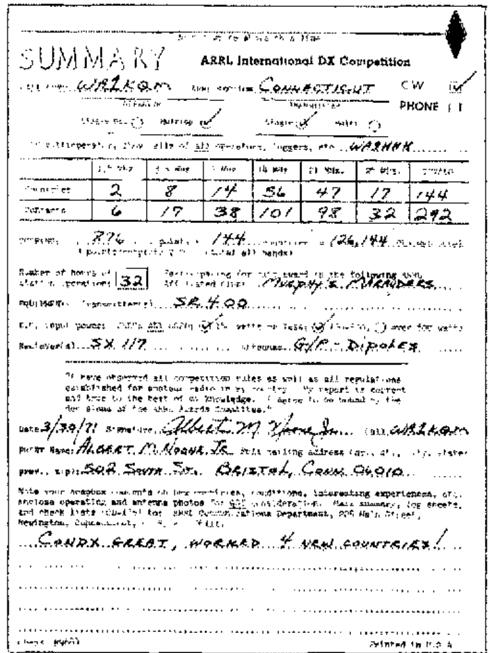
8) *Scoring:*

a) *Points:* One point is earned by a W/K or VE/VO station upon receiving acknowledgement of a contest exchange sent, and two points upon acknowledging an exchange received. Two points are earned by any other station upon receiving acknowledgement of a contest exchange sent, and one point upon acknowledging an exchange received.

b) *Final Scores:* W/K and VE/VO stations multiply total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of continental states and VE/VO licensing areas worked on one band plus the number of states and VE/VO licensing areas worked on each other band.

There are 48 continental states plus VO and VE1-VE8, a possible total of 57 multipliers per band.

9) *Repeat Contacts:* The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.



SUMMARY ARRL International DX Competition

WA1KQM CONNECTICUT CW ✓ PHONE

WA3HHK

Countries	2	8	14	56	47	17	144
Contacts	6	17	38	101	98	32	292

876 144 = 126,144

32 Murphy's Marauders

SB-400

SX 117 G/P Dipoles

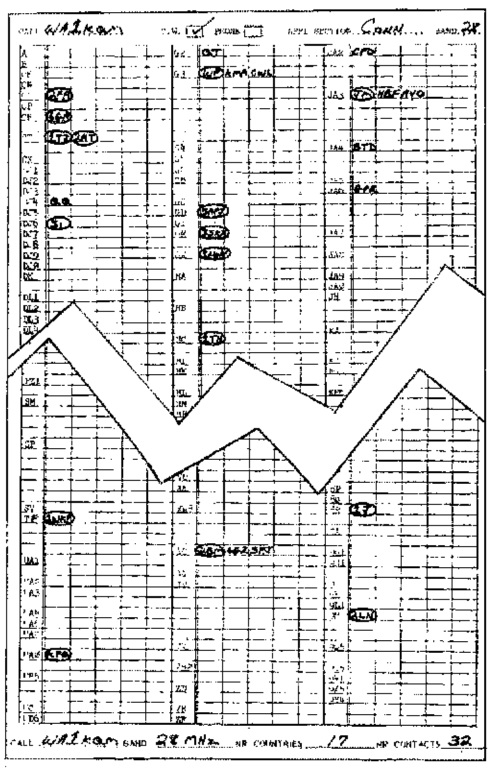
Date 3/30/71 Albert M. Moore Jr. WA1KQM

Albert M. Moore, Jr. 502 South St. Bristol, Conn. 06010

Condx great, worked 4 new countries!

Printed in U.S.A.

Sample summary sheet



Sample DX check-off sheet

10) *Reporting:* Contest work must be reported as shown in the sample forms. Each entry must include the signed statement.

To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with zip code. We suggest a minimum of 12 cents postage attached. This will assure your receiving 1 summary sheet, 1 DX checkoff sheet (required by USA entrants only) and 3 log-sheets, enough for 300 contacts on one band. Using this as a guideline you can adjust the postage according to your needs.

Contest reports must be mailed no later than April 16, 1971, to be eligible for *QST* listings and awards. All DX Competition logs become the property of the American Radio Relay League and none can be returned.

11) *Awards:* To document the performance of participants in the 37th ARRL International DX Competition, a full report will be carried in *QST*. In addition, special recognition will be made as follows:

a) A certificate will be awarded to the high-scoring single-operator phone and to the high-scoring single-operator cw entrant in each country, in Alaska, Hawaii and in each of the continental U.S. and Canadian ARRL sections (see page 6, *QST*) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section or country from which three or more valid multiple-operator entries are received.

b) A suitable certificate will be awarded to the operator making the highest single-operator phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three phone entries by members of the club and that these scores are confirmed by receipt at ARRL of the individual contest logs from such members. The highest-single operator cw scorer in each club will be awarded a certificate under the same conditions. Only a bona fide resident member, operating a station (his or another club member's) in local club territory, may compete for club certificates. Secretary's letter must be received by June 11, 1971.

c) A personalized plaque will be awarded to the highest single-operator DX phone and cw station (non-W/VE) in Africa, Asia, Europe, North America, Oceania and South America.

d) ARRL will award a gavel to the affiliated club submitting the greatest aggregate phone and cw score by its members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL of the individual contest logs from such members. Only scores of a bona fide resident member, operating a station (his or another club member's) in local club territory, may be included in club totals.

12) *Judges:* All entries will be passed upon the ARRL Awards Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

13) *Disqualifications:* Each participant agrees to observe the contest rules as well as all regulations established for amateur radio in his country. Violation of any regulation as confirmed by a single FCC citation or advisory notice or two ARRL-accredited Official Observer reports, may constitute grounds for disqualifications. Some examples of practices which can result in disqualification: off-frequency (out-of-band) operation, harmonics, spurious emissions, low tone reports in logs, key clicks splatter, excessive side-bands, U.S. stations working banned countries, interfering with channels handling amateur emergency communication.

QST

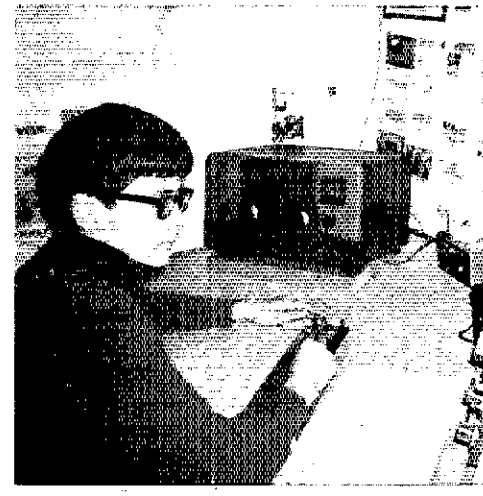
Strays

Stolen Equipment

The following equipment was stolen from W3KAU; Electro-Voice 602-F dynamic noise cancelling microphone; Comdel model CSP-11 speech processor; Collins 32S-3 transmitter, Serial †13490; Collins 516F-2 ac power supply, †20087; Collins 312-B-4 speaker console, †61906; Collins 30L-1 linear amplifier, †2066; Collins 75S-3C receiver, †11965 (extended range coverage with additional front panel selector switch and a factory modification for plug-in mechanical 4 kHz a-m filter. Complete with 38 crystals); Collins DL-1 dummy load; Collins 312-B3 speaker cabinet (modified to include a Waters 335 coaxial switch); Heathkit HO-10 monitor scope; and a custom 1000-watt dummy load (top and sides one-piece perforated gold anodized aluminum). Anyone with information on the above is requested to contact Police Detective Kitterman, Montgomery County, Maryland at 301-949-4782. A reward will be paid for any information leading to the arrest and conviction of any party involved in the theft. W3KAU, Kensington, MD.

—•••—

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.



Here's a recent WAS qualifier to admire. He's Bob Kresky, WNØYMK of Kansas. Bob is 13 years old and a Boy Scout. One more continent and he'll qualify for WAC, too. Bob's dad is WAØYML.

24th VHF Sweepstakes Announcement

WANT TO start the New Year off right? Then how about spending a couple of hours operating in the January VHF Sweepstakes, January 9-10, 1971. I'm sure you'll find it well worthwhile.

The contest begins at 2 P.M. Saturday and continues to midnight Sunday your local time (a 34-hour period).

To calculate your score, take the sum of your QSO points (at 2 points per complete two-way exchange) and multiply by total ARRL sections worked **plus ten.**

Be sure to send in your logs, regardless of score. They are always of interest in preparing the contest summarization for *QST.* Don't forget to include your comments on conditions, unusual occurences or what- have-you plus some good action shots of your contest operation, antennas etc. **Mail them to us no later than February 5, 1971.**

Send now for log forms: each sheet has space for 80 contacts plus a section checkoff list and a summary. (Let us know how many you want).

ARRL-affiliated clubs, and clubs awaiting approval of affiliation, are eligible to compete for an engraved gavel (see Rule †7). Club secretaries note: your entry letter **must** be received here at Hq. by **March 5.**

Awards will be mailed in early Spring following publication of the results in *QST.*

C U January 9! – *WA1KQM.*

Rules

1) *Eligibility:* Amateur operators in any ARRL section (see page 6) operating at home, or mobile or portable *under one call,* on or above 50 MHz, are invited to take part. Yukon- N.W.T. (VE8) counts as a separate multiplier.

2) *Object:* Participants will attempt to contact as many other stations in as many ARRL sections as possible.

3) *Contest Periods:* The contest starts at 2:00 P.M. your local time, Saturday, January 9, 1971 and ends at midnight, Sunday, January 10, 1971. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the zones concerned.

4) *Exchanges:* Contest exchanges, including all data shown in the sample, must be transmitted and receipted for as a basis for each scored point.

5) *Scoring:* (a) Contacts count *one point* when the required exchange information has been received and acknowledged, a *second point* when exchange has been completed in both directions. A section counts only once for multiplier credit regardless of band.

(b) Foreign Entries: All contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together as one, and a section multiplier of *no more than* one may be claimed for contacts with all foreign stations contacted. Foreign stations may only work stations in ARRL sections for contest credit. Foreign stations will give their country name in the exchange.

(c) Final score is obtained by multiplying total contact points by the sum of the different ARRL sections worked (the number in each of which at least one SS point has been credited) plus 10.

6) *Conditions for Valid Contact:* (a) Repeat contacts on other bands confirmed by completed exchanges of *up to two points per band* may be counted for *each different station* worked. (Example: WA1NFS works WA6GVC on 50 and 144 MHz for complete exchanges of 2 points on each band: 2 X 2 gives 4 points but only *one* section multiplier.)

(b) Cross-band work may not be counted.

(c) Portable or mobile station operation under one call, from one location only, is permitted.

(d) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest (with the exception of family stations, where more than one call is assigned to one location by FCC/DOC).

(e) Contacts with aircraft mobiles cannot be counted for section multipliers.

(f) Contacts made be retransmitting either or both stations do not count for contest purposes.

While no minimum distance is specified for contacts, equiptment in use should be capable of real communications (i.e., able to communicate over at least a mile.)

7) *Awards:* Entries will be classified as single- or multi-operator, a single-operator station being defined as one manned by an amateur who neither receives nor gives assistance to any person during the contest period. Certificates will be awarded in each ARRL section to the top-scoring amateur in the single-operator classification. In addition, a certificate will be awarded to the top Novice in each ARRL section where *at least three* such licenses submit valid contest logs. Multioperator work will be grouped separately in the official report of results in *QST.*

(Continued on page 104)

EXPLANATION OF VHF SS CONTEST EXCHANGES

Send Like a Standard Msg. Preamble, the.....NR		*Call*	*CK*	*Place*	*Time*	*Date*
Exchanges	Contest numbers 1, 2, 3, etc., a new NR for each station worked	Send your own call	CK (Readability and strength or RST of station worked)	Your ARRL section	Send GMT time of transmitting this NR	Send date of QSO
Sample	NR 1	WA1KQM	59	CONN	1905	JAN 10

SECTION EMERGENCY COORDINATORS OF THE AMATEUR RADIO EMERGENCY CORPS

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the Amateur Radio Emergency Corps organization throughout the Section. He acts as the SCM's executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency. One of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in his Section. Does your locality have an EC? If not, recommend the name of a likely prospect to the SEC. The SEC invites your questions concerning the status of the AREC in your Section.

ATLANTIC DIVISION

Delaware	W3DKX	Roger Cole	345 E. Roosevelt Ave.	New Castle 19720
Eastern Pennsylvania	W3ICC	Harford P. Drexler	P. O. Box 411, Cherry Ln.	Penns Park 18943
Maryland-D.C.	W3LQY	Marianne L. Payton	412 Audrey Ave.	Baltimore 21225
Southern New Jersey	W2LVW	James Peck	810 Indian Trail Ave.	Deptford 08096
Western New York	W2RUF	Clara C. Reger	435 Best St.	Buffalo 14208
Western Pennsylvania	W3KPJ	Henry T. Schneider	1806 Water St.	Westeyville 16510

CENTRAL DIVISION

Illinois	W9RYU	Harry J. Studer	705 Hillcrest Rd.	Milan 61264
Indiana	W9FC	Clifford C. McGuyer	2900 East Oak Street	Evansville 47714
Wisconsin	W9NGT	Sherman C. Carr	756 W. Washington Ave.	Hartford 53027

DAKOTA DIVISION

Minnesota	WAØMZW	Harley Hicks	11316 Harrison Rd.	Bloomington 55431
North Dakota	WAØAYL	David L. Beach	Apt. 7, 1116-19th Ave., S.	Grand Forks 58201
South Dakota	WAØEUZ	Claude V. Kaplan	RFD 1 - 23rd & Lincoln	Hot Springs 57747

DELTA DIVISION

Arkansas	W5PHZ	Joe Bartelli	P. O. Box 412	Rogers 72756
Louisiana	W5OB	John L. Robertson	2609 Halsey Ave.	New Orleans 70114
Mississippi	WA5JWD	Gene Mc Gahey	P. O. Box 118	Hernando 38632
Tennessee	WB4ANX	John H. Sanders	2149 Heatherly Rd.	Kingsport 37660

GREAT LAKES DIVISION

Kentucky	K4YZU	Morgan W. Wright	1758 W. Gaulbert St.	Louisville 40210
Michigan	W8MPD	Stanley J. Briggs	1885 Pinetree Rd.	Trenton 48183
Ohio	W8OUU	James W. Benson	2463 Kingspath Dr.	Cincinnati 45231

HUDSON DIVISION

Eastern New York	W2KGC	William L. Stahl	92 Shirley Ave.	Fishkill 12524
N.Y.C. & Long Island	K2OVN	John S. Brandau	1659 East 46th St.	Brooklyn 11234
Northern New Jersey	K2KDQ	Jack D. Wilk	P. O. Box 1175	Passaic 07055

MIDWEST DIVISION

Iowa	KØLVB	Gregg D. Miller	R.R. 4	Marshalltown 50158
Kansas	KØLPE	Joseph E. Hoover	P. O. Box 263	Concordia 66901
Missouri	WØENW	Gregory R. Hibbard	2413 Golf Street	Sedalia 65301
Nebraska	KØODF	Lynn Bilyeu	406 Henkens Dr.	Chadron 69337

NEW ENGLAND DIVISION

Connecticut	W1HHR	John C. Sullivan	Whitney Rd.	Columbia 06237
Eastern Massachusetts	W1AOG	Donald E. Guptill	17 Park St. Ct.	Medford 02155
Maine	K1CLF	Allen E. Schark	42 Maple St.	Presque Isle 04769
New Hampshire	W1LUD	John W. Earr	Farr Hill	Littleton 03561
Rhode Island	W1YNF	Gordon F. Fox	14 York Drive	Coventry 02816
Vermont	W1VSA	Harry A. Preston, Jr.	RFD 1	Charlotte 05445
Western Massachusetts	WA1DNB	Robert H. Phoenix	Box 431, N. Washington St.	Belchertown 01007

NORTHWESTERN DIVISION

Alaska	KL7FNX	William D. Crowl	Box 4407	Spenard 99503
Idaho	WA7EWV	Dale A. Brock	1508 Alder Drive	Lewiston 83501
Montana	W7TYN	Joseph D'Arcy	1916 Haggin Ave.	Anaconda 59711
Oregon	W7HLF	Dwight J. Albright	1678 Orchard Home Dr.	Medford 97501
Washington	W7UWT	Raymond H. McCausland	2812 Hayton Ave.	Bremerton 98310

PACIFIC DIVISION

East Bay	WB6DHH	Paul J. Parker	2236 Whyte Park Ave.	Walnut Creek 94595
Hawaii	KH6GQW	J. Patrick Corrigan	99-1154-B Aiea Hts. Drive	Aiea 96701
Nevada	WA7BEU	L. L. "Mike" Blain	560 Cherry St.	Boulder City 89005
Sacramento Valley	W6SMU	Theodore W. Rast	7512 Winding Way	Fair Oaks 95628
San Francisco	W6WLV	Hal Littlefield	1319 Hearn Ave.	Santa Rosa 95401
San Joaquin Valley	WB6OSH	Berge Bulbulian	2736 So. McCall	Sanger 93657
Santa Clara Valley	W6VZE	Charles E. Ghidden	1037 Capuchino Ave.	Burlingame 94010

ROANOKE DIVISION

North Carolina	W4FVN	Herschel H. Haney	Box 935	Lumberton 28358
South Carolina	WA4ECJ	Richard H. Miller	1509 Highland Ave.	Camden 29020
Virginia	WA4PBG	Montie F. Cone	317 Van Buren St.	Falls Church 22046
West Virginia	WA8NDY	D. A. Norona	P. O. Box 523	Buckhannon 26201

ROCKY MOUNTAIN DIVISION

Colorado	WAØHUQ	Clyde O. Penney	1626 Locust St.	Denver 80220
New Mexico	W5PNY	Harry McGavran, Jr.	2580A 45th St.	Los Alamos 87544
Utah	W7WKE	McCarroll Petersen	4815 Yorktown Drive	Salt Lake City 84117
Wyoming	K7NQX	Glen R. Blackburn	P. O. Box 164, 1739 E. 22nd	Cheyenne 82001

SOUTHEASTERN DIVISION

Alabama	W4WLG	Donald W. Bonner	2208 Rodgers Dr.	Huntsville 35811
Canal Zone	KZ5JC	John S. Catanzaro	Box 487	Balboa
Eastern Florida	W4IYT	Andrew C. Clark	41 Lenape Drive	Miami Springs 33166
Georgia	WA4VWV	Stephen D. Smith	5258 Seaton Dr.	Dunwoody 30338
West Indies (P.R.-V.I.)	KP4CO	Jose Medina-Hernandez	Box 1480	Mayaguez, P.R. 00709
Western Florida	W4IKB	C. D. McKechnie	P. O. Box 848	Chipley 32428

SOUTHWESTERN DIVISION

Arizona	K7GPZ	Elmer Olson	5733 N. 41st Place	Phoenix 85018
Los Angeles	WA6QZY	William L. Carpenter	140080 Los Angeles St.	Baldwin Park 91706
Orange	WB6COR	Billy C. Hall	Bit O'Home Lodge, Space 56 5002 W. McFadden Ave.	Santa Ana 92704
San Diego	K6EDA	Howard C. French	6524 Estelle Street	San Diego 92115
Santa Barbara	W6JTA	Robert W. Tauxe	2133 Fresno St.	Los Osos 93401

WEST GULF DIVISION

Northern Texas	W5JSM	W. F. Thompson	520 Ave. "J"	Hereford 79045
Oklahoma	WA5FSN	Leonard Hollar	710 So. 10th St.	Kingfisher 73750
Southern Texas	K5QQG	E. Wayne Smith	3118 Stanton Street	Houston 77025

CANADIAN DIVISION

Alberta	VE6XC	Roy Ellis	P. O. Box 2, Clover Park	Ft. Saskatchewan
British Columbia	VE7FB	Harold E. Savage	4553 West 12th Ave.	Vancouver 8
Manitoba	VE4IA	John D. Fallows	470 Hespeler Ave.	Winnipeg 5
Maritime	VE1HJ	F. R. Fraser	12 Albert St.	Dartmouth, N.S.
Ontario	VE3EWD	Ed W. Doyle	301 Lacasse Blvd.	Tecumseh, Windsor
Quebec	VE2BFZ	Jean-Marc Desrapleau	175 rue D'Alsace	St. Lambert, Comte de Chambly
Saskatchewan	VE5CU	W. H. Parker	1008-10th St. E.	Saskatoon

Announcing the 1971 ARRL

Simulated Emergency Test

January 30 - 31, 1971

AS THIS is written, it is still quite warm with the Indian Summer lingering in the air. It seems almost inconceivable that the cold weather usually associated with the annual Simulated Emergency Test is just around the corner. But, none-the-less, as you read this, time is growing short, and ARPSC leadership personnel are finalizing plans for the nationwide emergency communications exercise that will be held the last full weekend of January.

The purposes of SET are several-fold: (1) to provide a test of local amateur emergency communications organizations such as AREC and RACES; (2) to provide a test, under extreme strain, of the National Traffic system, the long-haul traffic facility of ARPSC; (3) to demonstrate, to our served agencies and the public, amateur radio's ability to function during conditions paralleling as closely as possible those that might be encountered during an actual disaster; and finally (4) to provide operator training and experience in emergency communications practice.

During the 1970 SET we made a good showing, although results were down slightly from the record levels of 1969. In spite of somewhat lower individual participation, reporting levels were up, a trend we'd like to continue in the latter respect, but one which must be reversed in the former. Afterall, in the end, it is the individual amateur that allows the fraternity to perform our public service deeds. Consider this your invitation to help make the 1971 SET the best ever.

The Local Test

"Okay," you say, "how can I help?"

The most likely course of action is to contact your local emergency coordinator, who, if he's worth his salt, will likely have begun planning exactly what will happen during the SET within his area of jurisdiction. Don't expect him to tell you what's going on, though. The EC should keep the exact plan under his hat, since it wouldn't be a very good test of emergency preparedness if everyone knows what will happen in advance.

The EC will tell you approximately when the test will take place and will probably recruit you as a member of his AREC group, if you aren't already. He may tell you something about how your assistance will be utilized, taking into consideration your equipment capabilities, experience and availability.

"But," you continue, "I don't know who my EC is," or "my EC isn't active," or "my community doesn't have an EC."

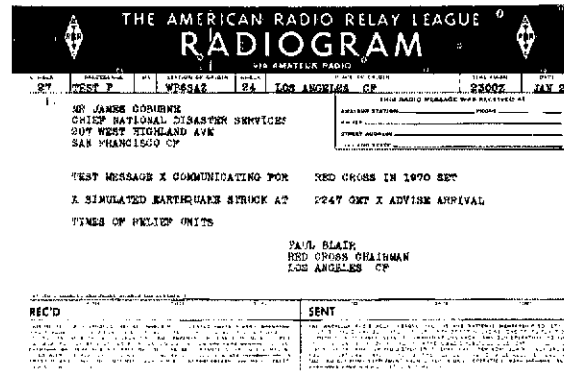
In the first case you can contact your Section Emergency Coordinator, who is listed in the table accompanying this announcement, or you can write headquarters and we'll try to supply the name and address of the nearest EC. It would be helpful if, in contacting HQ, you include the name of the county in which you reside.

In the second and third cases, the solutions are pretty much the same. In some communities, the Radio Amateur Civil Emergency Service, directed by the local Civil Defense Radio Officer, is the most active emergency communications group. His identity can be ascertained by contacting the local c.d. office. If neither an active AREC nor RACES exists in your locale, you can undertake to organize the local amateurs yourself. In that case, contact HQ for a copy of the SET Bulletin which gives information on the "nuts 'n' bolts" of developing a SET plan.

The Nationwide SET

While what we've been talking about so far has concerned the SET at the local level, a nationwide exercise, putting NTS through its paces, will also be going on. It is the job of NTS to try to tie together all the local tests through a systematic organization of liaisons and relays. Obviously, for these liaisons to be carried out, each local group must somehow be represented in NTS. This normally will be done by having one or more local stations present on a section level NTS net during the course of the exercise. If there is no exercise going on in your area and time is too short to organize one, you can still take part in SET through this net activity. Many served agencies (Red Cross, hospitals, Civil Defense, etc.) will be originating traffic for many destinations and additional traffic outlets will be most welcome. There will also be many extra liaison functions to

(Continued on page 85)



THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

FROM AMATEUR RADIO

27	TEST P		WP6SAZ	24	LOS ANGELES CP	2300Z	JAN 24

MR JAMES CORBETT
CHIEF NATIONAL DISASTER SERVICES
207 WEST HIGHLAND AVE
SAN FRANCISCO CP

TEST MESSAGE X COMMUNICATING FOR RED CROSS IN 1970 SET
X SIMULATED EARTHQUAKE STRUCK AT 2247 GMT X ADVISE ARRIVAL
TIMES OF RELIEF UNITS

PAUL BLAIK
RED CROSS CHAIRMAN
LOS ANGELES CP

REC'D	SENT

Here is an example of an SET message in proper form. Note especially the addition of the word TEST in the preamble and the words TEST MESSAGE at beginning of the text. Routine traffic, in which category most traffic originated by individuals during SET will fall, need not carry either test designator. All higher precedence SET messages must be indicated as test traffic to avoid the possibility of creating a false-alarm disaster situation.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity HRH

CONDUCTED BY GEORGE HART,* WINJM

PLANNED OR UNPLANNED?

THE ANNUAL Simulated Emergency Test being conducted the end of next month, should be one of our biggest annual operating activities. Certainly it is among the most important, for two principal reasons. First, it has strong public relations appeal. The SET is an ideal time to get into the public eye and ear, to give them the big picture of *organized* nationwide amateur public service as distinguished from the occasional glamor activity. Secondly, but by no means less importantly, it gives us some badly needed annual introspection — a looking at and evaluation of ourselves as a public service.

We don't want to belabor a subject unnecessarily, the SET was mentioned in this column last month and will undoubtedly be mentioned again next month. But this year we are "flat out" to make it the biggest and best SET yet, and we want to appeal to *all* you amateurs to help us make it so. Whether your "thing" is DX or contesting or VHFing or just horsing around the bands, how about giving your local EC a hand in putting over the SET? How about volunteering your services to him *now*, while there is still time to do some planning?

Planning, did we say? Most emergencies are unannounced, how can you run a realistic simulated emergency if you *plan* it? A good question, but it has a good answer. *You* don't plan it, your EC or net manager does. You just make yourself available to take part in it, and in order to do this you have to know when it's going to be. Sure, in a real emergency you would drop everything to lend a hand, but for a test the average amateur would take a dim view of cancelling his personal plans. So the SET should be planned to the extent that everybody knows when it's going to be (or at least what weekend), but not precisely *what* it's going to be. Even this can be pre-announced to some extent. For example, the EC may announce that sometime during Jan. 30-31 there is going to be a whaluva simulated blizzard in North Overshoe, Vt., but refrain from giving further details until the day of the test.

The SET can be a lot of fun. It doesn't have to be a chore. Suppose, for example, you hold yourself in readiness on the designated weekend and at noon you get a call from an assistant EC, "Go down to Schmaltz's Hamburger stand," he says, "and ask the cook for an envelope with your name on it." You do so, buy a hamburger while you're sorting the contents. There is a slightly smaller envelope inside, on which is written instructions for you to report into the net at a certain time and frequency and follow the NCS's instructions. You do so, and after a certain time in the net the NCS calls and instructs you to open the inner envelope. On it is written: "Stop transmitting, NOW! Even if you are in the middle of a sentence. The final tube in your mobile rig just went west. If you carry a spare, fine; simulate the amount of time it would take to replace it, then report back into the net. Otherwise, simulate getting a new tube from someone or somewhere and come back on the net as soon as you get it. Moral: Always carry spares."

Alas, most of us don't carry spares. Maybe you would have to go home to get one, maybe to a friend's house, maybe to a store to buy one (although most parts stores close on Saturday afternoon). If you can't find one, you're out of the SET just as you would be out of action in a real emergency. No fair cheating! Your final tube didn't really burn out, but you should play the game just as though it had.

The NCS who told you to open the envelope didn't know what was in it, so he is calling you with important simulated emergency traffic (*he* has instructions in sealed envelopes, too!). You can hear him calling frantically, but you can't answer. NCS instructs another mobile to proceed to your location to find out what happened. What do you do, stay and wait or go where you know you can get a replacement tube? The decision could be

* Communications Manager, ARRL.

The emergency operation center of the Fort Bend Co., Tex., Civil Defense was officially opened in Aug. A large number of amateurs were in attendance, including Southern Texas SEC K5QQG. Shown are WA5ZWG and WA5JCJ, the county EC, after inspecting the facility.

important in a real emergency. Whatever you decide, a post-mortem discussion following the test will reveal whether you made the correct decision.

Depending on the imagination of the EC and his assistants (the AREC Planning Committee) your SET might be so close to the real thing that you will find it quite exciting and challenging. When Old Man Murphy gets into the act and some things happen that were *not* in the EC's script, confusion could reign supreme, just as it would in the real thing.

So it is all very well to say the SET should be unplanned because most emergencies are of this nature, but *total* lack of planning could result in a dull, uninteresting drill. At least there should be some idea in advance what *kind* of a simulated emergency is planned, as well as when.

Then too, there are plans for the SET and *overall* plans for emergency operation. The latter should be applied to the SET in any case, just as they would be applied to the real thing if it came along. A SET planned along the lines mentioned above could very well result in some changes or innovations in general emergency planning, and this is what it's all about.

By the time you read this, your ECs will probably have received their annual Simulated Emergency Test bulletin from headquarters. Some ECs will go out after recruits, others will not. There is no better way to get an inactive EC on the ball, however, than to show him that there are hams in the area interested in doing something along emergency preparedness lines. Don't be one of these hams who sits around on his haunches in supreme indifference but with supreme confidence that he'll be available if really needed. You may be available, all right, and you certainly will be needed, but you won't be useful for anything but to create confusion among those who have been participating in emergency planning. Take some time out of your casual operating to find out what this public service is all about, eh? - *WINJM*

Public Service Diary

Upon landing on Kapingamarangi Atoll, a small island 960 miles from Guam, in his ship on July 20, KC6SG found that a Peace Corps volunteer working with the Star Fish Control Survey Team had come down with a high fever and other symptoms. On a schedule with W7UZH/KG6, the illness was reported to the Navy Search and Rescue division at Agana, Guam. A doctor was called in and diagnosing the case by radio, evacuation of the patient was suggested. After cutting through much red tape, W7UZH was able to report to KC6SG that an evacuation flight had been arranged for 0600 on July 22. The patient was returned to Guam and admitted to the Naval Hospital that evening. – *W7UZH, EC Guam.*

– . . . –

During the last weekend of July, a large rock festival was scheduled for a recreation area near Middlefield, Conn. Since communications were to be a problem, Red Cross officials asked if amateurs could help. W1BKI, President of the Middlesex Amateur Radio Society, began arranging for equipment and personnel, while local citizens sought a court order to ban the event.

Kingsport, Tenn., amateurs again were active at a highway rest stop near their city on the Labor Day weekend. Done in cooperation with local Red Cross and Safety Council officials, visitors could stretch their legs, get free coffee, snacks, soft drinks, etc. Here PAM WA4EWN, left, and SEC WB4ANX, right, take a message from a Texas visitor, center.

Although the status of the festival was uncertain, preparation continued. No one knew just what to expect, but as many as 400,000 thousand persons were expected to attend and the possibility of disorders was evident. Finally a communications network using ten-meter wide band fm was set up among the four local hospitals most likely to be needed if serious trouble developed, in addition to a control station at Middlefield School.

The courts upheld the citizen's plea and an injunction halting the festival was issued. However, by this time, many persons had begun arriving at the festival site, increasing fears that trouble might develop. The communications network began operating on July 30 with stations on at Middlefield School and Middlesex Memorial Hospital in Middletown, both manned by Middlesex ARS members. Later a station at Hartford General Hospital was activated by WA1HOL, WA1JZC and WA1NFS, although effectiveness was somewhat limited by curfews covering the city to curb civil disorders occurring during the period. Stations at Yale-New Haven Hospital and Meriden-Wallingford Hospital saw limited activity, although W1KLK provided communications to the latter from his home station.

Luckily, no large scale emergency developed, although assistance for a number of serious injury cases was given through the dispatching of ambulances from the festival area to the various hospitals. About 1200 messages concerning serious and minor injuries and routine matters were handled by sixteen participating amateurs. – *W1BKI.*

– . . . –

The Rocky Mountain Radio League was asked to provide communications for the search of an elderly lady who had become lost while hunting mushrooms near Mt. Evans, Colo., on Aug. 14. First on the search scene were WØNCN, WØVNP and WAØREX. WØDCY was contacted and provided a communications link to Clear Creek County authorities while WAØGWL of Littleton kept in touch with Denver. After seven hours of operating, WAØLVM took over as control station

PUBLIC SERVICE HONOR ROLL September, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below. Use CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 *QST* for details. Please note maximum points for each category.

Category	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	
Max. Pts.	*10*	*5*	*16*	*12*	*12*	*20*	*3*	*-*	*5*	*Totals*
K0LVB	10	5	16	12	12	19			5	79
W6BNX	10		16		12	20		2	5	65
WA8EFX	10	5	16	12	12	2	3		5	65
WA2EPI	10	5	16	12	12	2	3			60
WB2FEH	10	5	16	12	12				5	60
W7OCX	10	5	16	12	12				5	60
WB8BBG	10	5	16	12	12				5	60
K8BHH	10	5	16	12	12				5	60
WA0IAW	10	5	16	12	12				5	60
WA1HQL	10	5	16	12	12					55
WB2DLJ	10	5	16	12	12					55
WB4IDT	10	5	16	12	12					55
W4OGG	10	5	16	12	12					55
WB4OMG	10	5	16	12	12					55
W0LCX	10	5	16		12		3	4	5	55
W6MNY	10	5	16	6	12				5	54
WA0OEJ	10	5	16	12		5			5	53
W8IMI	10	5	16	3	12				5	51
W3EZ1	10	5	16		12	1			5	49
W6LRU	10	5	16		12			1	5	49
WA3EMI	8	5	16	12		1				48
W4HFU	10	5	16		12				5	48
W5SBM	10	5	16		12				5	48
W6BGF	10	5	16		12				5	48
W9HRY	10	5	16		12				5	48
WA8UPI	10	5		12	12	3			5	47
K0MRI	10	4	16		12				5	47
W1BJG	10		16		12				5	43
WA1HSN	10		16		12				5	43
W2FR	10		16		12				5	43
WA2ICU	10	5	16		12					43
W2RUF	10		16		12				5	43
WA3JSU/1	10		16		12				5	43
W3LOS	10		16		12				5	43
W3MPX	10	5	16		4		3		5	43
W3NEM	10		16		12				5	43
WB4HDW	10	5	16		12					43
W4ZDY	10	5	16		12					43
WA6LFA	10		16		12				5	43
W6VNQ	10		16		12				5	43
W7AXT	10		16		12				5	43
W7PI	10	5	16		12					43
WA9AKX	10		16		12				5	43
W0BV	10	5	16		12					43
WA1IVV	10	5		12	12		3			42
W1ZPB	10	4	16		12					42
K3MVO	10	4		16	12					42
W7IWJ	10	5		12	12	3				42
WB8CWD	10	5	12		12		3			42
W2FIR/5	10	3	16		12					41
WB8ALU	10	3	16		12					41
WA9VZM	10		16		12		3			41
WA3CKA	10	2	16		12					40
W4DQ	10	2	16		12					40
W6DEB	10	5	16	9						40
W7BQ	10	3	16		6				5	40
W0LGG	10		16		9				5	40
W1BVR	10	1	16		12					39
W7LBK	10	5		12	12					39
K1FIR	10		16		12					38
WA1GEH	10		16		12					38
WA2BEX	10		16		12					38
WB2LGA	10		16		12					38
W2OC	10		16		12					38
E3HKK	10		16		12					38
WA3IPU	10		16		12					38
K3OIO	10		16		12					38
K4KNP	10		16		12					38
W6INH	10		16		12					38
W7GHT	10		16		12					38
K8LGA	10		16		12					38
W9GGW	10		16		12					38
W0HI	10		16		12					38
WA0HTN	10		16		12					38
W4NOG		5		12		20				37
WA6FOQ	10	3	12		12					37
W6IL		5		12		20		1		37
K0MNQ	10	1	16		10					37
WA2FRZ	10	5	12		6		3			36
W2MTA	10	5	16						5	36
VE4FQ	10	1	8		12				5	36
WA3BYC	10		16		9					35
WB4DAI	10	5	8	12						35
W6EIT		5		9		20		1		35
K1SXF		5		12	12				5	34
WA3EPM	2		12	12	3				5	34
W8IIZ	10		12		12					34
W7QGP		5		12		11			5	33
W0VAS		5		12	12		3			32
WB4LAL	6	5		12	3				5	31
WB4PYA	10	5	8		8					31
W7CAE	2	5		12		7			5	31
W7IIO	6	5				20				31
K7UYW	10	5			12	4				31
WA2BCT	5	5	6	8	6					30
K2KTK	8		16		6					30
W6YBV	10		8		12					30
WA0UTT	5	5	8	12						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 liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; (9) Serving as net manager.

at the search headquarters at 0500Z. Search operations were temporarily suspended at 0800. When operations began again at 1030, additional amateurs had arrived on the scene in the persons of K1WYS, *K0s* AUZ ESG JJQ ONC, *WA0s* RED and WTG. Using handi-talkies through the W0WYX repeater, these amateurs hiked into the heavily wooded terrain with search parties. At 2000 on the fifteenth the woman was found, in good condition considering the previous night's cold temperatures. K1WYS and WA0RED were in the first radio-equipped unit to reach the victim. — *WB0AWG, VHF PAM, Colo.*

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On the evening of Sept. 7, at 0028Z, K0DVN received a call from K0ENU in Norton, Kans., advising that a tornado had struck his house. The Kansas Weather Net was activated by K0DVN and as more stations checked in, reports also indicated that St. Peter, Kans., had suffered damage from the twister. K0OMM was sent to the city to assess damage. There was minor property damage but no injuries. The net continued functioning until 0300 during which time the local commercial radio station was kept advised of developments. — *K0DVN.*

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On the afternoon of Sept. 22, W0MBP was mobiling near Sublette, Kans., when he came upon an automobile accident. Using the Midwest Amateur Radio Service frequency he called for assistance and was answered by W0MJN in Iowa who called the state police and an ambulance. Additional assistance in summoning ambulances for five persons injured in the accident was given by other amateurs on the frequency at the time. — *K0EXN, EC Zone 12, Kans.*

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Again on October 2, the Rocky Mountain Radio League's services were utilized when, at 1750Z, a twin-engine airplane with forty persons aboard slammed into a wooded mountainside fifty miles west of Denver. Within minutes of notification, WA0ZVM and K1WYS were mobiling to the scene using the Squaw Mountain repeater, W0WYX, enroute. W0DCY provided an immediate

landline link to the Georgetown and Idaho Springs fire departments and the Clear Creek County Sheriff.

At 1930 WAØZVM relayed a message to WØNCN requesting the Alpine Rescue Team of Evergreen, Colo., to standby; half-an-hour later the Colorado State Patrol requested that the team respond and start an immediate search of the crash area for survivors. At 2030 an emergency net was activated on the two-meter fm repeater with WAØRLQ as control. WØECN stationed himself at the Red Cross in Denver. One of the first messages handled on the net concerned the number of fatalities and survivors.

Early in the evening *WØs* CCA VNP, *WAØs* JDQ and IKY arrived at the crash command post to help out. WAØKUM relieved WØECN at the Red Cross and was himself relieved by KØQAR later that night. Net Controls through the remainder of the operation were KØUFA, WAØWTG, WØFZG and WAØOII. The operation was secured the evening of Oct. 3 when the last of 29 fatalities, many of them members of the Wichita State University football team, were removed from the accident site. — *WBØAWG, VHF PAM, Colo.*

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At 2145Z on Oct. 5, the downtown area of Shawnee, Okla., was hit with a late season tornado, which then skipped to the northeast corner of the town. Four persons were killed and at least another fifty were injured.

One of the first activities of the Shawnee Amateur Radio Club after the tornado struck was to provide emergency power generators to the sheriff's office and police department and several hospitals. Additional equipment was brought in by Oklahoma County RACES personnel with W5TKT in charge.

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The Oklahoma Emergency Phone Net was activated on 75-meters with WA5FSN and WA5TRS alternating as control stations. W5LHY, K5LUJ and K5LZF, all located in Shawnee, took turns handling the numerous health and welfare inquiries, many coming from the friends and families of the two colleges located in the city. The 7290 Traffic Net also helped with the incoming traffic with W5HWY, W5HVF and WA5JGU handling the bulk of the traffic on this channel. — *WA5FSN, SEC Okla.*

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On April 18, Vermont amateurs assisted a state wide effort by providing communications for a Green-Up Day, an activity in which volunteers combed state roads to clear them of litter. Stations were set up in each of 14 counties through the W1KOO and W1ABI repeaters. Hourly reports were obtained from each county at control station K1MPN. A six meter link was then used to the Civil Defense headquarters where the progress was marked on a large map. Seventy-four amateurs participated in the communicating while 67,000 volunteers took part in the actual green-up day exercise. — *K1MPN, SCM Vermont.*

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Six Wayne Co. (Mich.) amateurs provided communications for three separate Girl Scout Day Camps on June 16-18 and 23-25. None of the three locations had regular communications facilities available. Two-meter fm was used and no emergencies developed. — *W8BEZ, EC Wayne Co., Mich.*

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Los Alamos, N.M., area amateurs were alerted on July 19, when the local Search and Rescue organization learned of a woman missing from a hiking trip which had walked into a canyon near the city. Eight amateurs responded, but it was a false alarm. The missing woman was discovered later in the evening with her family. — *W5PNY, SEC N.M.*

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For the month of August, 1970, forty-three SEC reports were received at headquarters representing 14,907 AREC members. In August, 1969, forty-five reports were received representing 16,141 AREC members; thus, a decrease of two reports and about 1200 AREC members is evident. Sections reporting: Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Kans, LA, Mar, MDC, Mich, Mont, Nevr, Nev, NMex, NLI, NC, NNJ, NTex, Ohio, Okla, Ont, Org, Que, SDgo, SF, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WMass, WNY, WPa.

Traffic Talk

A favorite indoor sport of many amateurs who attend traffic forums at conventions is to think up "what if" types of questions which will confound the experts in their efforts to apply standard rules to them. For example, take the "book" message. This is always good for some discussion at any gathering of traffic people. The rules say that "book" form can be used at the discretion of the handling station in the interest of efficiency in handling. Each message, if it deserves to be sent at all (and unless you are the originator, you are not the judge of this), deserves to be sent in full in standard form. However, where a group of messages all contain common elements, they can be "booked" so that in transmitting them it is not necessary to repeat the same things over and over.

The common example is a message having the same preamble (except for number), text and signature going to a number of different addresses. The preamble (except for number), text and signature are sent first, then the different numbers and addresses. Details are in *Operating an Amateur Radio Station* and will not be repeated here. The question is, *what if* the entire text is the same for all messages except one word, or *what if* the only

An amateur radio exhibit was erected at the San Mateo Fair for thirteen days recently by the San Mateo Radio Club. More than 400 pieces of traffic were originated through the fair station. The station, W6UQ/6 is being operated by K6ORP in this photo.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Sept. Traffic

Call	Orig.	Rec'd.	Rel.	Del	Total
W3CUL	327	2561	2290	281	5439
K1BGS	1888	114	15	60	2077
K5TEY	0	827	822	5	1654
KØONK	147	745	699	29	1620
W1PEX	37	799	627	98	1561
W1BA	7	694	631	55	1387
W3VR	149	561	420	41	1171
WAØVAS	119	397	17	380	913
WØLCX	32	430	326	36	824
WA9VZM	28	347	347	0	720
K8ZJU	8	345	195	142	690
WA1JTM	22	334	311	15	682
W9JYO	290	193	184	9	676
WA9WNH	9	321	268	13	611
WA1IFE	8	293	236	57	594
W9JBQ	3	275	260	11	549
WA2FRZ	61	223	194	53	531
WB4NNO	36	242	225	17	520
WA3IYS	11	249	231	10	501
WB9BXX	31	230	206	34	501
WA5PPF (Aug.)	97	567	394	153	1211

BPL for 100 or more originations-plus-deliveries

WA4MHK 189	W1FUF 122	WA1JVV 108
WA6BYZ 148	WA3FMI 119	W2OE 107
W3MPX 144	WA2EPI 115	KP4WT 101
K2KQC 130	W9EQQ 112	WA1JZC (Aug.) 101
	WA1GCE 111	

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA4MHK, VE2ALE.

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.

common thing about all messages is the signature, or *how much* of the message has to be common in order to justify booking, or *how* do you indicate it to the receiving station when the book form to be used is not orthodox?

All good questions which have no specific panacea answers. You use your best judgment. If the cause of overall efficiency will be served, you use book form. If it will not, you don't. It's just that simple. The *count* you receive for handling traffic in this or that form is *not* a consideration. In any case, you seldom gain anything in the count by booking traffic. The above questions are typical, but as in all such questions the answers pretty much follow the rules of common sense. If you have forty messages with the same text except for one word, it would be worthwhile to book them and take the time to explain to the receiving station that one word in the text, indicated by XXX, is variable; however, if there are only two or three such messages, this would cause more confusion than it would be worth. The answer to the question about the common signature is that it ordinarily would not be worthwhile booking such messages; you don't *have* to book them, you know; you can always send them separately, even if you received them in book form. How much of the message has to be common to justify booking? Enough of it to effect a significant saving in transmitting (and receiving) time. How do you indicate unorthodox booking to a receiving station? There is no set procedure, you have to spell it out, and it better be good or you'll be the cause of some garbling.

Another application of the same principle came up in a discussion regarding duration of nets. In NTS, and perhaps some other nets as well, the duration of a net is a factor in determining the net's "rate," so it is necessary for the NCS to know how many minutes elapsed between QND and QNF. When QNY procedure is used, the NCS sometimes dispatches the only two remaining stations to a side frequency to clear their traffic, then makes one more check of the net frequency to see if he missed anyone. If no one, he declares QNF, meaning the net session is closed. The usual procedure then is to make a count of traffic cleared.

Now how about that traffic being cleared on a side frequency? The "rate" of a net is the traffic cleared divided by the amount of time the net is in directed session. The two stations dispatched just prior to the net closing are still hammering away after the net is closed. Does their traffic count in the total? Does the time it takes to handle it count in the net time? The answer is "yes" to both questions: the net is not really closed until all traffic that has been ordered cleared by the NCS is actually cleared. But how is the NCS to know how long it took and how much (if not all) of it was cleared? Well, he can listen. Or, he can estimate. The latter is another aspect of using the old noodle. If he is a good NCS, he will know about how long it will take them to clear the traffic under the conditions which exist. The exact time or the exact message count is not all that essential – an educated guess is good enough. If he doesn't want to take a guess, he can actually listen on the side frequency and get exact figures.

The moral of all this is, follow the rules as long as they are specific. Beyond that, use your head in applying the *intent* of the rules. If we don't all do that, the rules will get as complicated as those for DXCC and the Field Day. – *W1NJM.*

National Traffic System. W2ER reports issuing 2RN certificates to *W2s* BU FEB MTA QC RUF, *WA2s* BAN, CAL, WB2LGA. WB4NNO earned his 4RN certificate from W4SHJ. According to W9HRY, WA9MXG and WB9BJR should now have 9RN certificates. "This is disastrous – or else it's still summer time." – *K7NHL.*

September reports.

Net	Sessions	Traffic	Rate	Avg.	Rep.(%)
EAN	30	1514	1.194	50.5	97.2
CAN	30	932	.883	31.1	100.0
PAN	30	905	.915	30.2	96.7
1RN	60	714	.439	11.9	90.6
2RN	60	400	.632	6.7	98.3
3RN	60	384	.365	6.4	94.4
4RN	58	366	.302	6.3	90.7
RN5	60	544	.336	9.1	89.3
RN6	60	720	.581	12.0	100.0
RN7	50	212	.295	4.2	80.5
8RN	59	528	.382	8.8	91.1
9RN	60	480	.533	8.0	94.2
TEN	60	425	.490	7.0	77.8
ECN	54	140	.209	2.6	80.0
TWN	42	146	.187	3.5	38.7
TCC Eastern	118[1]	668			
TCC Central	90[1]	526			
TCC Pacific	120[1]	745			
Sections	1801	9230		5.1	
Summary	2574	19609	EAN	10.8	82.8[3]
Record	2866	27764	1.309	15.4	–

[1]TCC functions, not counted as net sessions.

[2]Section and local nets reporting (50): VSBN, VN (Va.); SGN, PTN (Me.); CN, CPN (Conn.); FMTN, VEN, WFPN, TPTN, GN, QFN, FPTN (Fla.); GSN, GTN (Ga.); PVTEN (N.J.); OZK (Ark.); LAN (La.); MDCTN (Md.-D.C.); KTN KYN (Ky.); QMN (Mich.); BEN (Wisc.); CHN (Colo.); BUN (Utah); EPA, PTTN, EPAEPTN, WPA (Pa.); BSN (Ore.); OSSB, BN (Ohio); NCN (Cal.); WSN, WARTS (Wash.); NYS, NLI, NLIPN (N.Y.); AENB, AEND, AENT (Ala.); CN (N. & S. Car.); RISPN (R.I.); MSN, MJN, MSPN (Minn.); OPN, OQN, W. Que. VHF (Ont.-Que.); QKS (Kans.).

[3]Overall efficiency rating, percent.

Transcontinental Corps. W2HR and W4NLC have received TCC certificates from Eastern Director W3EML. W6VNQ is looking for volunteers for TCC-Pacific. Any takers? Contact Bob.

September reports.

Area	*Functions/% Successful*		*Traffic*	*Out-of-Net Traffic*
Eastern	118	94.2	1821	668
Central	*90*	95.5	*1080*	526
Pacific	120	95.8	1490	745
Summary	328	95.2	4391	1939

The TCC Roster: Eastern Area (W3EML, Dir.) – *W1s* BJG EJI NJM, K1SSH, *WA1s* GCE JTM, *W2s* ER GKZ QC, K2KFK, WA2UWA, WB2RKK. W3EML, K3MVO, *W4s* SQO UQ ZM, K4KNP, WB4NNO, *W8s* PMJ RYP, K8KMQ. Central Area (WØLCX, Dir.) – W4OGG, W5MI, *W9s* CXY VAY, WA9VZM, WB9DPU, *WØs* HI INH LCX UCE ZHN, KØAEM, *WAØs* DOO IAW WEZ. Pacific Area (W6VNQ, Dir.) – W5RE, *W6s* BGF BNX IPW MLF MNY VNQ VZT, *K6s* DYX KCB, WA6LFA, *W7s* FM KZ PI, KØJSP.

Independent Net Reports.

Net	*Sessions*	*Check-Ins*	*Traffic*
EASN	27	127	50
Interstate 20 Meter SSB	23	383	2927
Eastern U.S. Traffic	27	111	42
Mike Farad E & T	26	372	296
Northeast Traffic	30	417	553
Clearing House	26	488	253
North American 20 Meter	26	587	558
All Service Net	4	59	40
7290 Traffic	44	1811	770
Hit and Bounce	30	313	530

QST

COMING A.R.R.L. CONVENTIONS

January 23-24 – Southeastern Division, Miami, FL

April 16-17 – Great Lakes Division, Grand Rapids, MI

June 19-20 – Rocky Mountain Division, Colorado Springs, CO

July 3-5 – Pacific Division, Jan Jose, CA

September 4-6 – Southwestern Division, Anaheim, CA

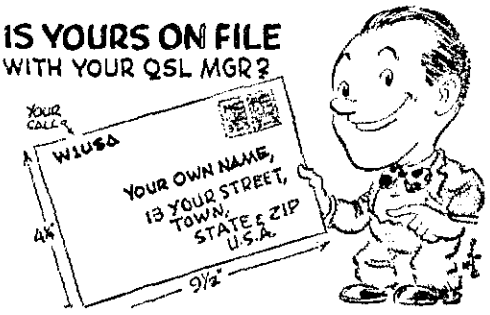
Hamfest Calendar

DEC 1970

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	29	30	31		

Nevada – The Sixth SAROC will be held in the Flamingo Hotel Convention Center January 7-10. SAROC room rate is $12.00 single or double occupancy. $14.50 advance registration accepted until January 1 and includes late show, Sunday breakfast, admittance to cocktail parties, seminars *and meetings. Sponsored by Southern Nevada* ARC, Box 73, Boulder City, Nevada 89005.

New York – The Westchester ARA will hold its Thirty-fifth Annual Christmas Banquet on December 10 at 8:00 P.M. at The Steak Pub, 2610 Central Park Ave., Yonkers, N.Y.



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 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in bold face.

W1,K1,WA1,WN1[1] – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.

W2,K2,WA2,WB2,WN2 – North Jersey DX Asso., 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, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4[1] – J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL, 32901.

W5,K5,WA5,WN5 – Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701.

W6,K6,WA6,WB6,WN6[1] – 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,WN8[1] – Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio, 43215.

W9,K9,WA9,WN9 – Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

WØ[1] – Reggie Hoare, WØOYP, P.O. Box 115, Mitchellville, Iowa 50169.

WAØ[1] – Lloyd Harvey, WØQGI, P.O. Box 7, Attica, Iowa 50024.

KØ, WBØ, WNØ[1] – Dr. Philip D. Rowley, KØZFL, 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 101, Aiea, Oahu, Hawaii 96701.

KL7,WL7 – Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

VE1 – L.J. Fader, VE1FQ, 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, VE4DX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 – A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.

VE6 – Karel Tettelaar, 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.

[1]These 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.

Happenings of the Month

IMMIGRANT HAM BILL PASSES SENATE

The Senate in October adopted S-1466, the bill introduced by Senator Barry Goldwater, K7UGA/K3UIG (and cosponsored by 25 senators), which would permit the issuance of amateur licenses to immigrants who have declared their intention of becoming citizens.

At hearings held by the Communications Subcommittee, the bill was supported by the senator; FCC Chairman Dean Burch; and ARRL President Robert W. Denniston, WØDX General Manager John Huntoon, W1RW and General Counsel Robert M. Booth, Jr., W3PS, were also in attendance. There was no opposition, and the bill moved quickly to the floor of the Senate and to adoption.

It now goes to the House for consideration during the "lame-duck" session after the elections. Late news will be carried by bulletin on W1AW's regular sechedules.

An ironic footnote: George Pataki, ex-YO2BO, for several years a prime mover in the legislation, became eligible for U.S. Citizenship in October and thus will soon attain his amateur license under standard procedures!

PENNSYLVANIA PLATE PROBLEM SOLVED

Call letter license plates will continue to be issued by Pennsylvania and the rate remains $3 – a happy ending to yet another computer foul-up story. The form 901 which amateurs receive before renewal was intended for vanity plates and other special issuances, and carries the $14 vanity-plate fee. However, amateurs need only pay $3 and should send the completed form and their check to:

Mrs. Elna Hoaglund (OR 219)
Department of Transportation
Harrisburg, Pennsylvania

Incidentally, we had quite a different story set up for this space originally – without the word "Solved" in the headline. A letter from David Heller, K3HNP on behalf of the Penn Wireless Association, Inc., of Bristol, Pennsylvania, however, was read in Harrisburg, and persuaded the Department of Transportation to change its mind. The Department had changed to a computer operation earlier this year, and had failed to request extra fees for special plates. The Director's initial view was to bar the people who hadn't paid the extra fee from future holding of the plates. Thanks to Dave and the other amateurs on the scene who changed the script!

AMATEUR RADIO WEEKS

In addition to the other state and city Amateur Radio Weeks reported here during the past year (and listed in the index at the back of this issue), Colorado Governor John A. Love set aside August 23-29, 1970 for that purpose. His proclamation mentioned assistance to government agencies during disaster, self-training and service to the public.

The Hon. Linwood Holton, Governor of Virginia, proclaimed the week of November 2-9, 1970, in his state, marking especially the relaying of medical information around the world.

The 1971 edition of Chases, *Calendar of Annual Events* will show the Amateur Radio Week as June 20-26, 1971, coinciding with Field Day, for the advance information of those who may seek a proclamation in their own city or state. QST

A high point of the National Convention was presentation of the New England Amateur of the Year Award to Sylvester Connolly, W1MD, primarily in recognition of his message and phone patch work with South America and in general. Syl is founder and past president, Hingham Radio Club; trustee of W1VPR and WA1ARW; RACES radio officer and past EC for Hingham; and a member of FOC, to mention only a few of his affiliations. Presenting the award at the banquet: The Reverend Daniel Linehan, W1HWK.

Technical Talks and demonstrations at the National were well received. Here gathered around slow scan TV gear are Richard Kendall, W1JKF; Joe Strillchuk, WA1LCD; Arthur Stoter, WA1NNW and Harry Tirrell, W1LQU.

President Nixon has named one of our fellow amateurs as his and the Government's top advisor on communications — Clay T. Whitehead, KØBGD/W6HYF, sworn in recently as Director of the new Office of Telecommunication Policy. Dr. Whitehead took BS and MS degrees in electrical engineering, majoring in communications theory and systems engineering, and his PhD degree in management, all from Massachusetts Institute of Technology, where he also was elected to Tau Beta Pi, Sigma Xi and Eta Kappa Nu. He served as a captain in the Army, was a consultant at the Rand Corporation and to the Bureau of the Budget, and served on the White House staff since January 1969 as Special Assistant to the President. He's a native of Neodesha, Kansas and is 32 years old.

Simulated Emergency Test

(Continued from page 77)

carry out with region and area level nets, and you may be called upon to help out with these.

As far as NTS is concerned, the test will begin at 2 PM local time on Saturday, January 30, with a session of the section nets. (Frequencies these nets operate on can be determined by checking Station Activities columns for your section, or write headquarters for a copy of the Net Directory.) The first section session begins an eight hour period of operation during which six complete cycles of NTS operation will be carried out; and an identical schedule will be carried out Sunday, January 31. The normal NTS schedule will be suspended during the two days of the test.

If you aren't a regular net participant, but would like to help out in SET, it might be a good idea to check-in a few times a week or two in advance of the drill. This would give you a feel of how the net operates and will give the net manager a chance to supply any additional information you might need. Operation generally gets pretty hectic during SET and discipline and terseness are even more important than usual. Thus, to someone checking in for the first time during a peak SET period, regular net participants, particularly control stations, may appear overbearing or overwrought. Just remember, your presence is welcomed, but there is so much going on, net operation is likely to be a bit more "snappy" than normal.

Additional information on traffic handling, AREC and NTS is available from headquarters. A large-sized, self-addressed envelope, containing sufficient first class postage will greatly speed the delivery of "free stuff" to you. Otherwise, it will be sent third-class mail, which can be painfully slow, especially during the Christmas rush.

Additional Information

Every SET participant, whether in AREC or NTS or both, is requested to originate at least two messages during the test to help with loading down NTS. One of these should be to the SEC (the state RO in the case of RACES) advising of your participation; the other can be to anyone, perhaps a friend or relative in a distant part of the country. A sample radiogram in proper form is illustrated elsewhere in this announcement. These messages should carry a routine (R) or test inquiry (TEST Q) precedence and will preferably be in fifteen words or less. Use of ARL standard texts where applicable is recommended. Other messages, originated by served agencies and leadership personnel, may carry test priority (TEST P) or TEST EMERGENCY (this precedence is always spelled out in full) precedences. TEST EMERGENCY traffic should be extremely rare and should not be used indiscriminately.

This year, the bulk of SET will be "unplanned," meaning that personnel assignments should not be made before the SET begins. Last year many of the upper level NTS nets tried the unplanned approach and met with great success. This time we'd like to see what happens if most of the groups use the unplanned method. Ultimate decision on whether a test is to be planned or unplanned is still left to the local leader, of course.

That should give you just about all the basic information you will need for SET. Please note that this is not a contest in which individual stations are competing for awards. In fact, about the only reward one gets in an operation like this is the feeling that he is preparing for the day when all his skills in operating may be needed in earnest. — *WA9HHH.*

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

FRACAP MEETING

The *Federacion de Clubes de Radio Aficionados de Centro America y Panama* recently held its 11th Convention in Managua, Nicaragua. IARU member Society the *Club de Radio Experimentadores de Nicaragua* served as host to this annual meeting, with a total of six countries participating. IARU/*ARRL* headquarters was represented by President WØDX. The photo below, taken at a reception for FRACAP delegates held by Anastasio Somoza, President of Nicaragua, shows (from left) YN1NT, President of CREN; WØDX/XYL, President Somoza; WØDX; and YN1CMR, Secretary General of FRACAP. The reception was held in the Presidential Palace.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: *e.g.*, cards for VP8s go to *RSGB* in Great Britain, W, K, VE and VO stations only may send foreign cards for which no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations. Bold face indicates new or changed listing.

Algeria: ARA QSL Service, P.O. Box 2, Algier R.P.
Angola: LARA, P.O. Box 484, Luanda
Antarctica: **Dave Porter, K2BPP, Mountainside Rd., Mendham, NJ 07945**
Argentina: RCA, Carlos Calvo 1424, Buenos Aires, BA
Austral/French Antarctic Lands: via Malagasy Republic
Australia: **WIA QSL Bureau, M. R. Jones, 23 Landale St., Box Hill, Victoria**
Austria: OSVSV, Box 999, Vienna 1/9
Azores: via Portugal
Bahama Islands: BARS, Box 6004, Nassau
Bahrein: (All MP4) Ian Cable, MP4BBW, P.O. Box 425, Awali
Barbados: ARSB, Highgate Signal Station, Flagstaff Road, St. Michael
Belgium: UBA, Postbox 634, Brussels I
Bermuda: RSB, Box 275, Hamilton
Bolivia: UCB, Casilla 2111, La Paz
Brazil: LABRE, P.O. Box 2353-ZC 00, Rio de Janeiro/GB
Bulgaria: CRCB, Box 830, Sofia
Burundi: via Congo (9Q5) QSL Bureau
Canada: See ARRL QSL Bureau
Canal Zone: Gloria N. Spears, KZ5GS, Box 407, Balboa
Cape Verde Island: RCCV, CR4AA, Praia, Sao Tiago
Ceylon: RSC, P.O. Box 907, Colombo
Chagos: via Mauritius
Chile: RCC, P.O. Box 13630, Santiago
Colombia: LCRA, P.O. Box 584, Bogota
Congo: (TN8) QSL Bureau, P.O. Box 2239, Brazzaville
Congo: (9Q5) UCAR, QSL Bureau, B.P. 3748, Elizabethville
Cook Island: ZK1 QSL Bureau, %Radio Station Rarotonga, Rarotonga
Costa Rica: RCCR, Box 2412, San Jose
Cuba: ANRAC QSL Bureau, P.O. Box 6996, Havana
Cyprus: CARS QSL Bureau, P.O. Box 216, Famagusta
Czechoslovakia: CRC,Box 69, Prague I
Denmark: EDR QSL-Central, Harry Sorensen, OZ6HS, Ingstrup-9480-Lokken
Dominican Republic: RCD, P.O. Box 1157, Santo Domingo
Ecuador: GRC, P.O. Box 5757, Guayaquil
El Salvador: CRAES, P.O. Box 517, San Salvador
Ethiopia: KSARC, ET3USA, APO, New York, N.Y. 09843
Faeroe Islands: OY-QSL Bureau, Sofus Rubeksen, OY3B, Undir Savartafossi, DK-3800 Torshvan
Fiji Islands: QSL Bureau, P.O. Box 184, Suva
Finland: SRAL, Box 10306, Helsinki 10
Formosa: QSL Bureau, CRA, Box 2007, Keelung, Taiwan, Rep. of China
France: REF, Boite Postale 70,75 Paris 12
French Oceania: RCO, P.O. Box 374, Papeete, Tahiti
Germany: (DL4 & DL5 only) DL4-DL5 QSL Bureau, 97th Signal Battalion, APO New York 09028
Germany: (Other than above) DARC, Box 86-03-20, D8 Munich 86
Ghana: GARS QSL Bureau, P.O. Box 3773, Accra
Gibraltar: RAF Amateur Radio Club, New Camp, RAF
Great Britain: (and British Commonwealth): RSGB QSL Bureau, G2MI, 29 Kechill Gardens Bromley, Kent
Greece: RAAG, P.O. Box 564, Athens
Greece: (SVØ only): Signal Officer, Hqtrs. IUSMAGG, APO, New York, N.Y. 09223
Greenland: via Denmark

QST for

Greenland: (U.S. Personnel) OX5A-E via MARS Director, XP1AA, 1983 Comm. SQ., APO New York 09023. OX4F-H via MARS Director, XP1AB, 2004 Comm. Sq. APO New York 09121
Guam: MARC, Box 445, Agana, USPO 96910
Guantanamo Bay: GARC, Box 55, FPO, New York, N.Y. 09593
Guatemala: CRAC, P.O. Box 115, Guatemala City
Haiti: RCH, Box 943, Port-au-Prince
Honduras: RCH, Apartado 17, San Pedro Sula
Hong Kong: HARTS, P.O. Box 541
Hungary: HSRL, P.O. Box 214, Budapest 5
Iceland: IRA, Box 1058, Reykjavik
India: ARSI, QSL Bureau, P.O. Box 534, New Delhi 1
Iran: ARSI, APO New York N.Y. 09205
Ireland: IRTS, QSL Bureau, 24 Wicklow St., Dublin 20124
Israel: IARC QSL Bureau, P.O. Box 65, Herzlia
Italy: ARI, Via Scarlatti, 31, 20124 Milan
Ivory Coast: ARAI, B.P. 20036, Abidjan
Jamaica: JARA, Red Cross Bldg., 76 Arnold Rd., Kingston 5
Japan: (JA): JARL, Box 377, Tokyo Central
Japan: (KA only): FEARL-M, HQ 5AF, Box 1414 APO, San Francisco, Calif. 96525
Johnston Island: KJ6BZ, % MARS Stn., Det. 1, 1957 Comm. Gp., APO, San Francisco, Cal. 96305
Kenya: RSEA QSL Bureau, Box 30077, Nairobi
Korea: KARL, Central Box 162, Seoul
Korea: (HL9) HL QSL Bureau, Signal Section, USFK/EUSA, APO, San Francisco, Calif. 96301
Kuwait: Alhalf Nasir H. Khan, 9K2AN, P.O. Box 736, Kuwait, Persian Gulf
Laos: Houmphanh Saignasith, XW8AL, P.O.B. No. 46, Vientiane
Lebanon: **RAL QSL Bureau, P.O. Box 1202, Beirut**
Liberia: LRAA, Post Box, 1477, Monrovia
Libya: 5A QSL Service, Box 372, Tripoli
Liechtenstein: via Switzerland
Luxembourg: *R. Schott, 35 rue Batty Weber* Esch-Alzette
Macao: via Hong Kong
Madeira Island: via Portugal
Malagasy Republic (Madagascar): QSL Bureau, P.O. Box 587, Tananarive
Malawi: 7Q7RM, P.O. Box 472, Blantyre
Malaysia: QSL Manager, MARTS, Box 777, Kuala Lumpur
Malta: **R. F. Galea, 9H1E, "Casa Galea," Old Railway Road, Birkirkara**
Mariana Islands: see Guam
Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, APO, San Francisco, Calif. 96555
Maurittus: Paul Caboche, VQ8AD, Box 467, Port Louis
Mexico: LMRE, P.O. Box 907, Mexico, D.F.
Midway Island: KM6BI, Box 14, FPO, San Francisco, Calif. 96614
Monaco: ARM QSL Bureau, Pierre Anderhalt, 3A2CN, 41 Bd du Jardin Exotique
Mongolia: JT1KAA, Box 639, Ulan Bator
Morocco: AAEM, P.O. Box 299 Rabat
Mozambique: LREM QSL Bureau, P.O. Box 812, Laurenco Marques
Netherlands: VERON, Postbox 400, Rotterdam
Netherlands Antilles: VERONA, P.O. Box 383, Willemstad, Curacao
New Zeland: NZART, P.O. Box 489, Wellington
Nicaragua: Mike Murciano YN1MO/W4, Box 902, Coral Gables, Florida, 33134, U.S.A.
Nigeria: NARS QSL Bureau P.O. Box 2873, Lagos
Northern Ireland: via Great Britain
Northern Rhodesia: see Zambia
Norway: NRRL, P.O. Box 21, Refstad, Oslo 5
Nyasaland: see Malwai
Okinawa: OARC, APO San Francisco, Calif. 96331
Pakistan (East): Mohd, AP5CP, TARC, Dacca Signals, Dacca 6
Pakistan (West): LARS, P.O. Box 65, Lahore
Panama, Republic of: LPRA, P.O. Box 9A-175, Panama 9-A
Papua: Via VK9 QSL Bureau.
Paraguay: RCP, P.O. Box 512, Asuncion
Peru: RCP, Box 538, Lima
Philippine Islands: PARA QSL Bureau, P.O. Box 4083, Manila
Poland: PZK QSL Bureau, P.O. Box 320, Warsaw 1
Portugal: REP, Rua de D. Pedro V., 7-4, Lisbon
Puerto Rico: Alicia Rodriguez, P.O. Box 73, San Juan 00919
Rhodesia: RSSR, P.O. Box 2377, Salisbury
Roumania: CRC, P.O. Box 1395, Bucharest 5
Rwanda: via Congo (9Q5) QSL Bureau
Samoa (American): *Utulei High School Amateur* Radio Club, % Director, Pago Pago, Tituila, 96920
Samoa (Western): Director of Post Office and Radio, Post Office, Apia
Scotland: via Great Britain
Senegal: Ch. Tenot, 6W8BF, P.O. Box 971, Dakar
Sierra Leone: RSSL, P.O. Box 907, Freetown
Singapore: SARTS, P.O. Box 2728, Singapore 1
South Africa: SARL, P.O. Box 3037, Cape Town
Spain: URE, P.O. Box 220, Madrid
ST. Vincent: QSL Bureau, P.O. Box 142, St. Vincent, West Indies
Surinam: QSL Manager (PZ1AR), SARL, P.O. Box 240, Paramaribo
Sweden: SSA, Fack, S-122 07 Enskede 7
Switzerland: USKA, Sonnenrain 188, 6233 Bueron/LU
Syria: TIR, P.O. Box 35, Damascus
Tanzania: RSEA, P.O. Box 2387, Dar es Salaam
Thailand: **STAR, P.O. Box 2008, GPO, Bangkok**
Trinidad and Tobogo: T&TARS, P.O. Box 1167, Port of Spain
Uganda: **Via Kenya**
United States: See ARRL QSL Bureau in this issue
Uruguay: RCU, P.O. Box 37, Montevideo
U.S.S.R.: CRC, Box 88, Moscow
Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
Venezuela: RCV, P.O. Box 2285, Caracas
Virgin Islands: Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, V.I. 00820
Wake Island: **Jack A. Chalk, KW6EJ, P.O. Box 7, Wake Island 96930**
Wales: via Great Britain
Yugoslovia: SRJ, P.O. Box 44 Belgrade
Zambia: RSZ, P.O. Box 332, Kitwe

THE PERU HEMISPHERIC DISASTER NET

On a sunny Sunday afternoon, May 31st to be exact, the writer had driven his family up into the Andean foot-hills to the well-known Peruvian "Granja Azul" or "Blue Farm" where we enjoyed an excellent fried chicken dinner. We were wandering about the grounds of the resort when at 3:25 P.M. the earth beneath our feet started an ominous rumbling and then began a motion akin to that of the ocean waves. We are not unaccustomed to occasional tremors but when they exceed four or

Ambassador Belcher presents transceivers to RC Peruane president Coronel Fernando Cardoza.

five seconds and pick up additional momentum, then it is time to move. When window panes in bungalows about us started to crack, I quickly pushed the children into the car and with the accelerator down to the floor-boards raced back to our home in Miraflores. We were delighted to find it intact, except for several broken dishes, and Lima undestroyed.

Still the "temblor" had lasted over forty seconds and we remained uneasy. The electric power was off so I could not inquire on the air. However, after a while it came on again, I went up to 40 meters and found local hams there who were as ignorant as I as to location or extent of any destruction. We all felt however that somewheres these vast forces released by Nature must have exacted their toll.

I returned to 15 meters where a couple of my Miami friends were on, K4DI and K4OL, and reported to them my misgivings. I asked them to be available for later reports and possible requests for external aid, and went back to 40 where our Emergency Net, all members of the Radio Club Peruano, was springing into life now that the power was back on. One after another, the stations checked in and started to call the different numbered districts. It became evident that the epicenter was to the north but the 2 and 3rd call areas were strangely silent. We did not begin to realize the gravity of the situation yet. After several hours of search a voice was heard saying: "There is OA3F calling." We immediately shut up and listened to the weak signal from Father Benito Meyer's station at the seminary in Huaraz. It was Brother Hilary at the mike and he had a tale of Disaster!

It was evident at once that Brother Hilary was operating under precarious conditions. While he transmitted, one wall of the shack broke away and fell down the mountain. The equipment had to be picked up in a hurry and moved before the rest of the shack went. Father Beade Jamieson, his friend and associate, attempted to direct and lead a group of panicky children; a wall fell and buried them all alive. Ninety-five percent of the buildings of Huaraz collapsed and under the debris were 10,000 victims!

The Club's emergency net went on a 24-hour schedule. Assistance headquarters were set up in the presidential palace with teletype to the Club.

I went back to 15 and immediately got hold of K4DI and W2AIM who were waiting for me and we rapidly made our plans. Without any "by your leave" from the M/M boys we preempted their favorite frequency 21,425 MHz. As conditions on 15 are erratic Lima would need both New York and Miami for patches to Washington. When my signals are good in Miami they may be not so good in New York and vice versa. Also when Miami's signals are good in Lima, New York's may not be. That was my reasoning. This was Sunday evening. Now to get in contact with the American National Red Cross Headquarters in Washington. Well, we did and told the incredulous director a story of disaster. We gave him a preliminary list of requirements. The first thought was for shelter – for tents to house the homeless. It was wintertime in the Andes and the air was exceedingly cold. That was the day of the quake.

From then on our Disaster Net operated 15 to 16 hours a day during the first three weeks. Contact was always made. Washington could be reached quicker than on the commercial circuits. We had plenty of help – too much at times. After the first day, the Peruvian Red Cross sent me an assistant to handle the telephone as the lines were overloaded and it took sometimes 20 minutes or half an hour to get through, or maybe you didn't get through at all.

We had a wonderful radio circuit with communication whenever needed with American Red Cross and Project Hope in Washington, World Medical Relief Inc. in Detroit and many others.

We received lists of requirements from the Peruvian Red Cross and the Ministry of Health. We asked for and obtained antibiotics, vaccines, serums, water purification pills, sleeping bags, tents, warm clothing and foodstuffs. First transportation for the isolated victims had to be by helicopter but the air was too thin at altitudes over 15,000 feet and the choppers were almost unmanageable. The roads were obliterated in the forty seconds or so of Nature's spasm. Many who died were not crushed by falling walls; they succumbed to bitter cold and hunger, to gangrenous wounds and broken and festering bones, unable to be reached in the first days.

As the usually sensational press reports only reported one or two hundred dead, relief agencies were dubious of the gravity of the situation. We suffered the agonies of frustration. My voice deteriorated into a raspy croak in my desperation and in vain efforts to convience people in

Washington that 10,000 were lying under the debris of Huaraz, that Yungay had become a 20th Centry Pompeii, that a whole side of a mountain had slid down into the beautiful canon of Huaylas, that of the 22,000 inhabitants of Yungay, the only survivors were 2000 souls and four palm trees! In fact, so completely obliterated was the city that its location could only be found by referral old aerial photographs.

The authoritative press agencies were still mentioning a mere 200 deaths even after Brother Hilary on his lonely mountain, a solitary mourner, related the fate of an entire city demolished in an instant. Who was Brother Hilary, who were we, a handful of radio hams, those pests who always seem to get into the TV set or record player, who were we, to refute these infallible fountains of (mis)information? Meanwhile people died in numbers.

But at last, extent of the destruction was confirmed and help came, first in rivulets and then in torrents. The policy of "wait and see" was abandoned. Herculean efforts were made to rush succor to the area. Politics and ideologies were forgotten and the whole world was compassionate.

Constantly, our net was interrupted by kind-hearted people who wanted to aid. "How can we help your people"? they asked. Collections were started in every city, of blankets, clothes for the Andean frosts, concentrated foods and so it went. The airlines transported it without pay and the airports were clogged with bales and cases for Peru.

I cannot attempt to remember all of those who assisted us. I shall mention a few who come to mind: There was Nancy in Detroit, WA8CGZ, who connected us with Mrs. Auberlin of World Medical Relief. That doughty soul had nearly 100,000 lbs. of badly needed relief items sitting in the airport waiting in vain day after day for air transport to Peru. There were KZ5EJ, Evelyn, KZ5MB, Bill and HP1XMY, Guy who helped in tracking these same supplies once they were under way. I mention KG6AQF/HK1, Herb, administrator of the Hope Project team in Cartagena, Colombia who volunteered part of his staff for quake relief, also W1IM, Cliff, that genial soul whose ready wit sustained us when our fires were burning low and W2EV, Jules, WA2WUV, Virgil, WB2YOI, Al WB5AKZ/HK3, John and Len, and HC2HV Helen and Ray, all of whom had active participation in our network at one time or another as did others who are not named but who are just as worthy.

There were other nets engaged in similar activities. First of course was the Emergency Network of the Radio Club Peruano on 40. The next best of them is still on the job in the quake area. It is known as the Red J Network and consists of 14 stations all of whose calls start with OA3J and differ in the last letter only. It continues to be the main present source of communication for the rescue groups and is under the control of the relief organization called: "The Cardinal's Committee of Solidarity of the Catholic Church". The name is misleading for the circuit includes stations belonging to other religious denominations such as the Adventists and Church World Service. The circuit is supervised and serviced by WA2AAD, Larry, who is of the Jewish faith! They are all in tune with each other on 7158 kc. and in other ways.

During our operations we occasionally encountered some ham who was not sympathetic and was very vocal about it on the frequency. From the beginning we understood the problems we would have to face and arrived at decisions which would not be liked by everyone. First, we resolved to limit the net's activities to relief traffic with official relief agencies. There were other stations on the air in Peru on all the bands who could and were handling individual requests for patches and telephone calls. The few times we softened and deviated from our policy proved to us that we could easily be snowed under. If we handled one such case there were always others waiting with similar requests who were hurt when we turned them down. There was something else which might have been misinterpreted by listeners. Signals on 15 meters suffer badly from fading; the contact at one moment may be S9 plus 10 dB and the next minute it is down in the noise. So we decided to keep on talking during lulls in traffic so as not to lose contact with each other. We filled such intervals with everyday remarks and idle chatter. In that way, we are able to keep the circuit going 15 or 16 hours per day. Under these circumstances, I don't think our "give and take" was always of the highest standards. Well, *you* try to make intelligent and interesting conversation under similar conditions day after day.

We take our hats off to the Maritime Mobile boys whose favorite 15-meter frequency we pre-empted. When they learned what we were doing they displayed the utmost good will and courtesy and even helped us in keeping the channel clear.

A few words about American hams in Peru. On the Red J Net you could find WA2LHZ/OA4, Father Daryl- el Padre Dario in Spanish, OA6BU/OA4, Father Ed. Schmitt – el Padre Eduardo, and K2ESE, David Labuda.

OA4HR, Ray, – the man who never lost his cool – was my very valuable assistant in the evenings. He also ran schedules with AMDOC. It was Ray who prevailed upon Braniff Airlines to transport WA2AAD, Larry, and his truckload of radio equipment from New York to Lima without charge. Larry, who listened in on us, broke in one night from Brooklyn to ask if we would welcome a volunteer. He must have been surprised at the alacrity with which his offer was accepted and preparations started to bring him down.

Others who were busy with quake traffic were OA4CZ, Clyde and OA4JW, Jim. WB4KUM/OA4, Breezy, went up into the quake zone with a mobile transmitter. His adventures would make an interesting story. There were others too on similar missions.

We were in contact with Lou, WØQQG and Gerry, KØPIV, on the Guam at all times. Arrangements were made to get them Peruvian Ham calls and I passed these on to them by radio when they were approaching Peruvian waters.

If during the hectic period after the earthquake we failed to answer breakers with due courtesy, please forgive us. – *Uda B. Ross, OA4J* QST

Correspondence From Members-

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

"NOR FOR ITS USE"

● I am pleased to see such a forthright editorial stand (October *QST*) regarding recent "interpretations" of Federal Communications Commission rules and regulations which appear to trend toward denial of message-handling activities by amateurs. The ARRL of course is in the best position to set matters right in things like this.

Your quotation from Paul Segal's treatise was indeed appropriate. . . The basic premise of the Communications Act of 1934 is that every use of the frequency spectrum must pass the test of "public interest, convenience and/or necessity."

Now, it surely is in the public interest for hams to handle messages, and I feel we should pound this point home again and again and again. Thanks to ham radio's long history of free message handling (and especially to phone patching in recent years), we have a large body of public support on this – but people forget basic premises; reminding them is important.

Paul Segal saw this very clearly (he was director for the Rocky Mountain Division when I was director from the Midwest Division; I knew him well); and that portion of his treatise on message handling most certainly, as you point out in your editorial, should stand as a basic principle. – *Louis R. Huber, W7UU, Seattle, WA.*

● . . . To exist simply as a "potential for service" should be expected of every citizen, regardless of his operating ability or knowledge of radio procedure in actual emergencies. Proficient radio operators must constantly participate in order to enhance even further their abilities and to continually acquaint themselves with the fastest, simplest procedure for handling emergency communications.

No matter what the source of the message, or the procedure used to communicate it, if the amateur feels that he is improving the art, and improving his capacity to perform in emergencies, then that traffic handling promotes the general welfare of our nation, and should not be barred by any regulation, or any interpretations of such regulation by any individual or individuals. – *Michael J. Moran, WB2FUV, Gardiner, NY*

● . . . I seriously doubt that the ruling quoted was written by one of the more experienced and careful career men we have so fortunately dealt with in past years. One of these would not have committed such an egregious blunder of interpretation. I invite the attention of the League's officers and counsel to the following observations:

1. Section 97.39 is concerned solely with the *issuance* of station licenses. The quoted ruling correctly recognized this in the first sentence (and thereupon proceeds to ignore or distort it).

2. Undoubtedly Section 97.39 would prohibit the issuance of an amateur license to an organization which was a mere dummy or sham for an otherwise ineligible organization. Thus, for instance, even the Red Cross or the Boy Scouts of America could not properly obtain an amateur license for its own "amateur club" which was such in name only.

3. Matters concerning the content, nature, origin and destination of traffic over a duly licensed amateur station are governed not by Section 97.39 but by other provisions of FCC Regulations.

4. Organized amateur participation in public service operations such as election reporting, The Eye Bank, charitable telethons, traffic coordination, etc., are fully authorized by and consonant with other provisions of the Regulations. If these things are not the very essence of PICON, what is? The "non-commercial hobby-type activities" cited in the ruling?

I do not presume to try to educate the League or its counsel in these matters, and no doubt the forgoing observations will already have suggested themselves to you. Nevertheless the transparently fuzzy thinking behind the letter ruling is so offensive to 35 years of legal training and experience that I cannot refrain from trying to be of some slight assistance. – *Grant N. Nickerson, W1RWD, New Haven, CT*

[EDITOR'S NOTE: Though not a communications specialist, attorney Nickerson has appraised the pertinent rule *precisely* as written and intended 32 years ago!]

● Section 97.1 says, "The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles: (a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to emergency communications . . ." When this section says "particularly . . . emergency communications", it is quite clear that it does not mean *only* emergency communications. "Service to the public" means service to members of the public as there is no conceivable way in which *all* the public can be served at the same time. Service to a small group or even one member of the public is still service to the public.

It is very poor judgement for individual amateurs to contact the FCC with questions like this. ARRL members should refer their questions to the League who can answer or request answers as the recognized representative of the amateur fraternity. – *Roy S. Williams, W6VON, La Mesa, CA*

● Re the Oct. QST editorial, "We've Got Problems", I shall not nit pick over your grammar, but nit picking is what the FCC is obviously doing over the amateur regulations. How they can strain at this legal gnat and also swallow the camel of gross violations on the Citizens Band is beyond me. Governmental agencies and the courts now rarely interpret laws in the spirit in which they were written. Consequently the respect many people have for the law is rapidly disappearing. – *Ken Stewart, W4SMK, Ft. Myers, FL*

OLDEST NOVICE?

● In reference to "Correspondence," September *QST*, and just to keep the ball rolling, I'll be 72 on December 7. – *WN3NMU*. . . I don't want to take credit from WN5ABD, but I was 72 on May 31. – *WN4RZM* . . . I was 73 on May 31. – *WN3OSU* . . . I do not doubt WN5ABD, but I was 74 on January 6. – *WN4PNF* . . . Within my family we think we have not only the oldest Novice, my father WN2KII, age 75, but probably the oldest to pass the Extra, my uncle W1DXK who is 78. – *W2YT* . . . I'm looking forward to a contact with this youngster; I was 77 on September 23. – *WN8HIS* . . . Oldest Novice? He 71, me 77 on June 30. – *WN7OVD*. . . I wish to state that I was 79 on August 11. – *WN6AJV* . . . As far as the oldest Novice is concerned, I'm sure Lou Cozby, WNØAYI, of Cameron, Missouri, must take the honors – he's 91! – *WNØBYX*

BUILDERS' DILEMMA

● With reference to the October article, "The Ham Builder's Nightmare" by Doug De Maw, W1CER, my recent experience may be of some interest to readers of *QST*.

Not too long ago, I wanted to get some GE semi-conductors, not commonly available. The Newark Electronics Corp. catalog carried a fairly complete listing of these items. My order for slightly over $5.00 was returned with a notice that additional items be ordered to bring the shipment up to or over $20.00, since this was their new minimum order. I would have been glad to pay an additional dollar or two as a handling charge for under minimum orders, but no mention was made of this sort of charge.

The company's policy is understandable when one takes into consideration the sky-rocketing costs of labor and the cost of producing and mailing their catalogs. I think their catalog ran to 600 or 700 pages. – *R. Lewis, K2HSM, Avenel, NJ*

● The article was the kind of thing I have wished to see for quite a while. As an amateur who has seldom bought a ready-made piece of radio equipment, I have long felt that too many of our hams have developed some sort of inferiority complex and no longer have confidence in their ability to build anything very complicated. (After all, they are only amateurs, while the commercial equipment was built by professionals.) Along with this attitude goes the complaint of not being able to get the component parts needed to build something described in *QST* or the *Handbook*.

One thing you might have mentioned is that Quaker Oats boxes still make very good coil forms, especially for 160 meters!

Seriously, though, I was very glad to see W1CER's article, along with the one by W1ICP. I hope this issue of *QST* marks the start of a renewed interest in building. – *Robert J. Peavler, WØBV, Kirksville, MO*

● Just finished reading "The Ham Builders Nightmare". Now let me tell you what keeps *me* up nights: how do you sort out a junk box into the useful and useless? How do I find out the usefulness of a glass capacitor for ham band applications? Are there any rules of thumb for determining the reliability of a potentiometer, for example, taken from WWII gear (besides searching for bullet-holes, Hi!)?

Someone with years of experience and know-how ought to sit down and write the "Ham Builders Encyclopedia." Let's answer questions like: how many different types of capacitors are manufactured? Where are they found? How are they used? How do you recognize quality components from the short-lived? I've come across many different types of slug-tuned coil forms: from what materials are they made? Which are best to use? What is a carbon-film resistor?

What a great adjunct this would be to the *Handbook*. I've seen some feeble attempts through the years at sorting out this maze, but surely it's not impossible.

The XYL won't let me bring home any more junk until I've used some of it! – *Mike Steir, W2EDY, Fairlawn, NJ*

DON'T BUG FCC!

● The current widespread practice of amateurs or a group of amateurs writing FCC over some fine point about the regulations or petitioning them for a Rule Making is getting out of hand. (E.g., page 85, September; pages 83-84, April) If this careless practice is not curbed soon, it will result in a set of regulations none of us can operate under. Many of these requests, although initially sounding high and noble, protected by the Bill of Rights, and all of those good things, show evidence of not being fully thought out as to their total consequences. Under today's complex regulations, it is almost impossible to grant a petition favoring one group or interest without hurting many others, a point that seems to have been overlooked by many petitioners.

I have observed that when a lawyer is asked a legal question by a layman, he almost instinctively feels there is a possibility of something wrong or the question would not have been asked in the first place. From then on he devotes his time and effort looking into the law books for just one place to justify his saying no. And most of our rules and regulations have one of these jokers buried somewhere. It has been known for years, but apparently not too well known in some parts of the amateur fraternity, that the standard reply to a request addressed to a bureaucrat in Washington is no. The lawyers at the FCC are legal eagles, not amateurs, at heart. It is also true that a silly question rates a silly answer, and judging from some of the recent pronouncements, these have been accompanied with citations justifying them – the "Eye Bank"; visiting call-letters, to name two.

This does not mean to imply that we should not let FCC have our comments when they formally ask for them. By all means give them. However, for day to day matters, before writing another damphool letter on the spur of the moment, asking for an interpetation or opinion on this or that, sit down and think it through. Is it really necessary? Why not ask an older, experienced amateur, or a local League official, or the Division Director, or even write the ARRL Headquarters? And if none of these have the answer, I am sure they can get one without bugging the FCC *officially*.

A high official in the Commission, and a friend of amateurs, in commenting on a recent adverse ruling to amateurs, is reported to have said "Somebody asked a question and we had to give them a straight-forward answer. It would be better if they didn't ask the question."

Don't ask questions of the FCC; just have fun! – *Lester C. Harlow, WB6ZNW/W4CVO, San Diego, CA*

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

W3GKP and W4HHK Work on 2300 MHz!

PROJECT 2300 began in April, 1967, when Paul Wilson, W4HHK, invited Bill Smith, W3GKP, to join him in an attempt to communicate via the moon on 2300 MHz. More than 3 1/2 years later, on Oct. 19, 1970, the two completed an exchange containing plenty of detail to qualify as communication. This is an amateur radio milestone on several counts. It is the highest frequency used to date for amateur communication via the moon, a DX record for the band, and very likely an all-time record for man-hours expended to achieve a single QSO.

Equipment used at the two stations was described in some detail in *QST* for July, 1969, by which time W4HHK had already heard W3GKP on several occasions. Both use klystron amplifiers, running 1 kilowatt input, and delivering nearly 300 watts to the antenna line. W3GKP has a 28-foot dish, with an estimated gain of 43 dB. W4HHK has an 18-footer on an elevated SCR-584 mount, giving full elevation and azimuth control, and a gain of some 39 dB. Both use parametric amplifiers in reception.

The antennas and some transmitter components were obtained through MARS channels, but a tremendous program of technical and physical labor was required by both participants, before any communication could be attempted. W3GKP has copied his own echoes for months, and has heard and been heard by DJ4AU, as well as W4HHK, on numerous occasions. W4HHK has participated in many over-the-horizon experiments with WA4HGN, as previously reported in these pages, and run months of EME tests with W3GKP. The program has been one of endless testing and refinement of equipment and methods.

Beginning around 0825 GMT, Oct. 19, each copied both calls, in prearranged 5-minute calling and signing sequences. Using techniques modified from meteor-scatter methods they next went to coded signals to indicate reception of calls and reports. By 0900, W4HHK was ready to send "R R R" for 2 1/2 minutes of the 5-minute period, followed by "73 73 73" the last 2 1/2 minutes. This unscheduled message almost threw W3GKP at first, but he copied the "73" by 0904, and the first 2300-MHz EME QSO was history.

This was a real-time QSO. No tape playback or chart recording was needed, nor was telephone contact used for the test. They did talk by telephone later, to celebrate the achievement, but neither required this check with the other to "confirm" a QSO. That had already been done, to the total satisfaction of both participants, before the land-line entered the picture. Paul had heard another EME signal just above W3GKP in frequency, and wanted to check with Bill on its identity. They think it may have been DJ4AU. EME is like that. You never know where your QRM is going to come from! – *W1HDQ*

1970 – A Record Year

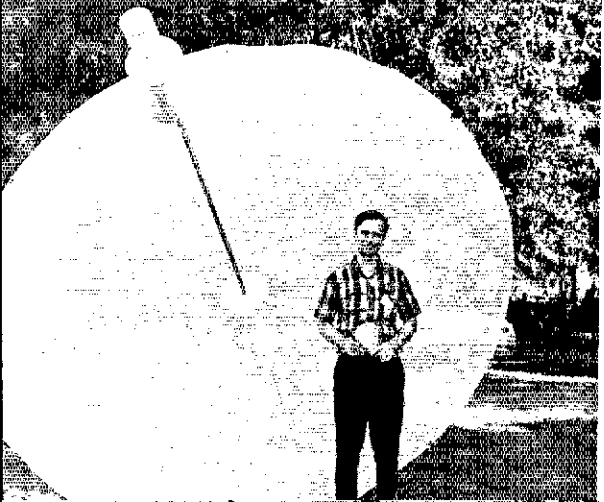
It has become customary at year's end to review the events of the year just ending and to prognosticate on the year just beginning. First, let's see how well we did one year ago predicting the major events of 1970. We said there would be the first 220-MHz moonbounce contact and that it would likely involve WB6NMT and K2CBA. We were nearly correct. WB6NMT worked W7CNK March 15th for the first EME work on 220, and that was followed 26 hours later with a WB6NMT – K2CBA contact. We also speculated that W3GKP would be on one end of the first two-way EME work at 2300 MHz. That proved correct also, as reported above.

Our speculation that WØDRL would participate in the first meteor scatter contact at 432 MHz was close. In August, he and W4FJ nearly had the "first," needing only final confirmations to complete a perseids QSO on 432.

50 MHz didn't fail our DX prognostication. There were South American and Pacific contacts made by suitably-located U.S. DXers.

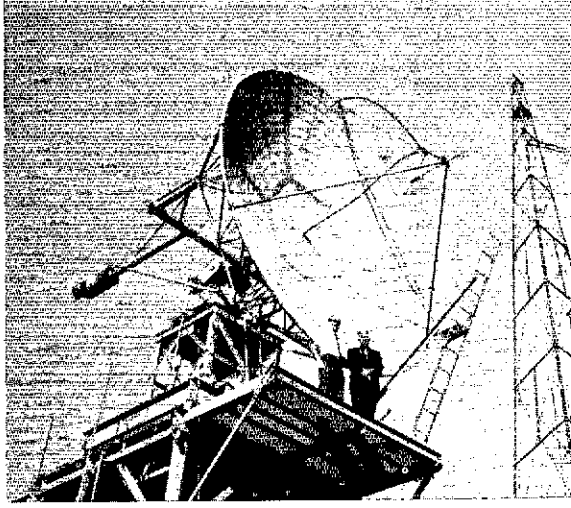
Month by month, these are the noteworthy events of 1970. In January a fairly productive winter *E* season was concluding on 50 MHz, and 144-MHz meteor scatter DXers were counting up

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



K2RIW captured 1296 first place honors with his 12-foot dish. It measured 23 dB over a dipole at the East Coast VHF Society contest. The Society has printed a booklet on antenna gain measuring and a copy is available free via K2UYH. Send him a self-addressed stamped envelope.

QST for



The array used at W4HHK in 2300-MHz EME communication with W3GKP is a surplus 18-foot Kennedy dish, obtained through MARS channels. 3rd Army MARS Director Harold Mulkey, W4VHX, and Paul Wilson, W4HHK, standing on the platform, give some idea of the size of the installation. Completion of the tower, and modification and installation of the dish and SCR-584 radar mount, required months of planning and labor, but the result is a system completely steerable in azimuth and elevation, probably unique in an individual amateur station.

their Quadrantid contacts when Oscar 5 was fired into orbit. The Australian satellite's beacon signals on 28 and 144 MHz helped enliven long winter evenings, well into February.

In mid February South American DX on 50 MHz made its first appearance of the year although most of us spent our vhf hours at the workbench with new projects. W3GKP and W4HHK spent hours bouncing 2300-MHz signals off the moon with encouraging results.

The event of March 8th will not be soon forgotten. That was the date of the most pronounced magnetic disturbance in many a memory. The resultant aurora produced many long-haul contacts at 144, including W2AZL and K2RTH working 1230 miles to W5WAX in Oklahoma. 50 MHz put on a show like only that band can: aurora and a F-layer backscatter opening that included nearly all the United States. Coming on a Sunday, the event was widely observed, allowing participation by hundreds of operators who had never before had such an experience. In late March, ZK1AA's 50-MHz beacon began pounding into the U.S. and he was worked by many, especially in the southern latitudes.

50 MHz didn't lose its steam in April, with dozens of contacts between the two Americas and in the Pacific between such widely-separated countries as Japan and Australia. KP4DJN, K6MYC, SM7BAE and others kept busy exchanging signals on 2-meter EME. W3GKP, while testing his 2300-MHz EME system, was heard in Germany at DJ4AU. Also in April, a tropospheric duct formed along the Gulf Coast permitting rare long-haul tropo contacts at 50 MHz. The best DX reported was an 829-mile Texas-to-Florida contact by WA5HNK and WB4DJG. And an April 21 aurora excited many.

May saw the return of E_S, including contacts on 144 MHz by W5ORH, Oklahoma City, into Canada and the East Coast. E_S linked to F_2 found ZK1AA being heard in the central and northeastern U.S., although no contacts resulted.

June provided the expected E fun on 50 MHz and the operation of many KP4s, XEs, ZF1s AA and RS and KL7s ABR, ENL, GFB and GLL added to the excitement. Not impressed by 50-MHz DX, the San Bernardino Microwave Society entertained themselves by setting new DX records on 3300 and 5650 MHz – 214 miles on each band, over an obstructed path between California mountaintops.

In July, W4HHK and WA4HGN copped the world's 2300-MHz DX record, 249 miles. K6MYC and ZL1AZR swapped signals off the moon for the first California-to-New Zealand contact on 144 MHz.

The reliable August Perseid meteor shower was a good performer again in 1970. Dozens of contacts were made and identifiable signals from W7JRG, Montana, were heard in New Jersey – 1700 miles! An August 16th aurora produced many typical aurora contacts and several of the more rare auroral E_S-type between 50-MHz stations nearly the North American continent apart. VE2AIO's exploration of auroral E possibilities between Europe and North America resulted in reception of beacon signals from Iceland. August also marked the beginning of the fall tropo season on 144 and up. A session on the 27th, was highlighted by a 320-mile contact between K4EJQ, Tenn., and W9JIY in Indianapolis on 1296 MHz.

Come September tropo put on its seemingly once-per-year big show. During the third week of the month, there was 800-mile communication over paths from the Midwest to the East Coast. States-worked totals quickly climbed on 432 with many stations now able to claim 18 or more worked.

Into October periods of above-average tropo and an occasional aurora kept DXers interested, and there was the first 2300-MHz EME contact by W3GKP and W4HHK. The F-layer and aurora events of the 17th and 18th were exceptional and are reported elsewhere in this column. This summary was written in late October, but as this is being read, the events of November and December will still be in mind.

Now what about 1971? Allow me to dust off the crystal ball once again. I'm going to predict W4FJ and WØDRL will spend enough sleepless nights to accomplish the first 432-MHz meteor scatter contact, that a new DX record will be set between Illinois or Indiana and New Jersey on 1296 and that several microwave records above 3300 MHz will be altered. On the lower vhf bands VE2AIO, W2BOC and others will make significant accomplishments in clearing up the mystery about auroral E and that 144 EME will become even more commonplace. I wish the ball would be brighter for six-meter F-layer DX, but I doubt that those of us now operating will again see the return of long-haul 50-MHz F_2 DX in our lifetimes. There may, however, be a few F-layer openings such as that on October 18, associated with occasional ionospheric storms.

As we know at vhf, it takes much input to get the output, and this too relates to your vhf column. Ed Tilton and I sincerely thank each of you for your cooperation and understanding in 1970 and we wish you and yours the best in 1971.

Improving Reception with the Swan TV-2B Transverter

The Swan TV-2B 2-meter transverter has made it easy for a growing number of vhf enthusiasts to try 2-meter ssb. Used with Swan transceivers, the TV-2B gives 100 watts output from its 5894. This is enough for most 2-meter work, but the receiving front end of the TV-2B may leave something to be desired, in weak-signal reception. There are simple and effective cures.

Building a preamplifier that will deliver close to the ultimate in sensitivity is a very simple matter. Many examples have been and are being shown in *QST*, the *Handbook*, and the *VHF Manual*. There are also quite a few good ones now on the market, if you're not in the building mood. Any of these may improve the noise figure of an old 2 meter receiver, transceiver or transverter, and probably most new ones, as well. Remember that a receiving preamplifier must be connected in the line to the receiver section only, in the case of a transceiver or transverter. This may seem like emphasizing the obvious, but many a preamp has been blown by testing it in the main line to the antenna, and then inadvertently throwing the send-receive switch to *transmit!*

The writer put a small 12-volt MOSFET preamp (Topeka FM Engineering, 3501 Croco Road, Topeka, Kansas 66605) into a TV-2B in some 30 minutes of uncomplicated work. The transverter can be restored to its original condition quickly and simply. The same basic procedure could be applied to other units, though other arrangements may be necessary to obtain the dc for operation of the preamp. Here is the process for the TV-2B and the HF-144DGK preamp kit:

Remove the TV-2B bottom cover and locate the antenna changeover relay. The receive contacts are toward the rear of the chassis. Trimmer capacitor C501, is connected between the relay *receive* terminal and the input coil, L501, of the 6CW4 first rf amplifier.

Unsolder the capacitor and set it aside for later use. The preamp will just fit between the relay and the rear wall of the chassis. Mount it upside down, foil side facing the chassis surface. In addition to the usual nut-and-bolt mounting, I soldered a short strap of brass stock from the foil to the brass enclosure of the TV-2B power receptacle, to assure good electrical grounding. The 12 volts dc for the preamp is taken from the relay power contact, on the rear chassis-wall side of the relay, adjacent to the preamp. The preamp should be mounted with its antenna input next to the terminals of the relay.

Capacitor C501 is now soldered between the original relay terminal and the preamp antenna-input connector. A short piece of wire is soldered from the preamp output to the tap point on coil L501, where C501 was originally soldered.

The preamp is now ready for alignment. A noise generator or signal generator may be used, but satisfactory alignment can be achieved with a weak signal. Do the alignment in the portion of the band you intend to use, and with the TV-2B bottom cover in place. An insulated alignment tool inserts easily through the ventilation holes in the cover.

When you remove the antenna from the TV-2B background noise should drop one or two S units. Before the modification it is unlikely that this happened. A further check may be made when the sun is on the horizon. Rotate your antenna back and forth across the sun and observe the rf noise level. It should be quite noticable and a good indication that you are now ready to hear weak signals.

Next month WØEYE will detail an easily-built 432-MHz preamp which can be built into an existing Parks 432 converter.

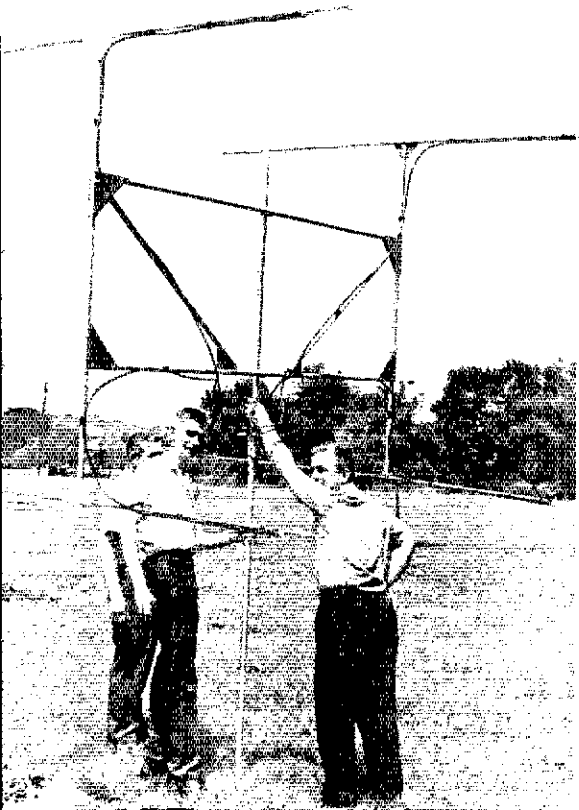
Far-North Beacon, VE8YT

Larry Kayser, VE3QB, tells us that the VE8YT 50-MHz beacon is now in operation, at Clyde River, NWT, on the northeast coast of Baffin Island. Transmission is on 50.08 MHz, cw, sending the call VE8YT, followed by a long dash, and then a 25-second silent interval, repeating the sequence each 40 seconds. The power output is 65 watts, and it feeds a halo antenna.

50-MHz enthusiasts are asked to watch for this beacon, and report details of any reception to ARRL. We will forward reports to VE3QB, if necessary, or you can inform him direct if you like. His address is 59 Westfield Crescent, Ottawa 5, Ontario, Canada.

OVS and Operating News

50-MHz DXers in California, from Sacramento to Los Angeles, and in the Miami area, were surprised October 17 by a sudden *F*-layer opening, apparently confined to those locations. K6RNQ says it began at 1705 GMT when a Miami station broke a contact between K6RNQ and WB6UYG. Extremely strong signals prevailed until 1725, when the muf apparently fell below 50 MHz, but the band opened again, from 1745 to around 1900.



First prize winner of the August 432-MHz antenna contest at the East Coast VHF Society was this 52-element Yagi array built by K2PPZ. Pictured left to right are K2JNG, K2PPZ and K2DZM.

The Miami area stations participating in the opening were WA4HNQ, WB4AHA, WB4FIB, and WB4LNQ.

The unexpected *F*-layer opening apparently was associated with a solar flare two days earlier and was an excellent tip-off to expect aurora that evening. This began around 2200 GMT, producing extremely strong buzz signals. After six hours of activity the aurora faded at KØCER at about 0430 GMT, October 18. At this writing no long-haul contacts involving auroral-*E* have been reported. Signals observed in South Dakota were typical aurora, covering paths to 800 miles.

The evening before, October 16, an excellent 4-hour *E* opening included much of the United States. Signals were strong and steady, more characteristic of summer openings than those usually encountered in the fall. Some of the better DX was between California and Ohio. Other fall *E* openings were reported by WA5IYX/5, San Antonio, on three days of September and two days in October, through the 11th. K7ICW, Las Vegas, says that September *E* openings exceeded those of August for the first time since 1959. Al reports *E* on September 1, 6, 7 and 13, with the 7th most interesting. It involved another experience with LDEs (long-delayed echoes). Between 0435 and 0545 GMT, an intense *E* opening was underway between Nevada and Arizona and the Pacific Northwest. K7ICW was working K7BDU, Phoenix, and K7TUO and K7BBO, both Washington, when K7BDU noted K7ICW on *E*-backscatter with strong, but considerably delayed signals. The effect lasted some ten minutes, with the delay gradually growing shorter until it disappeared. K7ICW didn't say how long the initial delay was, but it makes one wonder what path those signals were traveling!

KL7GLL, Sitka, Alaska, caught strong F_2 to the Pacific Northwest September 6, after being away from Sitka during the prime summer *E* season. Gene says he'll be home next summer, and looking towards the lower 48.

K1GYT, in rare Vermont, and WA6HXM, in not-so-rare California, sent reports on summer activities. Both found trans-continental *E* excellent on several occasions. WA6HXM also reports that WB6UYG worked KH6NS at 2216 GMT, October 4, on *F*-layer backscatter, while W6ABN was working XE1GE on the same mode. K6PYH heard both ends of the contact, but didn't work the Hawaii station.

We have several reports form overseas. JA1MRS, sent a copy of his log for September. It shows dozens of *TE* contacts into Australia, including several roundtables. The best was September 23rd and involved Japan, Australia and Papua for 3 hours, on a combination of *F*, *TE* and *F*-layer backscatter. During the summer we had reports of W/Ks working Japan. One JA station has been placed on a ship operating off our west coast and signing maritime mobile. Apparently the /MM was not heard by some who worked him! JA1MRS is a close observer on 50 MHz in Japan, but he mentioned nothing about JA work into the U.S.

From South Korea, HL9WI agrees that September conditons were good in the Far East. On September 23, Bill worked 43 JAs, several stations in Australia and KR6RS, Okinawa. Bill is still trying to work VS6DA in Hong Kong, who has been worked by KR6RS and the Australians. HL9WI says, "Too bad the DU (Philippine) stations aren't interested in six-meter DX. They spend most of their time mobiling on 6."

Also in the Far East, Glenn Hauser reports on his TV DXing from Thailand. In September, Glenn noted television signals via *E* and *F*-layer from West Pakistan, India, South Korea, China, West Malaysia and the Philippines. Glenn's report is lengthy and details the type of television programming seen from each station such as DZXL, Manila and AFKN, Seoul. Glenn writes for a TV DXing magazine published at Box 5001, Milwaukee, Wisconsin.

CX8BE, Montivideo, Uruguay sent a lengthy list of U.S., Caribbean and South American stations worked in the first four months of 1970. Jorge uses a homebrew 14-MHz phasing exciter mixing to 50 and 144 MHz. He has a 3-element Yagi on six, 7 elements on 2 meters and 40 watts ssb.

K4ROM says the North Carolina 6-meter SSB Net is now in operation at 0100 GMT, Fridays, on 50.12. Check-ins are invited.

WB9EDP wants scatter schedules for his kilowatt and 5 elements. WØPFP, Iowa, wonders if anyone else is copying the unidentified rtty signal on about 49.64. Jim hears the signal from the southeast between 1630 and 1730 GMT.

VE6AHE has left Alberta for a northern VE2 assignment. Randy says VE6OH is selling his 50-MHz equipment so VE6 may become more rare. Anyone needing VE6AHE's QSL may write Cpl. R.S. Smith 429-513-419, c/o Airman's Mess, C.F.B. Bagotville, Quebec, Canada. Good luck in VE2-land, Randy!

Finally, VE3EVW, began operation again as VP2MJ on December 15. As usual, Monty will be looking stateside through mid April.

144-MHz DXers have been well treated by tropo and aurora. One of the better fall auroras, the evening of October 17, began before sundown and lasted for nearly six hours. Signals were strong over paths to 800 miles as New England stations worked west to Illinois. K1HTV and W9YYF did especially well. WØEYE and WØMOX, both Colorado, also worked into Illinois. During the week preceeding October 17th there were several smaller and weaker auroras, none of which produced any outstanding results.

We have received additional reports on the fine tropo session the third week of September.

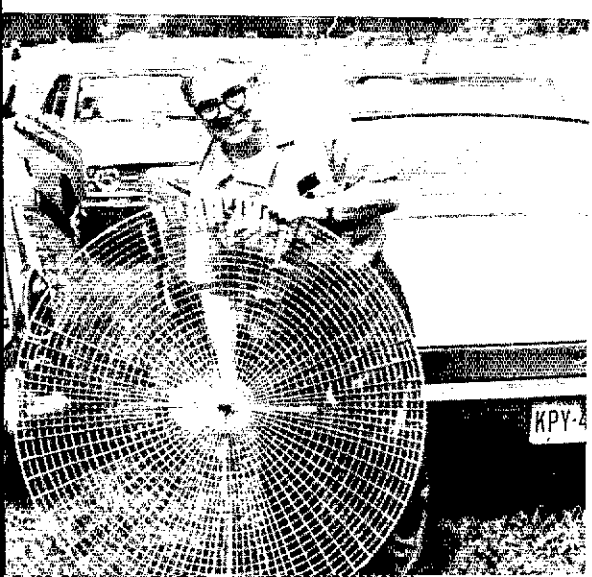
Orissa Dion, K7KHU, of Bothell, Washington, recently received ARRL 50-MHz WAS Certificate number 90. K1GYT, Vermont, was her 50th state. Orissa is the XYL of K7BAG, holder of 50-MHz WAS number 86. *(photo via K1GYT)*

Immediately available results were reported last month. K1HTV, Conn., worked west to Illinois on the 16th. Rich says 80 percent of his contacts were made on ssb above 145 MHz. From New York, K2DNR worked, among others, WA9DOT, Wisconsin, for state number 25. In New Jersey, WA2MTR says above 145 MHz sounded like 20 meters, as he fought through the QRM for several W9 ssb contacts. WA2UDT, also New Jersey, collected Illinois and Indiana for new states. WAØTRO, at Smith Center, Kansas, collected several 400-mile contacts in the Midwest. WAØPBO, Kansas City, worked 12 states, from South Dakota to Kentucky to Texas for excellent geographic coverage. WØLER, Minnesota, reached 43 states by contacting K4GOF, Kentucky. John says the 19th and 20th tropo was related to remnants of Hurricane Felice. She caused a low pressure area in Missouri which met a large high over eastern Minnesota, touching off an inversion. John says similar conditions have developed the past three years after hurricanes have come ashore in Texas.

WA8TYF made another of his sojourns into Arkansas in late August giving several more stations that elusive state on 144. Ex-K2HLA and W1FJH is now signing K4EZU at Elkton, Virginia and has already worked 21 states. During the September VHF QSO Party, eastern stations found tropo above average. W4ISS, Georgia, worked W8KAY in Ohio and there were many other similar DX contacts.

VE7BQH joined the ranks of successful 2-meter moonbouncers. Lionel worked SM7BAE on September 26, probably the first Canada-to-Sweden worked on 144. Lionel's ego was somewhat deflated by his wife, however: "Big deal, one contact per year; big record." I'll bet other ham wives share her view! Lionel's 80-element collinear will soon be replaced with one twice as large.

220-MHz news is scarce again this month, but we have overheard conversations on 50 MHz which indicate there is more 220 activity brewing. That October 17th aurora produced results on 220. W7IRG, Montana, worked W7CNK, Washington, and WAØQLP, South Dakota, for two new states, and then Ken worked WØEYE, Colorado, whom he had contacted before. WØEYE also worked WAØQLP. In Massachusetts, K4GGI/1 reports renewed Tuesday night 220 interest in the Northeast, with K9AQP/1, VE2HW, W2EIF and K2RTH active. WB6NMT continues work on 220 EME antennas and we'll detail his latest array next month, when more column space will be available. On September 16th, WA2FGK, N.J., worked K9HMB, Ill., one of the few 220 tropo contacts reported recently.



At 1296 MHz large antennas are not needed to develop high gain. WA2VTR's 3 1/2-foot dish placed third at the East Coast contest, measuring 17+ dB over a dipole. The feed system is described on page 48, June 1969, *QST*.

432 MHz has rewarded its fans with good fall tropo. The fun began around September 12th, with above-normal tropo enlivening the September VHF contest. K2ARO reached 13 states worked, adding Maine, Ohio and West Virginia. K2RIW also added three during the contest and then three more within the next week, to total 17. Dick's best DX was 812 miles to W9WCD, Illinois, on the 17th. K8DEO was responsible for many "first Ohio" contacts during the contest, which saw him work state number 22, WA1MUG/1, Mass. On the 16th, WA9NKT, Illinois, worked east to W2GLL, New Jersey, for state number 13. K1HTV, Conn., worked many 8s and 9s, including K9TZZ near Chicago, with a 44-element array strapped to the side of his tower only 20 feet high. WA2FGK, N.J., is now at 17 worked and K2VDK is at 18 with Illinois, Indiana, Ohio and Michigan the recent additions. K2UYH's number 20 was W4VQA, Kentucky, and another New Jersey station, W2CLL, snagged K9UIF, Indiana, for his number 20. K2ARO worked two Illinois stations for state number 14 and his 6th call area.

Excellent conditions in the midwest continued through the 19th permitting the following work. W8YIO, Mich., reached 21 states contacting WØLER, Minn., and KØTLM, Mo. Lew wonders if anyone would schedule him on 432 EME. K8DEO added still another, KØCQA in Iowa for number 23. Don also heard KØAWU, N.D., and WØBJ in western Nebraska, but couldn't raise them. W9JIY, added 5 more, reaching 15. Win worked West Virginia, Iowa and Minnesota.

WØDRL now has 19 states from Topeka, Kansas, representing much hard work. His most recent is W4VQA, Kentucky, 702 miles. During an 80-hour period beginning the evening of September 18th, Al made 50 contacts in 10 states. He says the tropo was the strongest he has ever heard on any band, with 4 watters peaking 30 dB over S9. WØLER says the opening covered the most geographical area of any tropo he has heard. From Minneapolis the tropo extended to eastern Ohio, South to Oklahoma and northwest to at least KØAWU in North Dakota. KØTLM, running 12 watts at Kansas City, Mo., was state number 11 for John. WØLCN, Minneapolis, also worked Missouri for his number 11.

Between duties at ARRL, Ed, W1HDQ, has found time for renewed 432 activity and during the month beginning in mid September worked 25 stations and reached 11 states worked. He finds the reliable range to be considerably improved over that prevailing in his previous forays on 432. Lack of activity on 432 is no longer a problem in most areas, and when the band is open, high power is not usually necessary. Love those varactors, eh?

QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

W H O :

If anything can go right, it just might,
and at the very best possible time.

— *Guess Who*

We were glad to get a letter from pal Grommet-head Schultz the other day, even in his own awful handwriting. Deciphering the scrawl we found he had been out of town for a week or so, then had returned to find his pet homebrew rig defunct. Grom also enclosed a photocopy of a note he says was sticking up out of his shack typewriter. Sounds like something out of a women's lib blurb. His analyst has the original . . .

Schultz, you dimwit –

You left your clunky rig turned on, B-plus and all, when you blew town. Not only that, you had a 20-amp fuse in a 2-amp line. And not only that, your 150-watt iron was plugged in behind the rack and would have burned right through the floor with no help from my crazy nephew. I opened some bum connections at the fuse block and wall outlet or you would be sleeping in the park.

Now I am a woman, see. You careless nuts keep me hopping day and night. In fact one scatterbrain like you would take a couple of full-time good fairies to keep alive and on the air. This mill is too handy to pass up so I'm giving you the word.

I will use it to tell you I am plenty fed up with hearing everybody glamorizing kooks and bad guys. Take my nasty newphew, for example (sure wish somebody would). You hams prance around chanting Murphy's law like it was a civil right or something. Field Day is becoming better known as Murphy's Day. It serves most of you right to get hit with the worst Murph can dish out, and believe me that can be rough.

Trouble is, when a ham gets a break instead of a breakdown he rarely realizes it or appreciates it. You, numbskull, are a prime example. Two of your tower guys are rusting through, there are three cold solder joints in your linear's bias supply, and the old 5U4 in your jiggly receiver is tuning from blue to greenish purple. When you heap finally folds you will no doubt credit you-know-who. I kid you not, too many of you jerks don't need a guy like Murphy around to sink you. But do I get any credit for holding your punk junk together?

No, you are content to sit around moaning Murphy this and Murphy that. What about *Auntie* Murphy? Sometimes I could just cry. . . . Oh-oh, here comes my no-good nephew now. I'm cutting out fast. Not enough room in the same shack for the two of us. 73 and Switch to Safety, kiddo.

— *Auntie Murphy*

P. S. by ME, you clown, the *real* Murphy. Any goofy old lady who goes around doing favors for kicks ought to get put away. I would wreck your crummy outfit but it's too unworthy. Next time you try to use this mill the carriage will fall off and three ball bearings will drop out, one of which you will never find.

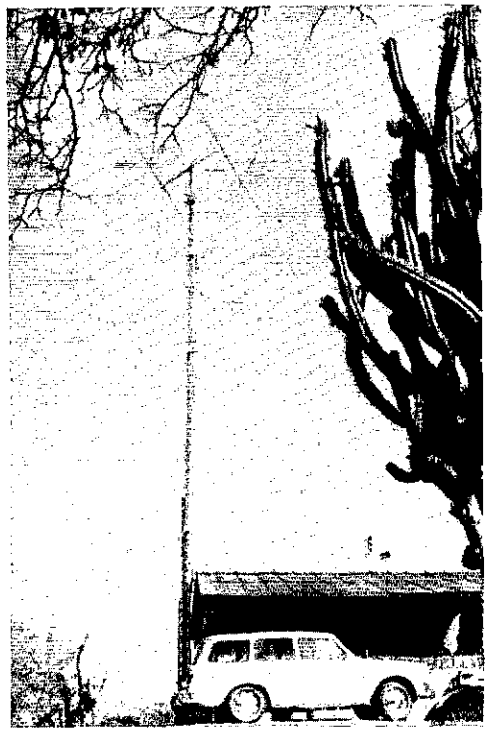
— *The Big M.*

Sure enough, according to Grommethead Schultz, when he did, it did, they did, and he's still looking.

* * *

W H I C H :

One-sixty is due to really pack 'em in this month. You're invited to try your latest top-band skyhooks in the 1st ARRL 160-Meter Contest on the 12th-13th, for one thing, an activity bound to shake down your outfit for the 1.8-MHz DX season ahead. All set? Full rules and data appeared on page 92, October *QST*.



YV7AV's triband quad and grubgetter punctuate a picturesque QTH of the Month on the arid plain near Carupano. Pedro's call shows up consistently in all sorts of DX action.

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

DXwise it's also time for the annual trans-atlantic and World-Wide DX Tests, a series of events promulgated by W1BB and associates since 'way back in '32. Test sessions will be held this 1970-'71 season on the mornings of November 29th, December 27th, January 10th and 24th, and February 14th, 0500-0730 GMT. W/Ks are urged to call CQ DX Test for the first five minutes of the hour, listen the next five minutes, call again during the third 5-minute period, etc., until the DX ball starts rolling. W1BB urges all to set their clocks accurately. Eastern U.S.A. stations will concentrate on 1800-1825 kHz, westerns on 1975-2000. Most Europeans will use 1825-1830, VKs like 1800-1860, and ZLs prefer 1875-1900 kHz. JAs hang around 1910 and other DX likely will cluster between 1800 and 1830 kHz. Remember, these tests are not meant to be contests. . . Furthermore, the fourth annual 160-Meter Transpacific Tests transpire at 1330-1600 GMT on December 5th and 19th, January 2nd and 16th, February 6th and 20th with similar procedures. Pacific regulars and a growing assortment of Asia/Oceania top-band talent will be on hand for the fun. Special JA-sunset tests are planned for 0730-1000 GMT, plus Japan-Europe trials at 2030-2200 GMT, same dates. W1BB continues to serve as clearing-house for 160-meter DX news from all points.

Things started poppin' in September for DX hawks on 160. W6KWE, who got things started last year as W3DPJ, began working cw stuff like AX3APN, VK6NK and ZM1AYG at midmonth. Two weeks later Tom found conditions good enough to sideband at length with VK3QI around 1400 GMT, also hooking KH6IJ and K8IUA/KL7 for good measure. K2ANR and W9BKA/8 rang the bell with VK9GN in late September, fine DX on any band. How's *your* pet 1.8-MHz skyhook going? W6EAY is ready with a new 2400-footer, and HB9IN (1828 kHz) flies a 5/8-wavelength balloon vertical when weather permits. On the other hand, WØNFL's trusty big bertha literally disappeared in August, completely vaporized by lightning. Back goes Jim to the doodle pad.

W/K/VE/VOs new to 160 should consult the most recently published data on what frequency segments and power limitations prevail at their particular locations. And remember that commercials KPH, WNU and WCC on 2045, 2048 and 2036 kHz respectively, are handy conditions indicators for 160-meter bounce. June "How's", pp. 99-100, is also suggested for more top-band DX background. Good fishin'!

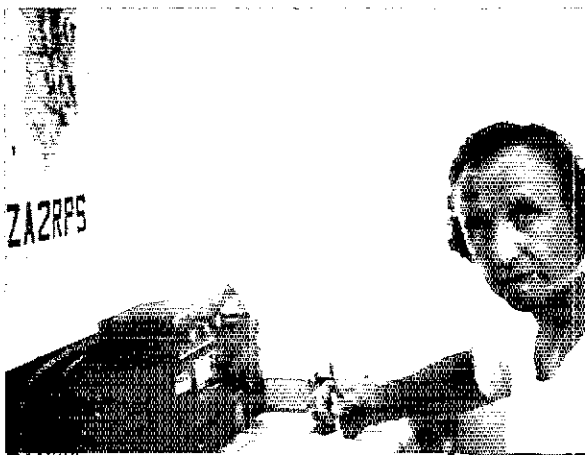
* * *

VR6TC (center) was visited by W6HUQ (left) and WA7FPG when USNS *Watertown* stopped at Pitcairn in September. While QSOing Tom en route, the Navy boys learned that VR6TC's SX-117 wasn't working properly on 28 MHz. Dave and John checked out the set on arrival, found the difficulty, and made many a ten-meter DXer joyful immediately thereafter. W6HUQ, by the way, has signed such DXotic calls as HZ1AB, KG6ICD and KA2RB.

WHERE:

ASIA - QSLs for my HL9VI contacts between September 12, 1969, and September 15, 1970, will be answered direct in response to self-addressed stamped envelopes (s.a.s.e.), otherwise via bureaus. – *WA7ESD*. . . Ex-4W1B-HB9YZ tells me he hasn't used that call since February-June, 1964. *W4JUK*. . . No problem QSLing for my son, HS3ACV, except that my call has been given incorrectly by some sources. I hope to confirm Jim's QSOs 100 percent. –

ZA2RPS, Albanian endeavor of (left to right) DL7FT, DJØUJ and DL7LV, accomplished nearly three kiloQSOs with 79 countries over four days in mid-September. DL7FT parries a pile-up in the hotel shack. We'll be rooting for the appearance of some resident ZA amateurs after recent DXpeditionary demonstrations. What adventure-oriented observers could resist joining such sport?



W8BVJ. . . IDXA, Box 125, Simpsonville, Md., 21150, is an address for September AP2KS contacts from East Pakistan. *DXNS*. . . JA3XPO of Japan's world fair intends 100-percent QSLing. – *WCDXB*. . . VE6AP, according to VE6MY, takes over the various QSL arrangements of the late VE6AO.

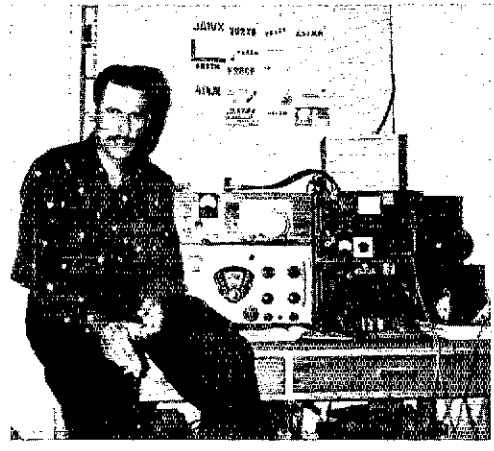
AFRICA – 5N2s signed the 5N5 prefix during Nigeria's tenth anniversayr celebration in October. *5N2ABG of NARS*. . . Contary to widespread misinformation I have no arrangements to handle ZD8 QSLs. *W4ISD*. . . When QSLing FH8CG bear in mind that he's a stamp collector. – *VERON*. . . Those 9I6s were 9J2s, suffixes unchanged, observing Zambia's sixth independence anniversary. – *DXNS*. . . W2MZV had confirmed about half of W4BPD's 25,000 '70 DXpeditionary contacts by October. – *WCDXB*. . . FR7ZU states he's handling his own QSLs which many await.

EUROPE – Due to continued traveling my C31DE QSLing will be inadvertently delayed, possibly until the Christmas vacation. – *EI6AU*. . . Beginning in October the TF2 prefix was withdrawn. Visitors authorized to ham in Iceland will henceforth use their own calls plus "/TF." This applies to ex-TF2s WKI (WA1NGK), WMB (K2LQQ), WLS (WA2HNO), WMF (WA2PQX), WHI (K3VKB), WMC (WB4CTE), WMA (WA5ZGR), WMD (WB6OPB), WME (KH6HCF) and myself. – *W5ILR/TF, ex-TF2WKP*. . . My address is incorrect in the *Callbook* so please refer to QSLing instructions in April '70 "How's." – *CT2AT (K7UWT)*. . . All foreign military-affiliated stations in Germany henceforth will sign the DA prefix. – *DXNS*.

WEREABOUTS – All KC4 antarctic stations may be QSLd through K2BPP. – *W1YYM*. . . I do not have an APO address, and WA3HUP does my QSLing. – *CE0AE*. . . Effective June 18, 1970, I am QSL manager for VR2FO. – *W2FXA*. . . My QSL duties in behalf of VK9BN commenced August 24, 1970. – *W3LPF*. . . WB6UJO disclaims KX6 QSL arrangements. – *WCDXB*. . . GW3DZJ will handle European QSLs for PJ8AR, W3HNK the W/Ks. – *DXNS*. . . "QSLers of the Month" applauded by "How's" correspondents WS 4YOK 4ZYT 8YMB, K8RXD, WAs 2GMD 2HZR 3JHB 5UHR 6RTA 9TZD, WBs 2ZHM 9BUV and 9CJS for DX-ceptionally fast confirmations are AXs 2AIA 2JH 6WT, CEs 2DI 0AE, CR6AI, CTs 1LN 2AA, DU1FH, EI9BG, FL2s AT CB, FR7ZG, GC3EML, GD3AIM, GI30LJ, GW8WJ, HK0BKX, HS3ACP, JA8GRR, JR1AZE, Ks 1WKK/TI2 5QHS/KS4 0RAX/KL7, KH5II, KR6CG, KV4AA, LX1LF, PJ2PS, PY7s AWD/0 7SR, PZ1AV, SV0 WO WY, TA2E, TG4SR, UA0YT, UC2RL UO5WB,UL7KAR, UQ2s KAA KCR, VP2s GBG GBH GLE LP LQ, VQ8s CC CD, VU2OLK, WA1FKE/HR5, YA1HD, YB0AAB, ZM1s AAT/K BNA VX, ZSs 1ACD 1EJ 4JB, 8P6AH, 9F3USA, 9G1HM and 9H1BL, together with QSL tenders Ws 2CTN 4NJF 7VRO, K9, CUY KLR, WAs 3HUP 6AHF, VE3s ABG DLC EWY IG, G3VRA and ZL2AFZ. Any candidates out your way?. . . Halp! These italicized colleagues seek clews to pry tardy cardies from holdouts mentioned: *W5BZK*, VP2KX '70; *WA2EWC*, CM2ZU, CO2FC, HC7GG, PY8DP, UK6QAA, ZM2GH, ZS6GG; *WA6PZL*, CR7CN, 9Y4DS; *WA6R7A*, CO2FA; and *WB2ZHM*, YA1YE. 'Alp? – We offer to act as QSL agents for deserving overseas ops. – *WAs 6PZL 7OCL, WB2ZHM*. . . Now a few individual specs but remember that each item is necessarily neither complete, accurate nor "official". . .

F9JS, Jean-Charles Sacotte, 180 av. de Choisy, 75 Paris 13, France
FH8CG, P.O. Box 135, Moroni, Comoros Islands
FL8AB, A. Belguise, P.O. Box 468, Djibouti, T.F.A.I.
FL8LM, M. Lotterie, P.O. Box 468, Djibouti, T.F.A.I.
FM7WG, Legrand, P.O. Box 79, Fort-de-France, Martinique
FY7AE, P.O. Box 496, Space C'tr., Kourou, French Guiana
HI8XAJ, c/o U.S. Embassy, Santo Domingo, D.R.
HS1ADX (via STAR or to W4VFP)
JA0CUV/1, T. Kumagai, c/o Koken-ryo, 6-38-8 Shinkawa Mitaka, Tokyo, Japan
KC6RK, R. Kenney, USCT Act. Code 1, P.O. Box 76, FPO, San Francisco, Calif., 96637
ex-KM6CE, c/o G. Zeigler, P.O. Box 10, NavCommUnit, FPO, Seattle, Wash., 98791
LZ1TD, Box 70, Haskovo, Bulgaria
PY7VP, Box 348, Fortaleza, Brazil
ex-PZ1DD, J. Lindveld, Jan van Goyenstr. 40, Meppel, Holland (or via W8BDO)
ex-TF2WKP (to W5ILR/TF; see text)
TU2CY, P.O. Box 921, Abidjan, I.C.R.
VP8LV, Box 137, Port Stanley, Falkland Islands
W5ILR/TF, E. Daigre, FPO, New York, N.Y. 09571
9J2JY, P.O. Box 1563, Ndola, Zambia
9Q5GJ, Box 79, Borende, R.C.

AX0LD (via ZL2AFZ)
C31BD (to F9JS)
CR7FR (via W2CTN)
DA1RS (to WA3KFK)
DA2XA (via DL5XW)
F8BC/CN (to F8BC)
F0HI/FC (via G3KFT)
FM7WF (via W2CTN)
FP0CA (to K2OJD)
FP0NQ (to W2NQ)
GB3CUL (via G3HS)
GB3LI (via G3TPY)
GC3UGK (to G3UGK)
HB0XKZ (to G3TXF)
HB0XSB (to DJ8KB)
HC6MJ (via DJ3JR)
HL9VI (see text)
HS4ACN (via STAR)
LU0XL (via IIIJ)
JA3IG (via WB4SPG)
JD1ABO (via JA1KSO)
KR6AY (via K0VXU)
MP4BHM (via RSGB)
MP4TDQ (via G3LQP)
OE1ZBW (via W2GHK)
OE9ZQJ (to G3TXF)



4S7DA gives codehounds good shots at Ceylon almost daily around 14,080 kHz. There you'll find Denver regularly scheduling friend W3QT who volunteered this picture.

TJ1AZ helps Cameroon's ham boom with his GT-550 and 4-element quad at Yaounde. When diplomatic duties permit you'll find Bob at the bottom of pile-ups on 10, 15 or 20. *(Photo via K4ASI)*

PJ1AA (via VERONA)	ZD8X (via WA5IEV)
PJ8AR (see text)	ZK1MA (via KH6GLU)
TA1TS (via TRAC)	ZM4JF/a (via ZL2AFZ)
VK9BN (via W3LPF)	ZM4OL/a (via ZL2GX)
VP1WMU (to W5WMU)	3AØEU (to F9IS)
VP2SN (via VE3EWY)	3AØFH (via WA2UJM)
VR2FO (via W2FXA)	5H3MM (via SM5CEU)
VU2ZR (via WA7LMZ)	5R8AB (via JA3BVW)
XW8CN (via DL7FT)	9H1CG (via 9H1E)
YBØAAO (via DLØAK)	9M6AD (via K6ETN)
ZA2RPS (to DL7FT)	9Q5EL (via W8WBT)

Your QTH advisory committee this trip: Ws 1FCC 1PL 1YYM 2DY 4YOK 5BZK 8KAJ 8YMB 9LNQ, K4EPI. WAs 2HZR 3JHB 4ZZU 6PZL 9FZD, WBs 2JYM 2ZYQ 9BUV 9CJS, 9Q5GE, *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 ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA3UI), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association *DX Bulletin* (K1IMP), 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* (PAØs FX LOU TO VDV WWP) and West Coast *DX Bulletin* (WA6AUD). Good show!

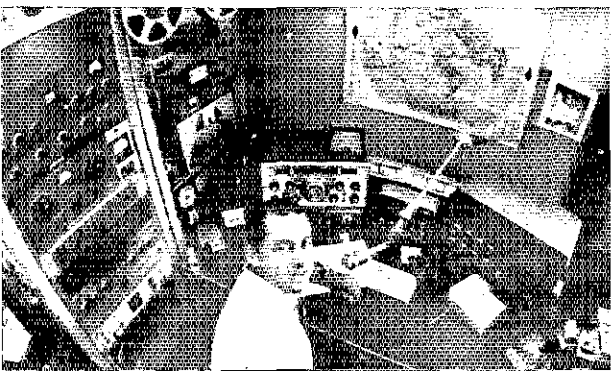
* * *

WHENCE:

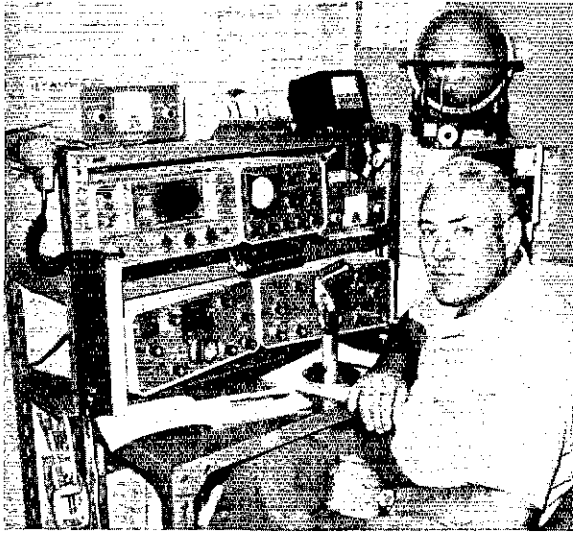
ASIA – My husband has started work as an economist for the Ford Foundation in New Delhi where I'll be operating mostly 10, 15 and 20 for the next two years as VU2IRA. – *W4IDG, ex-9N1RA*. . . I've been active for several months now on 14 MHz from Yokosuka with an HW-32A, dipole and long-wire, hearing big signals from CR8, FW8, VS5, etc. – *KA2DW (K5QJG)*. . . Okinawa ARC invites inquires on revised requirements for the Okinawa Award. – *KR6KQ*. . . I'm chief radio officer aboard a tanker on the Indonesia run, hoping to sign "/mm" or a YB call occasionally. – *HM5AP via K6QPG*. . . Operated MP4BHN and MP4BHV thanks to MP4BHH while with the Navy on Bahrain. – *WA4OWG*. . . Twin baby girls keep XW8DX, my brother, busy on and off the air. – *WA6NFC*. . . TA2EM's gear and QSLs were seized by authorities. – *W7TE*. . . EP2DX has been beaming Statesward around 14,225 kHz at 0200-0300 GMT. – *W3HNK*. . . DX is just great from this end and I think I'm halfway to WMJ (Worked a Million Japanese). – *HS1ADX*. . . MP4BHM is rigging a beam for fun on 10 cw. – *WA2HZR*. . . TA1s AM and TS are active on 20 cw from Istanbul, 0330 or 1530 GMT. – *K4EPI*. . . UV9BB and VU2CP are YLs who like their cw. – *W1PL*. . . Thanks to the thousands of DXers who made my year in Korea as HL9VL so enjoyable. – *WA7ESD*. . . WS 3JZJ 6LWA and WA6LTV are heard signing /XV5 from Vietnam on 20 but there's no indication that W/K QSOs are permitted. – *WCDXB*. . . Torishima's JD1ABO worked five thousand stations and a hundred countries in two months. – *DXNS*.

AFRICA – My wife 9Q5EL and I operate on 21,385 kHz daily at 1800 GMT with an HT-44, SX-117 and Mosley tribander. I'm a doctor with Methodist missions in the Congo. – *9Q5GE*. . . 3B8CC QRTd Mauritius for a new DX assignment. – *W7TE*. . . 9Q5GC's XYL 9Q5CM and brother 9Q5NB help represent the Congo. – *W4YOK*. . . ZE5JT, formerly W9PGB, looks for old Chicago buddies on 21,350 kHz. – *W9LNQ*. . . The inverted Vee of JJ1AW (K4PHY) puts out strong 80-meter signals for 5B-DXCC hunters. – *K4ZCP*. . . JJ1AZ got his ticket August 28th. – *K4ASI*. . . CR6s IK and YY got hitched, and CR6CA appears to be the only Angolan on Rtty. – *W5QPX*. . . SU1IM's 10-cw signal amounts to hard-to-copy fsk. – *WA2HZR*.

OCEANIA – KX6DR is most active on 15 around zero GMT, on 20 at 0400, and occasionally on other bands. – *WA5UCT*. . . I use an NC-200, homebrew 400-watter, dipole and cubical quad. – *YB1BM*. . . My seven years of 28-MHz operation as KR6TAB produced 154/149



VP9BY employs key, mike and keyboard on many bands with this fine layout in Smith's parish. Jim, Radio Society of Bermuda's v.p., supervises programming at ZBM/TV. *(Photo via W1NU)*



MP4BHH is a fixture on 14,220-14,240 kHz and also no stranger to 15 and 10. Tom's with the shipping industry on Bahrain. *(Photo via WA4OWG)*

countries worked/confirmed. – *KH6FJY/W6*. . . ZL2BI (now ZL3ND) and I (then W9MCW) had the first U.S. - N.Z. 20-meter phone contact in November of 1937. – *K4OI*. . . ZM2AI has a son in Concord, Mass. – *W1PL*. . . I'm on 40 and 15 cw almost nightly at 0900-1400 GMT with an HW-16 and inverted Vee and hope to hit 80 soon. – *KG6JAC*. . . DX nets may look good on paper but on-the-air operation with too many members doesn't work out. – *KH6BZF*. . . VR5DK was operated at Nukualofa by XYL WN6FSC and myself. – *WA6DKW*. . . AX3RG, found on 14,060-kHz cw, once was W9OQO in Indiana. – *W9LNQ*. . . The last five (of 50 needed) ZMs for NZART's Cook award are hard to find but I've collected 115 AXs. – *W8KZO*. . . It was a thrill to meet VR6TC in person. – *W6HUQ*. . . KM6CE is shutting down but club station KM6BI will remain available on several bands. – *G. Zeigler*. . . ZM3JC hunts N.H. and VT. complete his WAS. – *WA6PZI*. . . ZM1AAT/k made some 20,000 Kermadecs contacts before October QRT. – *DXNS*.

EUROPE – M1B and I hold schedules every Saturday at 1300 and 1600 GMT on 21,380 kHz., courteous breakers welcomed. – *WA3HUP*. . . Because of near-by high-power broadcasting only 180 of the 2200 QSOs made by DC9AR, DKs 1BN 1OE 2PS, DLs 4ER and 8RH signing C31CT were available to 5B-DXCC seekers on 40 and 80 meters. – *WA9HYS*. . . I hope to try 10 through 160 meters as DL5KS.*WB4APC*. . . OI9SUF was operated in early August from a Boy Scout camp north of the arctic circle. – *OH2BBU*. . . My operation as WA1DJG/SP6, the first humming by an American in Poland since 1964, resulted in a hundred QSOs. Met 33 hospitable SPs during my visit. – *WA1DJG*. . . I recommend DJ8CL's ssb 180-watter and quad on 14 or 21 MHz for really pleasant QSOs. – *W8EWF*. . . Next summer I'll try Nepal after KWM-2ing in the Pacific and Andorra this year. – *W9CTY*. . . YB9AAJ needs La., Me., N.Dak., S.Dak. and Vt. for WAS. – *W4YOK*. . . I operated HBØXKZ with friend G3TXF. – *WA3HRV*. . . F2FG visited my Levittown hamshack. – *WB2ZYQ*. . . TOPS CW Club runs its 80-meter code DX test from 1200 GMT on the 5th of this month to 1200 the 6th. – *G3IRM*. . . HBØAG winters as CT1XU. *W1PL*. . . G3TXZ is reports analyst for our *QUAX* 10-meter bulletins. – *G3DME*.

SOUTH AMERICA – HK3WO's No. 25 was the first all-phone 5B-DXCC and it appears I was the next to collect 100 voice QSLs on each of five bands although my 5B-DXCC No. 37 included some cards from 40 cw. - *W1MQC*. . . FY7AC works at the government prison in Guiana and expects to be active indefinitely. – *WB9BPG*. . . After fourteen years in Peru as OA7I and OA4KFI anticipate reassignment to Paris next year. – *PAØXE*. . . OA3Y is really SMØKY assisting in the rebuilding of Huraz after recent earthquake destruction. – *KG6JAC*. . . CEØAE now operates on several bands chasing his own 5B-DXCC and WAS. – *WA3HUP*. . . Returned to Holland in October – *ex-PZ1DD*. . . WA9EOO, heading for Brockton antarctic base, gives these data on current KC4s: USB, Byrd, 14,330 kHz; USH, Hallett, 14,300; USL, Brockton, 14,275; USP, Palmer, 14,290; USN, the Pole, 14,320; USV, McMurdo, 14,285; and USX, Williams, 14,310 kHz. – *W1YYM*.

WHEREABOUTS – As a full-time coast-to-coast trailer traveler, chasing DX here and there with QRP, I finally met old on-the-air friend VE1EK in person. – *W6CIS/m*. . . WB9BUV and *I, while visiting Nicaragua, were glad to repair and* reactivate the stations of YN4s AC and HC. – *W5QPX*. . . My 220 confirmed countries were all caught on 20 cw although I did try 10 meters in the "golden era". – *W6EAY*. . . I'm inactive at present after confirming 239 countries on 7 MHz. *W9NN*. . . Our primary International DX Association objective is to supply equipment to deserving hams in DX locations where gear is unavailable. – *K3RLY*. . . All bands seem much better as we head toward winter. – *WA9TZD*. . . Became W2GHK/VP9 for a while after scoring phone high in this year's Bermuda Test. – *W2GHK*. . . *Ten cw came to DX life in* September but may not last the winter. – *WA2HZR*. . . We need more *QST* coverage on ham teen-agers, also ISSB doings. – *WB2ZHM*. . . WB4NNO and I manage much DX fun without high power and beams, and both await our last few remaining WSLs for DXCC. – *W4ZYT*. . . Trying a switch from cw to ssb I find operating practices quite galling, especially on 20. – *W1FCC*. . . Lots of DX action on 15 cw. – *WA8JQF*. . . Couldn't put a beam on our steeple but a vertical and inverted Vee off the parsonage roof give encouraging DX results. – *W8KAJ*. . . Ten new members and 102 countries at W4VSV, Vanderbilt U. *WA4ZZU*. . . Wish those keyer guys would just keep going and not correct their frequent mistakes with more mistakes. – *W8BSS*. . . New office assignment limits my DX time. – *W1PL*. . . Just heard a bird tune up on 14,010 kHz and start calling a long CQ DX on top of FG7TE, PZ1AH and ZP5CE. *P. Kromayer*. . . DXers enthusiastic about QRP may be interested in our Pacific Amateur Radio Guild. – *K7LNS*. QST

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Our Spare Time

FOR SOME reason our amateur activity seems to make our uninitiated friends cat-curious about it. Their questions range the field: How far away can you go? What do you talk about? And we, as we always do, get all fired up and begin to tell about our experiences, nets, drills, activities. Then someone invariably laughs and says, "What do you do in your *spare* time?" Only radio? The answer is simple. We do exactly what everyone else does, for women everywhere have lots of hobbies, and there is always room for one more.

To give a complete answer would end up with a panoramic view of all womankind, and sound as breathlessly full of words as a Gilbert and Sullivan patter song. For a brief picture of us, we gals enjoy the things that every woman loves: cooking, sewing, gardening, working with public service organizations, and Church work. We like to knit, crochet, make rugs, and embroider. We enjoy travel, and some find flower arrangements hold their interest. Then there are the gals who like bridge, or Mah Jongg. Others are all wrapped up in music and languages and reading.

YLs enjoy sports both as spectators as well as participation in tennis, boating, fishing, golf and (would you believe) flying kites? We have YLs who like target shooting, fly their own planes, ride motorcycles; others have a hobby of antique cars.

There are animal breeders, and rock hounds, and amateur astronomers. And there are the coin and stamp group who range in their interest from idle collecting to really dyed-in-the-wool avid collectors. They like to hike, camp, do woodwork. They write, weave, watch birds and work cross-word puzzles. They visit shut-ins, make candles, work with ceramics, paint, make pottery, and many find genealogy fascinating.

And YLs are collectors. They collect dolls, soap, bottles, antique plates, and plain antiques, elephants, and matchbook covers. Others hunt for pencils, shells, pitchers, old radios, mugs, African violets, and telegraph keys, old books, charms for bracelets, and bells. One YL collects and raises orchids.

To apply the old music hall song, "It's the same the whole world over" — for there is no geographical division of interest. The DX gals enjoy the same things as the ones in this country.

That's what we do in our spare time when many of us aren't up to our ears in hospital auxiliary work, or Red Cross, or civil defense committees, working with Cub Scouts, or Campfire girls, not to mention our many organizational affiliations in patriotic, social and fraternal groups.

What then is our full time activity? YLs are nurses, doctors, secretaries. They are designers, and electronic technicians, and starlets in TV and movies. They are in religious orders, and students and teachers, and always homemakers. All of us, no matter what our jobs or leisure time interests, have one more hobby, that only one not listed in the YLRL 30th anniversary issue of *Harmonics*, — loafing.

1971 YL-OM Contest

Phone: Starts Saturday, February 27, 1800 GMT
Ends Sunday, February 28, 1800 GMT

Cw: Starts Saturday, March 13, 1800 GMT
Ends Sunday, March 14, 1800 GMT

Eligibility: All licensed OM, YL, and XYL operators throughout the world are invited to participate.

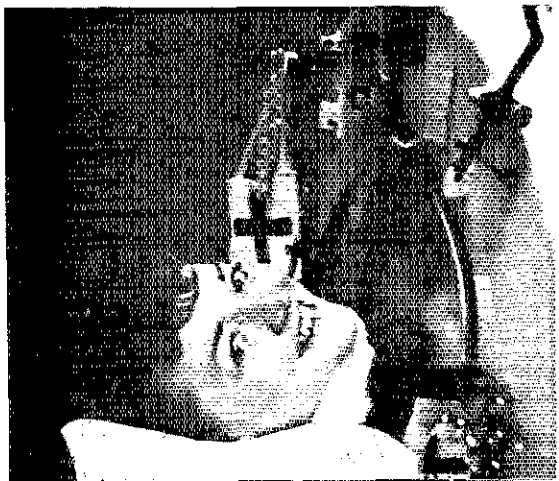
Operation: All bands may be used. Crossband operation is not permitted. Net contacts do not count.

Procedure: OMs call "CQ YL." YLs call "CQ OM."

Exchange: QSO number, RS or RST report, ARRL section, or country. Entries in log should show band worked at time of contact, time, date, transmitter, and power. (ARRL section list is found on page 6 of *QST* magazine, or send SASE to YLRL vice-president.)

Scoring: (a) Phone and cw contacts will be scored as separate contests. Please submit separate logs. (b) One point is earned for each station worked, YL to OM, or OM to YL. (c) A station may be contacted no more than once in each

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



Marie Scherer, of Cliffwood, New Jersey, is ready to take her conditional Class License examination. *(Photo courtesy K2MID)*

Quick communications needs for their isolated community in Nevada got Fran, K7YVN, into radio. Active in the public service corps, WCARS, and a member of ARRL, YLRL, NARA, Country Cousins, and the Papule Net, Faye is a teacher in the Carson City, Nevada public schools. *(W7FBV photo)*

contest for credit. (d) Multiply the number of QSOs by the number of different ARRL sections and/or countries worked. (e) Contestants running 150 watts input (300 PEP on sideband) or less at all times may multiply the above by 1.25 (low power multiplier).

Logs: Copies of all phone and cw logs showing claimed scores, and *signed* by the operator *must be post-marked* no later than April 4, 1971, and received by the contest manager (YLRL Vice president) no later than April 23, 1971. Please remember to file separate logs for each section of the contest. Send copies of logs to: YLRL Vice president, Mae Hipp, K7QGO, 5655 Yukon Drive, Sparks, Nevada, 89431.

Awards: Cups will be awarded to first place in each phone and cw, for both YL and OM. Second and third place winners in each contest will receive certificates. The winner of the phone cup is also eligible for the cw cup. Certificates will be awarded to the high place phone and cw winners in each U. S. and VE call district and country. No logs will be returned. Be sure the copy of your log is legible. Note the postmark deadline, *April 4, 1971!*

YL-ISSB QSO Party

Date: May 21, 22, 23, 1971
Time: Start May 21 at 2300 GMT
End May 23, at 2400 GMT.

The frequencies for this party will be: *Phone:* 3973, 7273, 14,332, 21,373, 28,673 kHz. DX participants may transmit on 3773, 7090, 14,332 kHz. *Cw:* 3565, 7065, 14,070, 28,070 kHz.

It has been suggested that due to possible interference there may be a leeway of plus or minus 5 kHz on the suggested frequencies. For full contest details contact Marcia Guest, WB4SBK, 1351 Tanglewood Parkway, Fort Meyers, Florida, 33901.

YLRL Membership

Again there are inquiries about membership in YLRL. This world-wide YL organization is open to any YL who holds a current amateur radio operator's license. All classes of license are welcome. The Novice membership includes full privileges.

Those who are interested in affiliation may write to their membership chairman. Eastern U.S. membership chairman is Marge Campbell, K4RNS, 65 North Arbor Drive, Ormond Beach, Florida, 32074. Western membership chairman is Beth Taylor, W7NJS, 14637 S.E. Fairoaks Avenue, Milwaukie, Oregon, 97222.

YL "Handi-Hams." Standing left to right: Janet Bailey, WNØVBS; Sr. Mary Alverna, WAØSGJ; Sr. Mary Jude, WN9BSR; Sr. Mary Cletus, WAØJIE; Seated: Mary Amdahl, WNØYWA; Leona Kroll, WNØZJC; Alta Mitchell, WAØVTZ; Edna Thorson, WAØRRA; Sr. Bernard, WNØVWR; Adelia Benton, WNØBSC. *(Photo courtesy WAØJIE)*

Plan Ahead

January 7-10, 1971 — SAROC. This year some very special activities are planned for the women who attend. Before the post-holiday let down, plan for a glittering weekend at the Flamingo in Las Vegas.

February and March, YL-OM contest.

May 14-16, 1971. Mid-west YL Convention. Mark the calendar now because in just six months the Mid-west YL, hosted by the Buckeye Belles and the Chix-on-Six, will be pulling out all the stops for the only large scale YL gathering in 1971. Those who have attended this affair in former years know that it is one to remember with pleasure. The Ohio gals have a lot of exciting things planned to make this the best so far. See you in Cleveland? May YL-ISSB QSO Party.

Eunice Bernon, K8ONA

Make a speech, appear on TV, organize a radio demonstration for the public, set up a phone patch, or handle traffic by the ton, that's how K8ONA spends her time. She got into radio for the same reason that many gals have: it was easier to join than fight! She shared the hobby with the OM, K8LMF, until he became a "Silent Key," and then kept on going.

K8ONA, Eunice Bernon

Strictly a 6-meter a-m gal, Eunice pioneered on 51 MHz when no one else was around that frequency. Now it is known as the "hot line" of northeast Ohio because someone is always listening. Her favorite activity is traffic and handling TVI complaints in Cuyahoga County Ohio, and she is the founder and traffic manager of the Apricot Net. A member of ARRL, NTS, ARPSC, AREC, YLRL, Chix-on-Six, Parma Radio Club, the Lunch Bunch, Eunice holds an OBS appointment, Public Service Awards BPL, Traffic Medallion, and has been awarded a special trophy for her public service activities at a local hamfest. Her particular interest is "selling" the public on our traffic activities by setting up booths so that the people can watch their messages going out.

When not on the air, K8ONA may be found addressing a Lions Club to secure assistance for sightless amateurs, visiting VA hospitals, appearing for some benefit, or demonstrating from the Mayor of Cleveland's office how public service is accomplished.

Her aspiration, because she loves music, is to form an amateur radio orchestra, and she encourages friends to bring their instruments to her home for a "jam session" after dinner. QST

24th VHF SS Announcement

(Continued from page 75)

When three or more individual affiliated club members complete and submit logs naming the club with which they are identified, an ARRL certificate will be issued to the leading club member. A letter must be received from the club's secretary itemizing participating members and approximate claimed scores. When fewer than three individual logs are received, there will be no club award or club mention.

A gavel with an engraved band will be offered the affiliated club whose secretary submits the greatest aggregate score, provided such scores are confirmed by receipt at ARRL Hq. of the *individual contest logs* from such members. Only the score of a bona fide member, operating a station in local club territory, may be included in club entries. Claims from federations, radio club councils, or other combinations of radio clubs, will not be accepted, nor can special memberships granted for contest purposes be recognized.

8) *Conditions of entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

9) *Reporting:* Reports must be postmarked no later than February 5, 1971 to be considered for awards.

Log sheets are now available from your ARRL Hq. **Unless first-class postage is included with your request, log sheets will be sent by third-class mail.** To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 12 cents postage attached. This will assure your receiving 5 log-sheets, enough for 400 contacts. Using this as a guideline you can adjust the postage according to your needs. QST

Strays

Feedback

The values for the capacitors connected across the oscillator coils in "A High-Performance HF Converter" (*QST*, October, 1970) are numbered incorrectly. The proper values are: L18, 120 pF; L19, 150 pF; L20, 43 pF; L21, 15 pF; and L22, 15 pF.

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In Fig. 3 of "A Frequency Counter for the Amateur Station," (*QST*, October, 1970) there should be no jumper between the i-f and bf leads at S3A.

— • • • —

Reversed Diodes! An error exists in the instructions accompanying the templates for the Digital Morse-Code Message Generator described in June 1970 *QST*. On the sheet showing the etching pattern for side A of the matrix board, the information should read, "Mount diodes and resistors vertically; connect *cathodes* of all AND- and OR-gate diodes through the board to Side A. Connect *anodes* of diodes to Side B, which is top side of board." Applying this correction will improve the performance of the matrix infinitely.

"It Seems to Us. . ."

(Continued from page 9)

elected directors on the scene; 3,000 hams in and around D.C. at varying levels of government and industry, all with their ears to the ground and ready to lend a hand if needed (more likely, keeping things from getting out of hand in the first place!); and, as frosting on the cake, a certain K7 who makes Washington pretty much a second home.

We doubt that any of this will stop attempts of other magazines to build circulation through "scare" editorials, but we thought the record should be set straight in particular as to the League's ability to speak out on the rare occasion a matter in Congress affects amateur radio. QST

Operating News

GEORGE HART, W1NJM
Communications Manager

ELLEN WHITE, W1YYM,
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE
DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD
Contests: ALBERT M. NOONE, WA1KQM
Public Service: WILLIAM O. REICHERT, WA9HHH

Contest Meetings. Beginning to assume the same proportions as DX meetings at conventions are contest meetings. The former have traditionally packed the house at conventions and other amateur gatherings for years, and there are a number of "eyeball" DX events variously sponsored throughout the country each year. Last year (i.e., 1969) at the Des Moines National Convention there was no contest meeting on the program but one was "whomped up" and the attendance was surprisingly good. At this year's National in Boston the contest meeting was featured in the program and attendance was excellent, despite conflict with several other meetings being conducted at the same time. Three of the CAC members were in attendance (Chairman W3GRF, W1AX, VE2NV), as were the liaison director (W4KFC) and the liaison headquarters staff member (W1YYM). Over a hundred avid contesters were in attendance and although no real fights developed, some enthusiastic discussion took place. Nearly all the major contests came in for some discussion – Field Day, VHF Parties and VHF-SS, CD Parties, DX Contest, and the November SS. Even a commercially-sponsored contest was mentioned. All in all it was an orderly and constructive meeting, constituting a valuable confrontation between the ARRL Contest Advisory Committee and the contest-minded fraternity. W1AX refers to the meeting as an "unqualified success" and hopes that more such will be held at future conventions and other planned ham gatherings.

Been to a convention lately? How long since? There is bound to be one in your area sooner or later, and we hope you'll go and get acquainted personally with those amateurs interested in the same kind of activity you are. There are bound to be some at any convention or hamfest. And if you should ever become involved in convention or hamfest planning, get someone to stage a Contest Session. We think you'll be pleasantly surprised at the attendance.

OPERATING EVENTS

(Dates in GMT)

December

2	W6OWP Qualifying Run
5-6	Indiana QSO Party, p. 109 Nov.
10	W1AW Qualifying Run
12-13	160 Meter Contest, p. 92 Oct.
17	W1AW Morning Qualifying Run
31	Straight-Key Nite, rules Op. News

January

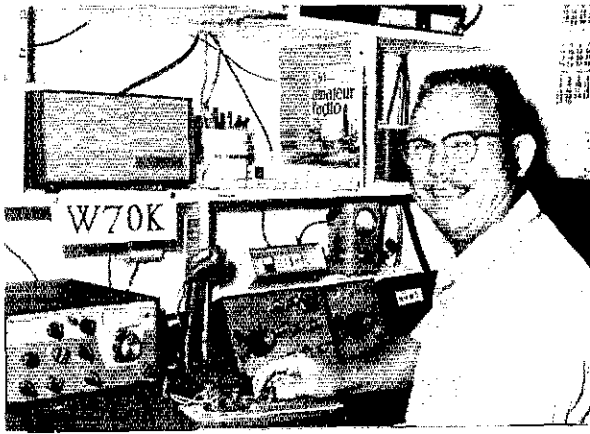
7	W6OWP Qualifying Run
9-10	VHF SS, rules this issue
13	W1AW Qualifying Run
16-17	CD Party, cw *
	"Lions" QSO Party, rules Jan.
23-24	CD Party, phone *
	Ark. QSO Party, this issue
30-31	Simulated Emergency Test, this issue
	French Contest cw, rules Jan.

February

3	W6OWP Qualifying Run
6-7	DX Competition, phone
11	W1AW Qualifying Run
12-14	QCWA QSO Party, p. 53 Nov.
14	FMT, open to all, rules Jan.
20-21	DX Competition, cw
27	French Contest phone, rules Jan.

* ARRL appointees and officials, only.

Change Your Call Lately? There has been some good-natured kidding going around the headquarters lately about call changes. Most of it is the result of a combination of upgrading and the achievement of a certain degree of seniority in hamming. You can't be a two-letter call holder



5BWAS No. 23

On Oct. 5, 1970, W7OK of Las Vegas, Nevada qualified for 5BWAS No. 23. Don regards this accomplishment as one of the top operating achievements in 40 years of hamming. Nice going, OM!

without having held a license at least 25 years, and nearly all the new ones are extra classers who have reached that milestone. Also, novices continue to become generals, with a consequent change of calls, and hams, like all Americans, are constantly on the move from one semi-permanent location to another, changing calls as they go.

Whether this is good or bad is a matter of opinion, but there is little doubt that it does cast some confusion on the matter of certificates and plaques, and questions relating to it often come up in operating circles. Is a certificate issued to WN1ABC still valid when WN1ABC gets his general and changes his call to WA1ABC or WA1DEF? Does it have to be endorsed or reissued? If W3ABC is an A-1 Operator, is he still an A-1 Operator when he gets his extra, pays his money and gets W3PU? If he then moves to the second call area and gets K2NG, is K2NG automatically an A-1 Operator?

Absolutely. Provided the identity of the individual (or club, in the case of a club station) does not change, any honors that go with an appointment or an award remain with that individual (or club). In the case of appointments, the call may be changed on the records, because an appointment is a continuing thing. In the case of a one-shot award (such as WAS, for example), the record is not changed if the award is achieved under a previous call. If you want to, you can start all over again and get a new award for your new call; *we* won't know the difference. In the case of an amateur who gets part of the award under one call and completes it under another, it is issued for the new call, but contacts made under both calls are valid provided they meet all the other requirements for that particular award.

The situation of changing call letters is fraught with "what ifs," probably more than we are able to answer here – because each case is slightly special. But the day of personal identity by call letters seems to have gone by, if indeed it ever really existed. Perhaps soon we'll be identifying ourselves on the air by social security numbers and call letters will be a thing of the ancient past. Be this as it inexorably might be, in the meantime something has to be done to keep the changes from snowing *under the records. If you made an award* under a previous call, please don't send the certificate or plaque in to have the call changed; the award was made under your old call and it is appropriate that this should be the one shown. Whatever privileges or prerogatives the award gives you are still yours, regardless of the change. If you hold an appointment under a different call in the same section, let the change be made next time a new certificate is issued; if in a different section, you have to apply for a new appointment anyway. If you made RCC or A-1 Op or received a PSA under a former call, let it ride as being appropriate that the certificate show the call used at the time of qualifying. Same with a code proficiency certificate. The way calls are changing nowadays, if everyone who changes calls insists on an entirely new set of certificates to reflect the symbolic change in status it can add significantly to the workload at headquarters.

New Activities Calendar. Speaking of changes, the January issue of *QST* will carry a change in the form of a calendar of scheduled upcoming activities. In the future, all activities sponsored by the League, clubs, foreign societies and other nonprofit groups will be centralized in one location and indexed on page 3. Thus, the "Operating Events" box which has been appearing in this department each month for quite some time will henceforth be located elsewhere and will include *all* scheduled operating activities, including section QSO Parties which have traditionally appeared in the "Station Activities" section of the magazine.

Starting with January *QST* to get all available information on a certain scheduled activity, look up "Operating Events" at the bottom of page 3, turn to the page indicated and there you will find a chronological listing of such upcoming events. If the rules are not included with the listing, there will be either a page reference to the same issue or a previous issue or an indication that the rules will *be in a forthcoming issue. The chronology will* include the current month and two months in advance.

We hope this will have the effect both of saving some valuable *QST* space and of providing a better service to our readers and members.

Gotcha Code Proficiency Award? It starts at 10 wpm and goes all the way up to and including 35 wpm, in 5-wpm increments. See the "Operating Events" calendar for dates, frequencies and times. Here's how to apply: (1) Indicate whom you copied (W6OWP or W1AW). (2) Underline a minute of the highest speed you think you copied correctly. (3) Include a statement that you used no type of aid or assistance violating the intent of the program (this does not rule out typewriters, which are encouraged). (4) Include your name (and call if you can remember it), and full address including zip. (5) Stand by and control your impatience while we process. – *W1NJM*.

STRAIGHT-KEY NITE

Staying home December 31? If so, dust off your old straight key and prepare for a friendly on-the-air event. The exercise starts at 8 p.m. your local time (on New Years' Eve), and ends 5 hours later at 1 a.m. Anyone may enter, providing he (or *she) uses a straight key. Operate about 30 kHz* inside the low end of the cw bands. To raise someone, call CQ SKN. This isn't a contest, so remember to ragchew.

Following SKN, we'd like to hear who you worked (just a list of calls) and your "vote" for the best straight-key fist heard. If there's enough interest shown we just might work up a special award for the best fist reported.

Reports must be at Hq. by January 18, please. *CU SKN!*

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, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed

amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least two years immediately prior to nomination. Petitions must be received on or before 4:30 PM 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 and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of the membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

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, W1NJM, Communications Manager

ARRL AFFILIATED CLUB HONOR ROLL

Each year, from the data given in or supplementing the annual affiliated club questionnaire (CD-18), we send out special certificates and make a special listing of those clubs all of whose members are members of ARRL. The first such listing appeared in June *QST* (p. 106). We are happy herewith to present the second listing of clubs who qualify as "100% ARRL Clubs."

Next February we plan again to forward to every affiliated club on the "active" list a questionnaire form for filing new data. How about putting your club on this honor-shrouded 100% list?

Bandhoppers Radio Club, St. Louis, Mo.
Beacon Radio Amateurs, Philadelphia, Pa.
Brush Creek Plaza Bird Watching and VHF Society, Kansas City, Mo.
Decatur Amateur Radio Club, Decatur, Ala.
Greensboro Radio Club Inc., Greensboro, N. C.
Johnson City Radio Association, Inc., Johnson City, Tenn.
Lamar Tech Amateur Radio Club, Beaumont, Texas
Louisville Active Radio Operators, Fernecreek, Ky.
Newington Amateur Radio League, New Britain, Conn.
North Shore Amateur Radio Club, Huntington Sta., L.I., N. Y.
Northern Illinois DX Association, Glen Ellyn, Ill.
Order of Boiled Owls of New York, W. Hempstead, N. Y.
Ottawa Amateur Radio Club, Ottawa, Ohio
South-Eastern Virginia Wireless Assn., Norfolk, Va.
Stratford Amateur Radio Club, Stratford, Conn.
Villanova University ARC, Villanova, Pa.
Virginia Century Club, Chesapeake, Virginia
York Amateur Radio Club, York, Pa.

CLUB COUNCILS AND FEDERATIONS

British Columbia Amateur Radio Association, Mr. Dave Gilmour, VE7YG, Secy., 1150 Comox St., Vancouver, 5, B. C. Canada.

Canadian Amateur Radio Federation, Mr. K. E. Rolison, VE3CRL, Secy., 53 Westglen Cres., Islington, Ontario, Canada.

Chicago Area Radio Club Council, Inc., Mr. Karl A. Kopetzky, K9AQJ, 1052 Loyola Ave., Chicago, Illinois 60626.

Council of Connecticut Amateur Radio Clubs, Mr. James W. Parker, K1VII, 17 West Main St., Niantic, Connecticut 06357.

Federation of Eastern Massachusetts Amateur Radio Associations, Mr. Eugene Hastings, W1VRK, Secy., 28 Forest Avenue, Swampscott, Massachusetts 01907.

Foundation For Amateur Radio, Ethel M. Smith, K4LMB, Secy., 2012 Rockingham St., McLean, Virginia 22101.

Hudson Amateur Radio Council, Mr. Fred J. Brunjes, K2DGI, Secy., 22 Ivy Drive, Jericho, New York 11753.

Indiana Radio Club Council, Mr. Ron Frye, WA9QLQ, Secy., 1810 Columbus Blvd., Kokomo, Indiana 46901.

Ohio Council of Amateur Radio Clubs, Mr. James W. Benson, W8OUU, Secy., 2463 Kingspath Drive, Cincinnati, Ohio 45231.

The Puget Sound Council of Amateur Radio Clubs, Mr. Jerry Seligman, W7BUN, Secy., 12306 80th. Ave., East, Puyallup, Wash. 98371.

Section	*Closing Date*	*SCM*	*Present Term Ends*
Miss.	12/10/70	C.C. Comfort, WA5KEY	1/2/71
Colo.	12/10/70	C.M. Cotterell, W0SIN	2/14/71
Sac. V.	12/10/70	J.F. Minke III, W6KYA	2/25/71
C. Z.	1/11/71	R.L. Oberholtzer, KZ5OB	11/10/69
Mar.	1/11/71	W.J. Gillis, VE1NR	3/11/70
Sask.	1/11/71	G.C. Pearce, VE5HP	4/11/70
Alaska	1/11/71	A.L. Weber, KL7AEQ	7/10/70
Ala.	1/11/71	D.W. Bonner, W4WLG	12/26/70
N. Dak.	1/11/71	H.L. Sheets, W0DM	3/8/71
S. C. V.	1/11/71	A.F. Gaetano, WeV2T	3/10/71
Mo.	1/11/71	R.J. Peavler, W0BV	3/18/71
Ark.	1/11/71	R.D. Schaefer, WA5IIS	resigned
N. C.	2/10/71	C.M. Dempsey, WA4UQC	4/10/71
B. C.	3/10/71	H.L. Savage, VE7FB	5/1/71
W. I.	3/10/71	J. Medina-Hernandez, KP4CO	5/1/71
Wash.	3/10/71	H.W. Lewis, W7JWJ	5/3/71
N. Mex.	3/10/71	J.R. Prine, W5NUI	5/9/71
L. A.	3/10/71	H.D.D. Hetland, WA6KZI	5/18/71

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Minnesota	J.H. Halstead, K0MVF	9/10/70
N. New Jersey	F.J. Amoroso, W2ZZ	12/9/70
S. Texas	E.L. Ulrey, K5HZR	12/10/70
New Hampshire	R. Mitchell, W1SWX	1/2/71

In the Utah Section of the Rocky Mountain Division, Mr. Gordon R. Smith, K7HEV, and Mr. Carroll E. Soper, K7SOT, were nominated. Mr. Soper received 83 votes and Mr. Smith received 71 votes. Mr. Soper's term of office began October 23, 1970.

DX COMPETITION COMING UP!

Got your logs yet? Still time to request 'em from ARRL, 225 Main St., Newington, Conn. 06111. 1971 dates for the fray are (phone) Feb./Mar. 6-7 and (cw) Feb./Mar. 20-21. Full rules in this issue.

SEPTEMBER 12 FMT RESULTS

The first ARRL "open" Frequency Measuring Test took place at 0130/0430 GMT September 12. This exercise was open to all comers, with competition limited to those reporting by September 23. Entries were received from 148 FMT fans, submitting a total of 762 measurements.

The umpire measured the early run at 3526.286, 7062.384 and 14,060.702 kHz. The late run checked out at 3537.128, 7077.822 and 14,078.047 kHz. Using these official readings, you can determine the accuracy of your own individual measurements. Hopefully you saved a copy of them!

Under the new procedures, all those submitting measurements meeting Class I or Class II Observer requirements[1] are shown in the following tabulation in order of average accuracy. The "Honor Roll" is the standing of the FMT leaders. In consideration of the minimum possible error due to doppler and other unavoidable factors, we accredit as of equal merit all those reports computing 4/10ths parts per million or higher accuracy. A participant must submit a minimum of *two* measurements to qualify for listing in the honor roll. If you're interested in error percentage, move the parts per million decimal point 4 points to the left.

(Continued on page 109)

[1] Class I OO applicants must demonstrate an average accuracy of less than 71.4 parts per million. Class II OO applicants must show 357.2 parts per million or better. Check with your SCM, see page 6 for addresses, for information on openings in your section.

DX CENTURY CLUB AWARDS

Due to the heavy influx of submissions made during September for Honor Roll credits (DXCC Note on adjacent page) as well as the regular submissions of New Members and endorsements, we were not able to complete the necessary preparation of the annual DXCC listings of DXCC participants. The annual listing will appear in the January issue. We are able to present the Honor Roll and the listing of new members to DXCC whose applications were received during the period from September 1 through September 30, 1970.

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries, less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through Sept. 30, 1970.

DL1IN	322/340	PY2CK	320/345	W9DWQ	319/334	W5KTW	317/323	OH2BH	315/319
G3FKM	322/341	W1CKA	320/332	W9GFF	319/334	W6EL	317/322	ON4NC	315/338
G8KS	322/342	W1DK	320/339	WØCJZ	319/325	W6EZJ	317/324	VE3CFG	315/331
GW3AHN	322/342	W2BOK	320/339	WØKF	319/338	W6MVL	317/330	W2DOD	315/335
HB9J	322/348	W2BXA	320/346	DL6EN	318/335	W6REH	317/325	W2EXN	315/331
K4LNM	322/338	W2CP	320/328	DL7AA	318/342	W8CUT	317/326	W2PDB	315/328
W1HX	322/344	W2DXX	320/328	DL9OH	318/331	W8EVZ	317/322	W2YTH	315/335
W2AGW	322/348	W2HTI	320/338	G2BOZ	318/338	W8KI1	317/325	W2ZGB	315/332
W2OKM	322/342	W2QM	320/337	GI3IVJ	318/335	W9GIL	317/336	W2ZTV	315/317
W4GXB	322/345	W2WZ	320/345	JA1BK	318/328	W9HB	317/334	WA2ELA	315/321
W4PLL	322/339	WA2IZS	320/338	K1IXG	318/327	W9HUZ	317/339	W3ECR	315/334
W4VPD	322/341	W3LMA	320/344	K1SHN	318/324	W9SER	317/334	W4JDR	315/333
W5ABY	322/341	W3LMO	320/335	K2LWR	318/333	W9YFV	317/343	W4MCM	315/328
W6AM	322/349	W3WGH	320/337	K4KQ	318/340	WØBTB	317/337	W4RLS	315/321
W6KZL	322/340	W4BJ	320/334	K4TWF	318/326	WØBQM	317/332	W5EGK	315/335
W7KH	322/347	W4BYU	320/340	K6DC	318/337	WØLWG	317/331	W5GO	315/321
W8BE	322/345	W4DQG	320/329	K9KYF	318/328	WØNVZ	317/331	W5HDS	315/334
W8EWS	322/348	W4LRN	320/334	K9LUI	318/327	CR6BX	316/335	W5PWW	315/329
W8JBI	322/343	W4OM	320/344	W1AZY	318/335	DL7BA	316/335	W5UKK	315/331
W9BG	322/349	W4QCW	320/339	W1HH	318/331	G3HDA	316/330	W5WZQ	315/331
W9NDA	322/348	W5AO	320/341	W1HZ	318/338	GSVT	316/339	W6CHV	315/336
WØBW	322/345	W5MMK	320/343	W2FXA	318/333	IT1TA1	316/334	W6ISQ	315/324
HB9MQ	321/341	W5QK	320/333	W2GKZ	318/322	JA1DM	316/333	W6ZJY	315/321
K2BZT	321/340	W6BZE	320/342	W2GQN	318/321	K2YLM	316/318	W8ARH	315/320
OF1ER	321/345	W6LN	320/342	W2QHH	318/341	K2YXY	316/325	W9AMU	315/333
VE2NV	321/340	W6RKP	320/336	W2SAW	318/337	K4JC	316/321	WØBN	315/323
W1AX	321/346	W6TZD	320/342	W2WMG	318/331	K6OJ	316/339	WØNLY	315/333
W1BAN	321/336	W7AC	320/346	W2YY	318/328	K6VVA	316/327	DL7EN	314/331
W1BIH	321/347	W7PHO	320/340	W3MP	318/342	K6YRA	316/320	GI3JIM	314/328
W1CLX	321/346	W8BT	320/339	W3MWC	318/334	K8LSG	316/329	K2IXA	314/333
W1GKK	321/348	W8DAW	320/346	W3NKM	318/337	LA7Y	316/340	K2PXX	314/322
W2CTO	321/343	W8EV	320/340	W3RNQ	318/338	VK3KB	316/341	K9GBM	314/317
W2NUT	321/339	W8NGO	320/339	W4ML	318/340	W2BMK	316/330	SM3BIZ	314/333
W2PCJ	321/340	W8WZ	320/344	W4NJF	318/323	W2CYS	316/340	VE2BV	314/333
W2RGV	321/339	W8ZCQ	320/336	W5GR	318/340	W2LAX	316/335	VK4QM	314/339
W2SSC	321/339	WØMLY	320/338	W5KBU	318/338	W2MJ	316/330	W1NU	314/331
W2SUC	321/340	WØELA	320/345	W5OLG	318/341	W2UVE	316/336	W2EZY	314/329
W2TP	321/332	WØPGI	320/338	WA5EFL	318/322	WB2CKS	316/319	W2NQ	314/320
W2ZX	321/342	WØQGI	320/338	W6DZ	318/333	W4AVY	316/330	WA2DIG	314/325
W3GAU	321/346	DL3RK	319/338	W6GPB	318/341	W4IC	316/323	WA2OJD	314/330
W3KT	321/347	G4MJ	319/338	W6KUT	318/340	W4SSU	316/326	W3MQ	314/321
W4AFF	321/346	K6EC	319/335	WA6GLD	318/321	W4VMS	316/320	W4AAU	314/335
W4OPM	321/338	K7GCM	319/329	WB6OOP	318/325	W5GC	316/327	W5GJ	314/323
W5KC	321/346	K8IKB	319/332	W7JG	318/328	W5HE	316/319	W6HYG	314/328
W5PQA	321/341	ON4DM	319/340	W8ONA	318/336	W5OGS	316/334	WA6EPQ	314/321
W6CUQ	321/348	W1FZ	319/340	W9ILW	318/327	W6ANN	316/338	W8DL	314/317
W6CYV	321/341	W1GYF	319/336	W9RCJ	318/332	W6BSY	316/334	W8KBT	314/329
W6EPZ	321/344	W1MV	319/338	WØAIH	318/335	W6FOZ	316/336	W9EKC	314/337
W6NJU	321/337	W2BQM	319/334	WØPNQ	318/342	W6HOC	316/331	W9IUV	314/336
W6OSU	321/335	W2HO	319/337	OJ2BW	317/336	W6KTE	316/319	W9MQK	314/328
W6PT	321/340	W2IVU	319/342	DL1KB	317/338	W6SQP	316/333	DJØKQ	313/316
W6WWQ	321/340	W2LV	319/340	G2BVN	317/337	W7ADS	316/335	DL3BK	313/329
W6ZO	321/344	W2PV	319/323	K2OEA	317/335	W7ENW	316/342	DL7HU	313/324
W7AQB	321/335	W2RDD	319/335	K8ONV	317/328	W8KPL	316/336	K4AJM	313/329
W7MB	321/347	WA2RAU	319/322	K9ECE	317/328	W9QQN	316/319	K6CH	313/334
W8JIN	321/348	W3CGS	319/340	KPØEZH	317/321	W9WYB	316/332	W1DGJ	313/321
W8MPW	321/341	W3GRS	319/333	KP4RK	317/329	YV5AB	316/337	W2TQC	313/334
W8PHZ	321/338	W4MR	319/340	OH2NB	317/340	YV5BOA	316/319	W5AFX	313/340
W8UAS	321/344	W5UX	319/336	PY2CQ	317/320	ZL1HY	316/342	W5EFW	313/333
W9LNM	321/346	K6LGF	319/333	PY2SO	317/320	DJ7ZG	315/318	W6ERS	313/322
WØDU	321/345	W6HX	319/344	W1CBZ	317/334	G3OQ	315/339	W6RGG	313/317
WØSYK	321/341	W6ID	319/340	W1GL	317/322	G6FA	315/332	W5LZW	313/323
CE3AG	320/346	W6TA	319/335	W1JNV	317/336	HB9FL	315/333	W6DO	313/320
G3HCT	320/333	W6UOV	319/335	W2CR	317/336	HAMU	315/336	W6VUW	313/322
HZL	320/334	W6WX	319/328	W2EXH	317/325	JA2JW	315/328	W6YY	313/335
K4TJL	320/331	W7CMO	319/331	WB2HXD	317/320	K2UVU	315/330	W7ADS	313/332
K6AN	320/343	W7OE	319/338	W2JT	317/338	K4ICK	315/329	W8BRA	313/338
LU4DMG	320/338	W8DMD	319/343	W3AFM	317/329	K4PDV	315/331	W8CT	313/320
LU6DJX	320/346	W8KIA	319/345	W3DJZ	317/327	K6EV	315/319	W9TKD	313/326
PAØFX	320/342	W8QJR	319/338	W3EVW	317/341	K6NA	315/338	WØGKL	313/330
		W8YCP	319/332	W4TM	317/341	K7ADL	315/322	4X4DK	313/333

Radiotelephone

W8BF	322/345	PY2CK	319/344	W9ILW	318/327	K2YLM	315/318	W2BQM	314/329
W8GZ	322/347	W1ONK	319/337	W9NZM	318/324	K4EZ	315/325	W3DJZ	314/321
W2TP	321/329	WA2RAU	319/322	DJ2YI	317/334	K4HEF	315/326	W3KT	314/335
W2ZX	321/342	W4QCW	319/334	DL9OH	317/330	K6YRA	315/319	W6RKP	314/325
W6AM	321/347	W6BAF	319/331	GI3IVJ	317/332	PAØHBO	315/330	W6ZIY	314/320
W6GVM	321/344	W8MPW	319/330	K6LGF	317/329	W2EXH	315/321	W7CMO	314/319
II2HP	320/344	WØCM	319/338	K8RTW	317/328	W2JT	315/331	WA8AJI	314/317
W1BAN	320/334	5Z4PRR	319/343	W4SKO	317/332	W2ZTV	315/317	WØMLY	314/328
W1JFG	320/337	K1IXG	318/327	W6EL	317/321	W4ANE	315/332	ZP5CF	314/332
W2BXA	320/344	K9KYF	318/328	W6RFH	317/321	W5KBU	315/334	DJ7ZG	313/316
W2HTI	320/337	K9LUI	318/327	W9WHM	317/335	W8JIN	315/332	HB9J	313/335
W4PDL	320/332	ON4DM	318/339	W2OKM	316/334	W8UAS	315/335	HB9TL	313/330
W8BT	320/339	W2PV	318/322	W3NKM	316/334	W9RNX	315/335	W2GQN	313/316
W9NDA	320/342	W2YY	318/322	W3WGH	316/327	YV5AIP	315/325	W2WMG	313/319
WØBW	320/337	WA2IZS	318/327	W4NJF	316/321	G3DO	314/337	W5PQA	313/330
DL1IN	319/336	W3RIS	318/345	W5GC	316/327	G5VT	314/337	W6TA	313/322
G3FKM	319/335	W4OM	318/336	WØGAA	316/321	K5JEA	314/327	W6WX	313/316
G8KS	319/335	WA5FFL	318/321	YV5AB	316/337	OE1ME	314/329	W6YY	313/335
K4TJL	319/330	W7PHO	318/338	DL6EN	315/330	ON4DH	314/332	W8EVZ	313/317
LU4DMG	319/337	W8QJR	318/337	G6TA	315/331	PY4TK	314/333	W9DWQ	313/318
				IIAMU	315/336	VK5MS	314/336		

New Members

September 1-30, 1970 *(phone below)*

DL2KM	238	K6MF	140	G3FXA	110	WB4GPI	106	WAØTWZ	103	K1PEF	101
WA9LOT	231	PY2DRP	139	G3VPS	110	WA8YDZ	106	DJ1QQ	102	K4CYU	101
WA9FHK	213	PAØLRK	134	W4MOX	110	DJ7ND	105	DL1OK	102	KØETY	101
DJ3OS	187	YU2DI	128	WB6QLZ	109	DL7NF	105	EA6BH	102	OK1DH	101
JA1KZD	156	DJ4OI	127	DL1RB	108	WA1COA	105	VE4SN	102	WA1JKZ	101
GC5AET	153	K4LP	116	JA1XGI	108	W6HQN	105	W4VSV	102	W2DSC	101
SM7ABL	148	ON5GT	114	JA3AUQ	108	K4IQJ	104	WØRYM	102	VE3GHZ	101
JH1GGW	143	WAØODW	113	W6OKK	108	YU2BOP	104	DJ8SG	101	WB6WQV	100
WAØUCU	143	YU3EM	112	K9LHC	107	SP3DOI	103	DL2JK	101	WØLFJ	100
		VE2IZ	111	WA3DVO	106	WB6VGP	103	G3IEP	101		

PY3BXW	270	DJ4OI	126	W8SSA	111	LU6BBA	105	WA5UCT	102	ZL1SZ	101
GW3AHN	235	JH1GGW	121	DJ5OI	110	DJ6BV	104	DL2JK	101	HK3LT	100
DJ3OS	187	JA1KZD	121	WA4UFW	108	I1AHG	104	PY2FTK	101	JA1HBC	100
DL2KM	180	XE1UA	117	WA5OQW	108	W8MJE	103	WA3GZT	101	KØETY	100
ZS4RN	166	SM7ABL	115	W5FRM	107	LU5DDM	102	W4REO	101	W2FLA	100
GC5AET	130	W3ML	112	WB4GPI	106	OH2VZ	102	WA7GQA	101	WA4VWC	100
PY2ECC	129	W1PLJ	111	WA8QIY	106	VU2VAL	102	WA8PRK	101	WAØUCU	100
TF2WLS	129									WAØVZF	100

DXCC NOTES

We have reached a point where it is no longer feasible to present both the annual DXCC listing and that of the DXCC Honor Roll in the December issue. In the past we have shown the DXCC Honor Roll in the June and December issues, with cards being submitted for those listings in March and September. To avoid the heavy input of submissions during the month of September, in the future we will be showing the DXCC Honor Roll in the March and September issues. Honor Roll submissions will therefore be accepted during the months of June and December for the September and March listings.

Please note that this change is concerned with submissions for Honor Roll credits only. The annual DXCC listing of DXCC participants will continue to be shown in the December issue as before and is not affected by this change. This change is effective as of December 1, 1970.

Operating News

(Continued from page 107)

Observers and SCMs alike may now use the following tabulation to prove qualification for OO appointment. No individual reports will be sent. An added bonus for SCMs is easier spotting of prospects for the OO appointment. Like this new system? Let us know! – *W1YYM*

HONOR ROLL

W1s BGW EO PLJ, WA2KSB, W3BFF, W4s FMW NTO TOY, W5UJF, WA5UNA, W6CBX, K6DM, WA6ZOY, W7s EJD FNA UXZ, W8s GRG NWU, W9s BCY CAA MNY, VE8QK.

.5 ppm K4HDX, W6RQ, W9IA K9KRW, .6 ppm K6MZN, 1 ppm W1DDO WA2CCF WA3KLR W5s FMO IJW TAD, 2 ppm K1GZH W2YYW W4FYM K4IAA WW6ASH K6LK, 3 ppm W4FZG K5s EVK LAD K6HI K8JHA W9HPG K9KEP, 4 ppm K2QDY WA5RIO WA5VQR WA7UDY/7 WØGIL, 5 ppm K1EER K1PKQ/5 W6AUC WA6JZZ WBØABE KØAZJ, 6 ppm W5NDW K6CL, 7 ppm WA3LLK WA4SSB W6FCX, 8 ppm WA2DVU W8DPW, 9 ppm W3RDZ WAØTJR R. Ireland, 10 ppm K3EMA, 11 ppm K3PER W4AQD/2 K6GG WA8DUL WØSUD KH6HEP, 12 ppm K2BQ W2QFR WA8MCR VE3GEQ, 13 ppm W1LQU W3YQ W5FHW WØRAY, 14 ppm W9WYB, 15 ppm K6KUQ K9JLR/3, 16 ppm W3ADE WA3FBP W9KFQ, 17 ppm W2BFS, 18 ppm W1AYG W4VSV (WA4ZZU, opr.) K6EC W7HLA, 19 ppm W2VLS WA7MUW, 20 ppm K4EHY, 21 ppm W9KCR WØPHY, 24 ppm K1KMV W1QV W3FYK W4WBK, 26 ppm K5SBR/5, 27 ppm K6s HV KUU, 28 ppm W2BHJ WB2NYK K9MAN W9MKL K9WMP, 29 ppm W6IWU WØWAS, 30 ppm W6AEV, 31 ppm W9TGN, 33 ppm W2SUC WA3LFL/4, 38 ppm

W1AW FALL-WINTER SCHEDULE
(Oct. 25, 1970—April 25, 1971)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your *original* operator's license with *you*. The station will be closed Nov. 26, Dec. 25, 1970; Jan. 1, Feb. 15, Apr. 9, 1971.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY OBS[3,7]	.....	.....
0030	← CODE PRACTICE DAILY[1] 10-13-15 wpm →						
0100	.....	← CW OBS[1] →					
0120-0130[4]	.....	.....	3.700[6]	7.020	3.520	7.150[6]	7.020
0130	.....	.....	3.700[6]	7.080	3.555	7.150[6]	7.080
0200	.....	← PHONE OBS[2] →					
0205 0230[4]	.....	.....	3.820	50.120	145.600	1.820	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	3.820	7.220	3.820	7.220
0500	CW OBS[1]	.....	← CW OBS[1] →				
0520 0530[4]	.....	.....	3.700[6]	7.020	3.945	7.150[6]	3.520
0530 0600	.....	.....	3.700[6]	7.080	3.945	7.150[6]	3.555
1400	← CODE PRACTICE[1] (5-25 wpm MWF), (35-15 wpm TTh) →						.....
1800-1900	.....	21.085	21.085	21.085	21.085	21.085	.....
1900-2000	.....	14.280	7.255	14.280	7.255	14.280	.....
2000-2100	.....	14.280	21.085	14.095	21.085	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[6]	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] W1AW 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: W1s QIS WPR. *Times-days in GMT. Operating frequencies are approximate.

VE6MJ, 39 ppm W5NBI, 41 ppm WA9TLT, 44 ppm W4MC W9KVE, 46 ppm WB6ZOK VE3DV, 47 ppm K5ZVZ, 55 ppm WA3JHB, 57 ppm VE5DP, 59 ppm W9JUV, 60 ppm WA3KDJ, 64 ppm WA8ETX, 65 ppm W8YMB, 69 ppm WA6CXB, 73 ppm W8BU, 76 ppm K7ZJS, 77 ppm W5QNQ W8JZD, 82 ppm WØLYC, 95 WB4FJT, 108 K4PKD, 131 ppm K2EYJ, 169 ppm K1WMQ, 172 ppm WA5DPJ, 346 ppm W7IJJ. The following are those not meeting Class II OO requirements (greater than 357.2 ppm accuracy): W1PL WA8DBI K6BV WB2FPG. Entries received after Sept. 23 and ineligible for the listing above: WA1AIP WB4JSD W5MSG W9REC.

Re the FMT. All FMTs are now "open." The 1971 FMTs will take place on Feb. 14, May 15, Sep. 12 and Nov. 13. The issue of *QST* the month before each test will detail the rules.

ARRL QUALIFYING RUNS

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualified at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period. W1AW will simultaneously transmit a qualifying run on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz at 0230 GMT Dec. 10. In converting, 0230 GMT Dec. 10 becomes 2130 EST/1830 PST Dec. 9. W1AW will also transmit a morning qualifying run on the frequencies shown above at 1400 GMT Dec. 17. In converting, 1400 GMT Dec. 17 becomes 0900 EST/0600 PST Dec. 17. W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz, at 0500 GMT Dec. 2. In converting, 0500 GMT Dec. 2 becomes 2100 PST Dec. 1.

W1AW CODE PRACTICE

W1AW transmits daily code practice according to the following schedule showing speeds, local times/days and GMT times/days. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries a checking reference.

10-13-15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5-7 1/2-10-13-20-25	9:30 P.M. EST SnTThS 6:30 P.M. PST	0230 MWFSn
5-7 1/2-10-13-20-25	9:00 A.M. EST MWF 6:00 A.M. PST	1400 MWF
35-30-25-20-15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThS
35-30-25-20-15	9:00 A.M. EST TTh 6:00 A.M. PST	1400 TTh

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 W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and October *QST* practice text to be sent in the 0230 GMT practice on the following dates.

Dec. 14: It Seems to Us
Dec. 22: Correspondence
Dec. 30: League Lines
Jan. 7: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

Jan. 8: The Coils, p. 145
Jan. 11: Another Converter Arrangement, p. 147

QST

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE — SCM, John L. Penrod, K3NYG — SEC/PAM: W3DKX. RM: W3EEB. WA3LTA reports that the U. of D. station, WA3GAY, is back on the air. K3GKF is in Ethiopia and he can be reached by writing M.F. Nelson, 30420 M.A., Addis Ababe, Ethiopia. The Kent ARC is conducting a Novice class. WA3NLG is working 160. W3HKS reports that with summer over activity should be high again. Please make an effort to check into one of the Delaware nets this winter.

Net	*Freq.*	*EST*
KCEPN	3905	1300 Su
DEPN	3905	1800 Sa
DTMN	145,260	1930 M
DSMN	50,400	2100 T

I wish all Delaware members a very Merry Christmas. Traffic: (Sept.) W3DKX 67, WA3DUM 17, WA3LTA 7, K3NYG 4. (Aug.) W3DKX 28, WA3DUM 9.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3CC. RMs: W3EML, K3MVO, W3MPX, WA3AFI. PAMs: WA3GLI, K3PSO. VHF PAM: W3FGQ. OO reports were received from K3RDT, K3HNP, WA3IUV, WA3EEC; OVS reports from WA3MCK, W3CL, K3WEU, WA3EEC, K3VAX, WA3IAZ, WA3KFT, WA3NVO; ORS reports from WA3EEC, WA3AFI, W3CBH, WA3NVO. BPL: W3CUL, W3VR, W3MPX, WA3FMI. PSHR: WA3FMI, WA3CKA, W3MPX, K3MVO, WA3IYC, K3OIO, WA3EPM.

Net	*Freq.*	*Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610	6:45 P Dy	288	328	W3MPX
PITN	3610	6:00 P Dy	205	177	WA3AFI
PEN	3960	5:30 P M-F	445	348	K3PSO
EPAE&TN	3917	6:00 P Dy	185	92	WA3GLI
WPWN	28.8	2215 Tu	14	0	WA3EPM

W3CUL reports handling 5 fairs and an operation all in the same month. W3EML reports TCC is doing well but traffic is slow. W3MPX is back at work. WA3LMO says school uses lots of his time. WA3LAK had the Morse Telegraphers put on a demonstration at the Franklin Inst. K3MVO says his traffic will pick up in proportion to golf reduction. WA3AFI almost has a conflict of interest with ham radio and teaching! WA3ATQ is busy with her overseas phone patch nets. W3NNL reports that beer spilled on hot tubes is definitely not good. WA3IYC is our newest ORS. WA4TMY/3 reports the ARRL National Convention in Boston was real interesting. WA3IUV is attending Drexel, so we might hear W3MGF back on. The Mount Airy VHF Club is getting ready for the Jan. VHF Contest. How about you other clubs? The ham shack at the Inglis house is shaping up. Anyone in the Philadelphia area interested in helping contact K3WEU? We still need regular liaison stations between phone and cw nets. If you can help, contact W3MPX. Traffic: W3CUL 5439, W3VR 1171, W3EML 483, W3MPX 465, WA3FMI 161, WA3LMO 158, WA3LAK 154, K3MVO 133, WA3AFI 126, WA3ATQ 103, WA3EXW 103, K3OIO 83, WA3CKA 64, K3PIE 59, WA3EPM 51, W3NNL 36, WA3LVC 32, WA3IYC 26, K3PSO 26, W3VAP 26, W3VA 24, W3HNK 22, W3HK 17, WA3INC 15, W3JSX 14, W3ADE 13, WA3TMY/3 12, W3CBH 10, WA3MCK 10, WA3EEC 9, WA3JWF 9, W3OY 8, W3CL 7, K3HKW 6, K3KTH 6, W3BUR 5, WA3NVO 3, W3BNR 2, WA3BSV 2, WA3IAZ 2, WA3IUV 2, W3OML 2, W3CDB 1, W3EU 1, K3FOB 1, WA3KFT 1, K3RDT 1, K3VAX 1, W3YR 1.

MARYLAND-DISTRICT OF COLUMBIA — SCM, John Munholland, K3LFD — SEC: W3LQY. PSHR: W3EZT (49). New appointee: WA3APQ as OO. W3ZSR continues rebuilding his station between business trips. W3FZV (ex-W4TFZ/3) is tuning up his new rig for the winter season in traffic and contests. W3ECP visited Atlanta. WA3MJF holds down the Sun. spot for NCS MDDS. K3NCM and "second harmonic" WN3OYP are looking forward to a big time in Gaithersburg at the belated FAR affair. WA3LFL/4, with aid from WA3HWB, has moved into an FB QTH south of the DC border and is going all-out vhf. W3EOV figured his signal must have been trying to go underground for the winter when the XYL recently advised him that his antenna was "hanging on the ground." W3CDQ had a nice summer overseas and attending events like the QCWA Picnic and is now back at the mike for nets and OBS skeds. W3BWT says things are quiet at his QTH but his health is better. WA3GVP sends Official Bulletins daily (except Tue. and Sat.) at 0000 GMT on 3643 kHz. WN3LLZ, WN3LHN, WN3OUE and other members of the New Carrollton ARA, WA3OBU, put on a fine show at the Prince Georges County Fair in Aug. and handled 15 messages with an SB-101, a 40-meter dipole and a 15-meter beam. WA3IYS made BPL. WA3HUJ is an Olympic weight-lifting candidate. WN3PBK has an HW-16. WA3OAO qualified for an Advanced Class ticket. Springbrook High ARC has a growing membership. The North Carolina vacation of W3TN held down his traffic count. K3STU writes an elated acknowledgement of receipt of his OO Class I certificate applied for in Apr., mailed in June, and delivered by pony express in July. W3QCW has added an SB-200 to his HT-44/SX-117 rig for an FB combo and is removing the Morning Glory "element" from his Marconi antenna. W3FA has returned from his 4-Fri. MDD NCS vacation and is ready for a big winter season of contests and traffic. W3JPT conducted an AMSAT Forum at the ARRL National Convention and was elected secy. of the PVRC. W3ABC is campaigning for state legislation to liberalize the Maryland DMV code for the issuance of amateur call-letter tags. All clubs and individuals can help by contacting their state senators and delegates before the next session of the Maryland General Assembly. W3LDD reports 248/248 for SBWAS. WA3LWT advises his new OBS sked is Tue.-Sat.-Sun. on 3643 kHz, tail-ending the MDDS net. Traffic: WA3LYS 501, W3TN 199, W3FCS 104, W3EZT 91, K3GZK 75, K3LFD 44, W3EOV 36, WA3MJF 33, WA3OBU 26, WA3LWT 25, WA3IIV 19, K3ORW 18, W3ECP 17, WA3LKJ 14, W3QCW 14, W3FA 11, WA3GXN 10, W3LDD 8, W3BWT 6, K3NCM 2, WA3GVP 1.

SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW. RM: WA2BLV. PAM: WB2FJE.

Net	*kHz Time (PM)/Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3930 6:00 Su	4	58	218	WB2FJE
NJEPTN	3950 6:00 M-Sa	30	647	312	W2PBV

New appointments: WB2FJE, recently appointed NJPON Mgr. as PAM. He is ably assisted by WB2SFX. New Jersey was well represented at the National Convention in Boston. Congrats to W2CVW on winning the code test at 45 wpm. W2FBF is conducting a code class sponsored by the Gloucester Co. ARC. SEC W2LVW reports 113 AREC members with three active nets and two with NTS liaison. OO W2ORS reports one station for off-frequency operation. W2BLM is back on frequency after two scout camping trips to the wilds of Canada. W2KGM is operating on vhf and maintains regular skeds with his son, who is located in Cherry Hill, N.J. The Southern New Jersey section lists twelve ARRL affiliated stations and clubs: Atlantic Co. 1, Burlington Co. 5, Camden Co. 3, Gloucester Co. 1 and Mercee Co. 2. WB2DRG expects to leave New Jersey for California where he will become a student of engineering in one of the universities. Our very best wishes to you, Randy, and hope to work you from 6-Land. Traffic: (Sept.) WB2VEJ 113, W2YPZ 30, W2CKF 21, W2BLM 14, W2JI 13, W2KGM 12, WB2FJE 11, WB2SFX 4, W2ORS 3, W2IU 2. (Aug.) W2BLM 17, W2ZQ 17.

WESTERN NEW YORK — SCM, Richard M. Pitzeruse, K2KTK — Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. Other leadership appointees and section nets appear in July *QST*. W2FZK is ex-K3AHT and is with Kodak in Rochester. GRAM is honoring W2CUY for 50 years in amateur radio. W2RQF is working hard to build up attendance in the cw version of the NYPON. WB2GDO has a modified audio processor which he considers putting into production. Sorry to lose WA2FOJ, of North Syracuse, to Silent Keys. WB2FAW is doing a fine job as EC of Herkimer County. Has anyone seen an antenna, heavy traps and 95 feet of coax in flight

around Palmyra? They lifted off from W2BLP in a tornado and haven't been seen since. Lightning took out the gear at WB2MXT. K2KQC has been appointed traffic manager of FHC-CHC-SWLHC. W2WS was seen at four ham picnics and two hamfests the past summer. WA2AWK is busy teaching Novice and General classes at the YMCA in Syracuse. WB2EHS renewed as OBS. An FB time was had at the NYPON picnic. WB2YFF suggests the League make itself more known to the prospective radio amateur and feels that most new Novices don't know ARRL exists! W2CTP attended the National Convention in Boston and chaired the FCARS meeting. W2EMW says Sept. conditions were poor but he managed 12 Asian QSOs with less than 100 watts. K2CC, the club guys at Clarkson, have a new SB-200. They are busy with a message service for students and in contests. WB2LQP has qualified for an ESS Net certificate. K2IMI has a new Challenger transmitter and new antenna. WB2GDL is in commandof Novice classes in and around Batavia. The president of DARC, DL1QK, visited the RAGS and RARA gangs on successive evenings. Karl was the guest of WA2ELA during his stay here as per DL8VQ/W2's ham exchange program. The Antique Wireless Association held its Seventh Annual Conference in Canandaigua. BPLers this month are K2KQC and W2QE. Sept. traffic with the asterisk denoting ARPSC honor roll: W2QE 380, K2KQC 337, WA2ICU 301*, W2QC 274*, W2FR 245*, W2MTA 148*, W2RUF 110*, WB2RHJ 97, K2KTK 52*, W2RQF 48, WA2BEX 44*, WB2LQP 40, W2FEB 39, WA2DHS 32, K2CC 31, WB2VND 28, K2UFR 26, W2DBU 24, WB2JNW 21, K2OFV 21, W2AFB 19, WB2HLI 19, W2EAF 15, K2IMI 15, WA2ILE 14, WA2ANE 8, W2PVI 8, W2PZL 8, WB2YEE 8, K2RTQ 6, W2RUF 6, K2KIR 5, WB2VBK 5, W2WS 5, WB2YKY 5, W2EMW 3, W2CFP 2, WB2EPG 2, WA2AIV 1.

WESTERN PENNSYLVANIA – SCM, Robert E. Gawryla, W3NEM – SEC: W3KPI. PAMs: K3ZNP, W3WFR. RMs: W3LOS, W3KUN, WA3AKH. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 P.M. local time; WPPN meets daily on 3955 kHz ssb at 10:00 P.M. local time; KSSN meets on 3585 kHz at 6:30 P.M. local time. Uniontown ARC, via the Magpie, reports that K3SAA received slow-scan TV on 20 meters and taped it. The Presque Isle Radio Club was first founded in 1921. One of the original founders was 8ABA, now K3ENW, who is still active. The PARC original membership was signed by Hiram Percy Maxim himself. The PARC is an area club of Erie which recently has been rejuvenated. WA3MTF and WA3OHN are now General Class licensees. WN3PXX is a new Novice in New Brighton. K3BTQ and XYL completed a twelve week program at the London University Medical School and now are on an eight-week tour of Europe on a motorcycle. K3CFA worked over 600 miles on 432 MHz during the Sept. 1970 VHF Contest. He also worked into Illinois, Indiana, Michigan and Ohio on 432 MHz. The Foot Hills ARC via W3LWW (Little Words of Wisdom) reports that W3ATQ is doing a fabulous job teaching theory to the future newcomers to ham radio. The Two Rivers ARC via *Spark Gap* paid a very nice tribute to K3HCD. The Etna Radio Club paper *Oscillator* says "lidcats" is again functional nightly on 21.360 MHz with Novices looking at 21.150 MHz and all at 0030 GMT. Check your license. Don't let it expire. Upgrade at the same time. WPA Tfc. Net for Sept. reports 30 sessions, 350 QNI, 199 messages. Traffic: K3ZNP 196, W3NEM 167, WA3IPU 156, W3KUN 114, W3ATQ 94, W3LOS 91, K3HKK 82, K3HCT 51, K3SMB 32, K3SOH 16, WA3JBJ 14, W3IDO 7, W3UHN 4, K3SJN 3, W3YA 3, WA3NAZ 1. Total traffic 1031.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYU. PAMs: WA9CCP and WA9PDJ (vhf). RM: WA9ZUE. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	4
ILN	3760	2330 Dy	193
NCPN	3915	1300/1800 M-Sa	78
Ill PON	3915	2245/1430 M-F	871
Ill PON	145.5	0200 MWF	13
Ill PON	50.28	1200 M	3

The Central Division was well represented at the ARRL National Convention in Boston. W9BVN, W9EFP and K9LLT were elected officers of the Sangamon Valley Radio Club, Inc. (Springfield). W9LDII reports that Lee County received its RACES license and the call K9CLW/2F. A new Novice heard in the Lake Villa area is WN9EAM. WA9IKO has joined the ranks of Silent Keys. Our sympathy to his family and friends. WN9ECF is a new Novice. W9NN received a 50-year award at the New York QCWA meeting. The Ninth Region Net had a traffic count of 480 during Sept., according to Net Mgr. W9QLW. Jose M. Cinjntje, PJ7JC, and FG7TI/FS7, was the guest speaker at the W9DXCC Dinner held at the Marriott in Chicago. K9TXJ received his 35-wpm Code Proficiency certificate. WN9AUR is now General Class with the call WB9AUR. Synton Amateur Radio Club (Champaign) has a new 2-meter station. W9LNQ has new twin granddaughters (to add to the QRM). WA9SDT has a new Swan 250-C and a six-element beam on 6-meter ssb. The Chiburban Radio Mobileers held its Third Annual 160-Meter Reunion Sept. 20 at Joliet with an EB crowd attending. W9ZHR is now a two-letter man, W9IP. W9QKE, world traveler and lecturer, presented his "Japan through the Lens of the American Bachelor Amateur" at the York Radio Club's Oct. meeting. The Prairie State VHF Emergency SSB Net has been organized to provide emergency communications during tornadoes, storms etc. and meets Sun. at 9:00 P.M. on 50.125 MHz. WA9VVV is net control and asks interested amateurs to check in. WA9WNH and WB9BXX are BPL recipients for the month. Traffic: WA9WNH 611, WB9BXX 301, W9NXG 195, WB9DPU 160, W9TXJ 137, WA9ZUE 120, WA9ZPL 112, WA9RTB 75, W9HOT 72, WA9XZF 56, W9IOQ 49, WA9IDC 49, W9IXV 42, W9ELF 35, WB9CXZ 33, W9LNQ 30, W9YH 28, W9PRN 24, WA9BRQ 21, W9EHJ 17, K9HSK 11, W9LDU 9, W9HJM 7, WA9SDT 2.

INDIANA – SCM, William C. Johnson, W9BUQ – SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT. PAMs: K9CRS, WA9OHX, (vhf) W9PMT.

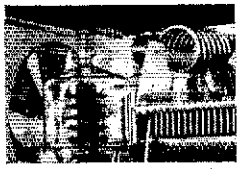
Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
IFN	3910	1330 Dy 2300 M-F	160	WA9OHX
ISN	3910	0000 Dy 2130 M-S 2300 S-S	385	K9CRS
QIN	3656	0100 Dy 0300 Dy	212	WA9WMT
ITN	3740	0100 Dy	92	WA9ZKX
PON	3910	1245 Sun.	37	WA9UMH
PONVHF	50.7	0200 M-Thurs	26	WA9TJS
Hoosier VHF			15	W9PMT

With deep regret I report the passing of these amateurs: Leonard Chalk, W9SNQ, of Portland; Vard A. Skinner, W9DOK, of Muncie; Robert Schaffer, W9SVL, of New Castle; Cecil Webb, W9VHB, of Franklin and Duane Lambright, WA9OLC, of LaGrange. W9KVF is taking a trip to Japan. WA9MXB has a new Heath Linear SB220. W9JBQ is broadcasting amateur activity around Jeffersonville through radio station WXVW every Mon. at 6:30 P.M. Send Jack some news about your activity. New Extra Class licensee is WA9PQX; Advanced, WA9ABI/WB9EFK. W9APO was licensed in 1923 and still is very active. The Indiana Radio Club Council fall meeting Oct. 4 was held at Butler Univ. W9HPG, Central Division Director, was the speaker. The IRCC Hamfest and Picnic will be hosted by the Michigan City and La Porte ARCs in 1971. W9BUQ went to the ARRL Convention in Boston. W9QLW was there with his XYL. If you have never visited W1AW you should see it the next time you are in that area. K9BNP has a new quad antenna. QIN Honor Roll: WA9ZKX 23, WA9VZM 23/16, W9EI 22/18, W9HS 20, K9VHY 20, WB9BDP 18, WB9ANT 15/17. *Amateur radio exists because of the service it renders.* BPL certificates went to WA9VZM, W9JYO, W9JBQ and W9EQO. Traffic: (Sept.) WA9VZM 720, W9JYO 676, W9JBQ 549, W9EWH 288, W9HRY 277, WA9ZKX 250, K9PZX 229, W9EQO 215, W9GGW 157, WA9OHX 123, W9ICU 106, WA9MXG 99, W9QLW 94, K9YBM 70, K9CRS 68, WA9WJA 66, K9CBY 63, W9BUQ 48, WA9WMT 43, WA9VBG 40, WA9TJS 36, K9RWQ 34, WA9NYU 32, K9RPZ 24, W9YYX 23, K9KTB 22, K9VHY 20, WA9AXF 19, W9HWR 19, WA9BHG 18, K9JQY 17, WA9CHY 16, W9EJI 16, W9PMT 16, K9ILK 15, W9UEM 15, W9LG 10, W9IOH 9, W9BDP 7, K9DIY 7, WA9OKK 7, W9FC 6, WA9AQW 1. (Aug.) WA9MXG 87, W9QLW 72, W9EJI 16, W9BDP 5.

WISCONSIN – SCM, S.M. Pokorny, W9NRP – SEC: W9NGT. PAMs: WA9EZT, WA9IZK, WA9OAY, WA9QKP, WA9QNI. RMs: WB9FFY, K9KSA.

Net	*Freq. Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
WSSN	3663 0030 TThS	40	2	K9KSA
WIN	3662 0115 Dy	283	81	W9HQT
WRN	3620 0130 Su (RTTY)			K9GSC
SW2RN	145.35 0230 Dy			WA9IZK
SW6RN	50.4 0300 M-S	177	1	WA9FZT
BWN	3985 1245 M-S	370	205	WA9OAY
BEN	3985 1800 Dy	642	117	WA9QKP
Wi-Pon	3925 1801 M-F	392	101	W9BMC
WSBN	3985 2300 Dy	1152	153	WA9QNI

W9HOT has asked to be relieved as WIN RM because of work. WB9FFY will take over as new WIN RM. W9EWC is working on a 440-MHz TV antenna. W9HLE is now Advanced Class. The West Allis Amateur Radio Club meets the 2nd Tue. of the month. W9QMT has been appointed as Asst. SCM and got a little work out while W9NRP was out of state. I received an activity report from



Here's the exciting new Heath SB-220 2 kW Linear Amplifier. Running maximum legal power on amateur bands between 80 and 10 meters, this compact powerhouse features two rugged EIMAC 3-500Z zero bias triodes in proven grounded grid circuitry. Note the modern desktop styling and the heavy duty components. And note the use of the reliable 3-500Zs. Heath chose EIMAC because these dependable tubes are ideal for heavy-duty operation, around the clock, around the world. And the two tubes have a total plate dissipation rating of 1000 watts.

Heath's choice is your choice. Go EIMAC. Look for the equipment featuring EIMAC power tubes.

The 3-500Z is one of EIMAC's family of zero bias power triodes: from 400 watts to 50 kW. Contact your distributor or a Varian/Eimac Field Office for further information. Offices are located in 16 major cities. Ask information for Varian Electron Tube and Device Group. Or write Amateur Services Department, Eimac Division of Varian, San Carlos, Calif. 94070.

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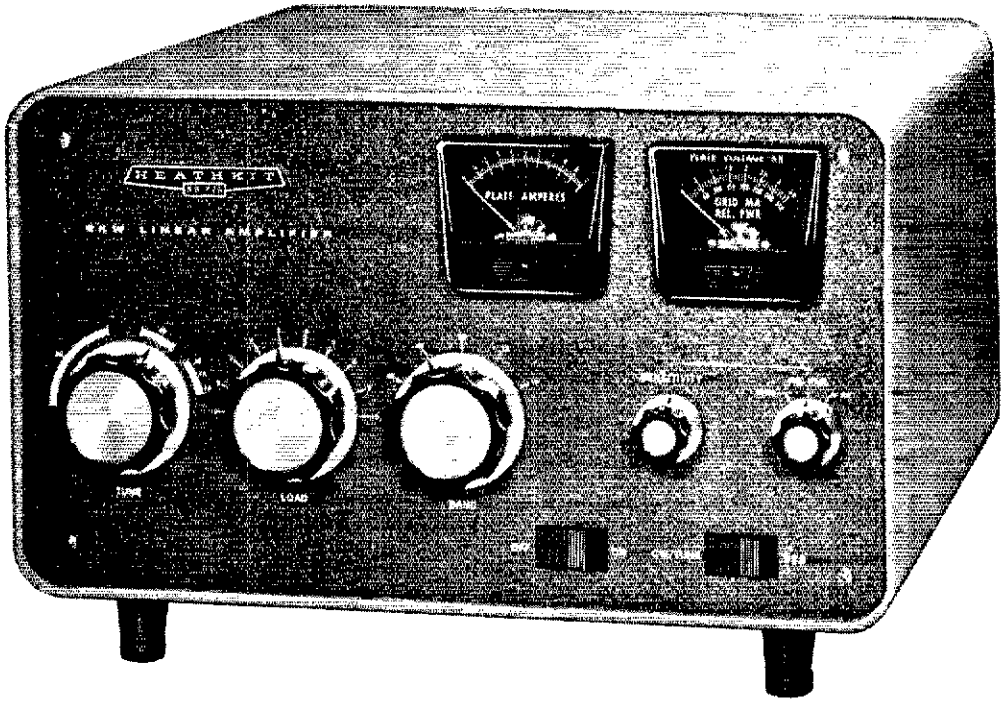
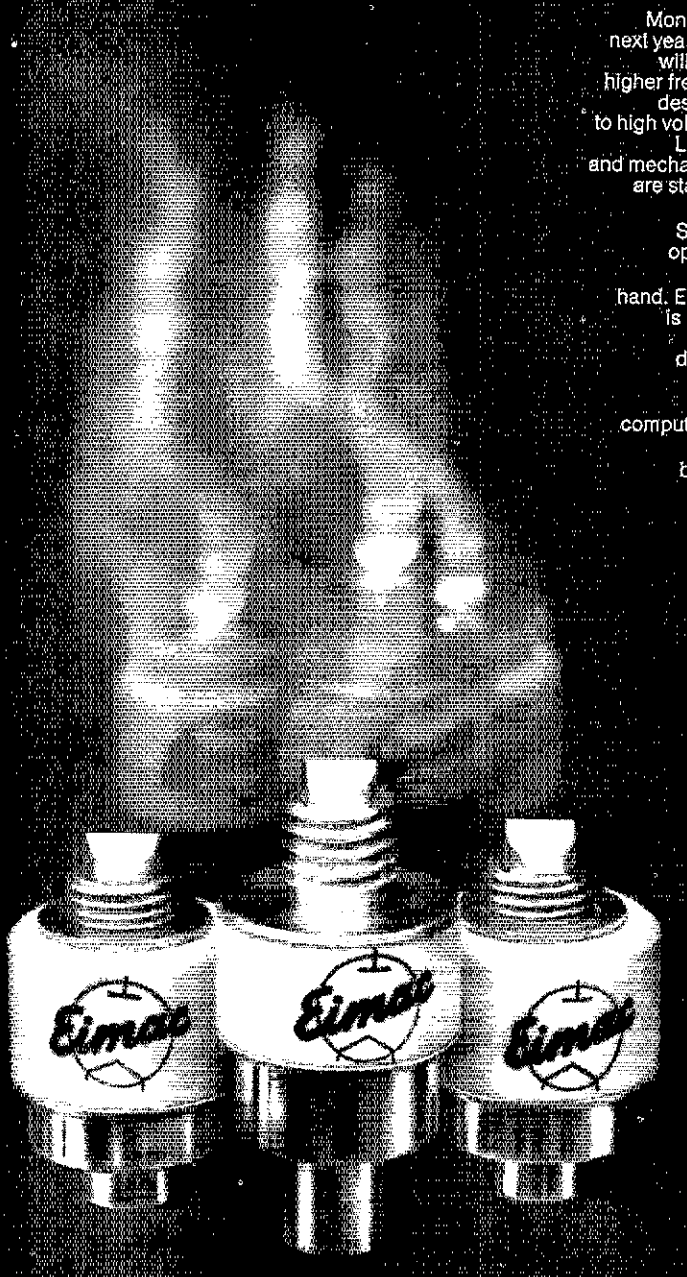
EIMAC 3-500Zs are Heath's Choice.



It's rough keeping up with planar triode requirements.



Month after month, standards get stiffer. But ev
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will still meet them. They provide greater powe
higher frequency and more reliability than "standar
designs. Ceramic/metal construction stands
to high voltage, high frequency, high current operatio
Large contact areas mean improved electric
and mechanical connections. Frequency stable anod
are standard. And extended interface arc-resista
cathodes let you handle more powe
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operation? Certainly. Switches? By all mean
But you're not limited by what we have
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equipment, or to propose new plan
designs to glove-fit your requirements. So y
can spend less engineering time and dollar
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computer aided design helps you get fast respons
The 7815AL carries an extended warrant
backed by demanding life tests. It's designe
to meet the stringent reliability requir
ments of airborne transponder and DM
(Distance Measuring Equipment) servic
The new Y-503 planar for uhf puls
service was custom designed to meet a
application program of high urgenc
The 8847 was created for DME ar
CAS (Collision Avoidance System) broa
band amplifiers covering 125 MHz ne
1.1 GHz. It delivers up to 4 kW peak powe
with a gain of better than 8 decibel
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So we moved ahead of them.

WN4PSP. Please send your report to W4OYI. WSBN Net certificates were issued to W9ANM, W9SUP, WA9ZWJ. A new radio club of Jefferson, Rock and Walworth Counties, called the Tri-County ARC, will meet the 2nd Sun. of the month. For information contact WN9DWG, K9LJM or WA9SAB. How about your picnic or hamfest dates for '71? Traffic: W9CXY 373, K9CPM 247, WB9FFY 157, WA9QNI 71, W9AOW 64, WA9QKP 58, W9DND 51, WA9YEC 51, W9FSJ 49, K9FHI 36, WA9OAY 35, W9HQT 32, K9UTQ 32, W9NRP 31, W9KRO 29, WB9ABF 28, K9IPS 28, WB9DAK 27, W9IHW 22, K9KSA 18, WA9LRW 18, WA9PKM 18, W9DXV 17, W9RTP 17, WB9BRF 16, WA9BNU 12, W9WYL 10, W9OMT 8, K9LGO 2.

DAKOTA DIVISION

MINNESOTA – Acting SCM, Bob Schoening, WØBF – Minnesota Net listings appear in Oct. *QST*. SEC: WAØMZW. PAMs: WAØDWM, WAØHRM. WAØMMV. WAØOEJ. RMs: WAØURW, WAØIAW, WØAAU. WØAA sends high-speed code practice at 7 P.M. local time Mon. on 3830 kHz. WØBG is on VK9 by now. Look for VK9FH. A newly-affiliated club is the Cathedral Amateur Radio Assn. of Proctor. The St. Paul Club now has classes for beginners and up-grading. The 3M Club has a new beam and a great station location. WAØIAW stopped at W1AW en route to the National Convention and worked many Minnesota YLs, including WØQXA and WØQXF, who offer the "Minn. Twins' Certificate." For details work *Janice* or *Janet*. The Minneapolis Radio Club offers a certificate for working 5 members in good standing. Details from WAØWDX. The Twin City DX Assn. is organizing, information from WØYDB. The Minnesota Wireless Assn. has a trophy for the SS with a handicap system for intra-club competition. WA7PQT/Ø is new in St. Paul and KØSEJ is new to St. James. Dakota Division officials met in Alexandria in Oct. WØTUO traded that call for WØMV. WNØASX reports working plenty of DX on 15. Old-timer WØWJA is very active again. Minneapolis Southwest High School is reported to offer a course in radio code for regular credit. Thanks for your activity and the many excellent traffic reports. Traffic: WAØVAS 913, WØZHN 137, KØCSF 127, WAØIAW 112, WAØWEZ 95, WØBUC 80, WAØYMU 47, KØZRD 42, WAØOEJ 30, WØHRM 26, KØORK 25, WAØTFC 25, WAØVTZ 25, WØAAU 24, KØMVF 23, WØBF 20, WAØEPX 20, WAØRKV 20, KØICG 19, WAØWDX 16, WØYC 16, WØEQO 11, WØBUO 10, KØELF 9, WAØJPR 8, WØKNR 7, WNWNØYVT 7, WØMNE 6, WØPAN 5, WØUMX 5, WØKLG 3, KØZXE 3, WØIYP 2, WØSZJ 1.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØRSR. OO: WØBH. WAØSJB took a month off and went to the State of Vermont on business and pleasure. WØBF went to Washington working mobile on the way. WØGNS is back on 75 with an HW-12. New calls in Dickinson are: WNØCFD, WNØCJP and WBØBAU. WNØCMT is at Noonan. WAØWAO is on ssb at Drayton. WA7GVT graduated from college in Tex. and is now WAØZPI in Dickinson. WBØBAY will be portable during the school year. WBØAOM is building an SB-102. The Theodore Roosevelt ARC handled radio communications for the Annual Teddy Roosevelt Cross Country Run in Medora Sept. 26, using 4 mobiles and a base station. KØTYY was one of the mobile operators. WØGOD has a TA-33 Jr. beam up. WØDXC also has a new beam and 6-meter Drake gear. WØECX is in Florida. WAØUKD has a new son. KØTYY has been transferred to Carson. *We are sorry to hear of the passing of WØ OKM, of Minot. WBØBCZ*, the UND station, is on the air from the Student Center and has been doing real well on the DX bands with the TH6. WØDM and WAØAYL attended the Sept. meeting of the Fargo Radio Club.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*Tfc.*
Goose River	1990	0900 Sun.	4	67	2
NDPON	3996.5	1830 S-S 0900 Sun.	12	219	9
NDRACES	3996.5	1830 M-F	22	752	68
CWN	3640	2100 M-F	16	20	2

Traffic: KØSPH 39, WAØRSR 25, WØDM 12, WAØVMA 12, WØBHT 4, WAØIPT 3, WØDXC 1.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – Several of the students with amateur licenses at South Dakota State University have a station set up in East Men's Hall on campus. They will be getting a club call shortly. WAØRIQ has remodeled his home shack. WAØLYO is nearly finished with his remote vfo for his Heathkit transceiver. New ECs for Minnehaha and Lake County are WAØSMM and WAØVNG, respectively. At the present time South Dakota has a total of 114 AREC members. The South Dakota ARTC Net will meet once a week on Sun. evening later than the regular S.D. Net. Net reports are as follows: Morning Net, 563 QNI and 34 formals; NJQ Net, 358 QNI and 27 formals. Traffic: WAØFUZ 172, WØHOJ 48, WAØUEN 39, WØIG 32, KØAIF 14, WØCAS 10, WAØRIQ/Ø 8.

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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 uV sensitivity for 10 dB S+N/N.

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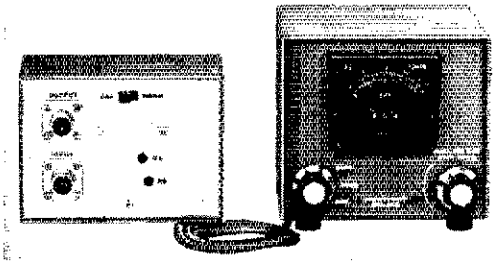
Front panel switch selection of SSB or CW filters. Now choose the built-in 2.1 kHz or optional 400 Hz filter with just a flip of a switch.

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 nonreactive 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 ±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:** 14¹³⁄₁₆" W x 6⁹⁄₁₆" H x 13⅜" D.
*Triple Action Level Control™



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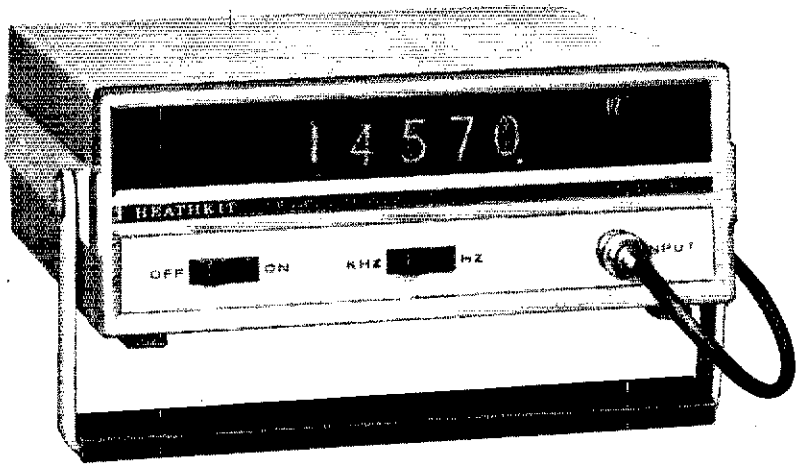
The only difference between the new Heathkit® Frequency Counter and those costing $400

...is the price $199.95*



Compare performance & features of the IB-101 to counters selling for twice the price! Counts from 1 Hz to over 15 MHz; advanced IC design eliminates blinking readout and divider chain adjustment.

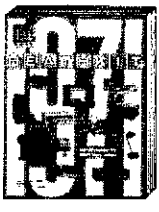
8-digit capability. Set the range switch to kHz and read to the nearest kHz... push the range switch to Hz and read down to the last Hz. Overrange & Hz/kHz indicators light up to give correct range at all times; do an 8-digit measurement with 5-digit readout.

Exclusive Heath-designed input circuit. Dual gate, diode-protected MOSFET design provides proper triggering without adjustment from less than 100 mV to over 200 V. Input Z is 1 megohm shunted by less than 20 pF to minimize circuit loading & error.

Other features include sockets for all 26 IC's and 5 display tubes... double-sided, plated-thru fiberglass circuit board... 120/240 VAC operation... convenient handle/tilt-stand. Compare the new Heathkit IB-101 to the $400 models... and discover that $199.95 buys more counter.

Kit IB-101, 7 lbs. $199.95*

IB-101 SPECIFICATIONS: Frequency Range: 1 Hz to greater than 15 MHz. **Accuracy:** ±1 count ± time base stability. **Gate Times:** 1 millisecond or 1 second with automatic reset. **INPUT CHARACTERISTICS – Sensitivity:** 1 Hz to 1 MHz, less than 100 mV rms. 1 MHz to 15 MHz, less than 250 mV rms, after 30 minutes warmup. **Trigger Level:** Automatic. **Impedance:** 1 Megohm shunted by less than 20 pF. **Maximum Input:** 200 V rms. DC–1 kHz. Derate at 48 V per frequency decade. **TIME BASE: Frequency:** 1 MHz, crystal controlled. **Aging Rate:** Less than 1 PPM/month after 30 days. **Temperature:** Less than ±2 parts in 10^7/degree C. 20 to 35 degrees C after 30 minutes warmup. ±.002% from 0 to 40 degrees C. **GENERAL: Readout:** 5 digits plus overrange ambient. **Temperature Range:** Storage; –55 to 80 degrees C. Operating; 0 to 40 degrees C. **Power Requirements:** 105-125 or 210-250 VAC, 50/60 Hz, 8 watts. **Cabinet Dimensions:** 8¼" W x 3½" H x 9" D not including handle. **Net Weight:** 4½ lbs.



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DELTA DIVISION

ARKANSAS – Acting SCM, Jimmie N. Lowrey, WA5VWH – SPC: W5PBZ. RM: WA5TLS. PAM: WA5KJT. The Arkansas DX Assn. held its Annual Dinner in Little Rock, Sept. 26. Special guest was 9Q5BW, and K5QHS told about his trip to KN4, Swan Island. I also enjoyed attending a meeting of the Northwest Arkansas Amateur Radio Club in Rogers. WA5SOU confirmed his 100th country and is ready for DXCC; he also is getting close to 5BWAS. Jerry Harwood, WA5MWI is a proud owner of a brand new solid-state Regency 2-meter rig. Fayetteville is well represented on the Razorback Net, with WA5YHT, WA5VNV, WA5SEA, WA5RNG and WA5VWH all checking in portable while attending the U. of A. K5QHS has now worked 300 countries. Welcome to WB5COK on the phone bands. W5MDP passed the Extra Class exam and WA5RNG is now Advanced Class. Net reports for Sept.:

Net	*Time/ZI/Day*	*Freq.*	*Tfc.*	*QNI*	*Mins.*	*Mgr.*
OZK	0000 Dy	3790	47	171	553	WA5TLS
RN	2330 Dy	3995	36	625	475	WA5KJT
PON	2130 M-F	3925	134	189		W5MJO
APN	1100 M-F	3937	3	398	1300	W5VFW
DX INFO	2345 Mon.	3860				WA5EFL

Traffic: (Sept.) WA5GPO 411, W5NND 149, WA5TLS 42, WA5EJT 16, K5EDH 4, WA5VNV 2. (Aug.) W5NND 28.

SIXTH ARKANSAS QSO PARTY

This contest, sponsored by the North Arkansas Amateur Radio Society, of Harrison will take place from 2200 GMT Jan. 23 to 0400 GMT Jan. 25. It is open to all amateurs. Stations may be worked once on each band and each mode. The exchange will be QSO Number, RS(T) and county for Arkansas stations and state, province or country for others. Logging information: Suggested frequencies (plus or minus 5): cw 3560 7060 14060 21060 28060; ssb 3960 7260 14300 21360 28560; Novice 3735 7175 21110. Scoring system: Arkansas stations score 1 point per contact and multiply by the number of states, provinces and foreign countries worked. Outside stations score 5 points for each Arkansas station worked and multiply the total by the number of counties in Arkansas worked during the period. The mailing deadline is February 9. Send your log to North Arkansas Amateur Radio Society, c/o J. K. Fancher, Jr., W5WEE, 407 Skyline Terrace, Harrison, Arkansas 72601.

LOUISIANA – SCM, J. Allen Swanson, Jr., W5PM – SPC: W5OB. RM: K5ANS. VHF PAMs: WA5DXA, W5UQR. The New Orleans VHF Club was asked to provide the communications for the National Sports Car Rally at Hammond but the meet ran into difficulty with local law enforcement officers and had to be cancelled. Better organization is needed for this sort of thing. W5PM is enjoying his European jaunt. W5EKF has relay troubles in his rig. WA5CAU takes a rig to his camp at the lake so he can keep in touch with the gang while he is there on a fishing trip. WA5MK is going mobile. W5OB now has 319 countries confirmed. WN5COG is a new Novice in New Orleans. W5KZI operates mobile from Texas, Arkansas and Louisiana on his business trips. There will be more news and traffic reports next month when the SCM gets back.

MISSISSIPPI – SCM, Clifton C. Comfort, WA5KEV – Asst. SCM: Walker J. Coffey, W5NCB. SEC: WA5JWD/WR6AHP. PAMs: W5JHS, W5NCB. W5JHS reports the Gulf Coast Chapter of QCWA is almost complete, and now meets on 3876 kHz at 8 P.M. local time Thurs. The Tombigbee ARC had a lively meeting featuring an auction sale. K5FEA made a trip to Europe and back so fast that most net members didn't know he went! W5YD is back on the air at Miss. State. U. W5LEA is recovering nicely from a heart attack. WA5VBS moved into a new house and learned too late about antenna restrictions. I regret to report W5ANS and W5CJR have joined Silent Keys. WA5VEP got his deer with bow and arrow. WA5SUE and K5YPR have new SR-220s. WA5UYW has a 4-1000 that is not up to full legal power yet. W5NCB says that more Miss. stations are needed in the DX circles. We welcome WA9QVT/5 to Mississippi. K5KIR is working phone patches for KC4USV. All amateurs should contact their state Congressmen now about the $1.00 incentive tag fee for maintaining emergency mobile stations. Contact WA5KPS or WA5KEY for more information. Legislators meet in Jan.!

Net	*Freq.*	*CDT/Days*	*Mgr.*
MTTN	3665	1845 Dy	W5SBM
GCSBN	3925	1830 Dy	W5JHS
MSBN	3990	1915 Dy	WA5UYW
CGCHN	3938	2000 Dy	WA5GOB

Traffic: W5SBM 246, W5FDT 80, WA9QVT/5 72, W5WZ 44, WA5TMC 24, WA5KEV 20, WA5SFG 20, W5BW 12, W5NCB 11, WA5YJA 6, WA5SUE 4.

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PCLP preamp supply 24
PT preamp 49
PS-1 AC supply 8
TX-62 VHF Xmtr 99

B & W
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381 TR switch 19
424 low-pass 9

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FCC-90B 100kc cal $ 12

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QT-1 Anti-trip $ 9
Model B slicer 39
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CLEGG/ SQUIRES-SANDERS
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417 AC sup. mod. 75
Interceptor Rec $249
Interceptor B Rec 325
Allbander HF tuner 69
Venus 6m SSB xmtr 199
416 AC supply 75
SS Booster 49
SS-IV Band Scanner 275

COLLINS
75A-2 Receiver $219
Speaker (A1, A2, A3) 9
75S-1 Receiver 325
75S-1 w blanker 375
75S-3 Receiver 425
32S-1 Xmtr 375
32S-3 Xmtr 575
312B-4 Control 149
351D-2 mount 79
516F-2 AC supply 115
516E-2 DC (28v) 95
MP-1 DC supply 119

R. L. DRAKE
2AC calibrator $ 9
2B Receiver 189
2BQ 'spkr Q-mult. 29
2C Receiver 189
2CQ spkr Q-mult. 34
SW-4A Receiver 225
R-4 Receiver 275
R-4A Receiver 299
MS-3 speaker 12
SC-6 6m converter 49
CC-1 conv.console 19
TR-3 Transceiver 375
DC-3 DC supply 75
T-4 Reciter 225
MN-2000 matcher 149
TC-6 xmit.conv. 189

EICO
730 Modulator $ 39
753 SSB Xcvr 129
751 AC supply 49

ELDICO
TFP-1 patch $ 25
SSB-1000 Linear 175

ELMAC
PMR-7 Receiver $ 59
PMR-8 Receiver 79
PSR-612 DC supply 19

GLOBE/GALAXY/WRL
Scout Deluxe xmtr $ 49
LA-1 Lin. Xmtr 69
King 500A Xmtr 199
SB-175 SSB Xmtr 59
V-10 VFO 29
Galaxy III Xcvr 169
Galaxy V Mk II 269
Galaxy V Mk III 289
GT-550 Xcvr 349
AC-35 AC supply 65
AC-400 AC supply 75
RV-550 Rem. VFO 69
RX-1 Remote VFO 49
VX-35 VOX 9
VX-35C VOX 12
CAL-35 Calibrator 9
SC-35 Speaker 15
SC-550 Speaker 19
2000 Linear-sup 275
Duo-Bander Xcvr 99
Rejector AC supply 4

GONSET
Comm I 6m $ 79
Comm III 6m 99
GC-105 2m Xcvr 169
2m Linear II 99
901A AC supply 39
910A 6m Xcvr 199
911A AC supply 39
913A 6m Linear 175
G-76 Transceiver 99
G-76 AC supply 75
G-76 DC supply 49
G-77 Transmitter 45
GSB-100 Xmtr 169
Super 12 19

HALLICRAFTERS
S-38D Receiver $ 34
SX-88 Receiver 389
SX-117 Receiver 199
S-200 Receiver 49
SX-130 Receiver 149
SX-146 Receiver 189
R-46 Speaker 9
R-50 Speaker 12
HT-32 Xmtr 225
HT-32A Xmtr 249
HT-33A Linear 275
HT-37 Xmtr 199
HT-46 Xmtr 275
SR-150 Xcvr 289
PS-150-120 AC sup 75
MR-150 rack 19
SR-500 Xcvr 225
P-500AC AC sup 75
HA-4 Keyer 39

HAMMARLUND
HQ-100 Receiver $ 99
HQ-100C Receiver 109
HQ-100AC Rec 139
HQ-110 Receiver 119
HQ-110C Receiver 129
HQ-110AC Rec 169
HQ-170C Receiver 179
HQ-170A Receiver 229
HQ-170AC Rec 239
HQ-170A immunizer 259
HQ-180 Receiver 239
HQ-180AC Rec 349
SP-600JX-26 (rack mt.) Receiver 275
S-100 Speaker 12
S-200 Speaker 15
HX-500 Xmtr 225
HXL-1 Linear 175
HK-1B Keyer 19
Noise Silencer 19

HEATHKIT
GR-64 Receiver $ 39
HR-20 Receiver 89
RX-1 Receiver 149
SB-300 Receiver 225
SB-301 Receiver 249
XC-2 2m conv. 25
XC-6 6m conv. 25
SBA-300-3 6m conv. 19
SBA-400-4 2m conv. 19
TX-1 Transmitter 115
HX-10 Transmitter 189
HA-10 Linear 175
HA-20 6m Linear 95
HW-32 20m Xcvr 89
HP-24 AC supply 50
VF-1 VFO 19
HW-29A (Six'er) 34
VHF-1 (Seneca) 139
HRA-10-1 Calibrator 9
HW-18-3 160m Xcvr 119

HEWLETT-PACKARD
410BR rk. mt. VTVM $150

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Cardomatic Tube Tester $175

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100kc Calibrator 9

KNIGHT
T-150A Xmtr $ 69
TR-106 6m Xcvr 89
T-175 6-10m Linear 69

LAFAYETTE
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HA-90 VFO 19
HE-50A 10m Xcvr 59
HA-500 Receiver 69

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NC-125 Receiver $ 79
NC-303 Receiver 239
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NCXA AC supply 75
VX-501 Remote VFO 125
200 Transceiver 239
AC-200 AC supply 59
NCX-500 Xcvr 299
HRO-500TS spkr. 30

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SB-34 Transceiver 279
SB2-VOX 19
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SW-117 AC supply $ 65
SW-240 Xcvr (late) 169
400 Transceiver 189
406B VFO 50
410 VFO 75
420 VFO 95
VX-1 VOX 15
350 Xcvr (late) 289
500 Transceiver 349
500C Xcvr 389
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NS-1 noise silencer 24
405X MARS osc. 29
250 6m Xcvr 239
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TV-2 2m Transverter (specify 14 or 50) 225
FP-1 phone patch 34

U. S. C.
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Z-200A (rk. mt.) 75

UTICA
650 6m Xcvr VFO $ 89
650A 6m Xcvr VFO 99

WATERS
369A Reflectometer $75
361 Codax keyer 49

The items listed below are brand new and carry the full manufacturers New Equipment Warranty. Some items have been on display but most are Factory Sealed.
ND = New Display FS = Factory Sealed

		Reg.	NOW
BTI			
LK-2000HD Linear	ND	$895	$695
EICO			
751 AC supply - kit	FS	$ 89	$ 54
751 AC supply - wired	FS	109	79
752 DC supply - kit	FS	89	49
752 DC supply - wired	FS	109	75
HFT 92K AM-FM Tuner kit	FS	64	39
SIGNAL ONE			
CX-7 Transceiver	ND	$2195	$1750
SWAN			
410C Remote VFO for 500C	FS	$115	$100
405 MARS osc. for 350 500	FS	45	35
TV-2 2m Xmit conv.	FS	295	225
260 Transceiver	FS	435	369
350C Xcvr (no supply)	FS	420	370

VARITRONICS — New Close-out Reg. Now
FOFM-2 12vdc 2m FM Xcvr (5 watts input) with BP-1 Battery Pak $262 $199
FM20M Mobile Linear for above 150 89
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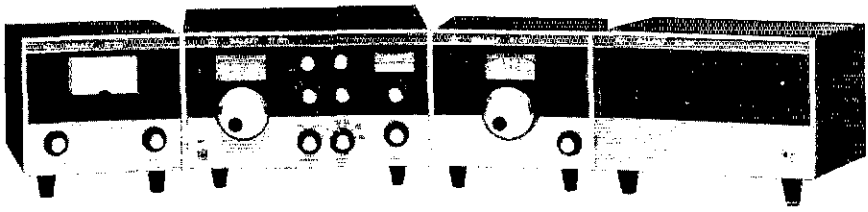


GT-550 Transceiver Order No. 800 Ham Net $550.00

The GT-550 is the best transceiver on the market for the money. Bar none. Costs just $550 and delivers 550 watts of power. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550 showing the purchaser how stable his radio was when it went through final check. 550 watts SSB; 360 watts CW; sensitivity better than .5 uv for 10 db S+N/N; stable—45 db carrier suppression; 25 KHz calibrator and vox option; no frequency jump when you switch sidebands.

RF550 contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 805 Ham Net $75.00

RV550 is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 804 Ham Net $95.00

SC550 Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 803 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT550 at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

Hy-Gain's Super Thunderbird TH6DXX

• "Hy-Q" Traps • SWR less than 1.5:1 on all bands • Takes maximum legal power • 24-foot boom. Order No. 389 Ham Net $179.95

Hy-Gain's 14AVQ/WB

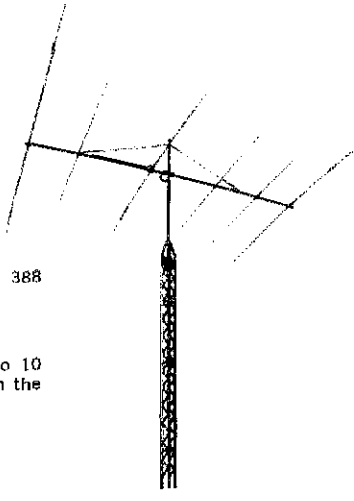
• New wide band operation • "Hy-Q" traps • 12" double-grip aluminum mast bracket • Taper swaged seamless aluminum construction • DC ground to drain off precipitation static. Order No. 385 Ham Net $39.95

Hy-Gain's Thunderbird TH3Mk3 (not shown)

• "Hy-Q" traps • Takes maximum legal power. Order No. 388 Ham Net $144.95

Hy-Gain's 400 Rotator/Indicator

• Handles large beams and stacked arrays with ease—up to 10 times the mechanical and braking capability of any rotator on the market. Order No. 400 Ham Net $189.95



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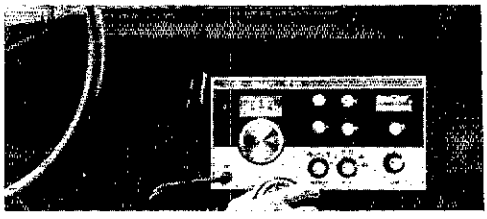

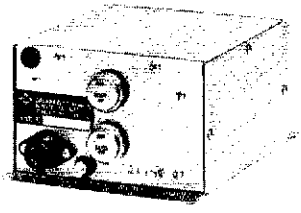

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Mobile, too, the GT-550 delivers more for the money. More power, more sensitivity, more stability and the best signal plus noise to noise ratio. Mounts under dash or over hump. See opposite page for more details.

G 1000 DC power supply for GT-550 mobile applications. Order No. 802 Ham Net $129.95

Hy-Gain's Hamcat 257 Mobile Antenna

• More power capability with lower VSWR • Higher Q plus broad band performance • Higher radiation effectiveness • Lightweight, super strength construction • Shake-proof sleeve lock folds over for garaging • Lightweight precision wound coils • Swivel base

Order No. 257	All new design 5' long heavy duty mast of high strength heavy wall aluminum tubing	$16.95
Order No. 252	75 meter mobile coil	$19.95
Order No. 256	40 meter mobile coil	$17.95
Order No. 255	20 meter mobile coil	$15.95
Order No. 254	15 meter mobile coil	$12.95
Order No. 253	10 meter mobile coil	$10.95

Hy-Gain Heavy Duty Bumper Mount Model BPR

• Rugged stainless steel construction • Handles full size heavy whip • Clamps to most car bumpers. Order No. 415 Ham Net $8.95

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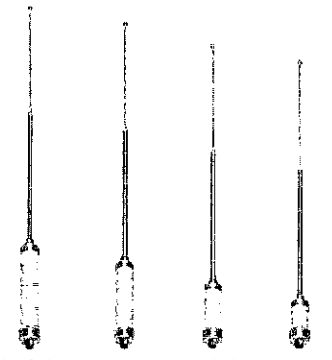
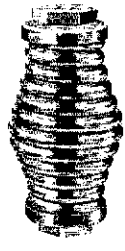


No. 256 40 Meter | No. 255 20 Meter | No. 254 15 Meter | No. 253 10 Meter

415

499



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TENNESSEE – SCM, Harry A. Phillips, K4RCT – SEC: WB4ANX. RM: K4AMC. PAMs: W4PFP, K4MQI, WA4EWW.

Net	*Freq.*	*Time(Z)/Day*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	2330 Tu-Sun	26	1440	79	K4MQI
TPN	3980	1145 M-Sat 1300 Sun.	30	1341	45	W4PFP
ETPN	3980	1040 M-Fri	22	596	27	WA4EWW
TPON	3980	2330 Mon	4	137	23	K4RTA
TN	3635	0000 Dy	30	164	47	K4AMC
ETVHF	145.2		9	40		WB4IOB
FTVHF	50.4		13	145	2	WB4IOB
MTTMN		0100 Tu&Fri	8	55		WA4GLS

The Mem-Fest '70 was a real hit with lots of hams from Tenn. and surrounding states. W4RUW, of Cookville, Tenn., made the long drive to Memphis. At the dinner on Sat. night Director Max Arnold answered questions concerning the ARRL, and the film "Hams Wide World" was shown. WA4RAS, of Decard, has been appointed EC of Coffee and Franklin Counties. WB4FZP recently received his Extra and 2nd-class phone licenses. EC's are reminded to establish contact with officials in your area so that they may know of the amateur services available. Make plans for the Simulated Emergency Test. Traffic: W4ZJY 142, W4SQF 103, W4OGG 52, WB4DAJ 50, WA4UAZ 48, W4WBK 48, WB4MYZ 41, K4AMC 39, WB4ANX 38, W4PFP 18, WB4MPJ 14, WA4CGK 10, WA4GLS 10, WA4YEM 10, WB4DYJ 9, W4TYV 7, WB4GTW 6, WA4EWW 4, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY – SCM, George S. Wilson, III, W4OYI. SEC: K4YZU. Appointment: K4UNW as OO. Endorsements: W4BEJ as PAM, K4AVX as ORS and EC, WA4AGH and WA4WSW as OPSs, K4HOE and WA4VZZ as ORSs. BPL: WA4MKH.

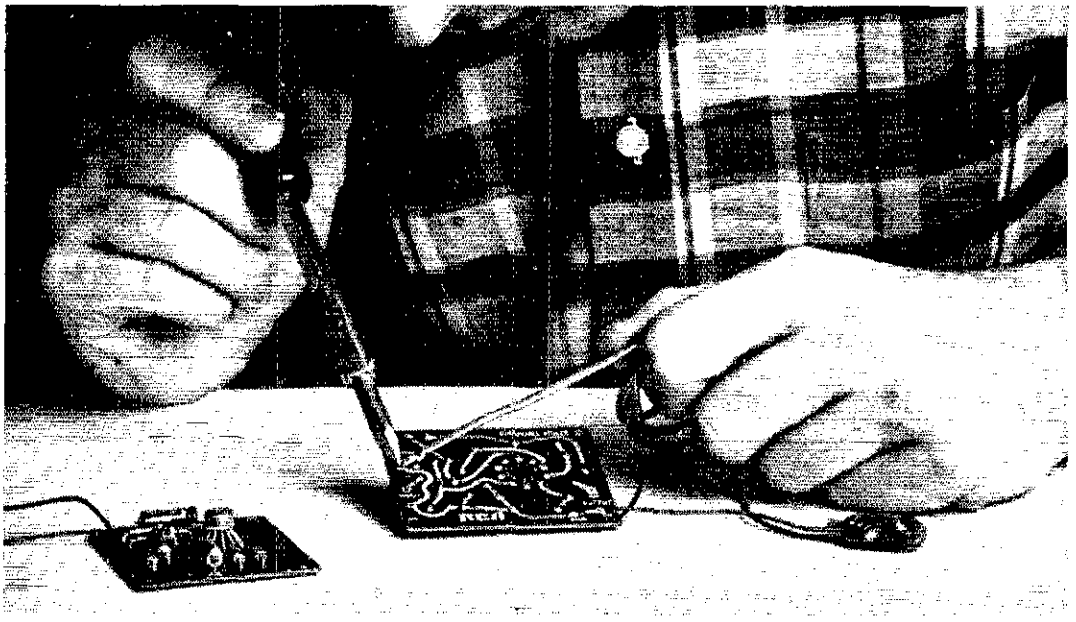
Net	*Freq.*	*EST*	*QNI*	*QTC*	*Mgr.*
KRN	3960	0630	373	33	W4BEJ
MKPN	3960	0830	480*	74	K4TRT
KTN	3960	1900	832*	169*	K4MAN
KYN	3600	2000	306	351*	W4BAZ
KCATN	50.7		94	18	WB4AXQ

The Murray Club has been affiliated with ARRL and continues to grow. Happiness is having college RCs checking in on the nets. The Owensboro 2-meter traveling circus, ably assisted by WB4FDK, again helped the Civil War doings at Perryville. There is a new cd director at Owensboro who is studying for a ticket. W4OYI is deputy director (operations) and WA4FMY is deputy director (communications). Several Novice classes have been started around the state. How about your community? Several demo stations at trade fairs and conventions are in the planning. Traffic: (Sept.) WA4MKH 319, WA4VZZ 193, WB4KPE 187, W4OYI 138, WB4NQZ 121, WB4LIL 95, K4MAN 85, W4BAZ 71, K4YZU 58, K4HOE 56, WA4GHQ 43, W4TOY 37, WB4AUN 37, K4UNW 36, WA4WSW 31, WA4FAF 30, WB4EOR 29, K4HY 29, WB4MTT 26, WAWA4MEX 24, WWA4AGH 21, K4UMN 16, WA4DYL 14, W4BTA 9, WB4DQM 8, K4VDO 8, K4FPW 6, WB4HTN 6, WB4EQY 5, K4YCB 5, WB4FDK 4, WB4MOR 4, WA4ZSJ 2, WB4GCV 1. (Aug.) WB4MTT 5. (July) K4FPW 13. Total traffic 1772, reports 42.*

MICHIGAN – Acting SCM, Ivory J. Olinghouse, W8ZBT – SEC: W8MPD. RMs: WA8PIM, W8RTN, W8WVL, K8KMQ, WB8DTT. PAMs: W8VXM, WA8TAN, K8PVC. VHF PAMs: W8CVQ, K8AEM.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300 Dy	709	291	60	WA8PIM
WSSB	3935	0000 Dy	750	137	30	WRVXM
BRMEN	3930	2230 S-F	809	70	26	WA8TAN
UPEN	3920	2230 Dy	393	84	30	K8MIK
GLETN	3932	0130 Dy	685	104	30	K8PVC
PON-DA1600 Dy	633		366	30	K8LNE	
PON-CW	3625	0000 M-S	169	59	24	VE3DPO
SWM2M	145.26	0100 M	60	0	4	W8CVQ

Silent Keys: K8DZL, W8CQU. The Tawas Hamfest was the best ever. It was attended by several hundred hams and everyone had a good time. W8CQB was honored as Michigan Ham of the Year. Blossomland ARC officers for 1971 are W8IAI, pres.; WA8MNF, vice-pres.; W8EEF, secy.; W8CGD, treas.; WB8CCE and WA8ZNV, act. New officers for SEMARA are W8IHX, pres.; WA8ERH, vice-pres.? K8PJQ, secy.; W8KAZ, treas.; WA8NYK and WA8SIQ, dir. The Rag-Chew Net started on 3910 at 1830Z is called the Michigan Knagg's Bridge Net. The Twin-Soo ARC has a new club house but needs many articles to furnish it. The Annual Corn-Fest by Twin-Soo was a big success. VE3FYW reports everyone present enjoyed it. Thanks, Gordon. WB8BXK is new at Hillsdale. WN8HWH is new at Niles. W8GYN is now W7HUQ at Sun City, Ariz., and is on 15. WA8BVP is now DJØXS. Look for him on 15.



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KC4000: Microphone Preamplifier IC Kit – a high-gain, low-noise, wideband *preamplifier that accommodates both low- and high-impedance* microphones.

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KC4003: Amplifier/Oscillator IC Kit – a 500 mW audio amplifier or a variable tone audio oscillator.

KC4004: 9-V Regulated Power Supply IC Kit – supplies 9 volts DC output with voltage regulation of less than 3% at a maximum current of 250 mA.

KC4005: Intruder Alarm IC Kit – a circuit that develops a warning "whooping" signal.

KC4006: Fire Alarm IC Kit – a heat-sensing wire sets off a warning circuit.

KC4500: IC Kit Enclosure and Hardware Pack – optional for KC4000, KC4001, and KC4002 – a handsome, sturdy, prepunched case with input and output jacks, switch, and other hardware.

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RCA

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WA8YIT says the new Clegg 22er is the berries. WN8EVZ just got his General Class ticket. W8SH reports fantastic aurora on Aug. 17 on 6 meters and he worked 13 states, 2 provinces and heard many more. Sept. Mich. 6-Meter Net reports ONI 102, OTC 7, sessions 16. Traffic: (Sept.) K8ZJU 690, K8KMQ 314, K8LNE 290, WA8PIM 244, WA8WZF 204, W8NOH 173, WA8ONZ 39, WB8DTT 95, WA8DUL 77, WA8FXR 68, W8IZ 64, WB8BYB 63, W8FZ 63, WA8LXY 61, W8MO 59, W8ZBT 58, K8MEG 53, WA8ZAV 44, W8IUC 42, W8DCN 41, K8MJK 41, WA8ENW 31, WB8EEU 26, W8TDA 26, W8WVL 26, K8JED 24, W8FX 19, WA8IAQ 19, W8BEZ 18, K8PVC 17, W8SWF 16, WA8WCZ 16, W8AGQ 15, W8MPD 12, WB8ANR 10, WB8CFV 9, K8QOJ 7, W8SCW 6, WA8PII 5, W8SH 2, K8AEM 1. (Aug.) WB8LEU 26, W8BEZ 20, W8ZAV 20, WA8DUL 11, WA8VXE 6.

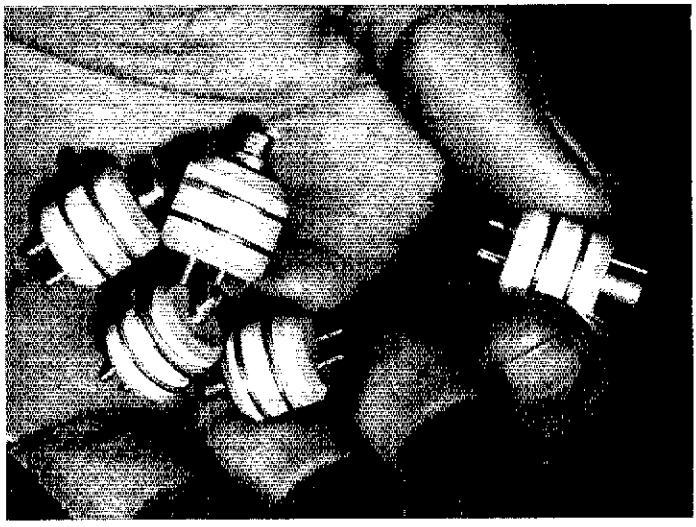
OHIO – SCM, Richard A. Egbert, W8ETU – SEC: W8OUU. RM: W8IMI. PAM: K8UBK. VHF PAM: WA8ADU. Sept. Net reports:

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBN	1962	1120	59	3972.8	1530/2345	K8UBK
BN	664	506	57	3580	0000/0300	W8IMI
O6MtrN	509	65	62	50.6)	0000	WA8ADU
				50.16	0200	
OSN	212	105	30	3580	2325	WA8WAK

BPLers: W8RYP, WA8ETX, K8ONA and WB8CWD. W8LT announces the start of a section-level RTTY traffic net which will begin operation Jan. 1, with nightly sessions tentatively scheduled for 2300Z on 3610 kHz. Further information is available from W8LT. The Stark Co. CD ARC's new officers are WA8ORQ, pres.; WA8ETX, vice-pres.; WA8VKF, secy.-treas. The Toledo Area Ham of the Year Awards went to W8UPH (1969) for "meritorious service in message-handling and participation in emergencies," and to W8JF (1970) for "meritorious service in conducting classes to help amateurs upgrade their licenses." Congratulations to new Advanced Class WA8VEC, Jefferson and Harrison Co. EC W8ERR reports a total of 283 man hours were expended in AREC/RACES drills during July, Aug. and Sept. New officers of the Springfield ARC are WB8AJC, pres.; WA8ZYE, vice-pres.; WA8IDF, secy.; WA8IKN, treas. W8ERD reports that he received 105 logs for participation in this year's Ohio QSO Party. WA8VBK tells us of a corn roast enjoyed by 41 members of the Buckeye Rag Chewers. The Westpark Radiops had a clambake in Sept. OVS WB8CEH advises that a new repeater from WA8PLZ is operated by the Miami Valley FM Group. WA8TYF worked South Dakota on 2 meters for state No. 36, and Kansas for state No. 3 on his 15-watt 432-MHz rig. I attended the Stag Hamfest sponsored by the Greater Cincinnati ARA in Sept. It was an excellent affair with about 3000 in attendance. WA8VKF announces a new Stark County 2-Meter Emergency Net operating each Tue. at 7:30 local time on 145.40 MHz. SEC W8OUU advises that our AREC is now 1159 strong. AREC in Ohio operates 30 local nets, 28 of which have NTS liaison on a regular basis. WB8CLF was appointed ORS, and W8KAJ is a new OO. 141 station activity reports were received this month. Was yours among them? The following hams sent activity reports every month for at least the past two years: WA8ADU, K8BYR, WA8DWL, W8ERD, W8GOE, W8GVX, W8IMI, W8LZE, WA8MCR, W8OE, K8ONA, W8QCU, K8UBK, WA8UPI, W8WEG and WA8YHN. Best wishes to all for a Happy Holiday Season. Traffic: (Sept.) W8RYP 562, WA8ETX 527, W8UPH 429, W8LAG 356, W8OZK 323, K8ONA 289, WA8WAK 281, WB8ALU 257, WA8UPI 224, WA8DWL 221, W8AVS/8 205, W8IMI 203, W8QCU 198, WB8CWD 183, W8PMJ 161, W8GVX 135, W8JD 128, WB8AKW 127, W8JMD 122, WA8QFK 121, K8BHH 108, W8MOK 94, WA8YUB 92, W8UDG 91, WA8SED 90, WB8CLF 82, WA8EFW 76, K8UBK 74, WB8DSV 72, W8NOO 63, WA8MHO 62, K8DHJ 60, W8GOE 57, WA8ECO 56, WB8AYC 52, K8BYR 52, WA8TYC 50, WB8BLH 48, WA8HGH 46, K8LGA 43, WA8ZTV 39, W8GNL 38, WA8ADU 37, WA8VKF 35, K8LXA 34, WA8MCR 34, WA8MIH 34, WA8GRR 33, WB8AJC 32, W8GRG 30, WA8AJZ 28, W8ENI 27, W8EGD 27, W8ETU 26, W8OE 24, WA8VWH 23, WB8BZX 18, K8PBF 17, W8GTS 16, WA8SHP 16, WA8ZWB 16, WA8ESA 15, K8ONV 15, WB8CKI 14, WB8DHY 14, W8GOD 14, K8MGK 14, W8ARW 13, W8BZX 13, W8NAI 12, WB8DZW 11, W8TV 11, WB8CFH 9, K8QVR 9, W8ILC 8, W8MGC 8, WA8STX 8, WA8JEH 7, W8UX 6, WB8EWK 5, W8JXT 3, W8LZE 3, WB8CQC 2, K8CKY 1, WB8EHI 1. (Aug.) W8GVX 104, WA8MIH 38, K8MGK 22.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – SEC: W2KGC. RM: WA2VYS. PAM: WB2VJB. VHF PAM: WB2YQU. *Section Nets:* NYS on 3675 at 2300Z; ESS on 3590 at 2300Z; NYSPT&EN on 3925 at 2300Z; ECARS on 7255 from 1200 daily; NYS County Net at 1500Z Sun., 0045Z Tue. on 3677 kHz



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and slow speed training Fri. and Sat. at 0045Z. *Attention all appointees:* Wouldn't it be simpler for everyone if *all* renewals were dated Jan. 1? Send your certificates or requests in *now* please. *Renewals and appointments:* K2BK as OO, W2ANV and K2MMF as ORSs, WA2EAH as OVS, W2HO as EC for Monroe, N.Y. We regret to report WA2ZGV as a Silent Key. *On the club circuit:* Division Director W2TUK was at the Schenectady Sept. meeting; code classes starting under WB2BDB. The newly-affiliated LERARC, Rockland Cy. will sponsor the 1971 NYS QSO Party. Watch for details. Westchester ARA opened the season with a film of the '70 FD taken by WN2MYK and WB2DLJ, who added sound track; Also slides by W2JBG and W2RP. The Christmas Dinner Dec. 10 had W2SKE as speaker. The Communications Club of New Rochelle heard WA2HRC on test equipment for the shack. *Individual station activities:* WA2MID picked up a call for special drugs from a Yugoslavian ham, arranged through W2APR, the Upjohn Drug Co. and 3 airlines to have delivery made in Belgrade. W2YTF reports LA6VI, LA7OF and LA6UF are wonderful hosts to any visiting amateur. YF pilots a Comanche and set up an air tour for W2YTF. WA2BUF is at college; WB2FUV is having problems matching activity to school term; WA2HGB is back to grad school at U. of Chicago. EC W2URP reports his Albany Cy. nets are back after the summer shut-down. K2BK has a new tri-band quad. VHF PAM WB2YQU is now active on the low bands as well. K2MPK is on the mend after Sept. hospital stay. Suggest all stations read CD Bulletin carefully and send comments through to W1NJM with a carbon to the SCM. Your help is appreciated by all concerned. WB2GXF now has two harmonics with calls. Welcome to WN2POF and WN2PGT. K2DNR reports No. 25 – Wisconsin. OVS renewal in Oct. column should have read WA2EAH and RM listing WA2VYS. Don't know what happened! Traffic: WA2VYS 52, WB2VIB 37, WA2VLS 34, WA2FBI 33, WB2FUV 26, WB2FWK 25, WB2JLR 22, W2ODC 22, W2URP 20, WA2HGB 16, WA2EAH 13, K2SJN 11.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGL – SEC: K2OVN. RM: K2UAT. HF PAM: WA2UWA. VHF PAM: WB2ROF.

NLI*	3630 kHz	1919/2200 Nightly	K2UAT RM
NLI VHF*	145.8 MHz	1930 M-F	WB2ROF PAM
NLI Phone*	3932 kHz	1600 Dy	WA2UWA PAM
Clear House	3925 kHz	1100 Dy	WA2GPT Mgr.
Mic Parad	3925 kHz	1300 ex.Su	K2UBG Mgr.
East U.S.	3683 kHz	0001 Nightly	K2UBG Mgr.
All Svc.	3925 kHz	1300 Dy	K2AAS Mgr.
NYSPTEN	3925 kHz	1800 Dy	WB2VJB Mgr.

*Section nets; all times above are local. Well, it looks like antenna-raising time is upon us! But don't mount anything to the chimney until next month, because a new transceiver just might be delivered by that fellow who operates VE8 mobile around this time. WB2DZZ recommends sending QSLs by first-class mail for a better return on QSLs for the new year. Speaking of new things, the gang at W2DSC has a new group of officers: WB2UUL, pres.; WB2FJX, vice-pres. and WB2DZZ sending letters and holding the money! WA2EMP reports his dad, WB2PNM, upgraded to Tech. Class. Congratulations! Gee Whiz! Hear K2DGL finally made Advanced Class, had my doubts for awhile! W2LGK would like to see more activity on "ten" when the DX "isn't." Give a CQ once in a while too, usually always somebody listening!. That "old" convention-attender W2PF enjoyed himself at the National, both this last one and his first one, the Second National in 1922! WB2FUH reports he is back in business after completing college. Well, the "Ole Man" of the vhf set did it again! At the annual QCWA Dinner its Golden Anniversary Award for 50 years of service was presented to our own W2EW, ex-2AVX. Congratulations on a well-earned award! K2UBG reports having a great time while mobiling through the States this summer, but reports poor 40-meter activity in the Far West. W2BCB is recovering from a stroke suffered in Aug. but QLFing with a new FTDX-560 and a FV 400S. Good to have you back in there, Otto! Seems like WA2SOH just can't get enough of hidden transmitter activity around these parts: he's motoring to New Jersey for a piece of the action over there! WA2DNO reports sporting a new high-priced call; he's now K2DW. K2RIW took top honors at the Annual East Coast VHF Society Antenna Gain Contest with his 1296-MHz parabolic dish. WB2WEJ is enjoying operating out in the "boon docks" while at college; says he never realized how much noise was in the "big city." The Flatbush Radio Club has a new meeting place. WB2DLJ reports the reactivation of the CCNY club station, W2HJ, and is looking for hams at CCNY to join the group! It is with deep regret that I report the passing of one of our fraternity, K2PKH, who passed on in Aug., was a member of the Long Island Mobile Amateur Radio Club and an ardent DXer. Dolph Gobel will be missed by us all. Traffic: (Sept.) WB2WEJ 173, WA2GPT 164, WB2LGA 126, W2GKZ 94, WA2CIS 85, W2DSC 85, WB2DZZ 81, W2FC 57, K2AAS 40, WA2EMP 30, W2LGK 14.

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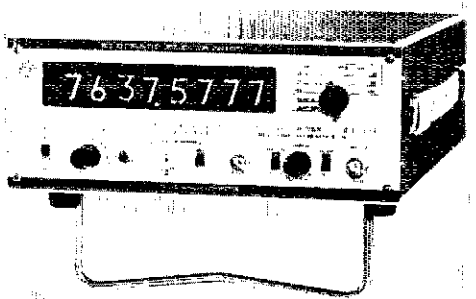

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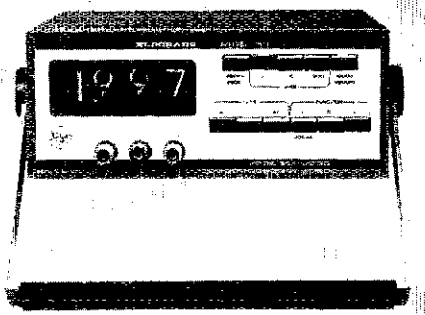

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WB2EUH 8, W2PF 8, W2EW 6, WA2LJS 4, W2DBQ 1. (Aug.) WA2GPI 214, K2UBG 129.

NORTHERN NEW JERSEY – SCM, Louis J. Amoroso, W2ZZ – SEC: K2KDQ. RM: WA2TAF. PAMs: W2PEV, K2KDO, K2SGX and WA2TBS.

Net	*kHz*	*Time(PM)*	*Days*	*Nets*	*QNI*	*Ftc.*	*Mgr.*
NJN	3695	7:00	Dy	30	359	249	WA2BLV
NJN	3695	10:00	Dy	26	162	70	WA2BLV
NJSN	3740	8:00	Dy	17	39	6	WB2FEH
NJPON	3930	6:00	Su	4	58	25	WB2FJE
NJEPTN	3950	6:00	M-Sa	30	647	312	W2PEV
NJAN	50425	8:00	M-F	22	161	16	K2SGX
EVETN	145710	7:30	Dy	30	218	92	K2KDO
ECTN	145800	8:30	M-Sa	27	122	83	WA2TBS
	146700	8:30	Su				

New appointments: WA2EVH as OPS and WA2JIM as ORS. Endorsements: WA2BAN as EC for Livingston and vicinity, W2BVE, WA2BHJ and WA2DQF as ORSs; WA2BHJ and WA2DQF as OPSs; W2BVE, W2PEV, WA2BCT and WB2JCI as ORSs. New club officers of the East Brunswicks ARC are WA2IOG, pres.; K2EWA, vice-pres.; WB2MMV, treas.; K2TZF, asst. secy.; WN2NTI, rec. secy.; WB2ZKW, act. mgr. WA2TAF would like to start his RTTY net up again. If interested, contact him or the SCM. WA2DIG made the DXCC Honor Roll. WA2BLE passed his Extra Class exam. WN2PMU is a new ham in Chester. K2EOP has been operating 17 years with his ARC-5. WA2EPI is working DX with his HB-15-meter beam. W2ABL visited W1AW. The K2MFE fellows lost their antenna mast in a storm. WA2BAN, WA2CCE, W2CVW, K2KDQ, WB2FEH, WA2DRH, WA2CGM and WA2ERZ were all at the National Convention in Boston. WN2KME and W2NKD operated at the Scoutarama in Somerville. WA2ERZ has a Model 19 and is trying RTTY. WA2UDT added the HO-10 scope to his shack. W2CVW won the high-speed code contest at the National Convention. WB2LTW is starting a radio class at Adams School. WB2RKC is looking for members for his Morris County Emergency Net. WB2MVI has moved to Alabama. W2ZZ has joined NJDXA. WB2OPM has a new Ameco 621 vfo. W2IOC and WA2JVO are building a 2-kw PEP linear. The WB2MFE group is up to 65 confirmed for DXCC. WB2JYM has a new 14XB/R4B combination. WB2VPZ is aboard the *USS Butte*. W2UTQ has a new 60-ft. Rohn tower for chasing DX. Hope Santa brings those new rigs and antennas. Also hope he sends the SCM some more reports. Merry Christmas and a Happy New Year, gang. Traffic: (Sept.) WA2ERZ 531, WA2EPI 327, WA2BAN 313, WB2TUL 204, WB2VPR 190, WB2DDO 169, K2KDO 140, K2DLL 115, WA2JIM 90, W2PIV 70, WA2CCE 64, WB2CDF 55, WA2DRH 49, WA2KHQ 41, WA2LDX 40, WA2FVH 39, WB2WNZ 29, WB2LTW 27, W2ZZ 25, W2EWZ 24, WA2EUX 22, WB2RKC 21, W2CU 15, WB2YPO 15, WB2BXK 14, WA2EUH 14, W2CVW 12, K2ZTJ 10, WA2GLI 9, WB2BCS 8, K2SGX 7, W2TFM 6, WA2UZH 4, WB2OHV 3, WA2YXO 3, WB2RUM 1. (Aug.) WB2YPO 31, WA2BHJ 19, WB2WNZ 13, WB2IHI 2.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØLVB, Ex-WØBTN (now K6CDX) visited friends and relatives in the Charles City area after a long absence. WAØYGA is the new EC for Clinton County, and our hats are off to WAØLFN, who served in that capacity for 5 years. WØHWA recently passed the General, Advanced and Extra Class exams all in one day. A hearty congratulations to Ray on a good day's work. New officers of the Clinton Radio Club are WAØGYB pres., WAØODB secy. School club stations are springing to life again. The Goldfield Radio Club station is WAØYUB and sports a Galaxy. The St. Ansgar Club started the year off with 2 Generals and 11 Novices and the call WBØAFI; A club is in the embryonic state at St. Edmonds High in Fort Dodge with WNØZSI as pres. We older types should give aid and assistance whenever and wherever possible to groups such as these. WØDSP reports three new Novices in the St. Ansgar area: WNØCBM, WNØCBN and WNØCPL. WAØLZO is a transplant into the North Iowa area. A new Novice in the Clear Lake area is WNØCSJ. WØKUS and some of his 160-Meter cronies are planning a 160-Meter DXpedition for this winter. Many thanks to my faithful "reporters" for the news items.

Net	*GMT*	*MHz*	*QNI*	*QTC*
Iowa Phone	1730	3.970	1261	256
Iowa Phone	2300	3.970	1128	55
IICN (cw)	2330	3.560	127	58

Traffic: WØLCX 824, WAØAUX 91, KØJGI 87, WØMOQ 83, WAØVZH 68, KØAZJ 63, WØLGG 60, KØUKD 19, WAØZID 19, WAØODB 11, WØBW 8, WAØQZL 7, WAØAIW 6, WØBQJ 5, WØKB 2.

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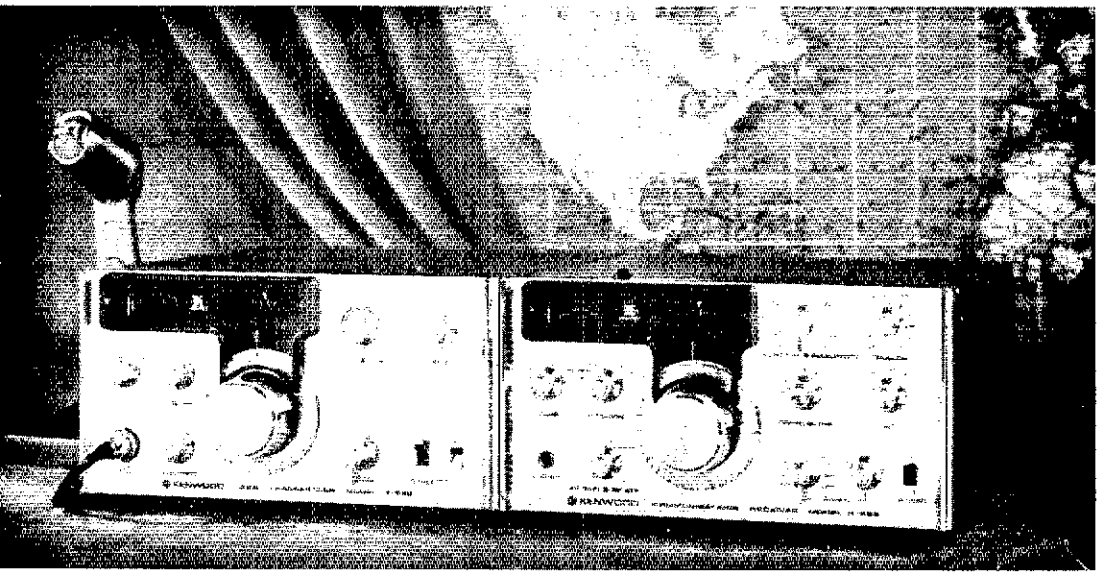

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KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØLPE. PAM: KØJMF. RM: KØMRI. VHF PAMs: WAØCCW, WAØTRO. The Hiawatha ARC furnished communications for KANZA District Boy Scout Camporee held Sept. 11 through 13 at Atchison Co. Lake, using 2-meter fm and appropriate antennas and auxiliary power. WAØSJV/Ø maintained contact with fixed stations in Hiawatha. Those taking part were WAØSRR, WAØUHW, WAØGRM, WØPB, WAØUFR, WAØKDC, WAØOZP, WAØUGV, WAØUCZ, WAØUQA, WAØSJV. The operation was commended by the District Scout Executive. WØLYC is at college. The CKARC annual watermelon feed was a success, thanks to WØCY. WØMBP radioed for assistance needed in an auto accident he came across near Sublett, Sept. 22. MID-CARS came to the rescue and assistance was speedy. WØZJY was heard on 2 meters during the 2-hand openings Sept. 18 and 19. KWN reports 30 sessions, 593 QNI, 47 QTC, WAØLLC mgr.; KEC, 2 sessions, 60 QNI, 1 QTC, KØLPE mgr. AREC activity still is on the upswing with 444 members and 54 drills reported in 11 of the Zones. Zone 3 EC, WAØPMS, will have a Zone AREC Net in operation before the first of the year. QKS reports QNI 442, QTC 216, sessions 60, mgr. KØMRI; QKN, QNI 143, QTC 56, sessions 30, mgr. WAØTZK; KPN, 307 QNI, 15 QTC, sessions 18, mgr. KØJMF; KSBN, QNI 865, QTC 118, sessions 30, mgr. KØJMF. Pilot Knob ARC elected WØBGX, pres.; WAØRNR, vice-pres.; WNØBGF, secy.; WAØYJL, treas. Wichita Heights High School Amateur Radio Club elected Curt Terwilliger, pres.; Bob Henderson, treas.; Mark Miller, secy. Hiawatha ARC elected WAØSJV, pres.; WAØKDC, vice-pres.; WAØ UPB, secy.-treas.; WØPB, act. mgr. Traffic: (Sept.) WØHI 264, WØINH 264, WAØLBB 237, WAØTZK 123, KØJMF 119, KØMRI 108, WAØLLC 86, KØBXF 38, WAØUTT 36, WØNEF 30, WØCHJ 26, WAØSRO 25, WØBGX 23, WAØDWH 20, KØLPE 14, WAØOZP 14, WØPB 12, WAØSEV 10, WNØAJU 3, WAØSXR 3, WBØBFI 2. (Aug.) WNØYXK 16.

MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW. RMs: KØAEM, KØONK, WAØSKP. PAMs: WAØKUH, KØONK, WØRTO, WAØTAA. Appointments renewed: KØAEM as EC, WØGBJ as ORS.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
HBN	7280	1200		687	56	KØLPE
MoSSB	3963	2400 M-Sat	26	1202	88	WØRTO
MoPON	3933	2300 M-Sat	26	488	37	WAØTAA
MON	3585	2300 Dy	27	151	134	KØAEM
PHD	50.45	0130 Tue	4	109	4	WAØKUH

There is a great need for EC appointees. All interested amateurs should get in touch with WØENW. Please note that Technician Class licensees are now eligible for EC appointments. I am glad to report that KØYBD is making good progress after recent back surgery. WAØTAA is back on the nets after a few days in the hospital. New officers of the Student Amateur Radio Club at Northeast State College are WAØUOX, pres.; WAØRAO, vice-pres.; WAØVNM, secy.-treas. WAØZLU has worked country No. 101, but school is holding down activity for him. KØJPJ is in college at Springfield. Congratulations to: WØGCL on 42 years as a licensed amateur, and to new Novice WNØCRF. Traffic: KØONK 1620, KØAEM 204, WØBV 150, WAØUPA 98, WAØHTN 83, WØOUD 58, WØGBJ 24, WAØVRI 20, KØRPH 16, WØRTO 16, WAØKUH 10, WAØVJN 10, WAØZLU 6, WAØYCN 2.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. Sept. *QST* disclosed a printing error concerning July reports. Omitted was the AREC Net which should have been AREC 3982, 1330 GMT, Sun., QNI 160, QTC 0, Mgr. WØIRZ, and WNN Mgr. is WØNIK. Nice to hear WAØGHZ back on the air after her stay in the hospital. WØLSI is in the Crestview Manor Rest Home at Chadron. KØWPF, Box Butte Co. EC reports 2-Meter AREC Net activity for Sept. QNI 24, QTC 1. WAØLRQ has received the WAC award. The Ak-Sar-Ben ARC Hamfest had 50 amateurs and their families in attendance. Net Control stations are requested to get daily net reports to PAM as soon as possible. New appointment: WAØBOK as OPS. Renewed appointments: WAØBOK as EC, WAØIBB as OPS and WAØHWR as RM. Sept. Net reports:

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	672	71	WAØLOY
NEB	3590	0300 Dy	187	32	WAØHWR
EBSN	3982	1130 1st M	5	0	WAØSOP
NMN	3982	1230 Dy	952	71	WAØJUE
WNN	3950	1300 M-Sa	548	21	WØNIK
AREC	3982	1330 Su	180	4	WØIRZ
CHN	3980	1730 Dy	851	98	WAØGHZ
NSN II	3982	2330 Dy	865	76	WAØLOY

Traffic: (Sept.) KØUWK 218, WØLOD 144, WAØSCP 67, KØKJP 64, KØJFN 56, WBØCAU 32, WAØCBJ 30, WØKPA 27, WAØOQX 23, WØDMY 22, WAØQLE 22, KØIAL 20, WAØQEX 19, WAØGHZ 18, WAØPCC 18, WØBFV 17, WAØBOK 17, WAØYGI 17, WAØHWR 16, WAØJIH 16, WAØRPB 16, KØSFA 13, WØTQD 12, WAØQEI 11, WØAGK 9, WAØEEI 8, WAØPIF 8, WAØVIT 8, WAØLOY 7, WAØOKC 7, KØHNT 6, WAØIBB 6, WØPHA 6, WØSWG 6, WØFQB 4, KØODF 4, WØRJA 4, WBØAFA 3, WØHTA 3, WAØJUF 3, WØNIK 3, KØOAL 3, WAØRZF 3, WØATU 2, KØERU 2, WAØLXD 2, WAØLRQ 2, WAØSOP 2, KØUDW 2, WØRAM 1, WØSCA 1, WAØTMG 1. (Aug.) WAØSPF 10.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John J. McNassor, W1GVT – SEC: W1HHR. RM: WA1HSN. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1845 Dy	30	286	473
CN	3965	1800 M-S 1000 Su	29	408	518
VHF 2	145.98	2200 M-S	22	71	13
VHF 6	50.6	2100 M-S	22	117	30

High QNI: CN – WA1GFH, W1EJI, K1EIR and WA1HSN. CPN – W1GVT, W1MPW, K1SXF and K1YGS. SEC W1HHR outlined section EC needs at an RM/PAM meeting. In the event of an emergency, monitor your net frequency to offer assistance. W1HHR will visit any club to speak on EC work. Conn. AREC Net meets Wed. at 6:30 P.M. on 3965 after CPN. All stations are welcome. Director W1QV was very busy at the Boston Convention, also, many others. This was a credit to the New England Division and a tribute to all who worked to make it a success. It was a real pleasure to meet so many Conn. amateurs there. WA1HSN resigned as RM because of a possible QTH change. His outstanding ability has been a credit to Conn. Best of luck and my sincere thanks to you, Bob! Our new RM, K1EIR, is a CN member of long standing and proven capability. Please join her on CN. Thank you, Barb, for taking over. Congratulations to: W1FUF, WA1JVV and WA1JZC on BPL; K1KTB, K1KRL and WA1MOW on Advanced Class; WN1MRT on General Class and 15-wpm sticker; WA1KRG on DXCC; and Trumbull ARC on ARRL affiliation! There is still time to load up on 160 meters for the coming contest. My sincere thanks to all who have made this another wonderful year! Merry Christmas and Happy New Year to All! Traffic: (Sept.) W1EJI 407, WA1JVV 345, WA1HOL 330, K1FIR 235, WA3JSU/1 190, WA1HSN 169, WA1GFH 142, W1FUF 133, K1EIC 118, W1CTI 106, W1GVT 69, K1SXF 69, WA1JYP 62, K1YGS 59, WA1KRG 48, WA1JMO 41, W1MPW 36, WA1JQC 26, W1HHR 25, W1AW 21, WA1JGA 19, W1BDI 17, W1QV 17, W1BNB 14, W1YBH 14, W1DQJ 5, W1CUH 3, W1YBI 3. (Aug.) WA1JZC 340.

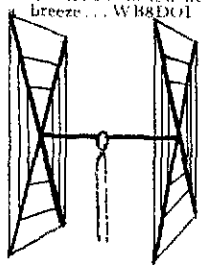
EASTERN MASSACHUSETTS – SCM, Frank L. Baker, W1ALP – SEC W1AOG received reports from ECs WAIs BYM, DXI, WILE, K1s NFW, ZUP. W1AOG was in the hospital but is feeling better. W1IG also was in the hospital. WA1ENM is our new Lawrence EC. After many years it was good to see ex-W1FL, now WØHG, from Kansas. Silent Keys: W1AKN, W1DZT, W1RWC, WA1MFM, K1KIX is now in Camden, N.J. The Tewksbury Memorial HS ARC, WA1MPJ, is now affiliated with ARRL. The 6-Meter Crossband Net had 13 sessions, 37 QNIs, 6 traffic. WN1NON has an Ameco 2 and 6 and Ten-Tec 3M-A QRP. W5RX, ex-W1DA, is on 10 ssb and is active on the 10-10 Net. The South Shore Club had a talk and pictures by W1FPW. K1WVW is repairing his rigs. W1AFD retired and now is in So. Yarmouth; he is RO for Dennis and Yarmouth. WA1NOJ is WØJF at Woods Hole. W1BNS is on 80 ssb and cw. EC W1IPZ has W1EXV as a new asst. K1WMN is pres. of the Montachusett ARC. The T-9 Radio Club met at W1WNK's. The Barnyard Net had 26 sessions, 402 QNIs, 10 traffic. WA1LBP has his Advanced Class license, new HW-100 and 80 inverted "Vee." W1EUJ is active on 220. W1BCH has a new TA-33 beam up 60 feet. WA1MNJ and WA1LGC are chief operators. WA1JLX says the CD Net is moving to 50.7 MHz. WA1HRU operates W9ODD in Milwaukee and wants phone patch to his brother WN1NKF, in Boston. W1PEX and WA1IFE made the BPL. WA1ENM is on 6. WA1JYY is pres. of the Canton High ARC. W1ABC has a new eleven-element beam for 2. WA1BYM has an auto keyer. WA1JHO passed the Extra Class exam and has an SB-102 and 220. W1AOG reports that the NEEPN had 4 sessions, 66 QNIs, 8 traffic. W2TPV/1 passed the Extra Class exam. W4YAC/1 took a trip to the West Coast and says that the 2-meter repeaters worked fine. WA1DJC was chief engineer of WALE in Fall River for 6 days; W1MWJ is new chief and is now on 6. WA1FNM is in several nets. W1AQV spent some time in the hospital; his niece, K1CZO, is on 6, has a tall tower and is working out fine. SM5AA visited W1AKY, his first visit to the U.S.A. Ed's son, WA1DWV, is home from Vietnam. W2TPV/1 is a new ORS/OPS. Appointments endorsed: W1QMN as EC, W1EUJ as OVS, W1TZ as OO/OBS, W1AQV as OBS, WA1FSI as ORS, W1BGW as OO, K1PNB as RM for EMN, WA1FAD as PAM for 2. W1MX is back on 2 and 6 ssb, using an HX-30 on 2 and a Collins 310-B into an SB-10. The

AHA! YOU THOUGHT GOTHAM

made ordinary, everyday, run-of-the-mill antennas. No, no, no. We make winners through superior materials and design. WA1JFG won the New England Round-Up championship with our 3-element 15-meter beam by a margin of 5,982 points! In QST since '53.

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1YB, DM4SEE, FL8SK, F6AUM, HK7YB in few hours. Instructions a breeze . . . WB8DOI



CUBICAL QUAD ANTENNAS—these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators)—absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' × 1¼" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

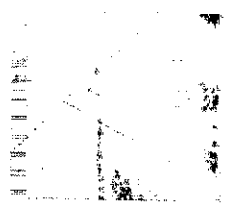
Now check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-El. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ¾" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20.	$21	4 El 10.	$20
3 El 20.	27*	7 El 10.	34*
4 El 20.	34*	4 El 6.	20
2 El 15.	17	8 El 6.	30*
3 El 15.	21	12 El 2.	27*
4 El 15.	27*	*20-ft. boom	
5 El 15.	30*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN,FG7XT, XE2I, KP4AQI, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. *DEALERS WRITE!*

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

Whitman ARC had ARRL's film. WN1NCW is starting a net on 3712 Tue. and Fri. nights. WN1NON wants an OVS appointment. The Middlesex ARC now meets at the Nonantum Library in Newton, the 2nd and 4th Frt. of each month. W1MGP retired. W1JEL is DJ0MW; his XYL, W1PRE, is DJ0MV in Munich. He is with the Voice of Free Europe. EM2MN had 22 sessions, 131 QNIs, 288 traffic. Traffic: (Sept.) W1PEX 1561, WA1IFE 594, WA1EYY 471, WA1JJL 117, W1TWG 115, WA1ENM 109, K1PRB 87, W1ARC 67, WA1BYM 56, W1BUF 53, W1CTR 49, W1DX 48, W1EMG 40, WA1FSI 33, W1RQI 31, WA1JHQ 30, WA1MFG 29, WA1KZE 27, W2TPV/1 21, W1AOG 13, WA1DJC 9, W1MNK 9, W4YAC/1 9, WA1ENM 5, K1ESG 4, K1OKE 4, W1LF 3, K1CLM 1, (Aug.) WA1JYY 76, WA1MFG 21.

MAINE – SCM, Peter E. Sterling, K1TEV – SEC: K1CLF. PAM: WA1ECM. RM: W1BJG. I am sorry to report the passing of W1WRZ, who was very active in the Barnyard Net and also was responsible for the forming of the net. He will be sadly missed on the airwaves. Sea Gull Net certificates have been issued to WA1IBM and WA1AQT. I am sorry to report the passing of K1QIF. New hams in Maine are WN1NIG, WN1NID, WN1NIR, WA1NKM, WN1NKC, WN1NNM, WN1NMW, WN1NNN, WA1NNS. We have just formed a new fm association for the fellows interested in having a 2-meter repeater in the state. Please contact K1QIG or W1MFJ for information. K1RSA is converting a DX-40 for 6 meters. W1LHK is out of the hospital and is home recovering. W1YA is back on the air and has started a message service for the student's and faculty on campus. K1GAX plans to go mobile with the new rig. The Sea Gull Net meets on 3940 Mon. through Sat. at 1700. Pine Tree Net meets at 1900 on 3596 Mon. through Sun. I am still looking for news, any tidbits are welcome. Traffic: WA1ECM 319, W1BJG 168, W1YA 48.

NEW HAMPSHIRE – SCM, Donald Morgan, K1QES – SEC: W1LUD. PAM: K1APO. RM: K1BCS. We extend the hand of welcome to WA1NMB (General Class) and WN1NNB. W1FFF and W1BUT sent in OO reports. On Sept. 21 we were saddened to receive the news that Cmdr. Frank L. Dawley, U.S. Navy (Ret.), W1YMJ, had passed on. He had held an OO appointment for some time but was better known for his Naval exploits, which included trips with Admiral Byrd to the North Pole. He always had a helping hand for the inexperienced and a word of encouragement. Frank will be remembered as having only good to say of his fellow man. He was a member of MARS and on the day of his passing was planning to help a fellow ham. He will be missed by all who knew him. NHAREC reports 45 check-ins and 11 traffic, GSPN reports 738 check-ins and 69 traffic, VTNH Net reports 30 sessions, 1034 minutes duration, check-ins 168 and traffic 497. ORS, OVS and OPS reports were received this month. Traffic: K1BCS 2077, WA1JTM 682, WA1GCE 462, W1UBG 126.

RHODE ISLAND – SCM, John E. Johnson, K1AAV – SEC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF PAM: K1IPK. Endorsement: K1OFD as ORS. RISPN report: 30 sessions, 443 QNI, 99 traffic. The Newport County Radio Club held another auction at its club quarters. W1TXL is operating on all bands after completing some antenna work. W1YNE has his new SB-401 transmitter in service and has two half-waves in phase on 40 meters. The W1AQ Club has started classes to advance its members for higher classes of licenses. WA1IUR held the last session and each week another section will be taken by other members. W1DK took the members on a trip to the local TV station and explained the various operations to them. The members enjoyed their stay at the transmitter station and later at the studio. WA1CVF has returned to college. K1AAV has a Swan 250 and expects to be on 6 meters soon. WA1IIM also has been operating on 6 meters. K1AGA is working on a rig for 2-meter fm and expects to contact other fm operators in the state. Traffic: WA1IGC 104, W1TXL 92, W1YNE 31, K1OFD 28, WA1CXF 14, WA1JST 6.

VERMONT – SCM, F. Reginald Murray, K1MPN –

Net	Freq.	Time/Days	QNI	QTC	Mgr.
Gr. Mt.	3932	2230 M-S	647	54	W1JLZ
Vt. Fone	3955	1400 Sun.	96	6	W1KKM
Carrier	3944	1400 M-S	463	3	W1BLC
VTPO	3909	2300 Sun.	65	23	K1BQB
VPSB	3909	2230 M-S 1330 Sun.	419	65	WA1HSG

New trustees of the Burlington Amateur Radio Club are W1BRG, W1BZD, W1ERO, W1IS, WA1MUA and K1YCZ as clerk. New officers of the Central Vt. Amateur Radio Club are WA1EQI, pres.; K1OXG, vice-pres.; K1OAJ, secy.; K1OJD, treas. The Vt. QSO Party is tentatively set for Feb. 27, 28, 1971. W1ZCJ is back in Chelsea making another station in Orange Co. W1IDM is going to Fla. for the winter. W1CBW has transferred to the Mt. Ascutney FTV station. May we wish you and yours a Happy Holiday season. Traffic: (Sept.) K1BQB 91, WA1GKS 33, K1MPN 10, WA1JGK 3. (Aug.) WA1JGK 49.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. CW RM: W1DVW. Berk. County 6-Meter PAM: WA1IGO.

NTS WMN (cw tfc.)	3560	7:00 P.M. Dy
AREC WMEN	3935	9:00 A.M. Su
AREC Worc. Cty.	3947	9:30 A.M. First Su
AREC Berk. Cty.	52.525	
HCRA (adj. AREC)	145.350	9:00 P.M. M
HCRA (Conn. Valley)	38.700	8:00 P.M. W

SEC WA1DNB has offered cooperation of the AREC with the CAP in cases of emergency. RM W1DVW reports the following for WMN: ONIs 176, Number of stations 20, traffic 187. Top five in attendance were W1ZPB, W1BVR, K1SSH, WA1LPJ and WA1LNF. K1UV won the code contest at the National Convention 40 wpm. W1ZPB sends Official Bulletins with RTTY tape. W1HRC has built the "Ultimate Transmatch" per July *QST*. WA1ABW is at graduate school at Columbia. It is with deep regret that we report the passing of W1CND. The Amateur Radio Club of the Fitchburg Salvation Army, is new in Fitchburg. From the CMARA: K1RNG is again conducting classes for would be Novices. From the HCRA: The club has donated its generator to the Middlefield Volunteer Fire Department. From the MARC: New officers are K1WMN, pres.; K1FGP, vice-pres.; WA1MWF, 2nd vice-pres., W1GUI, secy. At the installation banquet K1EUM spoke on the AF MARS program and "Hams Wide World" was shown. W1GUI is now a membe Quarter Century Wireless Assn. W1DEE is studying for his Ph. D. at the U. of Iowa. From the VARC: WA1ARF is signing /KS4 from Swan Island WA1LES QSOd JY1. Traffic: (Sept.) K1SSH 233, W1ZPB 151, WA1LPJ 83, W1BVR 79, W1DVW 56, W1KK 40, K1WZY 35, W1HH 24, WA1ABW 6, W1CSF 2, W1HRC 1. (Aug.) K1WZY 40, WA1BXQ 10.

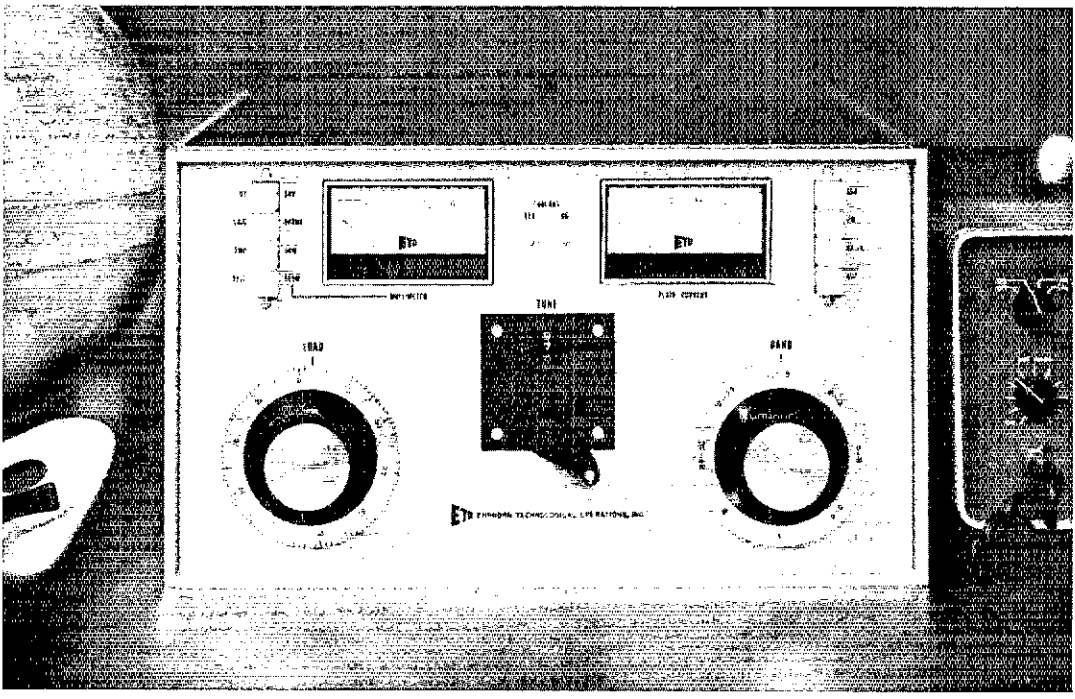
NORTHWESTERN DIVISION

ALASKA – Acting SCM, Kenneth R. Klopf, KL7EVO – KL7CAH and the Sourdough Net are the mainstay of communications in Alaska. The Sourdough isn't the only net but as far as I know it's the only non-specialized one throughout the state. Send me corrections. Plenty of other nets: S.E. Alaska Emergency Net (Sourdough merges with it on 3915 kHz), the teachers, preachers, lassies and local nets. The Alaska Slow-Speed Net (3735 kHz 0600 TThS) has had check-ins from Anchorage (KL7HAC, KL7GNP), Fairbanks (WL7GNA, WL7HAO, WL7GOY), Nenana (KL7GKH) and Flat (WL7HBD). They and all the nets invite check-ins. Fairbanks monitors 3905 kHz 0400-0800, for emergency calls. KL7FHF handles messages at Soettisham. Contact him through the S.E. Alaska Emergency Net. Auroral rocket shots in Nov. may be followed by some in early spring. The Signal Corps has maintained vhf communication for more than 20 minutes by means of the rocket artificial aurora.

IDAHO– SCM, Donald A. Crisp, W7ZNN – SEC: WA7FWV. The FARM Net meets on 3935 kHz daily at 0200 GMT. The Idaho RACES Net meets week days on 3991 kHz at 1515 GMT. WA7LJL has a new SB-200 linear. WN7OWH is a new ham in Wallace. W7HOV has a new 1-kw linear. W7AHS has a mobile and fixed 420-MHz ATV station. K7ZSW is building an ATV station. The Gem State Club sponsored a picnic attended by 50 persons. The Amateur Radio Operators of Idaho, Inc., had its annual banquet in Boise. New officers are W7SC, pres.; K7PKT, vice-pres.; W7ORJ, secy.-treas.; W7HOV and W7KZH, dir. Mr. Bert Colwell, Idaho communications director, was the speaker. WN7POV is a new ham in Boise. W7GHT is back on the air from his new QTH in Lewiston. WA7LJL has installed a new homemade tower and 15-meter beam. WA7FFZ has moved to Juneau, Alaska. FARM Net report: 1111 check-ins, 170 traffic handled. Traffic: K7KBX 320, W7GHT 150, WA7BDD 115, W7ZNN 8, W7FIS 1.

MONTANA – SCM, Harry A. Roylance, W7RZV – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. VHF PAM: W7IAC. I would like to thank the Montana hams for the honor of being SCM. If there is any way I can be of service to you please let me know. We had an EB vhf meeting in Helena with 31 in attendance and also discussed the forming of a Montana Council of amateur radio clubs. Interested clubs should elect a delegate to represent them and send the name and call to the SCM. Also discussed was the holding of a Montana Amateur Radio Convention in Bozeman. There are three 2-meter repeaters on now, Anaconda, Kalispell and Mt. Royal, Helena. Billings, Missoula and Butte are working on their repeaters and should be on shortly. The state ed will assist us with repeater locations if we will make our wishes

STRONG SILENT TYPE



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Write for an illustrated brochure describing the remarkable new *ALPHA SEVENTY* in detail. Suggested amateur price . . . $1595 complete.

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known to them. W7MRV, at Ryegate, has his 2-meter antenna on a 100-ft. tower and is solid copy in Billings. Heard W7IWW is Montana Air Force MARS director. K7NDV vacationed in Arizona and made it back in time for the Montana snow. Certificates endorsed are K7CTI, W7EKB as ORSs, K7CHA, W7JRG, W7OIO as OVSs, K7FGJ as OBS, K7CHA, K7PFO, K7OZU, K7FGJ as ECs, W7ROE as OPS. Please get your reports in to W7TYN and W7RZY. Traffic: W7LBK 25, WA7IZR 23, W7WYG 20, W7TYN 14, K7CHA 9.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7ROZ. Section nets:

Net	*Freq.*	*Meets*
BSN	3908 kHz	0130/2000Z
OSN	3585 kHz	0245Z Tu-Sat
AREC	3908 kHz	0300Z
OEN	3980 kHz	0200/0300Z

K7YOM reports for the AREC for Sept., sessions 30, check-ins 610, traffic 41, contacts 57, maximum number of counties 18. Southern Oregon Radio Club has resumed fall meetings and is trying to get members to join ARRL. WA7ADW is on 2-meter fm and am. W7HLF contacted 10 ECs for reports on the air. New appointment: WA7IES as OPS. WA7JRT is at OTI for some book-learning. The Portland ARC meets the 2nd and 4th Fri. of each month at OMSI. Traffic: K7ROZ 264, WA7ICX 242, WA7IFS 168, WA7KIU 67, K7QFG 51, WA7KRH 43, K7IFG 37, K7OUF 32, W7ZB 30, K7WWR 24, K7YQM 18, W7MLJ 17, W7BDU 16, W7HLF 16, WA7MIF 16, WA7HEI 14, W7LT 11.

WASHINGTON – SCM, Harry W. Lewis, W7JWJ – Washington section net control assignments are as follows: Sun. W7USO, Mon. W7AIB, Tue. K7CTP, Wed. W7GYF, Thurs. W7JEY, Fri. W7KZ, Sat. W7AXT. RN7 1st was handled by W7ZIW and WA7KOB; RN7 2nd by W7APS. K7KPC spent a long vacation this fall using the call of the North Seattle Radio Club. W7DA, W7AIB reports all is going well with the Clallam County Amateur Radio Club. Membership now is 50 with twice monthly well-attended meetings. W7IEU is off and running with the hunting season and putting counties on the map for county hunters. WA7KOB handled no formal traffic for one entire month because of girls and football. W7FQE notes nets going QNF B4 15 min. K7CZF is the new EC for Pierce County. Note cw chatter with WA7IKZ Mon. at 7:30 P.M. on 3.735. A new call in Washington is WN7PQU. Spokane AREC meets on 29.6 Tue. at 7:00 P.M. Ask WA7LOQ for her recipe on how to roast a turkey. For slow to medium cw net practice try the Northwest Slow Speed Net on 3700 kHz each evening at 7:00. Traffic: W7BA 1387, WA7HKR 327, W7PI 116, W7APS 90, K7CTP 81, W7JEY 72, K7TCY 55, K7KPA 43, WA7MEO 41, W7BUN 37, WA7LMO 37, W7BQ 29, W7AXT 16, K7OKC 12, W7ZHZ 12, W7FQE 10, W7AIB 9, K7SUX 6, W7IEU 5.

PACIFIC DIVISION

EAST BAY – SCM, Paul J. Parker, WB6DHH – RM: WA6DIL. WA6DIL wants to know where all the traffic has gone but by the looks of his totals he seems to have it all. W6AKB brought his trailer home for the winter. W6UZX was busy teaching a math course this past summer but is now back on the DX bands. W6CBF went globe-trotting again this summer and sent in a report from Paris, France. W6IPW has been quite busy lately with his FCC skeds. W6CBF is back from Europe, had an EB time and some eyeball QSOs to spice up his trip. K6PJ has been having a great time lately on the DX bands. W6RGG/W6TI have been busy as Official Observer and Official Bulletin Station. The DX bug seems to really have bitten quite a few in this section as W6TS reports having gotten quite a few recently. WB6VEW has been so busy with side items that his time on NCN has been down. WA6DIL hopes things quiet down now that he is back in school. A really active club in this section is the East Bay Radio Club. It seems to have activity for just about everyone from novice classes and instruction on station setup to classes for upgrading to General and Extra Class. New Novices from the class are WN6DZZ and WN6BVO. Keep up the really EB work, EBRC, and keep the new Novices and Generals coming. Traffic: (Sept.) WA6DIL 314, W6IPW 252, WB6VEW 31, W6UZX 20 (Aug.) WA6DIL 236, W6AKB 32, W6UZX 11.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: KH6GQW. RM: KH6AD. PAM: KH6GJN. QSL Mgr.: KH6DQ. ECs: KH6s GPQ, LP, BAS, GLU, GKD. K1HNO/KH6, K2HRA/KH6, KC6LJ and W7UZH/KG6. RACES Nets coordinate with Henry Gamache, Radio Officer.

Net	*MHz*	*Time(Z)/Days*
Friendly	7.290	2030 M-F
World Wide Boy Scout	21.360	1800 Sat

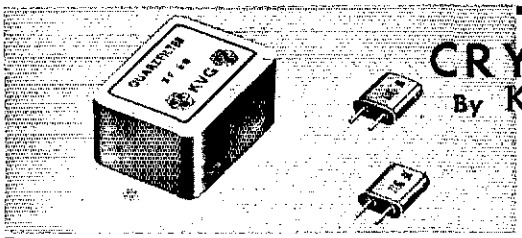
Confusion (Patches)	21,400	0130 All
Pacific Interisland	14,338	0830 M-W-F
Micronesia	14,338	0800 Tu-Th-Sa-Sun
PacDXNet	14,265	0600 Fri
S.E. Asia	14,320	1200 All
Gecko	14,290	0730 Tu
Pacific Typhoon*	14,265	* *

*During typhoon alerts. Again I bring to your attention the fa
that in addition to monthly reports from amateurs in the section,
your SCM I depend upon radio club bulletins to be informed
what clubs are doing. WB6ZXB/KH6 is now KH6HIH. Ex-Quet
SCM VE2OI and his gracious XYL were in Waikiki for some s
and sand. Also WØBWI and VK1AN dropped off at "Bloom
Zipper Flippers for a brew and an eyeball while on
around-the-island trip. KH6FGA is now signing /KG6. K4RSD/KH
KH6CTO and KH6FRU were all out near Palalehua for Field Da
KH6HHI had a fine DXpedition to Jaluro in the Talamatoos sign
FO8DG. KH6FDY's QSL Mgr., KH6BZF, was forced to reprint mo
cards. KH6GQW has been busy reconstructing his tower as well
trying out a new compressor. KH6GLU is now on Oal
Ex-KH6BXS writes that he is now WB6AYE. KC6EJ, ex-kW6
passed through town, as did Ø9MS. KH6GRG was home after Co
Guard "boot camp." W7UZH/KG6 recently worked WAS from
mobile "Toyota Land Cruiser." Remember: The 1971 SARC
Convention will be held in the Flamingo Hotel, Las Vegas, Ne
Jan. 7-10, '71. Write SN ARC, P.O. Box 73, Boulder City, N
89005 for details. KH6LP is back after spending most of t
summer at Ft. Huachuca. Announcing the 1971 ARRL/Simulat
Emergency Test (SET) Jan. 30 and 31 '71. What can you do to h
out and participate? Contact SEC KH6GQW and monitor your lo
emergency net frequencies. May I extend to all of you and yo
families the Best of Holiday Wishes from all of us on the Haw
section staff. Traffic: (Sept.) K1HNO/KH6 32, KH6BZF
K2HBA/KH6 9, KH6EOI 4, KH6GLU/KH6 4, KH6BAS 1, KH6
1, (Aug.) KH6GRG 20, WØDAD/KH6 18, K2HBA/KH6
K4RSD/KH6 4, KH6BAS 1, KH6CU 1, KH6GPV 1, KH6GQW
KH6LP 1, W7UZH/KG6 1.

NEVADA – SCM, Leonard M. Norman, W7PBV – SEC: Lev
L. "Mike" Blain, WA7BLU, K7VYT and the K7UGT gang ha
done an excellent job of selling amateur radio, the SNARS has t
largest club membership in Nevada, 80 per cent active on 2-Me
FM. W7RBV and K7HDO are on the sick list in Southern Califor
hospitals. The WCARS-7255 *Sentinel* has a new look, thanks
W7IOP, K7QOP, K7YVN and K7ZAU. K7YVN received a ve
nice write-up in the Ham on the Air section of the Los Ange
Herald Examiner by W6MLZ. W7PRM still is searching the Neva
desert for rare metals. W7TVF and family moved into a new QT
and will QSO anyone needing Nevada as soon as he gets t
antennas up. WA7BEU is active on RTTY with a Model 28 machi
W7PBV vacationed in Washington, D.C., and attended the Natio
Convention, plus an enjoyable visit to ARRL Hq. Mobiling
Nevada remember WCARS-7255 and W7AKE, K7UGE, K7UGT
repeaters.

SACRAMENTO VALLEY – SCM, John P. Minke, III, W6K
WB6KZN is the new EC for Sacramento County, replaci
W6SMD, who was appointed SEC last spring. K6GG, in Willows, h
been on 10-meter ssb daily and reports the band is very good. T
RAMS inserted in their Oct. newsletter a reprint of their fi
newsletter of Mar. 9, 1956. Officers at that time were W6MI
W6TOL, K6AMG, K6IRI, K6HRK, W6AK and W6MIW. Now tha
read the newsletter a bit more carefully, they were members a
officers of the Sacramento Club being congratulated by the RAM
RAMS members at that time on 2 meters were W6KKI, K6LW
W6ROZ and W6IJR. W6KKI is now president of the North Hi
Radio Club. The Golden Empire ARS of Chico held its anni
steak-bake in Bidwell Park, this year hosted by WA6KVX and XY
K6HTM and XYL and WA6AMI and XYL. W6GUV, of the GEAR
is now a Silent Key. Win had been active since 1937 and was t
first NCS of the Golden Empire Net. Your SCM fired up WA6J
again this year in the California QSO Party from Sardine Lakes
Sierra County. As of Feb. 25, I will have been SCM for 6 years. I a
still undecided if I will run again, but to those of you who a
interested in the job, have your petition with signatures of five t
members of ARRL to League Headquarters no later than Dec. 1
See page 108 of Oct. *QST* for details. Traffic: W6UNZ 59.

SAN FRANCISCO – SCM, Kenneth S. McTaggart, K6SRM
Season's Greetings to all. Now that the holidays are upon us t
traffic on NCN will be increasing. How about you checking in
your area of our section will be covered? We only have ten statio
in our section listed on the current NCN roster and there is alwa
room for more, especially in the more populous areas such as Mar
Santa Rosa, San Francisco and Eureka Counties. If you are not a
brass pounder just listen to NCN#2, the slow speed net, an event



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Passband Ripple		< 1 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 1 dB
Insertion Loss		< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3 dB	< 5 dB
Input-Output Termination	Z_t	500 Ω	500 Ω	500 Ω	500 Ω	1200 Ω	500 Ω
	C_t	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF
Shape Factor		(6:50 dB) 1.7	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:40 dB) 2.5 (6:60 dB) 4.4
Stop Band Attenuation		> 45 dB	> 100 dB	> 100 dB	> 100 dB	> 90 dB	> 90 dB
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or two and you'll soon get the idea of how the net operates. The net control will come back at your cw speed. I have an operating aid listing the QN signals for you free for the asking. WA7KQZ/6 now operates from Sonoma. W6KWF sends ARRL Bulletins at 0355Z, Tue., on 1987 kHz, followed by cw repeat at 0400Z on 1998 kHz. W6KWF also reports working VK3QI on ssb, a ZM and a number of VKs on cw, all on 160 meters. WB6FZN is working on a linear using 4-400As. W6OER is operating 2-meter mobile with fm on the Sonoma Mountain repeater. Frequencies are 146.9 in and 145.98 out. WB6KMI has been taking the RN6 liaison on NCN that W6YBV had manned until a recent illness. K6EKC says Sonoma County Red Cross hopes to have several mobile disaster units equipped with 75-meter gear rolling in the near future. Rumor has it that W6BIP is a grandfather again? Traffic: (Sept.) WA6BYZ 276, W6KVQ 178, W6WLV 156, K6SRM 69, WB6FZN 63, W6OER 61, W6BWV 10, WB6JQP 9, K6UGS 2. (Aug.) W6FAX 16.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – Merry Christmas and Happy New Year. WA6SCE has repainted his shack. WB6UFT, WA6ALH, WA6ALM, WN6REG and WA0NMT/6 activated the Lodi Amateur Station, WB6HUM, during the grape festival. WA6CPP contacted all VE districts during the W/VE Contest. W6YKS is DXCC. W6POW has a pair of six-elements on 6 meters. WB6LAY has eighty-elements on 2 meters. WA6NRV has a kw on 2 meters. WB6QWE adjusted his 6-meter beam with better results. W6MUV gave a talk on top-loaded antennas at the Tulare County Radio Club. WA6FCR and XYL are vacationing in the South Seas. W6DC is vacationing on Blue Ridge. K6JR has a Swan 260. WN6BBF is now in Bakersfield. W6EYU is SWLing on the ham bands. K6CZO is on ssb. K6RPH has power supply problems. WB6KUO holds daily skeds with WB6ETQ. W6JUK is chairman of the Antenna Ordinance Committee. WA6ACG gave a talk on test equipment at the Fresno Amateur Radio Club. WB6TIA is experimenting on 1296. WB6ZBX is also on 1296. W6YKV has moved to Jackson. The Stockton area has a net operating on 146.0 MHz at 2030 local time Wed. W6YKS is set up for RTTY. Traffic: WA6CPP 68, WA6JDB 24, W6YKS 24.

SANTA CLARA VALLEY – SCM, Albert P. Gaetano, W6VZT – SEC: W6NVO (acting). RM: WA6LFA, WA6DKF, formerly K2EIU, managed to check into NCN fifteen times during the month even though he had a house full of company. First things first. Ken, W6NW is trying to build a new operating table and keep on the traffic nets at the same time. W6ZRJ went to the National Convention in Boston. W6YBV has taken up residence in the hospital. We hope for a speedy recovery, Lee. W6BVB is spending two weeks in New Mexico. K6KCB is back on the traffic nets after a long absence because of getting a new business started. The Redwood City Civil Defense and Disaster Communication Net furnished communications for the Mexican Independence Day Parade. The help was provided by K6DRN, WB6YZQ, WA6QDC, WA6AIX, K6UKF, W6UOK, WB6MFD and W6DEF. W6YHM has been busy rehabilitating his equipment for the winter. WB6IYK has a home-brew linear on the air that really cuts through the QRM. WN6OMK has finished a Heath AA-14 30-watt stereo amp. It might also work as a modulator some day, Chris. Traffic: W6RSY 322, K6DYX 247, W6NW 239, WA6LFA 175, W6YBV 157, W6BVB 153, W6DEF 139, W6BPT 129, W6AUC 56, W6VZT 53, K6KCB 47, W6ZRJ 25, W6OII 16, WA6DKF 14, W6YHM 9.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Calvin M. Dempsey, WA4UQC – SPC: W4FVN. PAM: W4AJT, VHF PAM: W4HJZ. RM: W4WXZ. The Cape Fear Amateur Radio Society is now officially an ARRL affiliated club. The best to all of you in Fayetteville, N.C. WN4SCB now has worked 42 states on 40 meters. His wife is WN4SIU. WA4KWC built a new 40-meter antenna. K4CAX enjoyed participating in the W4 Contest, Delta, Washington State, West Virgini. QSO Parties. The Rock Hill, S.C., Hamfest was real good. WA4UQC will be operating mobile soon. The Carolinas Traffic Net, operating on 3573 at 2245Z and 0200Z, welcomes all check-ins. WB4LSU and K4EO have just passed their Advanced Class exam.

Net	*Freq.*	*Time(Z)/Days*	*QTC*	*Mgr.*
N.C. SSB	3938	2330 Dy	17	WB4ADF
THEN	3923	2330 Dy	75	WA4UQC
CN	3573	0200 Dy	47	W4WXZ

Traffic: W4FVN 184, W4WXZ 84, WB4MTG 35, WA4VNV 24, K4MG 23, K4VBG 14, WB4JMG 11, K4TTN 10, WA4UQC 10, WB4HGS 9, WB4BGL 8, W4EFL 6, WB4HGT 3, WA4KWC 3, WN4SCB 2.

SOUTH CAROLINA – SCM, Mrs. Elizabeth Y. Miller, WA4FFP – SEC: WA4ECI. Asst. SEC: W4WQM. PAM: WA4GAW. RM: WB4DXX. The Carolina Repeater Society is doing just fine with

approximately 25 members. The club repeater, WB4PLN, operate on 146.34 MHz input and 146.94 MHz output. The Palmett Amateur Radio Club has been cranked up again and remains 100% ARRL affiliated. W4SH is tackling a Heath linear. W4ZEQ is on 160 with long, long wire. K4HDX is rebuilding frequency meter afte last FMT (with his left hand yet). W4JA returned from the hospita to find a broken guy in his antenna system. Both he and it are OF now, and he expects to be much more active with his new Swa 270. WB4SKC, ex-W1OA/4, is in South Carolina Sea Islands for th winter. Congratulations to the South Carolina intelligentsia wh recently upgraded their licenses. We're all proud of you! K4UFU ha done it again! This time he stuck his foot in the power supply SCPN: 3930 kHz Dy noon: Sun 0830 and 1530 EDT, ON: 357 kHz Dy 2245Z and 0200Z. SCSSBN: 3915 kHz Dy 1900 EDT. SC AREC Forum: 3915 kHz Tue-Wed 1830 EDT. Traffic: WB4SKC 52 W4JSD 47, K4OCU 40, W4MC 29, WA4EFP 26, W4WQM 21 WA4GAW 19, K4LNJ 12, W4UMV 12, WB4BZA 3, W4JA 2.

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 t report the passing of the XYL of W4ODY. WB4NNO broke through to BPL solidly this month! W4TE reports a busy month but hi XYL, K4LMB, reports relaying more traffic than received. W4OGV continues to cheer us up from the hospital. W4UQ is confined to cv with a busted rig. WB4DRB, WB4PYA and WA4JMD are doing ARC things at William and Mary. WB4DRC ditto at Ohio U. and WB4FDT ditto at U.C.U. in Richmond. In a "thank you" lette from a ham in response to a citation from OO W4HU, it turns ou he had received two citations from the FCC the previous day; whil they are good, our OOs can't always beat the FCC, so heads up W4JUJ has 1769 counties, and reports K4AUL and WB4RDV hav all; WA4WAG reporting 1958. Our thanks go to Governor Holto for proclaiming Nov. 2-9 as Amateur Radio Week in Virginia Director W4KFC attended the Executive Committee Meeting i Hartford, the Shelby (N.C.) Hamfest and the National Convention in Boston, as did K4LMB, W4TE, WA4PBG, K4GCM, W4UMP K4AET, WB4JJE, W4FJ, W4TVT, W4RHC, W4WSF, W4GF W4LPY, K4MD, K4NWE, W4ZM, K4IKK, WB4INN and WB4MPP WA4EUL has a new TA-33 and 60-ft. tower. K4JM is lookin forward to the contest season. WA4HQW reports a slow month WB4GMC reports school "slump." SEVWA is 100% behind ARE under K4DOQ and has a new secy., WB4MBM. W4HU is chasing DX on 20 cw with a new two-element quad and exciter power. W4DM continues a twice-weekly sked with his father W9YPP. WB4PPY i drooling over the newly-arrived FTDX-60. WB4KIT is a new OPS Traffic: (Sept.) WB4NNO 520, W4TE 232, W4UQ 184, W4SOC 162, K4KNP 136, WB4CVY 133, W4NLC 127, WB4KSG 86, K4GE 73, WA4EUL 51, W4OKN 51, K4ESS 48, WA4JJE 47, WB4DRI 29, WB4FDT 28, WA4PBG 26, K4RHQ 25, W4THV 25, W4TJF/ 25, WB4GTS 24, WB4KIT 24, WB4PYA 24, WB4DRC 20 WA4WOG 20, W4ZYT 20, WB4KBT 19, W4SHJ 16, W4KFC 13 W4ZM 13, K4LMB 12, WA4NJG 11, K4ISJ 11, K4JM 7, K4AWV 6, W4MK 6, K4POL 6, WA4HQW 5, K4JYM 5, WB4GMC 3 W4KAO 3, W4KX 3, WA4TNS 3. (Aug.) W4SOQ 129, WA4EUL 72 W4NLC 46. (July) K4JYM 2.

WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8IYD, K8CHW Phone Net Mgr.: WA8LFW. K8CFT, K8BDH, W8UDR an WA8LET were active with a booth and station at the Oak Hi Sports Festival. WB8DXC is a new General in Buckhannon WA8CPY is back from Okinawa, attending W.V.U. WB8BBG is regular in the PSHR. K8HUX is inactive because of illnes WA8NDY and WA8WCK visited the Kanawha Radio Club. WA8KC is active in Ohio, Kentucky and W. Va. hf nets. W8DUV accepte the YLRL publicity post for 1971 and along with hubby, W8DUV attended the National Convention in Boston. WVN CW net report 67 stations and 37 messages handled. Phone Net reports 44 check-ins with 100 messages handled. WB8EOH is the new EC fo Logan County. W8CKX is consistent in reporting. WA8DQY W8DUV, K8HIN, K8LSN, WA8OKG, WB8DQX, WN8CPY a active YL operators. Congratulations to W4KFC and W4ACV o their willingness to serve amateurs in the Roanoke Division fo another term as Director and Vice-Director. Traffic: WB8BBG 205 WA8NDY 69, WB8CYB 33, K8CFT 14, W8DUV 14, WA8LFW 13 W8AEC 12, W8JM 12, K7DBH 7, WA8ZNH 6, WA8KCJ 5, K8QUV 5, WA8WCK 5, WB8EOH 4, W8HZA 3, W8WEJ 3, WB8AKR 2 WB8AQE 1, WA8OKG 1.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Charles M. Cotterell, WØSIN – Asst. SCM Neal S. Morris, KØJTV. SEC: WAØHLQ. PAM: WØCXW. RM WØLRN. 160-Meter PAM: WØLRN. VHF PAM: WBØAWG. CCN N

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Mgr.: KØECR, Hi-Noon PAM: KØIGA. WØKVX expects to put in a repeater on a peak south of the San Luis Valley and the RMRL put in a lot of time on the plane crash near Loveland Pass. DRL was in on it as well as the Boulder VHF Soc. Silver Stare Net should be on daily now. W4UDS has made DXCC. The first snow took KØECR and others off the air. Aug. 70 WØWYZ should be WØWYX. We need more listings for PSHR. KØMNO made it for Sept. Note revised rules Sept. *QST*. The fm repeater members assisted the Boy Scout recruitment program and also took part in searches for lost children. The Colorado Council of ARCs met Oct. 24. Anyone not now represented should contact WØHFP or WØCJK. Welcome to the Empire Radio Club as an ARRL affiliated club and also the Colorado DX Assn. I am making up a Colorado fm repeater directory if I get the necessary response. DRC has a nice amateur library going and needs more books, *QSTs*, etc. WØHFM is librarian. W4UDS, KØIGA, WØLLA and WØSIN reported. Colo Hi-Noon Net totals QNI 1004, QTC 121, time 1054. CCN, QNI 137, QTC 62, time 543. Traffic: WØWYX 245, KØJSP 136, WØLG 70, WØPGX 49, WAØMNL 48, KØECR 35, WØYCD 17, WØLRW 7, WØLCE 5, WØKFH 4.

NEW MEXICO – SCM, James R. Prine, W5NUI – The big Hamfest held in Sept. and sponsored by the combined Albuquerque clubs was very much a success and plans are underway for a bigger and better event next year. WA5LZX is back on the air with a new roof for the shack and an improved signal. Welcome to W7HYQ, who is a new resident of Santa Fe with the BLM. Progress has been made in the installation of the 2-meter repeater in Las Cruces. W5PNY has successfully transmitted 432-MHz TV pictures with sound to W5OJM. W5PNY also discovered that prolonged framing of a bright field will etch the image on the vidicon. K5IFU has moved to Hatch. The addition of phone numbers to the NTC and MCRD messages has greatly facilitated deliveries. NMN 01307 3750 kHz is off to a good run for the winter. The failure of adequate response from Novices has tabled the formation of a Novice net. Traffic: K5DAB 133, K5MAT 64, W5MYM 52, W5RL 47, W5DMG 42, WA5UJY 41, W5PDY 36, W5NON 28, W5NUI 26, WA5JNC 17, WA5JXU 17, WA5OHD 16, WA5MIY 15, W5PNY 6, WA5BLI 4.

UTAH – SCM, Thomas H. Miller, W7QWH – SEC: W7WKI. RM: W7OCX. DL4VA would like a schedule with a Utah station to complete WAS and is willing to meet anytime on any frequency. If interested, write Vandegrift, MATCOM-DSO, APO N.Y. 09052. WN7OXZ is one of only two YLs in Utah. W7JZ in Winnemucca, Nev. has been awarded BUN certificate No. 79. Conditions on BUN have greatly improved since the summer months. BUN reports sessions 30, QNI 668, QTC 31, average time 12.43 minutes. More net control stations are needed. Contact W7QWH or W7OCX if interested. K7ZIS is back in the swing sending QQ reports to needy hams with faulty signals. Since this may be the last report submitted to the ARRL as SCM I should like to thank those who have sent regular reports to the SCM. Either K7HUV or K7SOT will be the new SCM. Either can do an excellent job with your help. WA7HCQ is a new NCS on BUN. UDXA had its first annual steak fry with a good turnout. W7OCX turned 60 points on PSHR this month for his highest point total. Traffic: W7FM 78, W7OCX 51, WA7HCQ 49, K7CLO 5.

WYOMING – SCM, Wayne M. Moore, W7COL – SEC: K7NQX. The Cheyenne Club has started code and theory classes. W7RPV now has a 2-meter fm repeater on Bovsen Peak. WA7DNZ and K7KMT installed a repeater on Casper Mountain in Sept. They both receive on 146.34 and transmit on 146.94 MHz. Welcome to WA7PPQ, who is new in Hanna. K7TAQ now has 2-meter facilities. K7WRS was active in handling messages into the tornado area from Casper in Sept. K7IAL, WA7KKI and WA7CEI attend school in Laramie. Another new ham in Laramie is WA7PSM, who hails from Casper. WA7NBO has nearly made his DXCC and is clicking off the DX on about 14,027 MHz. Congratulations to WA7EHA, who passed the General Class exam and will try for the Advanced Class. Drop me a note about news from your part of the state so we can keep the column filled with interesting items. Traffic: K7NQX 353, W7SDA 54, K7IAQ 46, W7TZK 38, K7VWA 17, K7AHO 10, WA7BDI 10, K7SLM 10, WA7LLA 3, K7BTF 2, WA7FGK 2, W7RXS 1.

SOUTHEASTERN DIVISION

ALABAMA – SCM, Donald W. Bonner, W4WLG – RM: W4HEO. The Lee High School Radio Club of Montgomery, W4WBF, is generating a lot of new Novices and offers a code class. Whatever happened to the regular Montgomery Club? There are lots of activities now which keep us off the air at times but if everyone would (if possible) plan just one or two days a week to be available for traffic work it would make life easier for those who regularly QNI and have to take most of the traffic. Incidentally, any General

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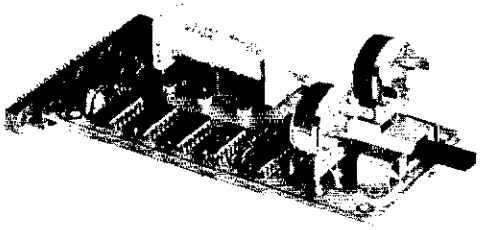

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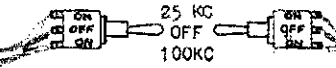

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who can copy 10 wpm should check into AENB occasionally for some code practice. You can be assured you will be answered at your own speed. New members of AENB are WB4NLK, WB4QAI, WB4OKT, WB4OVR and ex-WN4OJD. K4UMD is dabbling with *slow-scan TV using an old oscilloscope. K4PMO is now located in* Decatur. Traffic: WB4FKJ 156, W4HFU 131, WB4JMH 96, WB4POC 84, WB4LAL 67, WB4LAO 65, K4AOZ 54, WN4OJD 49, WB4KSL 42, WB4OVR 19, K4WOP 19, W4WLG 15, WA4AZC 13, WB4LNM 12, WB4MLV 9, *WB4ADF 7*, W4EMP 5, *WB4OKT* 2, WN4PSP 2, W4DGH 1, WA4VFK 1.

EASTERN FLORIDA — SCM, John L. Porter, W4KGJ — Asst. SCM: Albert Hamel, K4SJH. SFC: W4LYT. Asst. SEC: W4SMK. *RMs: W4ILE, K4EHY.* PAM 75: W4OGX. PAM 40: W4SDR. Traffic has been slow for the summer months but we expect things to pick up this winter. Hurricane Greta proved to be a fizzle but it did give the Southern Florida boys a good workout. The Dade Red Cross was active before and after the storm. *WB4CBP*, Dade County EC and his group assisted the local chapter in Dade. I think everyone enjoyed the hamfest at Melbourne this year. This is turning out to be one of the state's fastest growing events. KH6AK will soon be *joining the boys in the St. Petersburg area. Art has been trying to* retire for many years now and it looks like he has finally made it. Welcome to the state. K4IEX is now net mgr. of QFN. How about all you cw buffs dropping down on QFN and giving him a hand. *Welcome to the IBM Radio Club of Boca Raton, which was granted* League affiliation at the last Executive Committee meeting. Don't forget to have your club secy. drop us a line on club news. K4FMA was again high man in OO reports this month; 48 was the count. *Keep up the good work, Don. New EC appointees are WB4NGI,* Volusia County and K4NKA, Martin County. I would appreciate it if some of you fm boys would drop me a line once in awhile giving a rundown on fm activity in the section. One of the oldest nets in *ham radio, Knights of the Kilocycle, meet each Sun. at 7:30 A.M.* on 3910 kHz. It welcomes all check-ins. This is not a traffic net. Just a get together on the air for some good ole chit chat. We are short of ECs for our section. If you do not have an EC for your county, get in touch with W4LYT or W4SMK and volunteer for the job. You will be doing your neighbors a favor as well as yourself. Traffic: (Sept.) WB4OMG 137, WB4MIQ 136, W4FFP 135, WB4HJW 133, WA4HH 120, WA4BBY 101, WB4IKP 85, W4EHW 65, W4DVO 61, WA4HDH 61, W4NGR 52, WB4FJY 51, K4IEX 45, W4KGJ 34, W4YPX 34, WB4KPK 29, W4BFQ 28, WB4HNL 28, W4FP 26, WB4GHD 26, W4BNF 19, W4IAD 18, W4IYT 17, W4LK 17, K4LPS 17, W4AKB 12, W4GDK 12, K4IWT 11, K4HS 10, W4IA 10, WA4EYU 8, W4TJM 8, WA4UQQ 8, W4GUJ 7, K4BLM 6, W4ZAK 6, K4EBF 5, K4DVW 4, W4SMK 3. (Aug.) W4SMK 20, W4BGQ 18, WA4UQQ 9.

GEORGIA — SCM, A.J. Garrison, WA4WQU — Asst. SCM: John *Laney, III, K4BAI. SEC: WA4VWV. RM: K4BAI.* PAMs: K4HQI, W4LRR.

Net	*Freq.*	*Time(Z)/Days*	*qni*	*qtc*	*Net Mgr.*
GSN	3598	0000/0300 Dy	481	179	K4BAI
GTN	3618	2300 Dy	193	49	WB4IXO
GSSB	3978	0100 Dy	—	—	WB4DTY
Cracker	3995	1300 Sun	101	3	WA4IQU

Recent appointments: W4KRE as EC; W4RNL, W4LFP, W4AMB, *K5FLR as ORSs. Our condolences to the Greenlhon family of* Newnan. Grenie, K4GHE/K4SEX, passed away Sept. 24. Sorry also to hear about the death of the father of K4CVH, Columbus. New officers of the Atlanta Radio Club are W4REI, pres.; WA4VWV, *vice-pres.; WA4MDS, secy.; WA4NLA, treas.; WN4RSM, editor of The Atlanta Ham.* WA4GAZ was honored by the Georgia Single Sideband Association at its annual meeting held in Atlanta Oct. 24, 25. Art was presented the Association's "Amateur of The Year" award. The Georgia section was represented at the ARRL National *Convention in Boston by Asst. Director Price, W4DQD. W4LRR* reports that he worked 5 states during the Sept. VHF Contest. Several others were heard on 2 meters. Traffic: WA4RAV 134, K4BAI 90, WA4WQU 80, W4LFP 63, W4AMB 62, W4NSO 59, W4CZN 54, W4RNL 51, W4DDY 9, W4REI 8, W4FDN 6, W4UVP 6, W4PIM 5, WA4LLI 3.

WEST INDIES — SCM, Jose Medina-Hernandez, KP4CO — KP4BFF, U.S. Naval Radio Station, increased equipment and number of available operators. Regular operation schedule: Mon. through Fri. on 21405 kHz from 1700 to 1800 GMT. New Novices of the KP4BFF class are WN1NHV, WN5CMJ, WN4SDS, WN4SDR, *WN5CKB, WN1NMM, WN1NNH. W1VCU/KP4* is active keeping families of personnel deployed with Naval Operation Unit 11 in contact with their families. WA4UTP/KP4 is active on 10 meters. KP4DJI, former WB4EOT/KP4, reports a new net at Ramey AFB *which meets at 2200 on 14340 kHz every Wed. for passing traffic*

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back to the States for military personnel. Net controls are WA4ZSB and KP4DIP. KP4RK, Puerto Rican DXer, editor of the *PRARS Bulletin* keeps everyone well informed of DX activities. KP4GI has a KWM-2, H18RRP/KP4 has an SB-220 with SB-101 exciter. KP4ZC, KP4QV, KP4AST and KP4CO have new 2 kw PEP finals, courtesy of KP4QV. Congratulations to KP4AST who received a personalized plaque presented by ARRL in recognition of his outstanding performance in ARRL contest, making top score for North America. Traffic: KP4WT 150, KP4BFF 95.

WESTERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. RM: K4LAN. RTTY. W4WEB. PAM: W4MOQ. VHF: W4UOF.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC
WFPN	3957	2230 Dy	25	420	28
QFN	3651	0000/0300 Dy	60		

Pensacola: WA4SSB took part in the FTM. WB4DVM, K4AKL and WB4LJH are working on 450-MHz fm rigs. K4LAN was appointed RM and W4UOF VHF PAM. K4FKV and K4LAN are working on facsimile machines for copying weather satellites. Gulf Breeze: W4UBN is active on 75 meter ssb. Ft. Walton Beach: Some 45 local hams took part in gathering election returns, using 2 meter fm, 10 meter am, 75 meter ssb and amateur TV. New officers of the NW Fla. FM Assn. are W4SMS, WB4EQU, W4FDJ, W4MMW and W4UXW. The new W4ZBB radio van was used to reports results of a sports car rally; Also taking part were K4UBR, WB4KOX, W4RKH and W4FDJ. Communications were through the WB4KLT repeater. W4BVF returned to school at Suwannee after 30 years! WB4NHH still is having cw rig trouble. Panama City: K4VFY got married and is working on an M.S. degree in Tenn. WB4LEL and WB4RDG are now General Class. Marianna: K4UNT and WA4SIB got their first phone tickets. W4KCA and W4IKB assisted in collecting election returns. Traffic: W4IKB 6, W4RKH 5, WB4DVM 4, WB4NHH 1.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – SEC: K7GPZ. RM: K7NHL. PAM: W7UXZ. The University of Arizona ARC is now ARRL affiliated. Also in Tucson, the Catalina Club is reactivating with K7EMM as pres. The Old Pueblo Club is running code and theory classes in Tucson at 7:30 P.M. Fri.; call WA7JCK at 327-9179 for more information. The Scottsdale Club also is running classes; contact W7FCO at 945-4914. The Arizona Club has resumed monthly transmitter hunts on 3.878 MHz. Active clubs in the state with times, days, and locations of their meetings are:

Arizona ARC, 2000, 1st Thurs., 1510 E. Flower, Phx
Arizona Repeater, 1930, 2nd Tues., 5830 N. 19th Ave., Phx
Catalina ARC, 1930, 1st Wed., Pima and Craycroft, Tucson
Maricopa C.D., 1930, 4th Thurs., 2035 N. 52nd St., Phx
Old Pueblo ARC, 1930, 2nd Wed., Randolph Park Clubhouse, Tuc
Phoenix VHF, 2000, 1st and 3rd Wed., 1510 E. Flower, Phx
Scottsdale ARC, 1930, 3rd Mon., 35 S. Old Scottsdale Rd.

The Sun City-Youngtown ARC has elected the following officers for 1971: W7HFI, pres.; W7HTC, vice-pres.; W7HUB, secy.-treas.; W7GHW, dir. In Aug. the Ariz. PON had 30 sessions and handled 128 messages. PSHR: K7UYW 31, W7CAF 31. Traffic: K7NHL 167, W7PG 73, K7UYW 61, K7NTG 35, W7DQS 32, W7CAF 27, W7LLO 15, W7JMQ 13, WA7NXI 13, W7OUE 9, W7UXZ 8, WA7HUH 4, WA7JCK 4.

LOS ANGELES – SCM, Harvey D.D. Hetland, WA6KZI – Asst. SCM: Don R. Etheredge, K6UMV. According to W6AJL a code class is offered evenings on Thur. at the Inglewood H.S. The WA6TIC/6 vhf teletype repeater uses 146.58 MHz input and 146.70 MHz and 52.60 MHz outputs. WA6AWY is active in L.A. County RACES. WB6WIT reports a new quad at 80 feet. WA6BLK and WB6WIT had their TT units repaired by W6ABE. WN6ANA is planning for the Novice Roundup. WA6OWM is active using Drake gear and is planning on the ARRL 160-Meter Contest. WB6PAV earned his 15-CP. WN6DHM made membership in the RCC. W6FOW is attempting to interest members of the United ARC in 2-meter operating. W6NAA is reworking antennas but along with K6OMU put in time with county RACES during the brush fires. OO K6KUQ reports several "thank you" notes from Novices helped by the League's Official Observer program. Congrats to the Fair Ave. School QSO Chasers, the W6IN Society and the JPL ARC upon their gaining club affiliation with the League. W6INH has a new 4-400 final on the air. K6EA/Ø expects to return to the Southland soon. W6YRA earned WAS on phone. The Ramona RC has a Novice station operational for Novice members. The Antelope Valley RC is holding code and theory classes Thurs. evenings at the Antelope Valley H.S. K6AWO is trying to get a larger number of league members in the TRW Systems RC. WB6DPV returned to Goleta with the beginning of school. W6OEO has returned to teaching duties at UCLA following a European vacation. WB6LSB now

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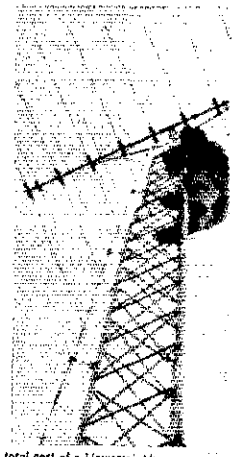

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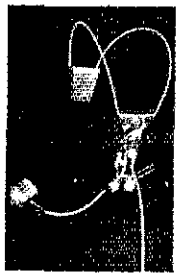

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attends Mount San Antonio College. WB6UHF has an HW-100 for use from the Univ. of Calif. SD. W6CZL spoke to the Downey RC on his recent trip to Japan. K6OKK spoke to the Atomics International-Rocketdyne RC regarding a 2-meter solid state final now available in kit form, and the Monterey Park RC is undertaking the sponsorship of an Explorer Scout Troop which will be oriented toward radio. WB6FVY is finishing up an SB-401. The Monterey Park RC reports very good support for its monthly Sat. morning breakfast meeting. WB6ZAQ now has his Advanced Class license and WN6AAW passed the General Class test. W6INH joined QCWA. The So. Calif. QCWA nets meet on 3917 kHz at 9:30 A.M. Sun. and 3695 kHz at 11:00 A.M. Sun. The new mgr. of the Southern California Net is W6LYY. Net reports:

Net	*kHz*	*Time*	*QNI*	*QTC*	*Month*
So. Cal.	3600	6:30 P.M.	403	425	Sept.
Mission Trails	3828	7:00 P.M.	1180	115	Sept.

Traffic: (BPL/PSHR): (Sept.) K6AEH 0/6, W6BHG 47/0, K6CDW 91/26, K6CL 50/0, W6DGH 12/0, WB6DPV 6/18, W6DQX 7/0, K6EA 4/0, W6FAV 0/10, W6FD 8/0, W6FJT 36/35, W7GAQ 23/10, WB6GHH 1/0, WA6GSV 0/3, W6IL 2/38, W6INH 329/38, W6IVC 87/13, WB6KGK 12/17, WA6LSB 0/1, W6LYY 12/0, W6NAA 9/4, W6OEO 11/4, W6OI 6/5, W6QAE 74/0, WB6PAV 0/5, W6USY 18/0, WB6WDS 1/0, WB6ZTI 35/13. (Aug.) WB6PKA 16/4, WB6WIT 5/0.

ORANGE — SCM, Jerry L. VerDuft, W6MNY — Asst. SCM: Richard W. Bierbeck, K6CID. SEC: WB6CQR. W6CPB has been appointed OO. Bill has noticed many rule violations on 20- and 40-meter ssb ranging from obscenity to no station ID. Let's all discourage this and "clean up the bands." EC K6GGS reports that San Bernardino City RACES supplied 2-meter communications during the Waterman Canyon fire Sept. 6. Participants were: WB6FTE (Asst. EC), WB6CZO, WB6HZS, WA6IYN, WA6EUF, K7BXT/6, WB6QQM, W6QOO, W6FZV and WB6FIY. W6ICP has resigned as mgr. of SCN and is succeeded by W6LYY of the L.A. section. W6FHM/DU1 honored the Desert RATS at its Sept. meeting with color slides and a lecture on "Vietnam Today." W6BAM reports the passing of W6CMT. OVS K6YNB is back from KL7/VE8-Land and scored nearly 8000 points in the Sept. VHF QSO Party. OVS WB6ASR operated the VHF Contest from the So. Cal. VHF Club, WB6VZY. New officers of the Newport ARS are W6NT, pres.; WB6TVA, vice-pres.; WA6ISO, secy.; WA6VJV, treas. The Victor Valley ARC conducts code and theory classes. Those interested write P.O. Box 869, Victorville, Ca. 92392. The Orange County AREC maintained stand-by mobiles and net operation on Sept. 27 because of the raging fires in San Diego County and in our own section. Those known to have participated in the 75-meter net alert were WA6OOR (Asst. EC), WA6ALC, WA6BYY, K6CID, WB6CZO, K6SQ/M, WB6UFX, WA6DXJ, W6JTZ, WB6WOO, W6FCS, WB6COR and W6MNY, K6MYN/M and W6WRJ/M. Public Service Honor Roll: W6BNX 65, W6MNY 54, WA6FOO 37, WB6ASR 8, W6CPB 2. PSHR forms are available from the SCM, address on page 6. Traffic: W6LCP 210, WA6FOQ 144, W6BNX 131, W6MNY 71, WB6ZEC 46, W6WRJ 35, WB6ASR 12, W6BUK 2, W6GB 2.

SAN DIEGO — SCM, Richard F. Leffler, WA6COE — Asst. SCM: Art Smith, W6INL. SEC: K6EDA. Special holiday greetings to everyone. The AREC got a real workout during the Oct. fires. I wish to thank all who participated in helping to provide communications for the CD operation. Club Christmas parties are this month. Why not make it a must on your list of things to do by dropping in on the club nearest you? See the ARRL board at Western for the latest club listings. Club News: W6MLZ spoke to the Palomar Club in Sept. In Oct. the El Cajon Club held its annual auction. SD DX Club held it's Nov. meeting at the QTH of W6BS. QCWA reports that 50-year awards went to W6ZV, K6EC and K6JL. W6DFY spoke to North Shores RC in Oct. and IVARA (Imp. Valley) is coming along real well with a newsletter, *QRK-5*, and a membership of 38! IVARA has 32 in its Novice class. Station activities: WB6PMF is pres. of IVARA, with W6JHG vice-pres.; WA6MIW, secy.; WN6CDT, treas.; W6DLN act. mgr. WN6FFL and WN6EES are new Novices. WN6MUH is now General Class. WB6VKV lost his home in the fires. EC WB6IQI has a new SR-2 scout wagon for his AREC work. Asst. ECs are WA6SPL (75) and WB6VWW (2) for the Eastern District. New towers are up for WA6AAF, WB4FOP/6, W6PIU attended the YLRL meeting in L.A. Traffic/PSHR: (Sept.) W6VNQ 4,37/43, W6EOT 367, W6RGP 277/48, W6LRU 207/49, K6KDE 111, K6HAV 85, WA6AAF 14, W6IAF 10, W6INI 6, WA6COE 2, WA6HGU 1, W6MAR 1. (Aug.) K6KDE 21.

SANTA BARBARA — SCM, Cecil D. Hinson, WA6OKN — SEC: W6JTA. RM: W6OJ. WN6CWQ is a new Lompoc signal with his HW-16 on 80 and 40 meters. The Mike and Key ARC meet the 2nd

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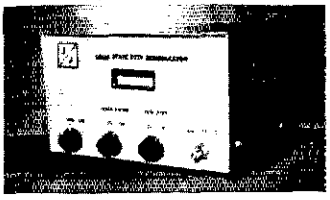

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Thur. of each month at the Camarillo Heights School auditorium, WA6DEI has converted ARC-1 on 2 meters now. W6SHX, long-time resident of Oxnard, will be moving to Oregon. The Channel Cities 2-meter net frequency is 145.80 with activity beginning at 1830. The Thousand Oaks ARC meet the first Thur. of each month at the Conejo Recreation Center. For additional information call Lavern, WB6PFY, at 495-0145. WA6WWC has completed his 4-1000 linear and is now adding a 40-meter beam to his tower. W6FKO has a new Tempo One ssb transceiver. WB6BII has moved "Down Under" and is operating VK5PK and VK5WC. W6RJM is out of the hospital after major surgery and recuperating at home. K6AAK has a new Heath SB-220 linear. The address of the Ventura County ARC is P.O. Box 2092, Oxnard, Calif. 93030. Traffic: WA6DEI 91, W6JTA 15, W6UJ 10.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Gene Harrison, W5LR – Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOO. RM: W5GQZ. Asst. SEC FTex/PAM VHF: WA5KHE. Once again we meet at the 16th Annual Brownfield Free Swapfest, in the *big* country. W5EYB and W5NSQ attended the Dallas ARC meeting Oct. 6. The Dallas Police watch is in operation. The KC Club, Ft. Worth reports DX time is in full swing. W5TI, program dir., meet the 3rd Thur. at Oak Grove Airport. WA5KTO earned an EE degree via UTA. K5FOG, the Arlington vhf specialist, advises 6-meter conditions excellent during the Aug. 2-meter fair. Many Dallas-Ft. Worth hams attended the summer meeting of the Tex. VHF Society in Pasadena, Aug. 1, 2. Dallas-Ft. Worth repeaters are using eleven (11) channels. W5QMJ, West Gulf QSL mgr., is doing a fine job. He has 18 assistants and receives 1000 cards a day! W5IZU. Asst. SCM East Texas, returned from Washington, D.C., and made the last train trip to St. Louis and Longview. Your SCM and his XYL made the 3970 meeting at Lake Cherrokee and the So. Longview and Delta ssb gathering at Tyler State Park. The FD in Brownfield was attended by W5NFO, Harbin, Bessenger, Smith, Jeijin, Milliren and Harrvill with 414 contacts in 39 states. The SCM newsletter, was finally mailed to 1700 No.Tex members. Thanks for taking the time to read this long "epistle." Sorry to learn that WA5KYO, of the Arlington RC, made a wrong twist. Speedy recovery OM. WA5PXQ is to be congratulated on having such a fine club. Thus far W5QGZ, W5JSM and WA5KHE have submitted comments relating to W♦PAN's (Director Shima of the Dakota Division) proposal to revise our field organization. Let me hear from you, please. The Irving ARC member, K5MMS, participated in emergency communications at Aransas Pass during "Celia." WA5KHE is very much for the TEX slow-speed cw net. The Oct. *QST* editorial caused comment in No.Tex. The Rockinchair Net meets on 7252.5 at 8:30 A.M. week days. K5HTK, of the Garland ARC, now is in VK country. K5ZVZ, of DeKalb, Tex., is new net mgr. of NETEXEMGNET, which meets at 8:00 A.M. Sun. on 3970 kHz. Traffic: (Sept.) W5VLV 77, W5HVF 30, WA6KNW/5 23, W5LUJ 22, W5PBN 22, W5JSM 19, W5IZU 16, K5BDC 14, W5QU 14, W5NFO 8, W5LR 7, W5VLU 7, W5MSG 2, W5QGZ 2. (Aug.) WA5PPF 1211.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM: W.L. Smoky Stover, K5OOV. SEC: WA5FSN. RM: WA5YRO. PAMs: W5MFX, WA5WHV, K5DLE and WA5ZRU. Well, as this goes to press we are digging out from the rubble of another tornado. Earlier in the year a couple of real serious storms hit Oklahoma City and the Tulsa, Enid, Venita and Miami areas. Tornados usually occur in spring and early summer. Here it is late in the season and a killer hits Shawnee. Let's keep our emergency gear in good operating condition. When I visited Shawnee Field Day operations I was confident the fellows were prepared and they have proved it because within minutes after the 4:45 P.M. Oct. 5 a tornado hit downtown Shawnee and swept north eastward to Prague. Amateur communication was established via 2-meter repeater and on 75 meters, and power plants were furnished for the police department and hospital. Neighboring Oklahoma City helped with power plants in short order. The SEC coordinated the 75-meter operations. W2FIR/5, of Altus AFB, a well-traveled man, just got back from a trip to Utah and is now on a month's tour of duty in Georgia. The 6-Meter PAM advises that there is now a central Oklahoma net on the 50-MHz band. Congratulations to WA5WHV on his appointment as PAM and OBS. Send a No. 10 SASE to your QSL Bureau. Traffic: (Sept.) K5TEV 1654, WA5LWD 81, W5FKL 61, W5CDG 39, WA5FSN 34, W2FIR/5 31, WA5ZOO 29, W5MFX 14, W5PML 14, W5IQ 8, WA5NZM 6, K5WPP 5, K5OCX 3. (Aug.) WA5LWD 27.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – SEC: VE6XC. The clubs around the province are swinging into action for the fall

and winter season. The NARC held its opening meeting at the Northern Institute of Technology. This was its second annual meeting of this type, designed to attract new blood to the amateur fraternity. Through well-planned advance publicity via newspaper, Radio and TV about 225 were attracted to the meeting; 75% of these were non-amateur. The program was well organized. I am sure many new hams will soon appear on the Edmonton scene. I doubt if many clubs could put this project over as well as the NARC did. However, it is a plan that clubs throughout the U.S.A. and Canada could well emulate. "Hams Wide World" is well adapted to such a project. I also enjoyed my visit with the Hat Ham Club. It was a pleasure to see the enthusiasm of their pending amateurs from the club classes. Congratulations to VE6AIJ on his appointment as OBS. VE6MJ is certainly running up his countries total. We wish VE6AHE lots of success in his move to Quebec. Traffic: VE6FK 12, VE6HN 7, VF6XC 7, VF6AIJ 4, VE6FS 4, VE6SS 4, VE6QY 2.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – VE7UM has wired an HW-12 for the Fire Marshall's Amateur Radio Station. 1970/1 officers for Vancouver Amateur Radio Club are VE7YG pres.; VE7API, vice-pres.; VE7BHW, secy.; VE7APU, treas. VE7CAK has her Class A ticket. VE7HA is active on 160 and building an ssb exciter. WA7NXO/VE7, located at West Bank participates in so many nets I have lost count. VE7RO was in the hospital. Nanaimo ARC officers are VE7MG, pres., VE7AFJ, vice-pres.; VE7AWC, secy.-treas. Fort George Radio Amateur Club officers for 1970/1 are VE7AXH, pres.; VE7XP, vice-pres., VE7CBJ, secy.-treas. Chilliwack ARC's new officers are VE7XV pres.; VE7AYZ, vice-pres.; VE7BHG, secy. Anybody want exercise walk, climb, crawl to VE7FLK, the repeater of Chilliwacks. VE7SH my XYL, my son and I did. VE7BXD, (one of our blind operators was awarded a beautiful lighter by the Alert ARC for message-handling for them. That brings up a point, the VE8s asked for someone to act as their SCM and I being that someone would like to hear from VE8s. Traffic: WA7NXO/VE7 181, VE7DH 9.

MANITOBA – SCM, Keith Witney, VE4FI – VE4FQ reports that MTN is almost belly up. I hope that by the time you read this that things will have improved. VE4EA is to be congratulated on hi ticket but why the /W9? VE4SR is trying to educate Virden and VE4LZ is once again pres. of the Manitoba Teacher's Society. Ex-VE4s XJ and HK are moving to a 32nd-floor apartment in Toronto. It should help the 2-meter range. Marty also is now aeronautical mobile. Anyone who remembers ex-VG4LI will appreciate the irony in his planned posting to Labrador. Traffic: VE4RO 35, VE4FQ 19, VE4JA 12, VE4CR 7, VE4QJ 6, VE4FO 4, VE4JF 4, VE4NE 4, VE4OJ 4, VE4DM 3, VE4LN 3, VE4XN 2, VE4YQ 2, VE4QK 1.

MARITIME – SCM, William J. Gillis, VE1NR – Asst. SCM Clarence Mitchell, VO1AW. SEC: VE1HJ. It is with deep regret we record the passing of Dr. G.F.W. Moore, VE1HX, of Perth, N.B. Thanks to the efforts of VE1RO, VE1AFB and the N.S. VHF Assn. an excellent vehicle for the exchange of information and promotion of vhf activity got underway Sept. 28. This is in the form of a meeting net each Sun. at 2000 on 3750. Stations from Quebec through to Nfld. have participated. VE1QV and VE1NR had a very enjoyable visit with VO1AW aboard the *M.V. Ambrose Shea* when Clarence operates VE0MD in addition to his duties as Asst. SCM. VO1HI has a new residence and a TH6. VO1HN is sponsoring whit caner VO1FF with WA2LBO/VO1 aiding VO1GR. VE3BDO was a recent visitor to VO1-Land. VO1AM is now at Stephenville. VO1 CW and EG are chasing DX and VO1DW is scoring some DX on 6 meters. VO1s BF, EJ, FR and FU are active on 20 meters. VO1IJ is awaiting a new SB-102. VO1AQ is ORP on ssb. VO1HH was activ in the VE/W Contest. VO1FZ is recuperating from recent surgery. VE1AMR was winner of the VE1RT memorial award for competition in traffic-handling (formal) sponsored by the Maritime Sparkettes. NSARA elected VE1AUE, pres.; VE1AQU, 1s vice-pres.; VE1MQ, 2nd vice-pres.; VE1AKO, secy.-treas. VF3s UC BVT and ANP were recent visitors to VE1FO. Congrats to Brit. and the Halifax Club on their excellent bulletin. APN is active daily at 2000 on 3653 kHz looking for stations in Nfld., Sydney and Saint John. VE1ES is active on local nets. APN reports sessions 59, QN 77, QTC 62. Season's greetings to all. Traffic: VE1AMR 85, VE1RO 72.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – Asst. SCM Ed Doyle, VE3EWD. Recent changes in the field have a change in manager for Ontario Phone Net with VE3AKQ stepping down after a two-year stint and VE3CRW taking on the job. There was a fine turn out at the RSO convention at Windsor Oct. 23-24 and an opportunity for the SCM to talk with the EC's and traffic gang. The SCM apoke to the OARC, Ottawa, on AREC and the effort of the Ontario amateur during the severe wind storm which struck the Fairbanks Lake area Aug. 20. A presentation to VE3EWD, SEC, of an Asst. SCM certificate took place at the RSO Convention. Ed will continue as SEC in addition to his Asst. SCM appointment. The

are still a number of counties without ECs and the need is still there. Contact the SEC for details. The Renfrew County Net meets Sun. on 3740 kHz at 9 A.M. All are welcome to QNI. Considerable amateur gear is moved on the Ontario swap nets. Those running such nets are asked to send me details so that I may publicize it in this column. Traffic is generally down on the cw nets and up on the phone nets. Any conclusions? VE3AMH is a Silent Key. The usual one-minute silence was observed on OPN. For those interested in making the Trillium award, listen in on the YL Net on 3770 kHz Sat. afternoons. VE2ZD made it in five minutes flat by calling into the net at the tail end after the gals had finished with net business. VE3BVQ has a new Eico transmitter. VE3BJY has a new 2-meter beam. Congrats to VE3EYW on receiving his Advanced Class license. VE3DPO is back handling the GBN after a series of visits to the hospital. Traffic: VE3GI 153, VE3ERU 111, VE3DV 50, VE3FXI 46, VE3DPO 44, VE3EHL 21, VE3DU 17, VE3GFN 11, VE3AIA 7.

QUEBEC – SCM, Joe Unsworth, VE2ALE. Appointments updated: VE2BG as OPS; VE2BU, VE2HW, VE2APT, VE2BMQ as OVSs; VE2DR as RM; VE2OJ, VE2PJ, VE2BVY, VE2CP, VE2DR, VE2EC as ORSs. VE2OJ has returned from vacation to KH6-Land. VE2JO has Advanced Class ticket. VE2BHO is a jr. operator, was originally C3MR. VE2XO has activated VE2BV. VE2RM mobiles a report about 50% accidents in the area covered. VE2WM/VE2DKZ reports VE2s DKZ, DLB, DLC, DLE, DLP passed phone tickets last June. VE2AJD skeds VEØMAD (MV,McLean) and QTCs for the boys. A new call is VE2AJU on 75 phone. VE2OY has a new FTD-200 and 75 phone. VE2FX reports plenty of apples at his summer QTH antenna farm. VE2AKM is editor of the VE2RM newsletter. VE2BMQ and VE2WD gave a splendid talk on Oscar (Amsat) and tracking at the recent VE2RM general meeting. VE2DEK is now VE3FCQ. Ceux qui desirent soumettre une qsl pour VE2AQC doivent le faire avant le 31 Dec. au secretariat de RAQI, gagnant $25.00. Traffic: (Sept.) VE2DR 24, VE2EC 20, VE2BVY 10, VE2ALE 9, VE2APT 5 (Aug.) VE2EC 40. QST

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (act of October 23, 1962; section 4369, title 39, United States Code). (1) Date of Filing – September 28, 1970; (2) Title of Publication – QST; (3) Frequency of Issue – Monthly; (4) Location of Known Office of Publication: 225 Main Street, Newington (Hartford County), Connecticut 06111; (5) Location of the Headquarters or General Business Offices of the Publishers: 225 Main Street, Newington (Hartford County), Connecticut 06111; (6) Names and Addresses of Publisher, Editor, and Managing Editor: Publisher – The American Radio Relay League, 225 Main Street, Newington, Connecticut; Editor – John Huntoon, 574 Hills Street, East Hartford, Connecticut 06118; Managing Editor – Laird Campbell, 18 Mohawk Drive, Unionville, Connecticut 06085; (7) Owner – (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.) The American Radio Relay League, Inc. 225 Main Street, Newington, Connecticut 06111 (an association without capital stock); (8) Known Bondholders, Mortgagees, and other Security Holders Owning or Holding 1 percent or More of Total Amount of Bonds, Mortgages or other Securities – None; (9) For Completion by Nonprofit Organizations Authorized to Mail at Special Rates – The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes have not changed during preceding 12 months; (10) Extent and Nature of Circulation – Average No. Copies Each Issue During Preceding 12 months – (A) Total No. Copies Printed (Net Press Run) 106,543; (B) Paid Circulation – 1. Sales Through Dealers and Carriers, Street Vendors and Counter Sales – 5,189; 2. Mail Subscriptions – 95,804; (C) Total Paid Circulation – 100,993; (D) Free Distribution (including samples) By Mail, Carrier or Other Means – 2,358; (E) Total Distribution (Sum of C and D) – 103,351; (F) Office Use, Left-over, Unaccounted, Spoiled After Printing – 3,192; (G) Total (Sum of E & F – should equal net press run shown in A) – 106,543. Single Issue Nearest To Filing Date: (A) Total No. Copies Printed (Net Press Run) – 104,197; (B) Paid Circulation – 1. Sales Through Dealers and Carriers, Street Vendors and Counter Sales – 4,816; 2. Mail Subscriptions – 95,513; (C) Total Paid Circulation – 100,329; (D) Free Distribution (including samples) By Mail, Carrier Or Other Means – 2,404; (E) Total Distribution (Sum of C and D) – 102,733; (F) Office Use, Left-over, Unaccounted, Spoiled After Printing – 1,464; (G) Total (Sum of E & F – should equal net press run shown in A) – 104,197. I certify that the statements made by me above are correct and complete. (signed) John Huntoon, Editor. QST

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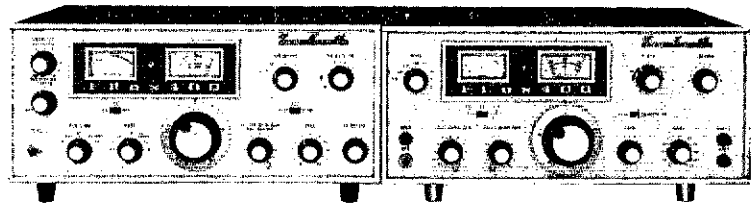

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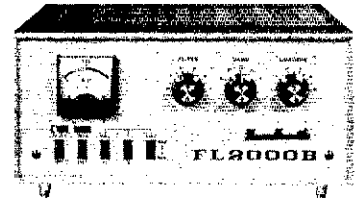

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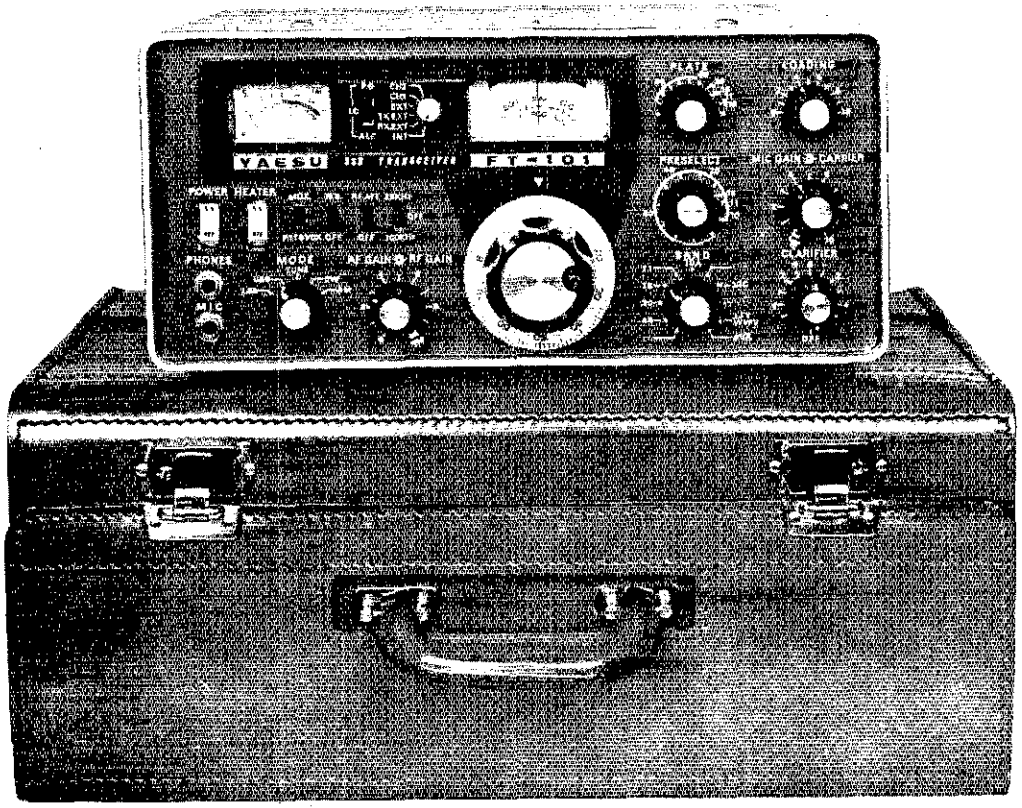

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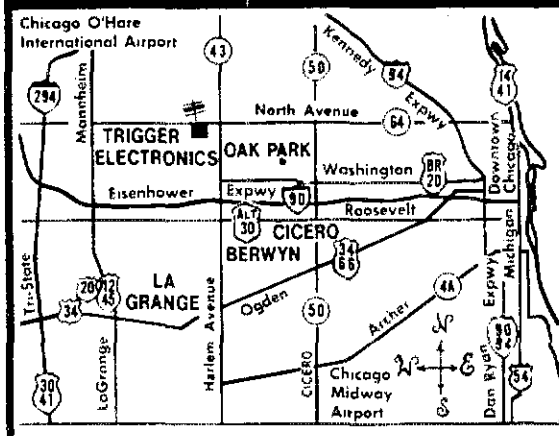

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(Special mail order prices valid to end of month only)

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Write for information. A. J. Gironda, W2JE, Box 394, Mamaroneck, NY 10543.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news. Business size s.a.s.e. to K2AFY, Box 74, Massapequa LI NY 11762.

SAROC, January 7-10, 1971, Flamingo Hotel Convention Center, Las Vegas, Nevada. Sponsored by Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada. Advance registration $14.50 per person accepted until January 4, regular registration at door, includes Flamingo Hotel late show and drinks, Sunday breakfast, cocktail parties, technical seminars and meetings, ARRL, DX, FM, MARS, QCWA, WCARS-7255, WPSS-3952 and WSSBA. Ladies program. Flamingo Hotel SAROC room rate $12 plus room tax, per night, single or double occupancy January 3 thru 12 1971. Mail accomodations request to Flamingo Hotel. Mail advance registration to SAROC.

ROCHESTER NY will again be headquarters for the huge WNY hamfest, Vhf conference and flea market May 15, 1971.

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CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway NY 10012. Tel. 212-925-7000.

WANTED. For personal collection. The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914. W1CUT, 18 Mohawk Drive Unionville, CT 06085.

NOVICES. Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk VA 23508.

WE'RE trying to complete our collection of callbooks at Hq. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington CT 06111.

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QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

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QSLs. All types. Attractive designs, quick return, free sample. W7UZ Press, Box 2387, Eugene OR 97402.

SAMPLES 10c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs — 100 3-color glossy $3.50; silver globe or eagle on front — report form on the back. Free samples. Rusprint, Box 7575, Kansas City MO 64116

QSLs 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

3-D QSLs — The modern concept that makes all others old-fashioned. Samples 25c (refundable). 3-D QSL Co. Monson, Mass. 05017.

QSLs 300 for $4.50, samples 10c. W9SKR, George Vesely, Rte.†1, 100 Wilson Rd., Ingleside, Ill. 60041.

RUBBER stamps $1.25 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

W7QCV QSL Bureau. We forward QSL's anywhere. 30 cards for $1. 451-145th Place N.E. Bellevue, WA 98007

QSL, SWL cards that are different. Quality Card Stock Samples, 10c. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

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QSLs "Brownie." W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

QSL Print. Samples 25c. K1FF, Blaisdell, PO Box 33, Melrose MA 02177.

QSLs. Radio Press, Box 272, Poway CA 92064.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSLs printing of all kinds. Reasonable, fast. Free samples, information. Cohen, Drawer Q, Pittsford NY 14534.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

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QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017.

TOROIDS. Uncased 88 or 44 mhy. 5 for $1.50 ppd. M. Weinschenker, PO Box 353, Irwin PA 15642.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St., Elizabeth, NJ 07207. Tel. 201-354-3141.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antenna Accessories, 1339 So. Washington St., Kennewick, WA 99336.

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for $1, 10 for $3. prepaid and guaranteed. Tepahco Box 198T Gallatin TN 37066.

TELETYPE Mod. LPR 28 receiver-only typing reperforator without cover good operating condx, sync motor 60 wpm, $125. Tape winder 110vac $15, †28 LBXD1 trans-dist 60 wpm, sync motor, wired for complete 100vac operation and converted to 7.42 code $75. T. Howard Box 252 Boston MA 02101. Tel. 617-742-0916.

160 meter Matchverter resonates any 40 or 80 meter inverted vee/dipole on 160 meters. Handles 250W PEP. $29.95 ppd. Top Band Systems, Dept.4, 5349 Abbeyfield, Long Beach, Calif. 90815.

WIRELESS sets, parts, catalogs, bought, traded. Lavery, 118 N. Wycombe, Lansdowne PA 19050.

CIRCUITS for 32 electronic projects, RF, audio and gadgetry, complete plans $1, PM Electronics, Inc., Box 46204, Seattle WSN 98146. Dealer inquiries invited.

QSTs before 1927 and amateur teletype publications wanted. Orville Magoon, 1941 Oakdell Dr., Menlo Park, Calif 94025.

SAVE on all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd. Swampscott Mass 01907. 617-589-9700

RTTY gear for sale. List issued monthly. 88 or 44 MHy toroids five for $2.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck W6VPC 1067 Mandana Blvd., Oakland CA 94601.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc. Box 209 Annandale VA 22003.

TELETYPE parts. Fast service. Machine to M.35. Buy, too. S.a.s.e. Typetronics, Box 8873 Ft. Lauderdale FL 33310.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info contact Al Marcy W4ID, Secy, 461 Third Av. Eau Gallie FL 32937.

WORLD QSL Bureau. See display ad elsewhere in this issue.

NOVICE crystals: 40-15M $1.38, 80M $1.83. Free flyer. Nat Stinnette Electronics, Umatilla FL 32784.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Erv Rasmussen 164 Lowell, Redwood City CA 94062.

GREENE Center of dipole insulator with or without balun, see ad page 123 June 1970 QST. O. Watson Greene, Box 423, Wakefield RI 82880.

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 50c each. Postpaid USA. East Coast Electronics 123 St. Boniface Rd. Cheektowaga NY 14225.

HALLICRAFTERS equipment discounted at fantastic prices. All brand new factory sealed cartons. Write for low, low prices. PM Sales 65 Birchfield Av. North Babylon NY 11702.

VERY in-ter-est-ing! Next 8 issues $1. "The Ham Trader," Sycamore IL 60178.

WANTED: An opportunity to quote your ham needs. 31 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also $25,000 inventory used gear, Request list. Chuck Schecter, W8UGC, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441.

SAFETY belt climing $15, 8 ft. fish $80, 100 MC counter $110. Rotor prop pitch $45. 2M duplexer $115. FOB Link, 1081 Aron, Coca FL 32922.

DIGITAL Frequency Meter — a-m or ssb transmitters to 35 MHz. 100 Hz readout accuracy with Nixie tubes. Kit or assembled. Micro-Z, Box 2426 Rolling Hills CA 90274.

RECEIVING and industrial tubes, transistors, all brands — biggest discounts. Technicians, hobbyists, experimenters — request free giant catalog and save! Zalytron 469 Jericho Turnpike, Mineola NY 11501.

PREPARE for FCC exams! You need Posi-check. Original, expertly devised, multiple-choice questions covering all areas tested in FCC exams. Same form as FCC exams. Keyed answers, 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. General Class $3.50. Advanced Class $3.75. Extra Class $4. Third class postage prepaid. Add 32c per copy for first class mailing. 64c for air mail. Send check or money order to Posi-check, PO Box 3564, Urbandale Station, Des Moines IA 50322. Write for club rates.

CIRCUIT board fiberglas any size 4c square inch, minimum $3 postpaid. Frontier Electronics, Orr MN 55771.

DX Awards log. 150 page book lists contacts for over 100 major worldwide awards. Individual logs for each award for record of contacts and confirmation. Required over two years to prepare. $3.95 ($4.95 foreign). McMahon Co. 1055 So. Oak, Knoll, Pasadena CA 91106.

WORLD Radio's used gear has trial-terms-guarantee! KWM1 $199.95, KWM2 $695, KWM2A $749, SB34 $299.95, GT550 $379.95, 6N2 $79.95, Ranger 2 $129.95, Valiant $129.95, HT46 $199.95, SB401 $249.95, HQ140X $109.95, 75S1 $299.95, SX101 $159.95, Free "Blue book" for many more. 3415 W. Broadway, Council Bluffs IA 51501.

ESTATE sale. Like new Collins 75S1 32S1 30L1 312B4 complete. $1000 firm, No shipping. W4GYO Box 28413 Atlanta GA 30328. Tel 404-252-3857.

WANTED: Old engineers from model airplanes. Will trade tubes, transistors, transformers, etc. etc. Frank Schwartz W4KFK 2400 W. End Av. Nashville TN 37203.

HAM's Spanish-English manual $3 prepaid. Gabriel K4BZY 1329 NE 4th Av, Fort Lauderdale FL

YAESU F Line — Fldx400, FRdx400, with all extras, mech filters, mic, 6&2 convtrs, fm det & extra fnls pft-used 20 hrs. $500, MP33 1 yr old. Offers welcm. N. DeLoye WA6ENV 2141 Fallen Leaf Pl, Tustin CA 92680.

SHAWNEE 6 meter 6-12-115v transceiver $120. Tiny Tiger generator new 1970 $65. Vibroplex presentation, case $30. WAØZMA, Quarters 4213A, USAF Academy, CO 80840.

HUNTER Bandit 2000C — Only a few left of this most famous two kW pep linear kit. Full guarantee, sold on first order basis, complete with tubes $329.95. Freight prepaid in the USA, APO and FPO. Grey only. Hunter Sales, Inc. Box 1128, Des Moines IA 50311.

SALE — Pick up W2BDS — "Big Bertha" plus rotator system, stacked 20M 646X, stacked 15M 532X, stacked 10M 523X, complete with phasing lines, remote controlled 8 pos. coax switch plus 40M 329X. Not everyone can afford — but — if you have desire and "mon" — come — take it away. Only $9,495.22 offered by M.D. Ercolino — 201-775-7254 before noon or 201-531-4990 afternoon.

MERRY XMAS and Happy New Year from WØCVU. Iowa's most truthful station.

CURRENT Amateur License laminated and wood display stand $1.00. Schickler, 16-18 163rd Street, Whitestone, N.Y. 11357.

WANTED: Electronics Instructor, General, Theory, workshops. Minimum 19 Science Camp Lake Placid NY. Write Eppstein Apt 4 B Westend Ave., NYC 10024.

QSTs 560 copies June 1920 to Dec. 1967. Ten copies missing. Older copies covers torn etc. As is $99.00. Pick-Up only. W2ML 516- CH8-7388.

HAMMARLUND HQ 180A (Mint) $275, HQ 145X $115. Want SSB Transceiver. E. Kohn, 46 Henry Ave., Princeton, NJ 08540.

HY-GAIN 18-HT Self supporting All band vert. $80, HRO-60R, All acces., spkr., 9 coils, book, etc., exc. condx. $310. Want NCL-2000. D. Mello W3FOR 114 Westway, Arnold, MD 21012 tel 301-974-4390

TR-4 & AC3 just factory aligned & checked. First Certified Check for $450. wins. David Beckwith, W2QM, Box 226, Pompton Lakes, NJ 07442.

HALLICRAFTER SX101 in excellent condition. $110 plus shipping. K1ZLL, 24 Rayton Road, Hanover, NH 03755.

SELL: Swan 500CX, 117XC, 510, MARS, CAP Crystals - $600. SB-200 $190, 18AVQ $45. Package $810. Zeares K3ETS, 216 Fairmont Ave., Sunbury, PA 17801 717-286-2948.

DRAKE, R4A $300. R4X with power supply $350 mint condx. Prefer pick-up but will ship if you pay charges. P.G. Balko W1AU Hillcrest Rd., New Canaan, CN 06840.

COLLINS KW1 Transmitter. Excellent condition, extremely low operating time, instruction manual, $1200.00 — Heathkit "Ham Scan" Spectrum Analyzer, Model HO-12. Assembled, only 8 hours use, instruction manual, $50.00 — Gonset 6M Communicator II. Receiver squelched, which needs minor repair, but otherwise in good condition, $30.00 — Delica Frequency Meter, Model SFM. Freq. range 3.0 to 200 MHz, good condition, $15.00 — Bob Gonsett, WA6QQQ, 10351 Valley Spring Lane, No. Hollywood, CA 91602.

COMPLETE Station SB301 $230.; SX111 $140.; 1076 BK Color TV Analyzer $190.; Heath SWRB $10.; 722 EICO VFO $35.; HO10 Monitor Scope $50.; 625 Eico Tube Tester $25.; 1012 Heath Scope $60.; 1T11 Heath CAP. Checker, $25.; 368 Eico Sweep Generator, $70.; HWI VOM $20.; Hand Crafted AM Xmitter, must be seen, appr. 150W.I., built in Pr. Supply, 10-80, Cost $400, sell $165.; 250 Receiving type tubes, $.50 each; 50 various power transformers, $2. each; QST, CQ, 73s, books. Cash or M.O. only; will demonstrate; prefer local sales but will deliver 50 miles on sale over $100. W2HPN 516-488-4683.

HALL, HA-5 VFO New never used $50.00 postpaid. A.E. Wilson Box 392 E. Brewster, MA.

HEATH SB401 W/crystals $265 Hallicrafter SX111 Recvr $75 Gary WA9YQO 13039 W. Playfield, Crestwood, IL 60445 312-389-3385.

MANUALS — R-390/URR, R-390A/URR, BC-639A, $6.50 each, Hundreds more. S. Consalvo, 4905 Roanne Dr., Washington, DC 20021.

COLLINS KWM-2 No. 16,000, PM-2, CC-2 Used few hours, Immaculate. $1000. WA2OVG, 53 Downing St., NY NY 10014 212-691-4711.

COLLEGE expenses, must sell, HW-100. Fully assembled, never used. $240.00 Simpson 250 VOM, $50.00 and Heath IM-11 VTVM, $15.00. All perfect. Call 606-858-4193 Dan Tosh, Asbury College, Wilmore, KY 40390.

MUST SELL: Heath HR-10B and calibrator. $65 or best offer. David Rehrig, Box 135, Ashfield, PA 18212.

SELL: Galaxy V MK II, AC400/PS, CAL, spkr, manual, $325.00 Post Paid. Gary Westfall, KG6ASP, 4 Ragsdale St., Nimitz Hill, FPO S.F. 96630.

FOR SALE: D-104, Swan Vox, Hmbrw Linear, 30ft. KTV TWR, 4-400 w/socket, 2 meter halo, write WB2HJW, P.O. Box 2 Garfield, NJ 07026.

JACKITRONIX — New & Used Electronic components- Special- 455KC IF, iron core, Air tuned, Q approx. 175, Sharpen up your Recvr. 99cents ea 6 for $5.00- Special- Jennings type RA vacuum relay, DPDT, 30a, 300v (2 KV test), coil 115 vdc @ 25 ma, $7.00 ea- Special- Micro-switch, SPDT, 10a125v, 35 cents ea 4 for $1.00. Send 25 cents for catalog. W4EZS.

FOR SALE: Mint SP600 JX26 in Cabinet, Including Manual. Looks like new. Mechanically & Electrically excellent. No Modifications $300. Good Eico Model 324 RF Signal Generator — $20 Good Millen 92101 Receiver Matching Preamplifier with 20, 10 & 6 Meter Bandpass coils & manual $30. Five clean HRO plugin Couls G,F,G,H,J — $35. Two Collins 75A4 Mechanical filters 2.1 and .5 KC $30 each. M.J. Boho, W3ZB, P.O. Box 414, Edinboro PA 16412.

COLLINS 75A-4, serial 2364, completely updated including front end, with speaker. $375 or best offer. W2WK 516-378-1155.

DRAKE 2B receiver, $150. Clegg 99 6M transceiver, $75. Both in excellent condition. John Fishback, 152 Washington St., Woburn, Mass., 01801.

NCX-5 with NCX-A (AC) and NCX-D (Mobile) Power supplies in excellent condx. $375. Fred Besancon, 221 Natoma Ave. Santa Barbara, CA 93101.

DRAKE R-4A Rcvr and MS-4 Spkr $315.00. Drake 2-NT CW Xmtr $110.00, Drake W-4 RF wattmeter $51.00, Heath HM-15 SWR meter $13.00. Omega-T TE7-02 noise bridge $28.00. 32 Crystals Novice bands only $1.50 each. All in excellent condition. Frans Liem WB8EPJ, 5732 Rosebury Dr. Dayton, OH 45424. Telephone 513-236-2050.

NEW SR200, TH3, 6 & 2 meter beams, Hustler with all coils, Knight oscilloscope, signal tracer, capacitor checker, D104 mike, hustler BTV vertical, subre saw. WA9KBL 312-439-5884.

GALAXY 5 Mk2, AC400, G35DC Supplies. Excellent $300. Michael Tarnowsky, WB2YJS, 23 Brewster Ave., Apt 24, Ridgefield Pk., N.J. 07660.

FOR SALE: Heath Mohawk rcvr $100, Swan 175 w/o ps. $35. WA0VSM Karl Kramer 2316 W. Willimete, Colo. Springs, CO 80904.

HALLICRAFTERS HT37 xmtr. mint $175.; Heathkit HW30 Twoer complete with mike $20.; Craig Model 212 tape recorder and mike $20. Thomas W. Griece Sr 83 Pilgrim Rd., Torrington, CT 06790.

SELL new Ameco Nuvistor Converter Model CN5OW IF Output 30.5 to 34.5 in unopened carton — first $30. W8HBI 3318 Ralph Ave., Cleveland OH 44109.

SACRIFICE — New 2KWPEP NCX-1000. Solid state except driver/final. 1KWCW, 400WAM. Received Aug. 10th. Thoroughly tested on 79 QSO's. Numerous S9+20 rpts from DX. Make sked to hear outstanding SSB. Amnet $1095. Yours for $900. Need smaller rig for trailer. Consider trade for perfect R4B, T4XB w/AC&DC supplies. W5ACL 4010 River Dr., Houston, TX 77017.

DRAKE 2-B, 2BQ & Extra Xtal Mint No scratches - $185 K7RIW - 2618 E. Grandview Rd., Phoenix, AZ 85032 992-2638.

SELL: HQ-170 rcvr, exc cond. Elmac-AF 67 Xmtr. Bob Fiduk, Box 261, Sycamore IL 60178.

WANTED Collins 302C-3 Frank Lindsay, Holdrege, NE 68949.

MINT Condition SB401 transmitter with crystal pack, $240.00 or best offer. WB6WDI, 1105 Oxford Rd., Burlingame, CA 94010. Call 347-7347.

SELLING: Drake 2-C, $200.00; Ham-M Rotator, $100.00; Ameco PT Preamp, $53.00; Raytrack Horizon VIL 2 KW 6M Amplifier, $565.00; Maco Quad 10,15,20M, $95.00; (All factory sealed). Gonset Comm III 6M, $110.00; Matching Gonset 100W Amplifier w/new tubes, $80.00; New 826's $25.00/pair; Heathkit HA-20 6M Amplifier, 125W, $95.00; Knight R-100A, $85.00; Ameco TX-62 w/relay, $95.00; HW-32A w/AC, $145.00; HP-13, $50.00; 12V Dynamotor, $20.00; Parkes 220meg. converter, $50.00; Drake SC-6 6M converter, $50.00; Swan Mark VI 2KW PEP 6M Amplifier, $365.00. Or best offers. All equipment guaranteed mint w/manuals. F.O.B. Tom Dittrich, WB2LZD, 249 Meadow Lane, Vestal, NY 13850.

SELL: Ameco P.T. Preamp. Factory reconditioned mint. $40.00 F.O.B. Jupiter, W.F. Asbury Waterway Rd., Jupiter FL 33458.

COLLINS 30L1 For Sale. Excellent condition - $300. Sorry cannot ship. Edw Ayres 7016 Browning Rd Pennsauken, NJ 08109.

TEAC A4010S stereo tapedeck; new Price includes factory service manual and spare parts kit. $350. Nonnemaker, 66C Elizabeth Rd., Hampton, VA 23369.

HQ110AC Hammarlund receiver. Immaculate condition, with manual, $135. Raymond Harrill, WA5GSC, 5511 Baseline Rd., Little Rock, AR 72209.

HAM Ticket — Amateur Radio License Course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co., 220 Mira Mar Ave., Long Beach, CA 90803.

SELLING: Hammarlund HQ-170C w/matching speaker, $185.00; Eico 720 CW Transmitter, $50.00; Hallicrafters SX100 w/matching speaker, $175.00; SX110, $90.00; Ameco PT Preamp, $42.00; Mosley RV-4 Vertical 10,15,20,40M Plus Roof mount, factory sealed $35.00; Waters Compreamp No. 359, $15.00; HW-12A w/matching AC, $125.00. FOB. Goetz 605 Broad St., Endicott, NY 13760.

SELL Polygon Quad Kit. Never used $50.00. Charles Dene 45 Eastbrook Lane, Willingboro, NJ.

COLLINS 75A4, S/N3155, factory modifications, top condition, 5KC, 3.1KC and 6KC filters; with speaker and manual, $375.00. John T. Egan, W9EQQ, 1327 Monroe, River Forest, IL 60305.

WANTED — Collins 30- L1 Linear. State Condition, Serial number and firm price. Prefer pickup northeast. WA2MDR Box 311 Brightwaters, NY 11718.

WANTED Collins filter for 75A4 500 H2 cw, Mint HQ170C for sale $140, WA2YPD Friction, 4 Carteret Rd., Allendale, NJ 07401.

SELL: NCX-5 MK II, Aux VFO, AC Supply, Calibrator, xtra xtals, excellent condition. Best offer over $400; WA2IAM, 8 Citrus Dr., Rochester, NY 14606.

HEATHKIT SB 300 Receiver and SB 401 Transmitter excellent condition $499. SB 200 Linear $190. Michael Poston WA4EFY, Cornelia, GA 30531.

FOR SALE: KWM II SN 15,500 — 516F2 $850.; NCL 2000 $325.; Telrex 15 KW Baluns $10.; Ameco Receiver Preamplifier $20.; 24 hour clock $7. Equipment can be heard daily at 14220-21280 Need: 8122's. W2LEC.

FOR SALE: Heath SB-101 $325, HP-23 with SB-600 spkr $45, SB-200 $179, SB series CW filter $11 SB-301 $239, 6 and 2 meter converters for the SB series $16 each, sixer $25, HR-10 $39, DX-60 $49, HG-10B $27, Comdel CSP-11 speech processor $59, Eico 723 $29, Ten Tec PM-1 $29. Before 3 P.M. call 615-647-2891. Fred Harris, WA4URA RFD 4, Box 122, Clarksville, TN 37040.

SQUEEZE Key, the ultimate electronic Keyer. Compact, integrated circuit board, built-in double lever paddle, sidetone speaker. Quality import. $79.50. SASE for brochure. Dave Kennedy, W9DL, Far View Rd., RR No. 1, Elburn, IL 60119.

SWAP excellent 5 string bluegrass banjo with case for heath mobile P/S, 5B Mobile antenna including mount. Write Lew, WA5YOD, Box 22577, Fort Worth, TX 76122.

SX101A $189; BC-348 $65; Telrex 20M Beam, 38' unguyed mast, rotator $65; 45' Tritower $25. All pickup only, offers ok. K5MVN 113 Woodcrest New Iberia La 70560.

WANTED a used multiband transceiver write with full details P. Hellyer, 6542, 20th. NE Seattle, WA 98115.

SELL Gonset GSB 201 Linear Amplifier with four 811A's excellent condition $150. S. Bennon W9DT, 2205 Twickingham Dr., Muncie, IN 47304. 317-284-9461.

6 meter Clegg transceiver with manual. Very good condition, $80. Fred Beihold, WB9CTC, Box 46, Kempton, IN 46049.

SELL: Collins 75S1 Receiver, mint condx, $285. W0SRK, Zearing, IA 50278.

HW22A, HP13, Mike, Hustler Ant. WA3DTL.

VARIAC, 115v., 20AMPS., uncased, new, $25 + postage (25 lbs. ea.) B. Sherrett, TUSLOG DET. 6, Box 557, APO New York 09254.

MCCOY Crystal filter and generator crystals. New in box. Model 32B1 $25.00 Dan Tosh, Asbury College, Wilmore, KY 40390.

SELL or swap Heath HW-17A with HWA-17-2 FM Adapter & 4 xtals. Consider swap on Heath GR-78 Rcvr, SB-200 linear or what have you? W7FOM Laurence B. Smith 441 Minnesota Ave., Rte 4 Missoula, MT 59801.

CANADIANS, Heath DX60A $90; HR10 $90; HG10 $45; HO-10 $45 You pay postage VE3EMQ 33 Toronto St., Kingston, Ontario.

WEST Coast Hams buy their gear from Amrad Supply Inc. Send for flyer. 1025 Harrison St., Oakland, CA 94607.

LINEAR — NCL 2000 perfect $340.00; used less than 5 hours. Moving to mobile home. Call Graham 517-ED2-1774 3647 W. Arbutus, Okemos, MI 48864.

SELL 200V, excellent condition, original carton - manual $450.00 WA2RMR - Del Baglivo, 20 Centre Ave., Secaucus, NJ 07094.

HT-37 $175.00 HQ-170 $125.00 or botb $275.00 excellent L. Claggett, 90 Surrey Dr., Brunswick, OH 44212 Tel. 216-225-9336.

SB-200 for sale. Immaculate. $200. K1JPR, 22 Darbrook Rd., Westport CT 06880.

FOR SALE amateur and engineering book collection. Send SASE for list. K1APA, 3 Sunny Acres Brattleboro VT 05301.

WANTED: Kennedy 28' or larger parabolic reflector and or a manual. Also a AM-915A/TRC-24, send specs., price, and condition in first letter. K8EFS Merlin Anderson R No. 4 Box 54 Charlotte, MI 48813.

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WANT Pre-1921 wireless equipment and catalogs. Description, price, Dick Sepic, 1945 E. Orangegrove Blvd., Pasadena CA 91104.

STAINLESS Steel ground rods. No corrosion to cause resistance. 5/8" dia. 10' long, $7.40 COD check, money order. Ship express collect. G & F Mfg. Co., Inc., 5555 W. 109th, Oaklawn, IL 60453.

SELL Page communications engineers FSK demodulator Model D3 similar to Frederick Electronics demodulator including decision threshold computer with built-in CRT. Good condx. $100.00 Plus shipping charges. Marvin Fein, W2AH, 151 Rock Creek Lane, Scarsdale, NY 10583.

FOR SALE SB200 Mint $195 You Pay shipping No trades, Mike Morrisey, 752 High St., Harrodsburg, KY 40330.

DRAKE TR-4; AC, DC P/S; matching speaker; mobile mount. xlnt condx. $500, you ship. C.F. Black, WB0BIS, 2616 Belle St., St. Joseph, MO 64503. 816-233-8423.

DRAKE 2C, Xtal Calb., with 2CQ and Drake 2NT Xmtr. — $300.00. Wm. Hicks, WN8FFO, Box 8, Jonesville, MI 49250.

HW-100 5-band Heath transceiver perfect with manual $210 plus shipping W8GRG 2842 Winthrop Cleveland OH 44120.

SB200, $190; BC610, $40. K1MBA Saw Mill, Wallingford, CT 06492.

SB-401 Xmtr with Xtal pack $225.; Drake 2-B Rcvr with Spkr/Q-mult $175 — both for $375; SB-630 station console $65 — All three in mint condx with manuals for $425. R. Jansing, Apt. 314, 303 W. State St., Doylestown, PA 18901.

SWAN 250, 117XC pwr. supply, xtal calibrator, $235. Drake L-4 $400. W2EOS, 7471 Thunderbird Rd., Liverpool, NY 13088.

SELLING 2-CQ. Want Swan FP-1. WB9CZS.

EICO 720 xmit 90 - 75 watts Gud condt. $40.00 WA1LAT, 14 Percy Rd., Lexington, MA 02173.

FOR SALE: Hallicrafters SX-101, Great Shape. WN0ZXC, 808 Henderson St., Kennett, MO 63857.

TRANSFORMERS rewound W4CLJ 411 Gunby Orlando Florida

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SELL: Hallicrafters HT-37 Trans. exc working cond. Dow-Key Relay, Turner 254c Mike- $200 WA1KOU Jim Rittenburg 17 Gannett Terr. Sharon, MA 02067 Tel. 617-784-6252.

TWO complete Heavy Duty 2500 v.d.c. 500 mill power supplies in 4 foot 6ud grey cabinet casters including 6 illuminated Triplett meters 0 to 50; 150; 500; two 1000 mills One 0 to 150 v.a.c. Two low pass line filters, relay. Plus copper chassis screen shield Two 4-250A amplifier 15 amp filiment transformer, Variac, B & W e.c. KW coils 10-15-20-40-80 Split stator 50 uuid butterfly 1/2 inch spacing and 25 uuid vacuum, overload relay, blower. Oscilloscope thrown in. Come get it $125.00 W9GM John G. Harrington, Hugerstown, IN 47346.

CONTACT us for the best deal on new or reconditioned Collins, Kenwood, Tempo-One, Drake, Swan, Galaxy, Hallicrafters, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to beat any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio Butler, MO 64730.

COLLECTOR'S Item IRE Proceedings run, 1950 thru 1954, broken 1945 thru 1948, s.a.s.e. list. Interested Kennedy 110 and SR2000. Have Grebe CR5 and Crosley 51. Trade. W5LR, 1314 Holly Glen, Dallas TX 75232

DUMMY Loads, 1 kw., $9.95. Phone patch, $8.95. Wired, $4. Ham-Kits, P.O. Box 175, Cranford NJ 07016

WANT Early issues of Radio News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electronics, Popular Radio, Broadcast, Wireless Age, 1923-25 Callbooks. For Historical Radio Library. Wayne Nelson, W4AA, Box 127, Concord NC 28025

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SWAN 250, 117XC, Mike, excellent $250. Want mobile eq. WB2KDB/5 307 West First, Weatherford, TX

SEASON'S Greetings to all from "D.B.", W4UDQ, Paul, W4HHK, and Steve Wilson, Box 430, Collierville, TN 38017

SWAN 350C, 117XC AC supply, excellent condition, $340. FOB WA9QOI 314-986-2849

SELL: HT37 Transmitter — $160; SX101A Receiver — $155; Linear Systems 500D.C. Supply — $55; Waters 10-80 MTR mobile antenna — $30; All in good condx. Ray Stanzak 4764 Norstar Blvd., Liverpool, NY 13088

WANT SS 2M FM; SS Frequency Counter; 23 Channel CB. Trade or Sell H-P, General Radio, Stoddart, Gertsch, Bird, etc., or 144/220/432/1296 up gear, list SASE. W4API, Box 4095, Arlington, VA 22204.

HT 32B for sale A1 shape $225.00 Stan Talago Rt 3 Bridgeport, WV 26330

FOR SALE: BC-221AH Frequency Meter, mint condition $85, Heathkit O-4 5" oscilloscope $20. Eugene A. Frenko, W3EGM, 555 Thayer Ave., Silver Spring, MD 20910 301-589-7523

FOR SALE: Heath SB 200 Linear, mint condition with manual, $200.00 RTTY Demodulator, works perfectly, $75.00. S. W. Henderson, P.O. Box 236, Camp Hill, AL 36850

SIX meter SSB sale: Heathkit SB 110A with HP 23 supply, SB 600 speaker, $250.00. Clegg Venus with 416 supply, SS speech booster, $200.00. New Clegg Apollo linear amplifier, $150.00. Contact: George Hawrysko, WB2GWU, 220 Highland Blvd. Apt. F-12, Brooklyn, NY 11207. Phone: AC 212-277-4001 between 5-9 P.M.

COLLINS 75A4 S/N 1674, mint, 6/1 vern. knob, low noise/mixer, H.S. Drake type n. blanker, 2.1, 3.1, & 6 filters $350. 32S1 S/N 86 very clean, 6146Bs with 516 F 2 power supply with speaker $375. Will ship. W6DSX, P.O. Box 201, Paradise, CA 95969

SAVE! Tri-Ex LM-47OD motorized 71' self-supporting tower one year old including TA-70L tilt-over accessory, thrust bearing and 20' mast $1850 value only $1250. Hy-Gain 205B five element 20 meter Long John beam $250. Henry 2K linear $350. Hy-Gain DB 10-15 beam $50. Pick-up only. Will ship following fob: Collins 75S-3B S/N 15829 mint $425. Collins 516F2 in speaker cabinet $95. New Hy-Gain 400 rotator factory guarantee $135. Comdel CSP-11 Speech Processor $75. Gonset GPP-3 Phone Patch $25. Hy-Gain 18 HT Hy-Power $50. 213-377-3508. E. Titcomb, W6DQ, 8 Surrey Lane, Rolling Hills, CA 90274

KWM - 2 Serial 12367 $675.00 Remote VFO Phone Patch and Watt Meter Model 312B5 $195.00. AC supply 516F2 $90.00. All manuals and cables, mint condition. $925.00 takes all. Any demonstration. Phone evenings 201-274-0146 W2OZD

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SX-101 Mark - III - Hallicrafters Ham band receiver, 10 thru 160, includes 11 meters, 6 EH 7 RF, FASR AGC. Excellent condition. $100.00 Harold E. Brown, W1ONU RR 1 Box 145P Palmerton PA

HAVE two Drake FR-4 transceivers, your choice: One year old with P S $500. or new with P S and noise blanker $600. also 2 vacuum variables UCSL 750 uuf at 5000 volts; LM-19 frequency meter; 0.5 & 2.1 filters 75A4; SC 453; 813 Fil Xform; Hi voltage filter Caps: Panadaptor. Wanted: Drake SPR-4 & T-4B Combo; Millen GDO. K1PNS, 24 Rockwood DR., Waterford, CT 06385

CHESS Players: Meet 3545, anytime. Play +8 kHz. W2EYG.

SELL Heath SB 200 Linear-excellent condition $190, or best offer, pick-up deal only - W8DSW-R.F.Hudson 6546 Crane Ave., Detroit MI

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 Q, Box 44 Dayton, OH 45401

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HEATH DX-60 transmitter and HG-10 vfo, factory calibrated, both like new, manuals, $70.; Vibroplex "deluxe original" bug, chrome, new, $20.; swr bridge, new, $10.; Q-multiplier, $7.; S-38C receiver, all new tubes, $25. J. L. Rethbock, P.O. Box 102, Boston, Mass. 02101. Telephone 617-262-7479 evenings.

TWO'ER Alliance Rotator, 8/8 J-Beam, $50.00; 45 QST's 65-70 $10.00. No Trash! You pay shipping WA9PIW 8234 Central Park, Skokie, IL 60076

MR1, MT1, MP1, Typing ReperFerator, VF1, Tuner, BC455 - Make offer. Send for list. Need SSB Trancieve, K5BCQ 506 S. Austin No. 178 Webster, TX 77598

SWAN 500 including 117 XC supply, Excellent condition one owner, original cartons — $395.00 certified check Roberts, 1515 32nd S.E. Auburn, WA 98002

SX-117, mint, $179. W5RKT, 901A Spring Valley Plaza, Richardson, TX 75080.

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FOR SALE: Heath SB-200 SB-300 Also Kleinschmidt TT-325/FG Distributor Transmitter. W4MSO, 7908 Juniper St., Miramar FL 33023 989-8217

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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 Ave at 8PM — New members wanted.

TOROIDS! Lowest price anywhere. 40/$10 postpaid. Center tapped 88 or 44 mhy 5/$2. Lorenz 60 speed page printer with built in reperf and TD (ASR) $125. Teletype model 32KSR reconditioned, perfect page printer (60 or 100 speed) $200. Reperforator tape 11/16" $10/case/40. Stamp for list. Van W2DLT 302Z Passaic Av. Stirling NJ 07980.

ESTATE W9OOL: Collins S/Line for sale, xcint condx, all four pieces one unit. $900. xmttr 32S-1, rcvr 75S-1, console 312B-4, and p/s 516F-2. Mrs. T.S. Lively, 914 Cornell Ct., Madison, WS 53705

FOR SALE: Apache TX1 with SB 10 SSB Adapter $135.00, Hammarlund HQ 140X $125.00. First $225.00 Gets both. Alfred L. Jacobs, WA0HIH Box 241, Kiowa, KS 67070

DISCOUNT Prices, New Equipment, Factory-sealed Cartons, Full Warranty! Galaxy GT-550 ($550) $459, R-530 ($795) $669, FM-210 ($220) $185, Swan 270B ($499) $420.; 500CX ($565) $475, Ham-m with indicator ($129.95) $99.95, TR-44 ($69.95) $59.95 Antenna Specials Hy-Gain TH6DXX ($179.95) $140, Hy-Quad ($129.95) $104, Hy-Gain 400 Rotator ($189.95) $149.95, Mosley CL-36 ($172) $135, CL-33 ($145.15) $115, TA-33 ($133.10) $106, TA-36 ($167.35) $134. New Drake Equipment R-4B ($475) $390.; T-4XB ($495) $415. New Tri-Ex W-51 Self-supporting Tower (Reg. $393) $333 Prepaid. BTI LK-2000 (Reg. $795) $674. Write for Quote on items not listed. Discount Radio Sales. Box 6044, Lubbock, TX

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verything you've always anted to know about low Scan amateur television

On what amateur bands is SSTV authorized?

The FCC has authorized SSTV operation on all phone bands except 160 meters and the General Class portion of the phone band on 80, 40, 20 and 15 meters. With the above exceptions an amateur licensee can operate SSTV on the same frequencies he can operate phone.

What kind of radio equipment is required for SSTV?

The radio set and antenna you now use for phone contacts are all that are required. The Robot Model 70 Monitor connects across the speaker wires and the Robot Model 80 Camera plugs into the microphone jack. Most SSTV work today takes place on 20 meters using SSB radio sets. Successful SSTV contacts can be made with transceivers operating barefoot.

How many SSTV stations are now on the air?

About 100 SSTV stations, using home constructed equipment, are now on the air, and the number is growing rapidly. They are located in the United States and practically all continents. The DX capability of SSTV is being demonstrated daily by picture exchange between U.S. and foreign amateurs.

Where do I tune to hear SSTV operations?

Slow scanners operate on a net of 14230 kHz. Schedule time is 1800Z on Saturday and also most evenings. An international net meets on the same frequency daily at 1830Z. Local nets operate on 3845 kHz and 7200 kHz at 0400Z. Call-ins with or without SSTV gear are welcome.

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Do I need any special technical knowledge to operate SSTV?

No. The Robot SSTV equipment is so designed that any licensed amateur operator can easily set up and operate a SSTV station. The impression that SSTV required advanced technical knowledge was based on the fact that, until now, amateurs operating SSTV had to build their own sets.

What is the effect of interference on the picture?

When the SSTV signal is about 2 "S" units stronger than the interference, clear pictures will be received. The modulation system used in Robot SSTV equipment has a very effective interference suppressor.

Can I record SSTV pictures?

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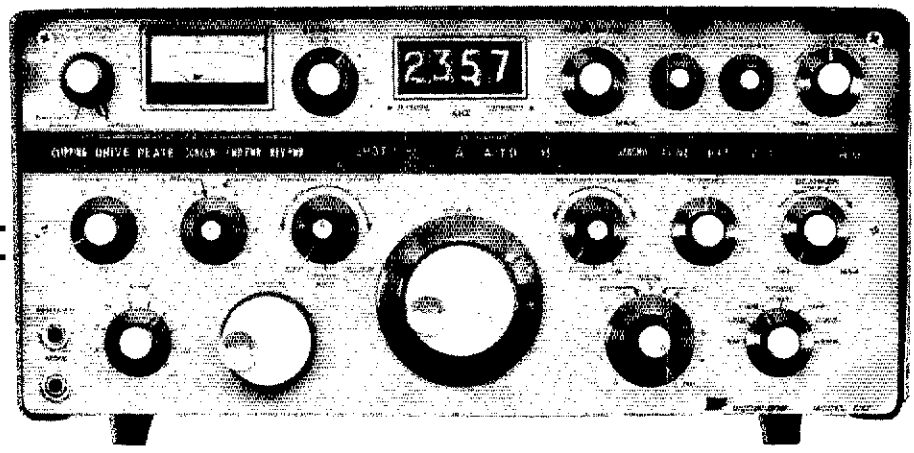

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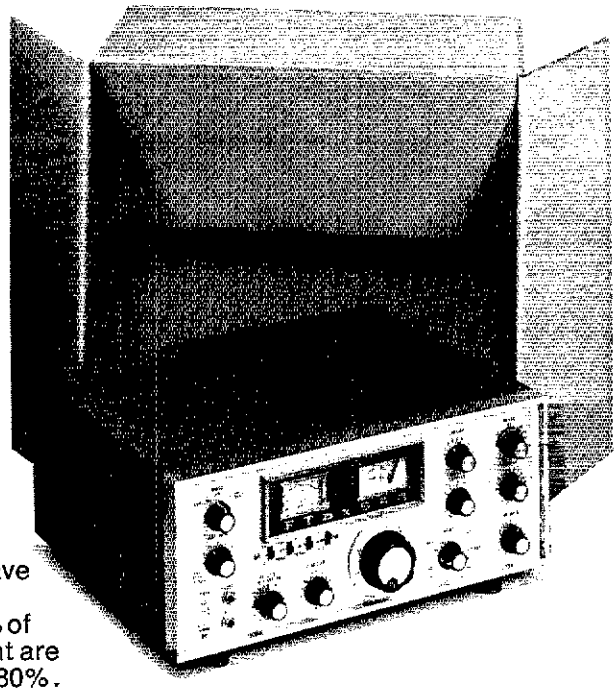

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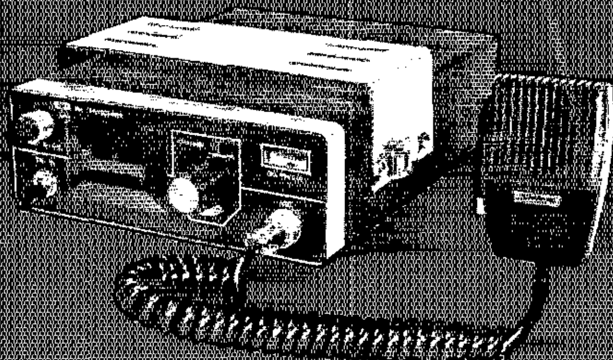

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SPECIFICATIONS

General

Frequency Coverage	144-148 MHz
Number of Channels	12 Channels, 2 supplied Channel 1 Receive 146.94 MHz Transmit 146.34 MHz Channel 2 Simplex 146.94 MHz
Modulation	Frequency Modulation
Transmitter Control	Push-to-Talk
Power Drain	AC: Receive 6 Watts Transmit 50 Watts DC: Receive 0.5 Amps Transmit 4 Amps
Power Source	AC: 117 Volts Factory Wired 220/240 Volts 50-60 Hz DC: 13.5 Volts ±10%.
Dimensions	7⅞" W x 2¾" H x 10¼" D.
Weight	8¼ lbs.
Standard Accessories	Dynamic Microphone, Antenna, Connector Plug, AC/DC Cord

Transmitter

RF Output Power	10 Watts
Frequency Deviation	15 KHz maximum
Frequency Stability	±.001% or less
Spurious Radiation	Greater than —80 dB below Carrier
Frequency Multiplication	12

Receiver

Receiver Circuit	Crystal-controlled Double Conversion Superheterodyne
Intermediate Frequencies	1st 10.7 MHz, 2nd 455 kHz
Input Impedance	50 to 75 Ohms
Sensitivity	0.5 µV or less for 20 dB S+N/N ratio 1 µV or less (30 dB S+N/N ratio at 10 kHz deviation with 1 kHz modulation)
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