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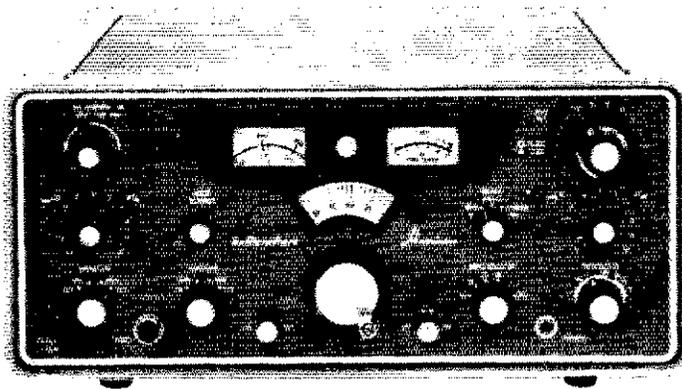
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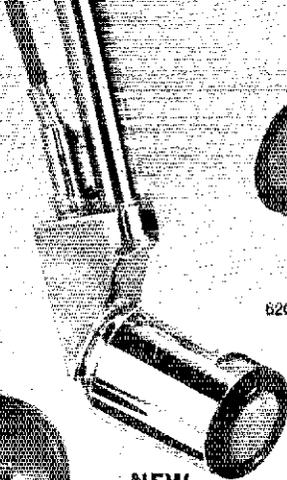
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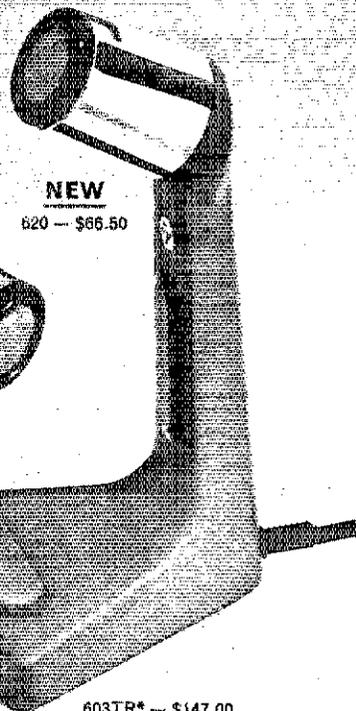
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OUR COVER

The rig is a QRP 80/40-meter transmitter-receiver and it is described on page 11. The young lady is our QST Production Assistant, Linda Sturtevant.

QST

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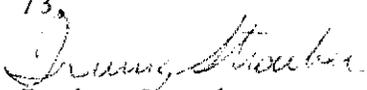
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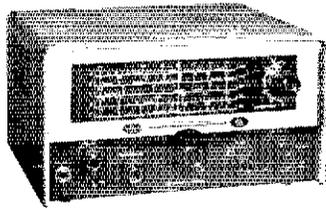
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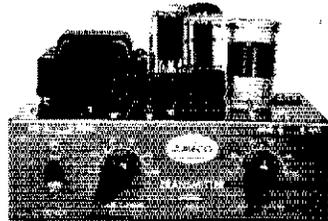
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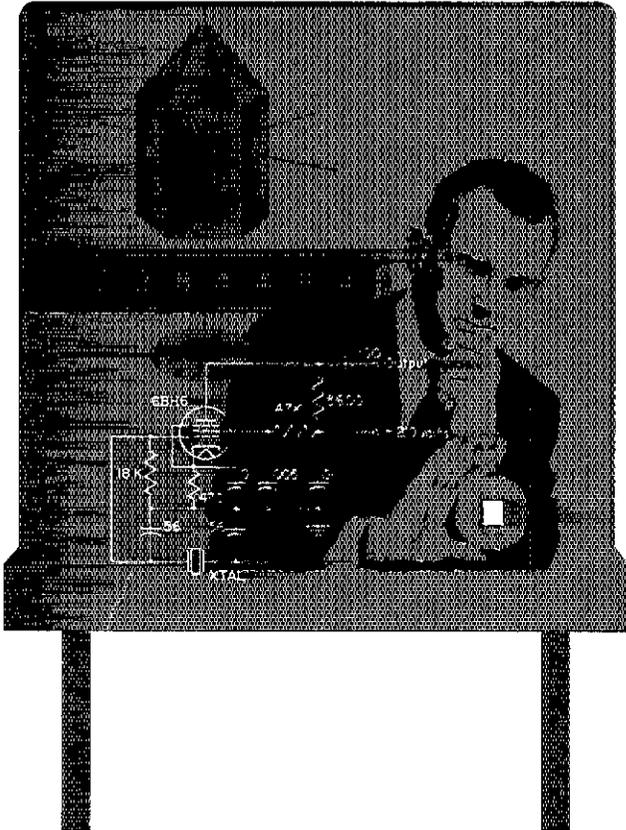
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Vice-Director: Thomas C. Banks W5HJ
6500 Mossman, N.E., Albuquerque, N. M. 87110

Southeastern Division

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

Southwestern Division

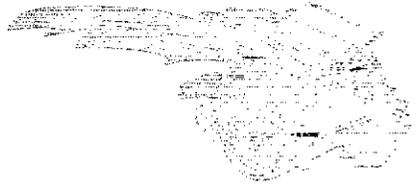
- JOHN R. GRIGGS W6KW
538 Costa Mesa St., Costa Mesa, Calif. 92627
Vice-Director: Arnold Dahlman W81EI
14940 Hartland St., Van Nuys, Calif. 91405

West Gulf Division

- ROY L. ALBRITTON W5BYB
107 Rosemary, San Antonio, Texas 78209
Vice-Director: Lester L. Harbin W5BNG
1515 Culmum, Fort Worth, Texas 76107

* Member Executive Committee

"It Seems to Us..."



BOARD MEETING

This morning, like every other weekday throughout the year, our pickup truck made the first of its thrice-daily trips bringing bags of mail from (and to) the local Post Office. Four gals, with one supervisor, spent three and one-half hours just sorting, machine-slitting and opening envelopes, and time-date stamping the contents. This kind of volume presents quite a workload for the Hq. crew. But we wouldn't have it any other way, for it is an expression of a healthy, concerned, involved — and *expressive* membership.

There is one aspect of our incoming correspondence which deserves separate comment, especially in view of another Board meeting soon. It relates to those letters requesting, expecting, and/or demanding various actions by the Hq. When such matters are within our jurisdiction, fine. But some of them concern basic policy matters. "Please request FCC to change the amateur regulations . . . (Technician privileges)." "I am appealing to you to support my petition . . . (for more phone frequencies)." "What are you going to do about this matter? . . . (counterpart calls)."

While it is most flattering to have this kind of input to Hq., it's not the way the system is designed to work, and thus not the best way to achieve the results you want.

Despite what you may have read in editorials elsewhere (usually critical of ARRL and devoted to circulation-building through appeals to dissension), it is still the elected Board of Directors which sets League policies. It is your representative, listed on page 8 of this and every issue of *QST*, who can most effectively translate your wishes into action.

You and your fellow amateurs, that is. Seldom is one letter or one view or one proposal of sufficient immediately-recognizable merit to gain instant acceptance. For an action to materialize, it needs more than one proponent or one supporter.

In fact, there are really two steps involved in affecting League decisions. First, you must convince your own director that what you propose is meritorious. Second, and equally if not more important, a majority of the other 15 directors must carry similar views, convinced by *their* members. A certain idea may be topmost in the minds and desires of, say, the New England Division; but if this feeling has not been expressed by fellow hams in the Central, Pacific, Roan-

oke, Delta, etc., divisions, we WIs will make no headway at all on our pet project.

The system is a pretty good one. As has often been said, democracy is rather horribly inefficient — but it is still the best governing procedure yet discovered. Those hepped with a pet idea may chafe at its slowness, and the "stupidity" of all the other members who don't happen to agree; yet this is built-in protection against precipitous (and probably unwise) action promoted by a small but noisy minority. League policies can and do change, but there must be some indication of general support by the membership as determined by directors in their individual divisions.

So communicate with your representative, on your own or through action by your radio club, if your thoughts concern the specialty areas of contests or vhf repeaters, expose them to one or more members of the advisory committees on those subjects (details in "Haps" last month) set up by the Board for just this purpose. We'd appreciate receiving a copy as information, certainly; but the missive seeking action in basic policy matters should go to the director or committee member.

The Board meeting is the first of May, but even now is not too early to speak up. The sooner you get an idea in active discussion, the better the chance for its full consideration and — assuming its merits — eventual adoption.

OUR NEW (?) LOOK

This issue of *QST* marks the first with any substantial use of the new IBM composing equipment installed in our Headquarters earlier this year. Of course as we write this we haven't seen the final results ourselves, so perhaps we should hold our breath and cross our fingers rather than say anything!

The concept of the system is hardly new, but the gear became suitable to our needs only with the recent switch to offset printing. It's computerized, and therefore a lot smarter than we are right now; with adequate practice, we expect to turn those tables, before too many later issues come off the press. Meanwhile, like the lady shopping in hair curlers, we may not look our best, and this will be especially true during the transition period where we're using some of each kind of type preparation.

We'd appreciate comments, pro and con. Assuming, that is, you notice any difference.

QST

League Lines . . .

Another Oscar is up! On January 23, after numerous postponements, the VK-built "Australis" satellite rode into sun-synchronous orbit aboard a Delta vehicle. Its 39 pounds contain both 29.450 and 144.05 Meg. telemetry emissions. We hope you were prepared, at least heard it, hopefully undertook some qualitative measurements -- and reported them (Amsat, Box 27, Washington, DC 20044) to add to data being collected. Why the past tense? Because the power source is expected to last only about a month, so Oscar may be silent by the time you read this.

W1AX also went into orbit in January -- copping the #1 5BWAS award. Quite an accomplishment, especially acquiring all the cards in such a short time, but the sort of thing you'd expect from OT Corey (you may remember him better as W1JYH). Speaking of awards, three European stations -- DL7AA, LA7Y and OH2YV -- are among the first 12 qualifiers for 5BDXCC.

When amateurs in Puerto Rico, Hawaii or Alaska, or in U.S. possessions, operate portable or mobile, FCC says (in a letter to WB2LZj) they are required to send only the numeral of the call area in which they're operating, precisely in accordance with Section 97.87 of the rules. That is, when KP4XX goes portable in areas under the fourth call district's jurisdiction, he signs KP4XX/4 whether he is across town from the home QTH, in the Virgin Islands, or in North Carolina! No violation, of course, if complete prefixes are signed to indicate portable location, as has been the custom for convenience in identification -- especially in contests.

Several times the question has arisen whether it is permissible to make a videotape of the new ARRL film, for convenience in later TV showings. By all means! Prints are also available for purchase in special cases -- possibly by clubs, industry, etc. -- at \$250 each.

Late delivery of January QST caused a few nightmares at Hq. We put copies in the mail December 20-22 (west coast first, then working east) -- so figure out how long it takes the Post Office to get the magazine to you. A few complainants point out they're getting other ham magazines "on time." Sure -- they're mailing a week or two earlier than they used to, which only means the copy deadline is that much earlier and thus the news (if any) is that much older. VE7WL says even Canada has its troubles; he had some second-class mail sent from Vancouver, a matter of about 75 miles, and it took 11 days; "it couldn't have walked," he says, "as there is water in between."

A broader League field program. A 3-man Board committee is currently studying ways to broaden the traditional Communications Department field program (in which about 6000 members are currently involved) to provide organized activities for members interested in other specialty operating areas. Any ideas or suggestions, please?

ARRL Full Membership increased in 1969. Not much, admittedly -- only tenths of a percent -- but that's the same order of magnitude of the losses we've had the past couple of years. This development may startle, but probably won't stop, the "competitive" magazine editors and other prophets of doom for amateur radio and the League who claim we're losing hams in droves.

Quote-of-the-month, from "The Ontario Amateur" -- "Our hobby comes in several 'delicious flavors' -- DX, fm, rtty, traffic, building, experimenting, ragchewing, etc."

An Engineer's Ham Band Receiver

BY RUDOLF FISCHER,* DL6WD



Front view of the receiver. At the upper left from the tuning-dial assembly is the receiver incremental-tuning control and the S meter, and at the upper right is the afc loop sync. push button. Within the dial assembly appear the dial counter in the window at the left, and the phase-lock meter indicator in the window at the right (an edge-wise meter is used). The home made dial was inspired by the design used in the HRO series of receivers.

THIS article describes a solid-state receiver which utilizes a somewhat unconventional conversion principle for optimum overall performance. Today's modern electronic components were incorporated for realization of this project, which offers the following highlights:

- 1) Single-conversion principle with very selective 9-MHz crystal filters.
- 2) MOSFET front end for good cross-modulation performance.
- 3) Double-balanced diode mixer with hot carrier diodes.
- 4) Electronically tuned front end using varicap diodes.
- 5) Phase-locked precision-tuned hf oscillator.
- 6) Complete coverage of all ham bands 160 through 10 meters.
- 7) Transceive output signal 9 MHz above the received frequency plus receiver incremental tuning.
- 8) Extensive use of linear integrated circuits and toroidal inductors.

* 6924 Neckarbischofsheim, Turmstrasse 27, Federal Republic of Germany.

Block Diagram

Fig. 1 shows the main layout of the receiver. The upper portion of the diagram is the basic receiving system and the lower portion is used for generation of the main conversion frequency.

The rf signal from the antenna is amplified in a cascode amplifier followed by a source follower which provides impedance matching to the balanced diode mixer. The intermediate frequency of 9 MHz is filtered by one of three crystal filters selectable for a-m, ssb, or cw reception and then passes to a 3-stage i-f amplifier. Separate demodulators for a-m and ssb/cw are provided. For ssb/cw reception a crystal-controlled BFO feeds the injected carrier to the product detector. A part of the i-f signal is amplified separately for agc generation and for the S-meter circuit. The detected output passes to a 2-watt audio amplifier which feeds a low-impedance speaker or dynamic headsets. A 1.75-MHz calibration oscillator can be switched on for checking the low-frequency band edges.

The receiver's main conversion oscillator is a so-called VCO, a voltage-controlled oscillator,

Described here is a totally solid-state instrument designed to have wide dynamic range, freedom from spurious responses, and good sensitivity and selectivity. While such features are certainly not uncommon in modern-day receivers, the author's method of received-frequency conversion is a novel one for the home constructor! The high-frequency local oscillator, using a frequency-synthesis technique, is phase locked to a linear master oscillator operating at a much lower frequency. This approach affords, with single conversion, the stability and bandwidth advantages of a dual- or triple-conversion receiver having a crystal-controlled first oscillator and tunable first i-f, while the possibility of "birdies" from mixing products is greatly reduced. Because the complexity of a project such as this would prohibit its being undertaken by any but an experienced amateur, full construction information is not included; instead the author concentrates on circuit details.

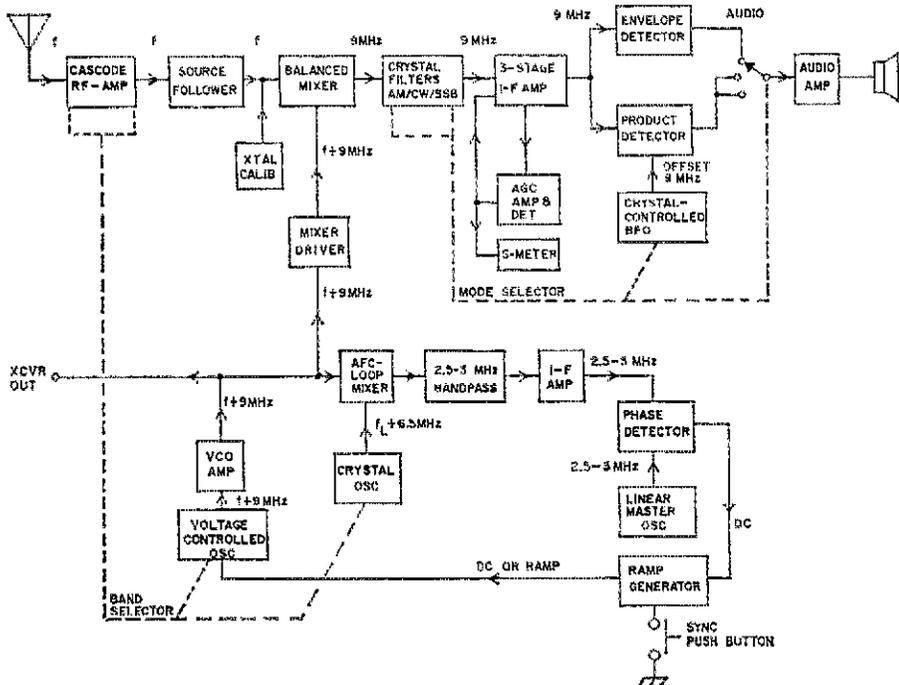


Fig. 1—Block diagram of the receiver. Dashed lines show band-switched and mode-switched stages. The frequencies of receiver operation are shown between appropriate blocks.

f —received frequency, MHz.

f_L —lower frequency limit of amateur band segment in use (1.8, 3.5 . . . 28.5, 29.0, or 29.5 MHz).

which is phase locked to a lower-frequency linear master oscillator. This VCO is simply a free-running oscillator, the frequency of which depends on the reverse dc voltage applied to a varicap, which is an integral part of the oscillator tank circuit. The VCO frequency can be voltage-tuned through the range of frequencies 9.0 to 9.5 MHz above the lower frequency limit of the received ham band segment. Phase locking is obtained in the following manner: The VCO frequency is mixed with a crystal frequency 6.5 MHz higher than the low-frequency end of the received band. This results in an i-f of 2.5 to 3 MHz (with 500-kHz band coverage available from this layout). This i-f signal passes through a bandpass filter, is then amplified in a broad-band amplifier, and fed to a phase detector. This phase detector gives a dc error output voltage when the phases (and thus frequencies!) of the i-f and LMO signals are deviating from each other. In the phase-locked condition, any frequency drift of the VCO causes an error voltage at the phase-detector output, correcting the VCO frequency within microseconds. The VCO frequency therefore follows exactly that of the LMO, and perfect stability is achieved although the VCO operates at a much higher frequency. This is called an automatic frequency control or afc loop.

By pressing the sync push button, the VCO frequency is swept through its spectrum by a ramp or low-frequency sawtooth waveform voltage. Locking to the LMO frequency is obtained

by the phase detector error signal at the moment of phase coincidence.

The main advantage of this manner of frequency generation is that the VCO can be designed for high spectral purity (or low spurious content), so problems associated with unwanted mixing products are reduced considerably. Broad frequency coverage can be obtained by combining a simple VCO and a crystal oscillator to give the proper afc loop intermediate frequency. The disadvantage of course is the more complex circuitry and higher cost. Commercial frequency synthesizers are using this principle to generate stable frequencies up into the GHz range.

Figs. 2 through 5 show the schematic diagrams of the various parts of the receiver. Table I (page 18) gives the data for constructing or selecting the band-switched components. The following paragraphs provide operational information about each section of the receiver.

Receiver Front End

The rf signal coming from the low-impedance antenna is clamped by a pair of fast-acting silicon diodes, which protect the receiver against excessive signals from the station transmitter. If the broad-band signal voltages from the antenna are in excess of 200 mV, which never happened with the author's various antennas, protection should be made in another manner, such as an rf attenuator, to prevent cross-modulation effects.

CASCODE AMP

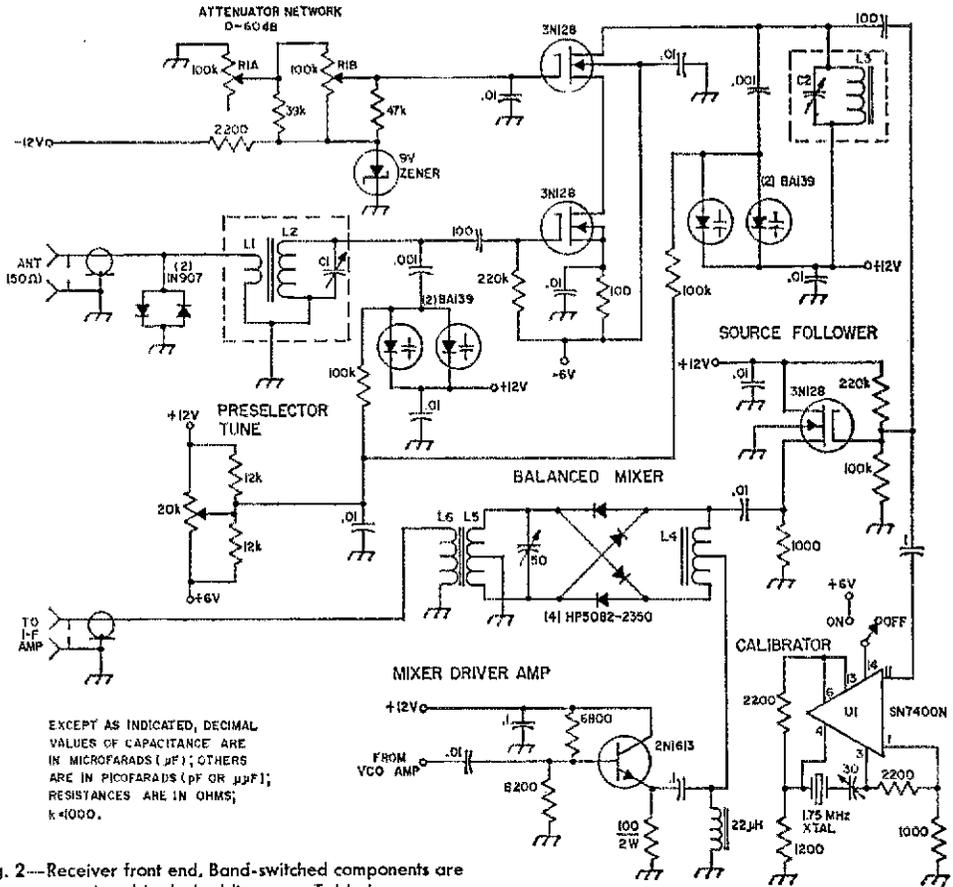


Fig. 2—Receiver front end. Band-switched components are enclosed in dashed lines; see Table I.

- L₄—Toroid, 32 turns No. 32 enam. wire, center tapped, wound on Indiana General Ferramic Q2 core, form CF102.
- L₅—Toroid, 16 turns No. 32 enam. wire, center tapped,

Inductive coupling is used to the input circuit. Winding ratios were carefully adjusted with a noise generator. Input and drain circuits are wound on separate ferrite toroids for each band and are peaked by small concentric trimmer capacitors. Band tuning is done electronically by two paralleled varicaps, completely eliminating the mechanical problems associated with a ganged tuning capacitor. Reverse voltage of 0 to 6 volts is applied to the varicaps from the panel-mounted PRESELECTOR TUNE potentiometer. When using varicap diodes in a tuned circuit, care should be taken that the reverse voltage applied to the diodes is an order of magnitude larger than the peak of voltage across them. Otherwise, curious effects will be observed when the rf voltage modulates the varicaps or drives them into conductivity. The author used German BA139 varicaps from Siemens Company for his receiver. These diodes offer a capacitance variation of 3 to 20 pF for a 20- to 1-volt reverse

wound on Indiana General Ferramic Q3 core, form CF102.

- L₆—Toroid, wound over L₅; 20 turns No. 32 enam. wire.
- R₁—Dual control, each section 100,000 ohms linear taper.

voltage, and a Q of about 400 at 30 MHz. An equivalent varicap should be the VC615 Evicap from Easton Corp., 25 Locust St., Haverhill, Mass. 01830.

Having carefully checked preamplifier performance of transistor front ends, a cascode configuration with two 3N128 MOSFETs was chosen. Its gain of 35 db at 30 MHz is by far too high to be usable, but when it is reduced to 10 to 20 db by applying reverse bias to the gate of the upper transistor, this results in a cross-modulation characteristic comparable to vacuum tubes. Measurements were performed with two modulated signal generators 50 kHz apart; the desired signal was 10 μV and within the receiver's bandwidth. The interfering signal could be as high as 100 mV before noticeable cross modulation occurred. The gain-reduction voltage is derived from a resistor network around a double-ganged potentiometer to get a nearly linear calibration of 0 to 60 dB on this "attenuator."

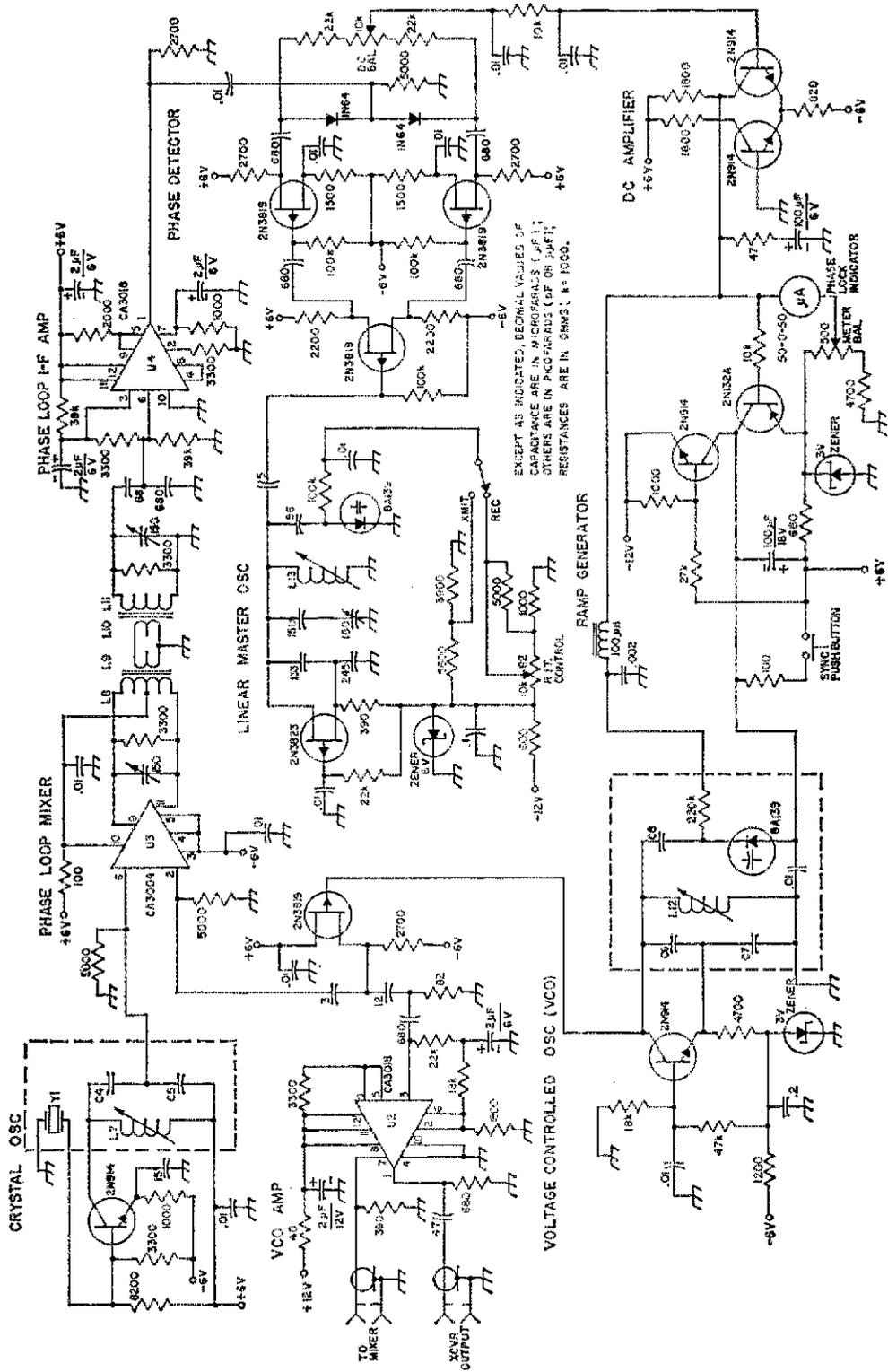


Fig. 3—Phase-locked main-conversion-oscillator system. L_1, L_2 —Toroid, 40 turns No. 32 enam. wire, center tapped, wound on Indiana General Ferramic Q2 core, form CF102. L_3, L_4 —Toroid, 42 turns No. 30 enam. wire closewound on slug-tuned ceramic form $\frac{1}{2}$ -inch dia. 1-inch long. R_1 —Receiver incremental tuning, 10,000-ohm 10-turn

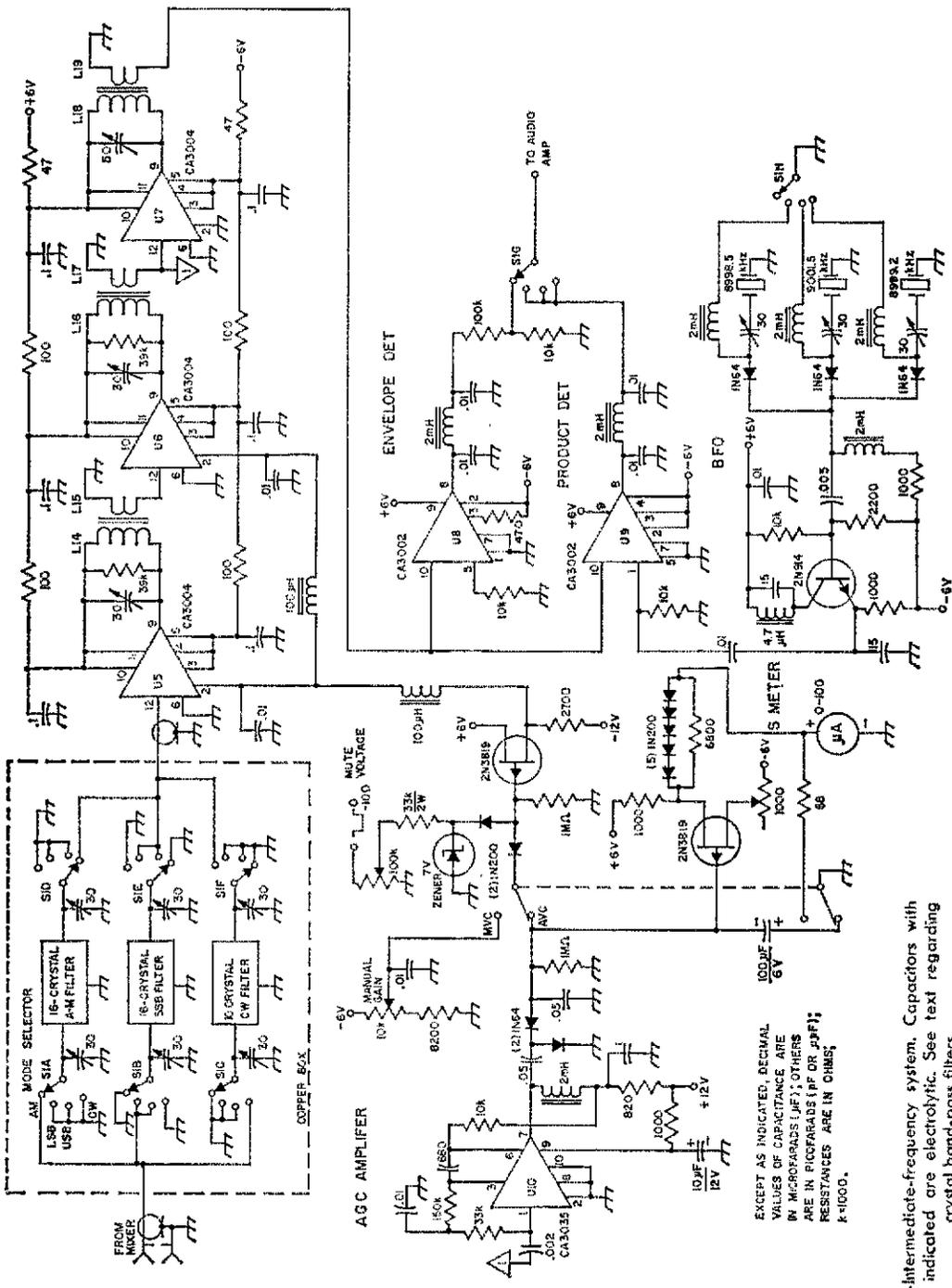
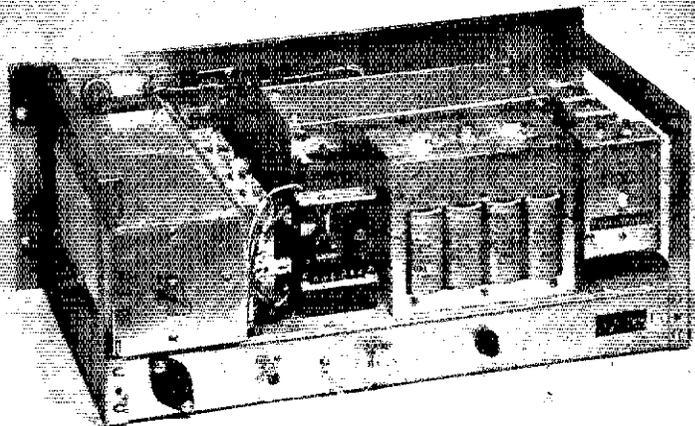


Fig. 4—Intermediate-frequency system. Capacitors with polarity indicated are electrolytic. See text regarding crystal band-pass filters.
 L14, L16, L18—Toroid, 28 turns No. 32 enam. wire, wound on Indiana General Ferramic Q3 core, form CF102.
 L15, L17, L19—Toroid, wound over L14, L16, and L18 respectively; 9 turns No. 32 enam. wire.
 S1—Miniature ceramic rotary, 3 sections, 9 poles, 5 positions, non-shorting; 8 poles and 4 positions used (Centralab PA2029 or equiv.).



Rear view of the receiver, showing block construction and heavy shielding. The large compartment at the left of the chassis is the rf assembly. To the right of center may be seen the four electrolytic capacitors in the power supply. The assembly forward of the supply is the LMO.

This eliminates an attenuation network at the receiver's antenna input, as it is possible to reduce preamplifier gain below unity.

An FET source follower provides matching to the low-impedance balanced diode mixer, which is a ring modulator. The mixer is driven by a toroidal broad-band balancing transformer, L_4 , which covers 1.5 to 30 MHz. A quartet of Hewlett-Packard hot-carrier diodes 5082-2350 was used for the ring modulator, but the less expensive type 5082-2800 was tested and performs as well at these frequencies. These are ultrafast switching diodes operating on majority carrier conduction and are perfectly suitable for wide-dynamic-range mixer applications. It should be noted that diode mixers have gain below unity. In this layout, conversion loss was measured to be around 8 dB, and proper impedance matching in the mixer is of utmost importance so as not to degrade the overall noise figure. The mixer output is coupled through a tuned and balanced transformer, which steps up the mixer impedance of 300 ohms to 500 ohms to match the succeeding crystal filters.

Mixer performance largely depends on the drive level applied to the diodes. A 4-mW signal is delivered from the 2N1613 power transistor to the input transformer's center tap. Signal levels up to 800 mV at the mixer's input can be processed without noticeable cross-modulation. In this front end, any cross modulation which occurred originated from the preamplifier, and not from the mixer. (I am still looking for someone having experience with negative feedback in a low-gain MOSFET cascode amplifier.) Dynamic range of the receiver was measured to be around 80 dB and sensitivity on all bands was better than $0.1 \mu\text{V}$ for a 10-dB signal-plus-noise to noise ratio for a 30% modulated a-m signal; on two bands it was as low as 40 nanovolts.

The calibration oscillator utilizes an SN7400 quadruple-NAND digital IC, having a square-wave

output of 5 volts peak-to-peak. Because of its good long-term stability, a 1.75-MHz HC-27/U crystal is used to check the low band edges. The trimmer in series with the crystal is for adjusting it to the proper frequency.

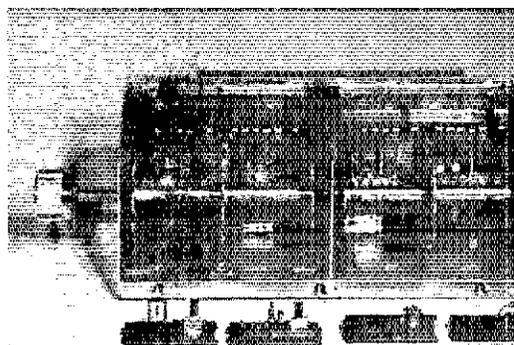
To obtain the shortest leads to all hand-switched components, the front end and the phase-locked oscillator (described later) were built into two ganged TV turret tuners. (See the photograph below.)

Phase-Locked Main Conversion Oscillator

The functional principle of the main conversion oscillator was already discussed. More details will be given here for the circuit shown in Fig. 3. This system is completely self-working, providing two output signals for feeding the mixer and for transceive purposes.

The crystal oscillator has a tuned collector circuit with the crystal connected between the transistor's base and ground. Series-resonant crystals, regardless of whether fundamental or overtone ones, can be used in this oscillator.

The voltage-controlled oscillator is a simple Colpitts, with the varicap in series with C_3 forming a part of the tank capacitance. As C_3 determines the VCO's tuning range, it is band-switched together with the inductor and the varicap. Using a separate varicap for each band was a precaution with regard to VCO tuning capability, but proved not to be necessary. (The tuning



The rf assembly built into two ganged TV turret tuners. From left to right are the crystal oscillator, voltage-controlled oscillator, balanced diode mixer, and MOSFET cascode amplifier. A set of bandswitched components is shown in front of the assembly.

range of the VCO is 8.5 to 10 MHz above the received ham-band segment, thus leaving a margin of 500 kHz on both sides.)

The VCO output passes to an isolation amplifier and is then fed to the integrated-circuit VCO amplifier. An amplitude-frequency correction network at the output of the 2N3819 holds the output level constant regardless of the band being used. The transceiver output is capable of delivering 250 mV rms into a 50-ohm load at 2-dB regulation.

Frequencies of the crystal oscillator and the VCO are mixed in the CA3004 phase-loop mixer, U_3 . The bandpass filter following the mixer consists of two inductively coupled toroidal circuits damped by parallel resistors to obtain a flat passband from 2.5 to 3.0 MHz. U_4 , an IC broad-band amplifier having 35 dB gain, brings the level up to 1.5 volts rms to feed the phase detector.

The linear master oscillator is an FFT Colpitts tuned by an old BC-221 variable capacitor. Only 80% of the capacitor's tuning range is used to cover the 2.5- to 3.0-MHz range, and maximum frequency error could be held below ± 500 Hz with respect to linear dial markings. Final adjustment for linearity was made by trimming the outer rotor plates. All capacitors in the tuning circuit are 750-ppm/degree negative temperature coefficient, resulting in an overall frequency drift below 5 ppm/degree for the complete assembly at room temperature. The linear master oscillator would be difficult to duplicate without a frequency counter being at hand; there are excellent LMOs from Collins on the market.

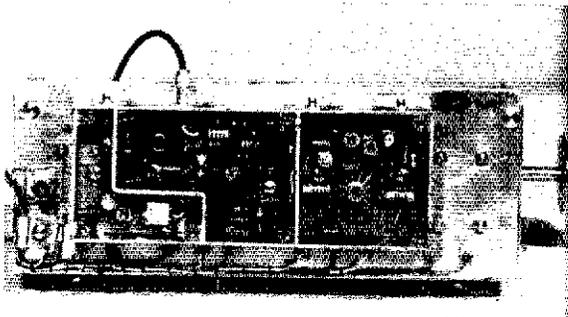
Receiver incremental tuning is done during receiving periods by a varicap fed from a 10-turn Helipot, giving 2 kHz per revolution at midband.

The phase detector must be a broad-band version to cover the 2.5- to 3.0-MHz range. Three inexpensive FETs are used, the first to obtain two LMO signal voltages 180 degrees out of phase. The other two FETs amplify the frequency to be detected up to 2 volts rms, and the amplified signal is fed to the phase-sensing diodes. Within the so-called capture range, the phase-detector output voltage is positive for frequencies lower and negative for frequencies higher than that of the LMO. Graphically plotted this is an S-shaped curve, with the peaks only fractions of a hertz on either side of the LMO frequency.

Only an i-f falling inside these close peaks will generate an error output signal of the correct polarity to lock the afc loop. As this cannot happen by itself, tuning into the capture range must be done by another device, the ramp generator. The phase-detector output passes through a simple inverting dc amplifier, the output of which feeds the ramp generator, and simultaneously feeds the cathode of the varicap in the VCO. The ramp-generator output feeds the anode of the same varicap. Pressing the sync push button shorts the 100- μ F electrolytic capacitor in the ramp generator with a 100-ohm resistor. Releasing the button starts the 2N914

transistor to act as a constant-current source which slowly charges this capacitor from +6 towards -12 volts, thus forming a linear ramp voltage. This ramp voltage tunes the frequency of the VCO through its spectrum at a rate of approximately 500 kHz per second, starting from the low-frequency end. At the moment the afc loop i-f, which is also being swept through its spectrum by this procedure, tends to cross the capture range of the phase detector, a negative output voltage from the dc amplifier starts conduction of the 2N132A transistor. Before, this transistor was held below cutoff by the Zener diode in its emitter. Its conduction now stops the ramp voltage from rising any more, by clamping it to a fixed level. This is the moment the VCO locks in.

Once locking has been achieved after each band change, the frequency of the VCO stays like the "Rock of Gibraltar," even at 38 and 39 MHz. A small center-reading meter signals the locked condition. Note the series combination of a 47-ohm resistor and a 100- μ F electrolytic



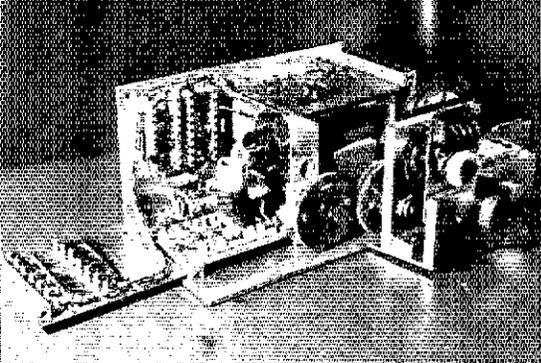
Rear view of rf assembly showing from right to left the afc loop mixer, VCO amplifier, and mixer driver amplifier. Heat sinks with radial fins have been placed over the CA3018 IC and the 2N1613 transistor.

capacitor at the dc amplifier's output. This is a very important network to give the proper time constant within the afc loop for low phase jitter and good locking capability.

Of course the sync push button might have been replaced by a band-change activated contact, but it was provided to demonstrate the small difference in comparison with normal receivers, and so it stayed there.

The I-F System

The incoming i-f signals are filtered by high-frequency crystal filters having a center frequency of 9 MHz. One of three high-performance filters for a-m, ssb and cw reception is selected by the mode switch. Trimmer capacitors at the input and output terminal of each filter are provided for adjusting passband ripple to minimum. The mode selector switch with the crystal filters positioned around it was built into a copper box, leaving only coaxial connectors emerging for the cables to the mixer and i-f amplifier. It is very important that, within the box, two separate



linear master oscillator assembly, with the BC-221 tuning capacitor, reduction gear train and counter dial. The phase detector circuit is constructed on the back panel, and the afc loop i-f amplifier, on perforated board, is mounted on top of the assembly.

contact sections be used for input and output terminals with careful shielding between them, and that all unused filter terminals be grounded. Otherwise, stopband attenuation would be determined primarily by stray coupling around the filters, and not by the filters themselves.

The crystal filters used by the author are computer-designed laboratory models from a German crystal manufacturer having bandwidths of 5.0, 2.4 and 0.4 kHz for a-m, ssb, and cw reception, respectively. A total of 42 crystals are incorporated, giving 140-dB stopband attenuation for the a-m and ssb filters, and 90 dB for the cw filter.¹ Any 8-crystal filter designed for low insertion loss and having a good shape factor will do well in such a receiver.² A very important aspect: stopband attenuation of the filters should be larger than the receiver's dynamic range!

¹Careful compartment shielding and double-shielded interconnecting coaxial cables are required in order to realize the benefits of stopband attenuations of the magnitude described by the author. In practice, even with careful physical layouts, shielding to provide greater than 90- or 100-dB isolation between input and output circuits is difficult to obtain. — *Editor*.

²Suitable 9-MHz crystal filters, manufactured by KVG in West Germany, are available in the U.S. from Mr. Henry Ingwersen, Spectrum International, Topsfield, Mass. 01983. — *Editor*

Thanks to RCA's application literature, the i-f amplifier could be built easily with linear integrated circuits. A 3-stage amplifier using CA3004s gives a 65-dB voltage gain, where the first two amplifier stages are controlled by either manual or automatic gain control. Tuned toroidal transformers are used for interstage coupling and impedance matching.

The last i-f amplifier feeds both the envelope detector for a-m signals and the product detector for ssb/cw reception. The crystal-controlled BFO was built around a 2N914 transistor. A 1.7-volt rms signal is delivered to the product detector for optimum performance. A trick used to select the appropriate BFO crystal for lsb, usb or cw operation is electronic remote switching, by gating one of the three diodes in series with the crystals. Series trimmers are provided for adjusting the crystal frequencies to the desired point on the filter skirt.

A part of the i-f voltage is picked up after the 2nd i-f amplifier, amplified 40 dB in the agc amplifier CA3035, U_{10} , and rectified by a voltage doubler. This agc voltage is fed via a gate diode to the 2N3819 source follower, which provides gain control of the 1st and 2nd i-f amplifier stages. The gate of this transistor can be switched from the agc signal to the manual gain potentiometer. The available receiver muting voltage of ~ 100 volts is clamped by a Zener diode and fed to a second gate diode to shut down the receiver during transmitting periods. The 100- $k\Omega$ poten-

TABLE I
Band-switched components

Component	Band					
	160	80	40	20	16	10 (A through D)
L_1	6 turns } Ferramic Q2—	5 turns } Ferramic Q3—	3 turns } Ferramic Q3—	2½ turns } Ferramic Q3—	2 turns } Ferramic Q3—	1½ turns } Ferramic Q3—
L_2	57 turns } toroid	53 turns } toroid	30 turns } toroid	15 turns } toroid	10 turns } toroid	8 turns } toroid
C_1	10—60-pF trimmer	10—60-pF trimmer	3—30-pF trimmer	3—30-pF trimmer	2—20-pF trimmer	2—20-pF trimmer
L_3	57 turns, Q2—toroid	53 turns, Q3—toroid	30 turns, Q3—toroid	15 turns, Q3—toroid	10 turns, Q3—toroid	8 turns, Q3—toroid
C_2	10—60-pF trimmer	10—60-pF trimmer	3—30-pF trimmer	3—30-pF trimmer	2—20-pF trimmer	2—20-pF trimmer
L_4^*	28 turns	23 turns	40 turns	24 turns	18 turns	14 turns
C_3	47 pF	47 pF	30 pF	10 pF	10 pF	10 pF
C_4	470 pF	470 pF	360 pF	120 pF	120 pF	120 pF
L_{12}^*	26 turns	22 turns	19 turns	14 turns	12 turns	10 turns
C_5	33 pF	26 pF	13 pF	10 pF	8 pF	6 pF
C_7	27 pF	27 pF	27 pF	27 pF	27 pF	27 pF
C_8	56 pF	39 pF	37 pF	15 pF	10 pF	6 pF
Y_1	8.3 MHz	10.0 MHz	13.5 MHz	20.5 MHz	27.5 MHz	(A) 34.5 MHz (B) 35.0 " (C) 35.5 " (D) 36.0 "

* L_7 and L_{12} are wound on slug-tuned phenolic forms ½-in. dia., ¾-in. long. Tuning is done on 160- and 80-meter bands by high- μ slug cores, on 40- through 10-meter bands by low- μ slugs. All inductors are wound with enameled No. 32 wire. Toroids are wound on Indiana General Ferramic Q2 or Q3 cores, form CF102.

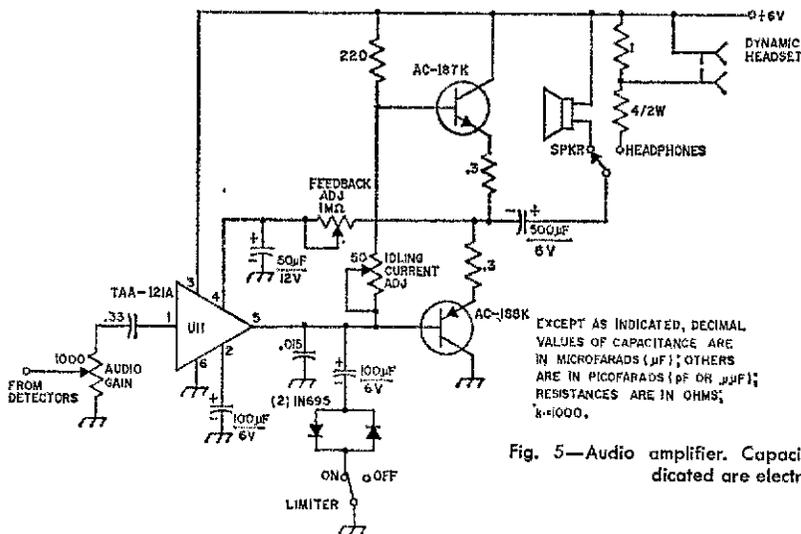


Fig. 5—Audio amplifier. Capacitors with polarity indicated are electrolytic.

tiometer is set for a convenient level during transmitting periods.

The age voltage is fed simultaneously to another 2N3819 FET which is a dc amplifier with a bridged S meter. The resistor-diode network in series with the meter provides linearity. A 50- μ V signal at the antenna input was fixed to be S9, and a fairly linear calibration of 5 dB per S unit could be obtained.

When the receiver is operated with age, a 100- μ F capacitor is switched in, giving a fast-attack, slow-decay characteristic, with a decay time constant of 5 seconds. When the receiver is switched to manual gain control, a scale with a calibration of 0 to 20 dB is used. The receiver is then run in the linear amplification mode, and the dynamic range is slightly higher than 20 dB. That is to say, for the linear mode (age) and the logarithmic mode (age) two different calibrations on the meter are used.

Audio System and Power Supply

Little need be said about the audio system, which is equipped with German transistors from Siemens Company. A TAA-121A integrated-circuit audio amplifier drives a pair of complementary transistors capable of delivering 2 watts of audio power into a low-impedance speaker or, at reduced level, to a dynamic headset. The 50-ohm variable resistor across the bases of the complementary pair is for adjusting their idling current to 10 mA. The 1-M Ω resistor in the feedback path is adjusted for minimum audio distortion in the integrated-circuit preamplifier. A very simple noise limiter can be switched in if needed.

Details on the power supply will be omitted

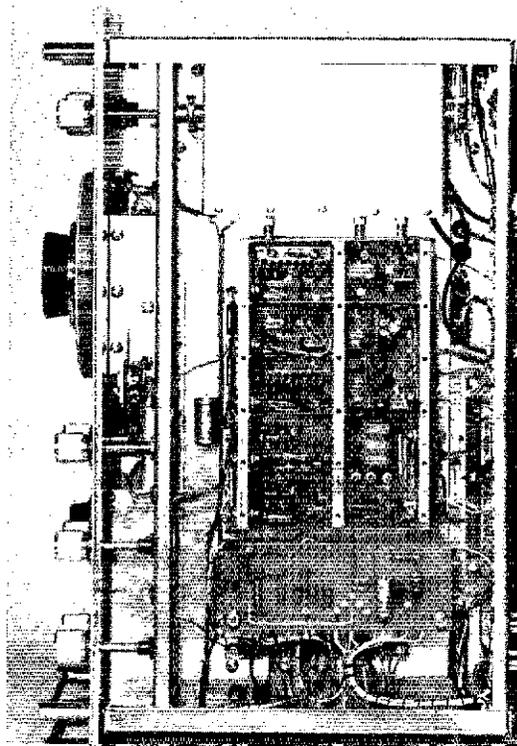
A view underneath the main chassis. At the upper end of the receiver is the heavily shielded copper box containing the crystal filters and the mode selector switch. In the center is the i-f system with the cover removed.

here for simplification. A transformer with two 18-volt secondary windings feeds two bridge rectifiers and two 10,000- μ F filtering capacitors to obtain positive and negative supply voltages. Four Zener-stabilized series regulators deliver outputs of -12, -6, +6, and +12 volts. Attention should be paid to residual hum, which should be kept below 2 or 3 mV. Total power drain of the receiver is less than 20 watts.

Mechanical Layout

When constructing a receiver of this complexity, one never knows beforehand whether a specific new circuit will work satisfactorily or not (and several did not!). Separate blocks for the

(Continued on page 65)



High Versus Low Antennas

Performance Tests Using Identical Arrays

BY WAYNE E. OVERBECK,* K6YNB

"THE higher the better" is the traditional rule of thumb for ham radio antennas. Few amateurs would disagree with this axiom, and most experienced antenna builders can recall how much better they "got out" after "raising the beam another 15 feet." However, few empirical studies of the effect of antenna height on signal strength have been published in amateur circles.

This is unfortunate, since several amateurs have studied the question methodically, including Dr. J. E. Lindsay, who has now published his definitive treatise on quads and Yagis¹ but not his excellent work in this area. And while both *The A.R.R.L. Antenna Book* and Orr's *Beam Antenna Handbook*² discuss the importance of antenna height in theoretical terms, neither reports the results of practical studies in the field.

With this in mind, the author set out to study the effect of height on signal strength at various distances, on several bands, and with various forms of propagation. Only amateur equipment was available for the study, but in other respects, the author strived to keep the methodology as rigorous as possible.

The Method

The author's approach was to erect identical antennas atop two towers of different heights

* 11552 Geil Lane, Garden Grove, Calif. 92640.

¹ Lindsay, "Quads and Yagis," *QST*, May, 1968.

² Orr, William I., *Beam Antennas Handbook*, 3rd edition.

and obtain comparative signal reports — with some safeguards to minimize reporting errors and to assure proper statistical treatment for the resulting data. For the main tests, one tower was 72 feet high (the practical maximum for the author's residential back yard at the time of the tests), while the other stood 34 feet high (about the minimum usable height for DX work, according to Orr). The two towers were placed as far apart as possible without trespassing — about 50 feet. With this separation, no interaction was evident on any band.

A pair of two-element cubical quads were selected for the 10-, 15-, and 20-meter experiments. Each had an eight-foot boom with all elements mounted concentrically on two sets of spreaders, and each antenna was fed with a single feed line (85 feet of RG-8/U in both cases). This design obviously involves some compromises in element spacing and impedance matching, but both quads developed good SWR curves and front-to-back ratios when tuned. And, more important for our study, whatever compromises existed were essentially the same for both the high and low antennas.

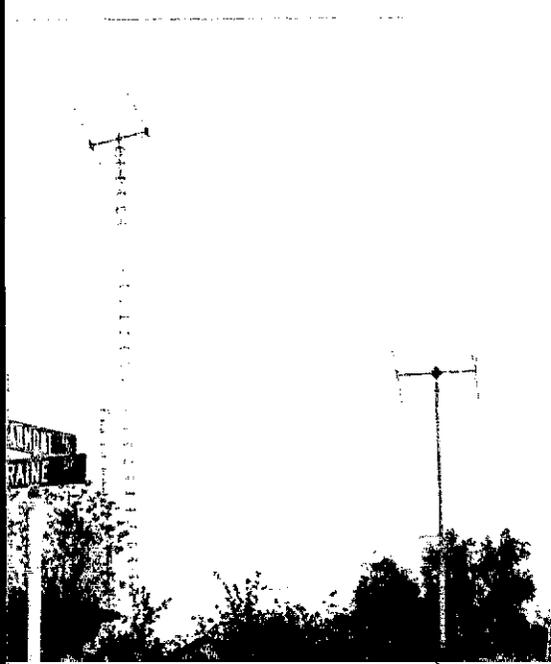
It became apparent during the tests that many amateurs regard cubical quads as exceptional performers at low heights, but (unlike Yagis) not much better if raised higher. This popular impression is contrary to Lindsay's findings, which suggest that quads and Yagis respond quite comparably to changes in their height. Accepting Lindsay's conclusions, we assumed that our findings would be roughly the same if Yagis had been used for the primary experiments.

The author wanted to determine how well high and low antennas would perform not only on DX work, but on "Stateside" *F*-layer communications, ground-wave work, and *E*-skip as well. Thus, separate tabulations were kept for DX reports (i.e., those from stations more than 4000 miles away) and for reports from "Stateside" stations (i.e., *F*-layer reports over 1500-3000-mile paths) on each frequency band.³ The author was careful to avoid seeking reports

³ No 10-meter "Stateside" tests are reported because the *muf* was too low for reliable *F*-layer work across the U.S. when these tests were run.

Shown here are the two cubical quads used by the author to study the effects of antenna height on performance. The antenna at right is atop a 34-foot tilt-over mast described by the author in June, 1969, *QST*. The quad at left is on a 72-foot tower.

QST for



This article compares the performances of identical antennas mounted side by side at different heights, and produces some experimental evidence to support the practical importance of antenna height for most types of amateur radio communication.

during anything that resembled an *E*-skip opening on 10, 15, and 20 meters, in the interest of studying *E* skip vs. antenna height separately on 6 meters.

To study the effect of height on vhf ground-wave signals, the author replaced the cubical quads on the two towers with two pairs of seven-element 2-meter Yagis, each fed in phase with ratio-dipole driven elements. A move to a new home prevented the use of the same two towers for 6-meter experiments, but the author later set up two three-element 6-meter Yagis — one atop a new 90-foot tower, and the other on a 42-footer — to continue the study.

On each band, the tests were conducted on ssb (except on two meters, where a-m was used), with an audio tone serving as a reference signal. The author switched between the high and low antennas repeatedly on each test, in an effort to counteract the effects of QSB.

This test procedure does introduce some sources of error, including the variability of hams' skills in observing the results, and the lack of receiver S-meter standardization. To cope with this kind of sampling fluctuation, the author obtained a number of reports on each band and then used t-distribution statistical methodology to evaluate the resulting data. However, even with these efforts to make the study as rigorous as possible, the author makes no claim to finality for the results obtained. The findings on each band did prove to be statistically significant (at the .05 level of significance or better), but you

don't "prove" things or arrive at exact parameters this way. The only claim the author makes for his results is that they suggest general trends that will probably be confirmed if this study is replicated elsewhere. There is no implication here that a 72-foot-high antenna produces "12-dB gain" over a 34-foot-high antenna in 20-meter DX work just because the mean advantage in our tests was about 2 S units in this instance.

The Results

The results of these tests, summarized in the accompanying table, were interesting in several respects. With the exception of one case on 10 meters, every single DX station reported a substantially better signal from the high quad than the low one. This is thoroughly predicted in the literature, but we also found that the high quad produced a significantly stronger signal (taking the mean, or average, figure) on "Stateside" work. And on ground-wave work, the high antennas were absolutely consistent in outperforming lower ones. However, *E*-skip contacts proved to be another story, a point to be covered in detail later. The mean advantage of the high quad over the low quad in DX work was 2.1 S units on 20 meters, 1.8 S units on 15, and one S unit on the 10-meter band.

Since the author's linear amplifier (a commercial unit using two 3-400Zs) produces a signal gain of about two S units over the exciter alone on most S meters, it became apparent that many

Comparative Performance Data for High and Low Antennas.

<i>Band/path</i>	<i>No. reports</i>	<i>No. favoring high antenna</i>	<i>No. favoring low antenna</i>	<i>No. reporting no difference</i>	<i>Mean high-antenna advantage</i>
20/DX	16	16	0	0	2.1 S units
20/U.S.	18	15	0	3	1.4 S units
15/DX	12	12	0	0	1.8 S units
15/U.S.	36	20	0	16	0.9 S units
15/ground-wave	12	12	0	0	2.2 S units
10/DX	8	7	0	1	1 S unit
6/ground-wave	5	5	0	0	2 S units
6/ <i>E</i> -skip	10	2	7	1	-1.3 S units
2/ground-wave	16	16	0	0	3.3 S units

DX stations could not distinguish the kilowatt feeding the lower quad from the exciter "bare-foot" with the higher array. The implications of this dramatic difference in signal strength for DX-contest operations are obvious: it's no wonder the "big guns" using antennas 130 feet high get through the pile ups quickly, with or without big linears.

On Stateside *E*-layer work, the pattern was less consistent, although the high array continued to hold a significant edge. While a majority of the reports still favored the high quad by one or two S units, more than a third of the stations dissented, reporting equal or virtually equal signals from the two quads. No one reported a stronger signal from the lower antenna, perhaps because of the author's effort to avoid *E*-skip contacts in this phase of the study. The mean advantage of the higher quad was 1.4 S units on 20-meter Stateside work, and 0.9 S unit on 15 — still a substantial advantage, but not enough to render a low antenna useless for portable work, as generations of Field Day operators can attest. In fact, the author previously described a portable quad⁴ that stood only 19 feet high, but nevertheless worked very well for "back-home" contacts during a long vacation. An antenna only 19 feet high is clearly undesirable, but if higher antennas are not feasible, much successful hamming can still be done. (This is especially true on an occasion like Field Day, when almost everyone's antenna is low, and the few beams that are 40 or more feet high seem to dominate the bands; if the competition is using a low antenna you can too!)

Ground-wave Tests

Although the plan was to study the effect of antenna height on ground-wave communication only on vhf bands, a number of stations within 100 miles volunteered reports on the hf bands. These reports were not tabulated except on 15 meters, but they consistently favored the higher array by at least two S-units.

In the vhf experiments, height again proved decisive for ground-wave work. On both two and six meters, every station favored the high antenna. On two meters, the mean advantage was an amazing 3.3 S-units. Surprisingly, the higher array appeared to be equally superior on contacts with San Bernardino-Riverside stations (some 30 miles from Beaumont, Calif., where these tests were conducted) and on contacts into the Los Angeles basin (almost 100 miles away).⁵

After moving and acquiring the 90-foot tower, the author put a single seven-element 2-meter Yagi up and took an S-meter reading on a nearby repeater with the new tower cranked

⁴ Overbeck, "The 20-Minute Portable Quad," *QST*, May, 1967.

⁵ On the hf bands, it is normally assumed that a high antenna has a greater advantage over a low antenna on long-haul DX than it does on shorter paths, but the opposite may well be true for vhf ground-wave work. This is suggested in the *ARRL V.H.F. Manual*, (1st edition, pages 24 and 25). Thus, one would expect that an increase in height would result in greater improvement in signals over the 30-mile path than over the 100-mile path.

down. As the tower ascended to its full height, the signal rose from S8 to 15 dB over S9 on a popular transceiver's S meter.

On six meters, only a few ground-wave tests were conducted, but the results were similar: everyone favored the higher antenna substantially.

6-Meter E-Skip Tests

However, on 6-meter *E* skip an entirely different relationship developed: the lower antenna had the advantage in seven out of ten tests during single-hop openings.⁶ Only one station favored the high antenna, and the low array had a mean advantage of 1.3 S units over the high array!

Although this finding is surprising and contrary to every other test conducted, it is consistent with the one previous practical study of antenna height vs. signal strength the author could locate in ham radio literature. Working in the late 1940s, Leroy May⁷ set up identical six-meter Yagis at heights of 35 and 75 feet, and compared 350 received signals on the two arrays. He found that the low array was superior for distances below 1000 miles while the higher array began to pull ahead at distances exceeding 1100 miles.

The author made no attempt to fully replicate May's work, but all of our 6-meter *E*-skip experience supports him: for contacts into many major cities from greater Los Angeles, a high antenna is a handicap! Much to his chagrin, the author has frequently seen his 90-foot-high Yagi outperformed on 6-meter *E* skip by a beam sitting 10 feet above somebody's roof on a TV mast.

Conclusions and Recommendations

It is customary when reporting a study such as this to conclude by summarizing the findings and making some recommendations. The conclusion here must be that, for every application except *E*-skip work, there are worthwhile advantages in having an antenna at least 70 feet high. This height advantage is most pronounced on ground-wave and long-haul DX work.

The only logical recommendation we can make, then, is that all hams should own towers 70 feet high. May all of the XYs, frightened neighbors, hill-collectors, and zoning-conscious city officials of the world forgive us!

Alternately, maybe we should suggest that all hams (except the author) use 35-foot towers to give the author a better chance in DX contests. Or better yet, how about an antenna-height multiplier for the DX contests? Let's see, that's 1.5 if your antenna is below 75 feet, 2.0 if it's below 40 feet, and 3.0 if you bury it in the ground. . . .

QST

⁶ At the time of the 6-meter tests, *E* skip was barely "in season." The author is continuing this study during seasons of more frequent *E*-skip openings.

⁷ May, "Some Practical Results on the Question of Antenna Height," *CQ*, April, 1953.

— . . . —

Use your Zip code when writing ARRL. Use ours, too. It's 06111.

A Simple Safety Feature for Crank-up Towers

BY KATASHI NOSE*, KH6IJ

SOME crank-up towers can become lethal instruments or cause severe injuries. I had been hearing of crank-up tower accidents for a number of years, the most common being from runaway cranks and stuck towers.

An unnerving experience with a stuck tower, just a few weeks before a similar accident befell one of our most well-known amateurs, made me wonder how many other unpublicized accidents of a similar nature take place. Certain federal agencies do not approve of crank-up towers because of these dangers.

The Booby Trap

Consider a simple crank-up tower using an inexpensive boat winch as shown in the photographs. When cranking down the tower the safety ratchet must be disabled, otherwise the cable cannot be paid out. If the handle should slip out of hand in this position, it is liable to "windmill." The reflex of most people is to grab the rotating handle, which can injure you severely, resulting in lacerations or most likely a broken wrist.

* Department of Physics, University of Hawaii, 2585 The Mall, Honolulu, Hawaii, 96822.

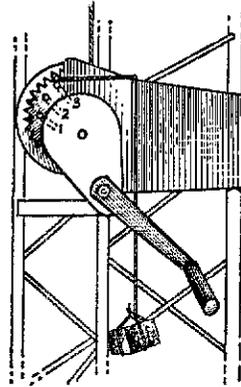
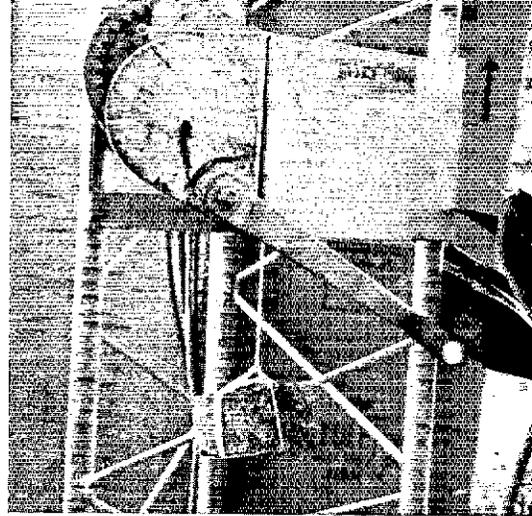


Fig. 1—Lead cord through bracing structure so that the weight pulls the latch lever from Position 2 to Position 3 as it falls. Position 1, not used; Position 2, Neutral; Position 3, crank-up.

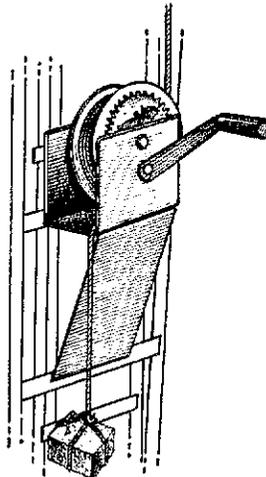


Fig. 2—Another model of tower. Lead cord between housing so that a direct pull will cause the ratchet to slip into the crank-up position.

The other inherent danger in inexpensive towers without roller guides is that they are likely to get stuck in the most unlikely positions. If this happens when the tower is far from the nestled position the cable becomes slack, and one immediately senses that something is wrong.

However, if the inner section gets stuck near the completely nestled (cranked down) position, the cable becomes slack and the immediate reaction is to assume that the tower is completely cranked down. During a shake-down process of a newly installed tower, my tower got stuck only 3 inches from the completely nestled position. The cable became slack and I assumed that the tower was completely cranked down. I happened to glance down at the safety stop and noticed that the inner section had not come to rest against the bottom stop. A slight push against the inner section caused it to become unstuck and it crashed down into position. If my hands had been inside the tower, I would have been injured. It was determined later that a balun from the low-frequency antenna had become pinched in a precarious position against the rungs and that a slight shove dislodged it.

The more expensive crank-up towers with worm-gear winches are not subject to this failing since the sections are "loaded" at all times. The winch pulls down on the sections, the windlass drum merely paying out the cable on one end and taking up on the other end.

A Cure for Run-Away Crank Handles

The common boat winch has three positions, only two of which are used, the other being downright dangerous. In one position the ratchet prevents backlash and this is the position used for cranking up the tower. Some amateurs I know of disable the ratchet when cranking up because of the noise it makes. This is only asking for trouble.

The other extreme position of the ratchet is unused, and is dangerous because if the ratchet accidentally slips into this position when cranking down the tower, the crank will stop suddenly and the handle is liable to slip out of hand. The chances are pretty good that when cranking up or cranking down a tower we are pretty much under stress — e.g., high wind, rain, storm, or we have sweaty or greasy hands, and are in a hurry.

In the midposition, the ratchet is completely disabled. This is the position used to crank down the tower, and the position you have to be careful about. If the handle should slip out of hand it will windmill. One cannot reach for the ratchet handle since it will be behind the windmilling handle. The chances are pretty good that the tower will come crashing down into the nestled position.

A simple cure is to tie a string to the ratchet handle, guiding the string so that a direct pull on it will engage the ratchet in the crank-up position. Tie a rock or weight to the end of the string so that the falling weight will pull the string and snap the ratchet into position.

In practice, one holds the weight in one hand and works the crank with the other. The string should be long enough to allow free motion of the crank-up hand, yet short enough to engage the ratchet in a minimum amount of time. If the handle slips, let the weight drop (purposefully or by reflex) and it will tug on the string and snap the ratchet into the safety position.

Tests have shown that the tower falls about two inches before it locks into position. This scheme is shown in the illustrations for two different models of winches.

Those of the older generation who used to hand-crank Model "T" Fords with the spark timer in the advanced position will appreciate the danger of "windmilling" crank handles.

No Cure for Stuck Towers

I cannot think of a simple way of rectifying the "stuck tower" danger other than to suggest that one be sure to observe that the bottoms of the inner sections have come to rest completely against the safety stops. I now jam a stout piece of wood into the rings of the tower even in the completely nestled position, and have become suspicious to the point of testing it with a stick of wood before touching the tower.

As an added precaution I place a coiled spring similar to that used in automobiles at the bottom of the tower to absorb the shock should everything else fail despite all these precautions. **QST**

Appendix:

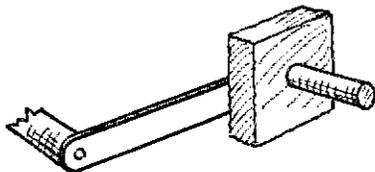
- (a) Two bricks fall at the same rate as one brick; i.e., there is no point in using a heavier weight than necessary to snap the ratchet into place when the weight is dropped.
- (b) If the moment of inertia (I) of the handle can be increased, we can gain time so that the tower locks into place with a minimum fall.

$$I = mr^2$$

Where: I = moment of inertia (neglecting the weight of the arm).

m = added mass (weight).

r = length of crank arm.



Increasing the length of the arm is much more effective but is not practical, while increasing the mass is. Insert on the crank handle a piece of metal (lead, brass, iron) with a hole in the center as shown.

**SWITCH
TO SAFETY!**



The packaged unit is built on the original chassis of the "DC 80-10" receiver, May 1969 QST. A home-made cabinet encloses the equipment, and consists of two U-shaped pieces of aluminum which are held together at the sides by means of 4-40 hardware and 1-inch wide aluminum strips. The speaker is visible at the upper right of the photo.



Packaged QRP for 3.5 and 7 MHz

BY DOUG DEMAW,* WICER

THE popularity of the QRP equipment described in May and June 1969 QST¹ prompted this writer to combine the transmitter and receiver units in one package. Some refinements were added — af amplifier and speaker, band-change switch, printed-circuit transmitter board, send-receive switching, and a cabinet for the entire trans-receiver assembly. All components except the power supply are assembled in one cabinet.

The New Circuit

The diagram of Fig. 1 is shown in block and schematic form to avoid repetition of the original, and unchanged, QST circuits. Wherever circuit modifications or additions have been made, schematic illustrations are used.

The toroidal af filter has been changed from phone-band selectivity, 2.5 kHz, to 900 Hz for cw use. This is done by replacing the 0.22- μ F shunt capacitors across the toroid coils with 0.47- μ F units. Since the filter is much sharper with the new 900-Hz peak frequency, cw reception is vastly improved. Greater insertion loss resulted from sharpening up the af filter, so an additional stage of audio amplification, Q_2 , was added.

A band-change switch, S_2 , permits switching between the main portion of the receiver (3.5 to 4 MHz) and the 40-meter plug-in converter.

* Assistant Technical Editor

¹ "The DC 80-10 Receiver," QST, May 1969. "The QRP 80-40," QST, June 1969.

This makes two-band operation possible without the need for substituting a jumper plug for the converter on 80 meters.

A three-position function switch, S_1 , changes the mode from receive to transmit in its first two positions. In the third position, MONITOR, the antenna is removed from the receiver, and the receiver operates as a cw monitor.

The June QST transmitter — originally built on an aluminum chassis — is assembled on an etched-circuit board.² It is switched from 3.5 to 7 MHz by means of S_3 . One switch section selects the appropriate output frequency. The remaining switch section, S_{3B} , adds an 820-pF capacitor across the driver collector coil during operation on 80 meters. The crystals are changed at the front panel.

A fixed-value resistor, R_1 , is substituted for the 1000-ohm af gain control in the original receiver circuit. This provides a termination for the toroidal filter. Stage Q_1 , the audio amplifier of the original receiver, is modified as shown in Fig. 1. A second stage of audio amplification, Q_2 , follows Q_1 , and has a gain control, R_2 , in its base circuit. It was found desirable to have the af gain control after Q_1 to improve the noise figure of the receiver. With R_2 ahead of Q_1 , the noise generated by Q_1 tended to mask the received signal at low af gain settings. Decoupling networks have been placed in the 12-volt leads to Q_1 , Q_2 , and consist of two 1000-ohm resistors and two 50- μ F electrolytic capacitors.

² The transmitter circuit-board template and parts layout are available from ARRL for 25 cents and a s.a.s.c.

This portable cw trans-receiver operates from 12 volts dc, delivers nearly 2 watts of transmitter power to the antenna, and has receiver performance that is comparable to many superheterodynes. Peak current drain, with both the transmitter and receiver operating simultaneously, is approximately 600 milliamperes. It can be operated from the car battery, from a size-D flashlight-cell pack, or from an ac-operated 12-volt dc supply.

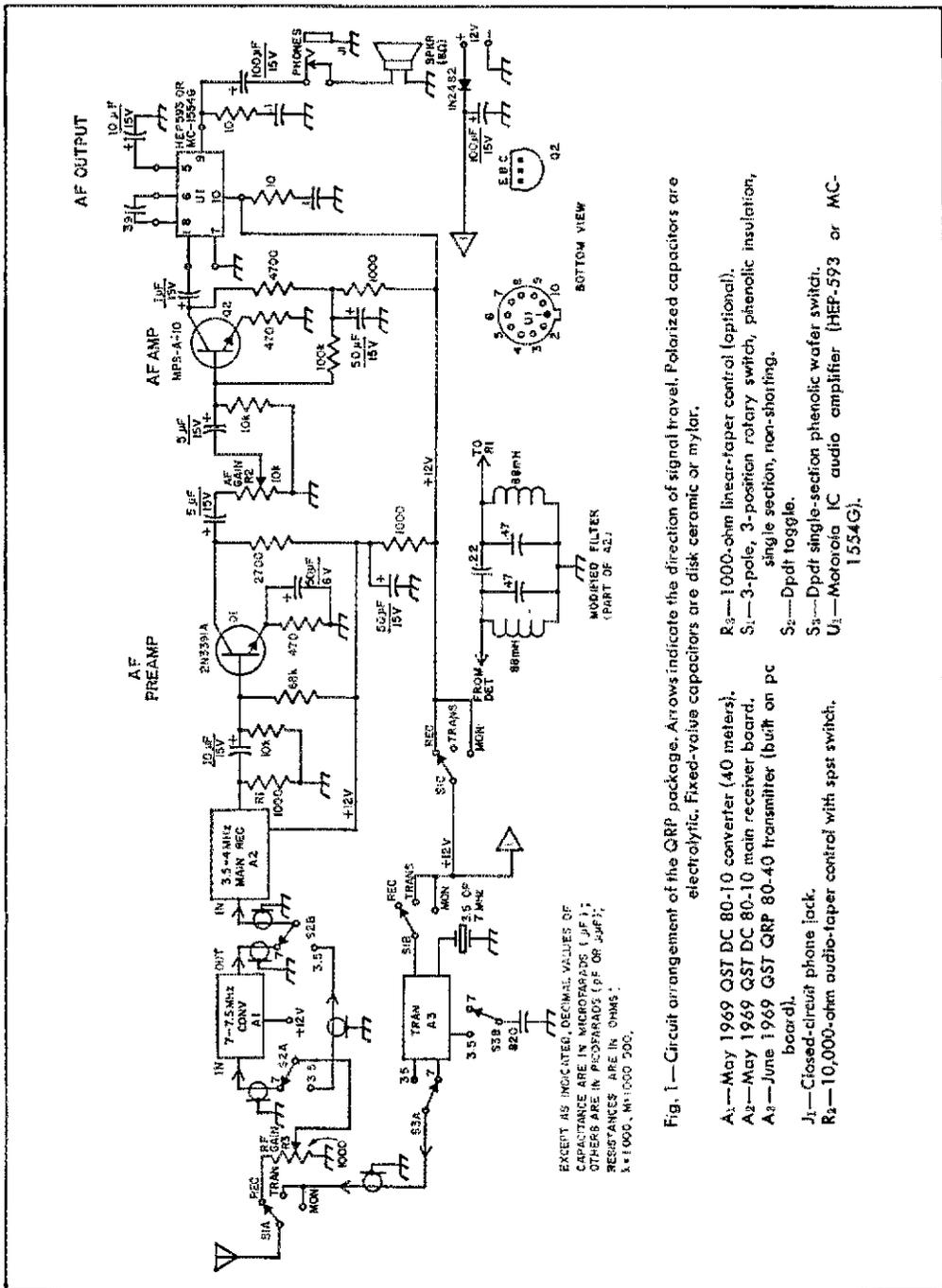


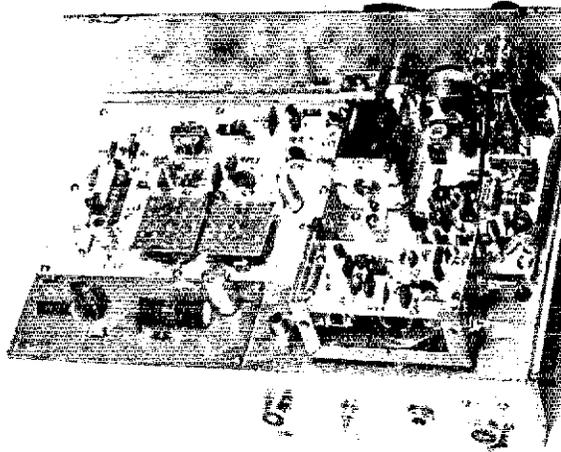
Fig. 1—Circuit arrangement of the QRP package. Arrows indicate the direction of signal travel. Polarized capacitors are electrolytic. Fixed-value capacitors are disk ceramic or mylar.

- A₁—May 1969 QST DC 80-10 converter (40 meters).
- A₂—May 1969 QST DC 80-10 main receiver board.
- A₃—June 1969 QST QRP 80-40 transmitter (built on pc board).
- J₁—Closed-circuit phone jack.
- R₂—10,000-ohm audio-taper control with spst switch.
- R₃—1000-ohm linear-taper control (optional).
- S₁—3-pole, 3-position rotary switch, phenolic insulation, single section, non-shorting.
- S₂—Dpdt toggle.
- S₃—Dpdt single-section phenolic wafer switch.
- U₁—Motorola IC audio amplifier (HEF-593 or MC-1554G).

The networks prevent the motorboating and howl caused by feedback along the supply leads when decoupling is not used. The emitter of Q₂ has no bypass capacitor, to allow the stage to be degenerative. This cuts down on the stage gain and provides just the right level of audio for driving the succeeding stage. U₁. Q₂ is a low-cost Motorola plastic

transistor. Almost any npn audio transistor can be used at Q₂, so don't be afraid to make a substitution. This is not true of Q₁, however, since the 2N3391A is designed for low-noise audio amplification. However, other low-noise af npn types can be used at Q₁. A transformerless 1-watt IC audio output stage, U₁, drives a 4-inch speaker (8 ohms).

Looking at the top of the chassis, A_2 , the transmitter, is mounted at the upper right. Converter A_1 is at the lower right of the chassis, and af amplifier U_1 is visible at the lower left of the chassis. The large circuit board occupying the upper left portion of the chassis is A_2 . The speaker jack is just to the left of the converter. The slug-tuned coil shaft on the rear lip of the chassis is part of a bc-band wave trap that was added to cut down on overload from a nearby a-m station.



The version shown here is built on an etched-circuit board. Approximately 40 mV of signal is needed to drive U_1 to full rated output; Q_1 and Q_2 satisfy that need. A closed-circuit headphone jack, J_1 , disconnects the speaker when the phones are plugged in. Low-impedance phones will give the most output, but 2000-ohm phones provide ample headphone level despite the mismatch they present.

Mechanical Changes

The transmitter board³ is mounted in the open corner of the receiver chassis, near the front panel. A crystal socket and band switch are mounted above the board on the panel. Standoff posts, $\frac{1}{4}$ inch high, support the transmitter above the chassis.

In this model, stage Q_2 is built on a small circuit board and is mounted at right angles to the board upon which U_1 is built. There is no reason why Q_2 and U_1 cannot be built on a common circuit board if the constructor so desires.

An on-off switch for the 12-volt input line to the unit has been added to R_2 . This feature is useful if a battery supply is used with the equipment.

An rf gain control, R_3 , is visible on the front

³The transmitter circuit board is available from Stafford Electronics 427 S. Benbow Rd., Greensboro, N. C. 27401.

panel of the composite unit. It consists of a 1000-ohm control between the antenna and chassis ground. The movable arm of the control connects to the input line to the receiver section. It was found useful when receiving very strong local signals, but for all practical purposes can be left out of the circuit.

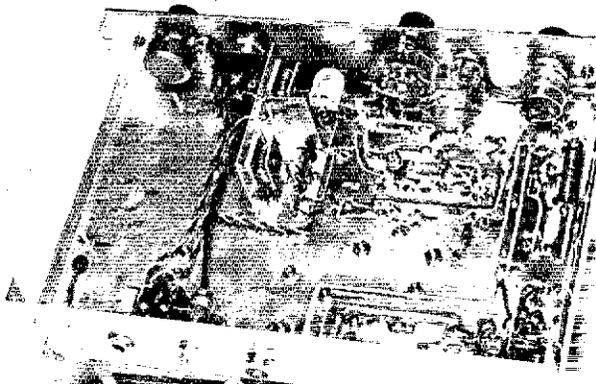
A home-made aluminum cabinet encloses the trans-receiver. The speaker mounts on the top surface, and plugs into a phono jack which is located near the plug-in converter.

Concluding Comments

It is hoped that the reader will not be skeptical about the potential offered by QRP gear. The first weekend the packaged unit was in service eight states were worked on 80 meters, and 10 states were garnered on 7 MHz. The antenna was an end-fed 128-foot wire tuned with an L network. The lowest report received was RST 559. The average report was RST 579, and several reports of 599 were obtained. The prime virtue needed for QRPing is *patience*. It helps to call CQ too!

A VFO-controlled version of this equipment is in the works at this time. It will appear in a subsequent issue of *QST*. Often, a VFO is the required common denominator for low-power operation. Meanwhile, the crystals will continue to get a good workout! **QST**

Very little has been changed under the chassis from the original DC 80-10 layout. The function switch, S_1 , is mounted on the front lip of the chassis, just to the right of the ceramic trimmer. The IC audio amp, U_1 , is located at the lower right, and is mounted over a cut-out area of the chassis.



The K4GGI 220-MHz Kilowatt Amplifier

HF Efficiency at the Top of the VHF Range

BY LEWIS D. COLLINS,* K4GGI

THE amplifier described here is a modification of the design for 432 MHz by Dick Stevens, W1QWJ, that appeared in February, 1966, *QST*.¹ Dick has often led the way in vhf and uhf amplifier design, the most recent example being his adaptation of a single-ended 432-MHz amplifier² to 220 MHz.³ I have followed suit by adapting his push-pull configuration as well. The mechanical details are quite similar to the 432 unit, so we shall concentrate on the points where this amplifier differs from the original. In circuitry, this design closely resembles the popular two-meter units by W1HDQ,⁴ W6MOX,⁵ and W1DXE,⁶ and the reader should also consult these articles for operating and construction pointers.

Structural Details

It should perhaps be pointed out that by using a 7 × 9 × 2-inch chassis, the sheet metal plates can be made from one piece of aluminum 16 by 26 inches. Only four cuts are required to yield the necessary pieces. I used 0.050 aluminum, which is a bit thicker than the usual radio chassis, so it is handy to have access to a shear, but not necessary. Also, 57 inches of aluminum angle is required.

The similarity of the layout to that of the W1QWJ 432 amplifier is apparent from Fig. 1. The input end of the amplifier is shown, with the cover plate removed, in Fig. 2. The tube sockets are spaced on 3-inch centers, 6 inches up from the bottom of the 7 × 9 × 2-inch chassis.

I used the standard Eimac SK-600 type socket rather than the Johnson units used by W1QWJ,

* 11 Brattle St., Apt. 19, Arlington, Mass. 02174.

¹ Tilton, "The W1QWJ 432-Mc. Kilowatt Amplifier," *QST*, Feb. 1966, p. 11.

² Tilton, *The Radio Amateur's V.H.F. Manual*, ARRL, Newington, Conn., Chapter 10.

³ Stevens, "A 500-Watt FM and CW Transmitter for 220 MHz," *QST*, May, 1969, p. 21. *Feedback*, Sept., 1969, p. 15.

⁴ Tilton, *The Radio Amateur's V.H.F. Manual*, Chapter 6.

⁵ Breyfogle, "Top Efficiency at 144 Mc. with 4X250B8," *QST*, Dec., 1961, p. 44.

⁶ Tilton, "A High-Efficiency 2-Meter Kilowatt," *QST*, Feb., 1960, p. 30. *Feedback*, April, 1960, p. 35.

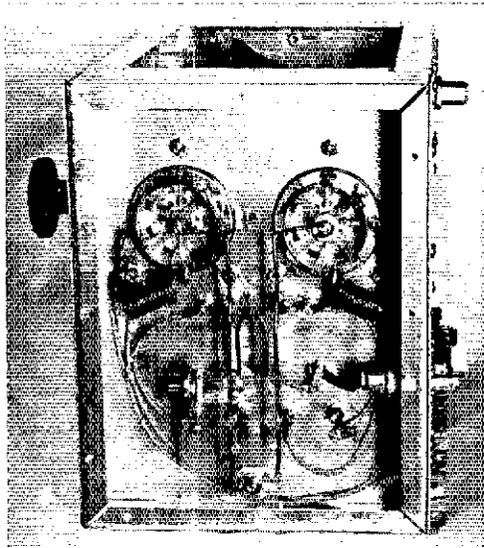
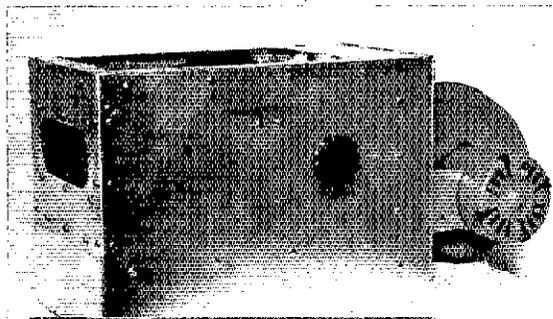


Fig. 2—Grid end of the 220-MHz amplifier, with the cover plate removed. Grid circuit is a half-wave line, tuned at the bottom end by a capacitor mounted on a polystyrene block. This, in turn, is attached to the lower edge of the chassis with a bracket not visible in the picture.

but only because they were at hand. All cathode pins were directly grounded at the socket by springing them over and soldering to the base ring. The ungrounded side of the tube heaters was bypassed with a button mica capacitor.

The top view, Fig. 4, shows the plate circuit construction. The quarter-wave plate lines are copper water pipes 1½ inch outside diameter. I made mine 6¾ inches long for several somewhat arbitrary reasons, the prime one being so they could be made into half-wave lines at 432 MHz at a later date if the need arises. I only used about 6½ inches of this length. The adjustable short was made from a ¾-inch wide strap of flashing copper, although more substantial construction might be desirable. The lines are supported on a 3-inch standoff at the center of the shorting strap. The finger stock that slips over the tube anodes can be conveniently held in place for soldering by an automotive radiator hose clamp.

Fig. 1—Exterior appearance of the K4GGI 220-MHz kilowatt amplifier shows similarity to its 432-MHz predecessor.



QST for

Tuning is done, as in the popular two-meter 4CX250 amplifiers, by homemade disks of flashing copper soldered to the heads of $\frac{1}{4}$ -20 flathead brass machine screws. The disks are 1-inch diameter. The screws are threaded through brass nuts soldered to each side of the lines. A 200-watt iron or small torch is necessary for this job. The shaft coupling presents a bit of a problem. The ideal arrangement is a nonmetallic home-brew unit machined from Teflon, although I have been using a conventional high-voltage coupling of the sort that is often found in BC-375 tuning units.

The output coupling loop of No. 12 is supported by a standoff insulator and the stator terminal of the series capacitor. These components are mounted on an aluminum bridge above the plate lines.

The bottom chassis, 7 by 11 by 3 inches, is not available from all manufacturers, and actually could be dispensed with if desired. In this event, a 7 x 11-inch plate would be mounted between the two sides of the box with 11-inch

lengths of aluminum angle stock. The bottom view, Fig. 5, shows the filament transformer and its dropping resistor, the second high-voltage bypass and rf choke. The metering switches and grid-bias supply could be mounted in this space if desired. However, I plan to share these items between several similar amplifiers for different bands after the manner of WILDQ.⁷ Since the plate circuit is a closed-end quarter-wave, this amplifier does not have provision for separate metering of the plate currents for the two tubes.

Circuits and Wiring

The grid tank is a half-wave line made of No. 12 copper wire spaced 1 inch. It is tuned by a butterfly capacitor which is mounted in a polystyrene block at the bottom end of the line, as can be seen in Fig. 2. It was planned to include a small differential capacitor for a balancing adjustment, but none was at hand at the time of construction, so we omitted it. Fortunately, it was unnecessary in our amplifier, but we

⁷ See footnote 4.

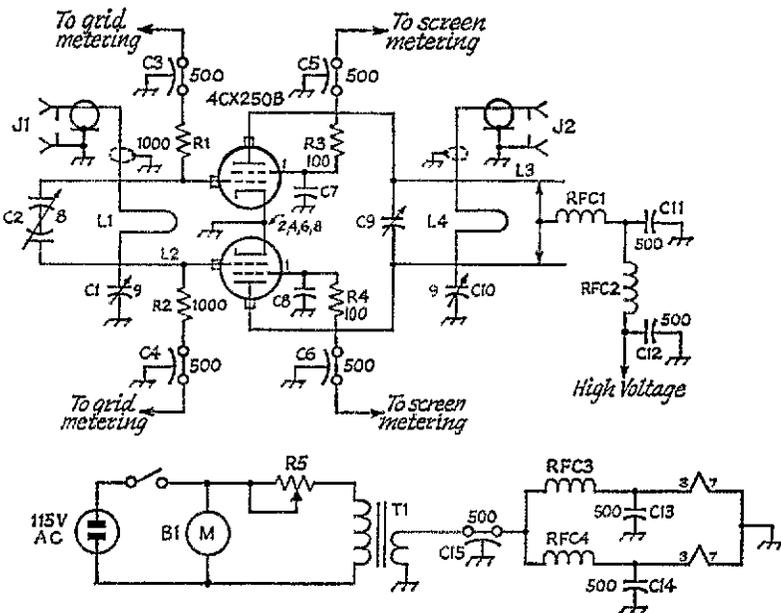


Fig. 3—Schematic diagram and parts information for the 220-MHz amplifier.

B1—Centrifugal blower, 3-inch intake, 3000 rpm (Dayton 2C610).

C1, C10—9-pF miniature variable (Johnson 160-104).

C2—8-pF-per-section miniature butterfly (Johnson 160-208).

C3 through C6, C15—Feedthrough bypass, 500 to 1500 pF suitable.

C7, C8—Screen bypass, part of Eimac SK-600 socket.

C9—1-inch copper or brass disks on $\frac{1}{4}$ -20 brass screws.

C11, C12—500-pF 20-kV TV doorknob capacitor.

C13, C14—500-pF button mica.

J1—Chassis fitting, BNC.

J2—Chassis fitting, Type N.

L1—U-shaped loop, 5 inches No. 12 wire, U portion $1\frac{1}{4}$ by $1\frac{1}{2}$ inch.

L2—L-shaped, 6 inches No. 12 wire, spaced 1 inch.

L3— $1\frac{1}{2}$ -inch OD copper pipe, $6\frac{3}{8}$ inches long, spaced 3 inches on centers. C9 is $1\frac{1}{4}$ inches from tube end. Shorting strap is $\frac{3}{4}$ -inch-wide flashing copper.

L4—U-shaped loop No. 12 wire, U portion $2\frac{1}{2}$ by $\frac{3}{4}$ inch.

RFC1—RFC4—13 inches No. 16 enamel, close-wound $\frac{1}{2}$ -inch diam.

R1, R2—1000-ohm 2-watt composition, 470-ohm 1-watt also usable.

R3, R4—100-ohm $\frac{1}{2}$ -watt composition.

R5—50-ohm 10-watt adjustable. Set for 6.0 volts at tube heater terminals.

T1—Filament transformer, 6.3 volts, 6 amperes.

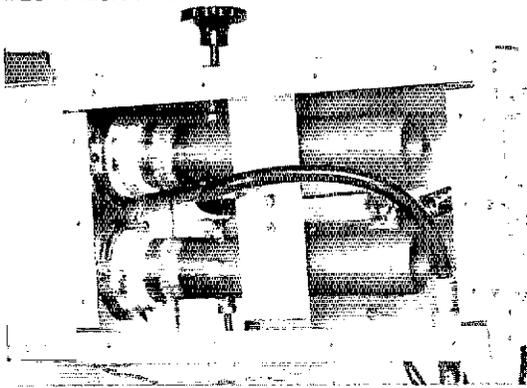


Fig. 4—Looking into the top of the K4GGI 220-MHz amplifier. Small braces of perforated aluminum keep the chimneys in place. The coupling loop and its series capacitor are supported from a bridge over the plate lines.

recommend including it. We have heard reports of others having difficulty in balancing similar amplifiers even with the inclusion of such a capacitor. Having not studied the details of their construction, we are not qualified to comment on where they may have gone wrong.

Plate voltage is fed to the plate lines via a homemade rf choke wound of No. 16 enameled wire on a $\frac{1}{2}$ -inch-diameter form, which was subsequently removed. Although the rule of thumb is to use a quarter-wave length of wire (13 inches), I made mine closer to $\frac{3}{4}$ -wave, to avoid possible second-harmonic resonance problems in the choke, although there should not be much second-harmonic energy flowing in this tank.

The grid-circuit "rf chokes" are 1000-ohm resistors tapped at the cold points of the grid lines. Note that the use of a half-wave grid tank

facilitates separate metering of the grid currents to the two tubes.

Checking Amplifier Balance

The balancing procedure for this amplifier is the same as that for the popular two-meter amplifiers.^{8,9}

Adjusting the output tank circuit for maximum power should be done with a Bird wattmeter or similar reliable power-measuring device, and using a well-matched load. Simple diode rf detectors can give misleading results, and have the further disadvantage of being not calibrated. (Note that wattmeters also are beset by accuracy problems due to non-sinusoidal waveforms; this is particularly troublesome in transistor and varactor work.) With about 1000 volts on the plates and 210 volts on the screens, it should be possible to adjust the final tuning, the output coupling loop, and the series output capacitor for over 250 watts of output. The plate-line short should be positioned so that the disk tuning capacitor is in the center of its range. We should reemphasize that these adjustments depend on the power level, so they should be optimized at the maximum power level that will be used. In our experience, it was pretty easy to arrive at a compromise setting that yielded good efficiency at from 300 to 1000 watts input.

Operation

The operating hints from the previously-referenced 4CX250B amplifier articles apply equally well here. I plan to use this transmitter for moonbounce, meteor scatter, and extended-range tropo work at 1-kw input cw. Under these conditions, the power output has been measured at more than 700 watts. The plate efficiency at the 400-watt input level is nearly as good, exceeding 65 percent, so this makes an excellent amplifier to use at intermediate power levels, for long tube life, or to make use of the less-expensive surplus 4X150As. I feel that this amplifier is much easier to build with the average amateur's facilities than is the popular single 4CX250 transmitter incorporating coaxial construction, if you don't mind obtaining a second tube and socket.

Acknowledgment

The transmitter incorporates ideas from several *QST* articles, already referenced. In addition, the following persons assisted with the project: Walker Merritt, W1LMT, donated the tubes; Ted Simmington, W1JOT, assisted with the mechanical details; Dave Thornburg, W2KZV/WA1KOR, made the photographs and cut the aluminum; Bob Reif, K9AQP, assisted with the testing; and Hank Cross, W1OOP, lent his Bird watt-meter. Several others provided encouragement along the way, but the prime mover was Sam Harris, W1FZJ/KP4, who enticed us with the prospect of being on one end of the first amateur 220-MHz moonbounce contact. 

⁸ See footnote 4.

⁹ See footnote 5.

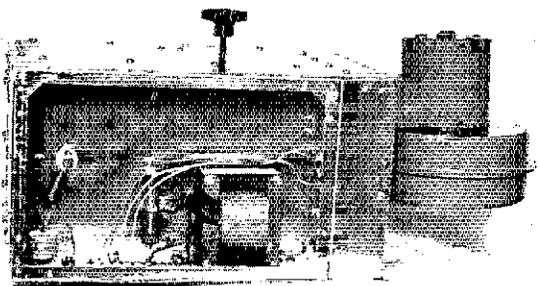
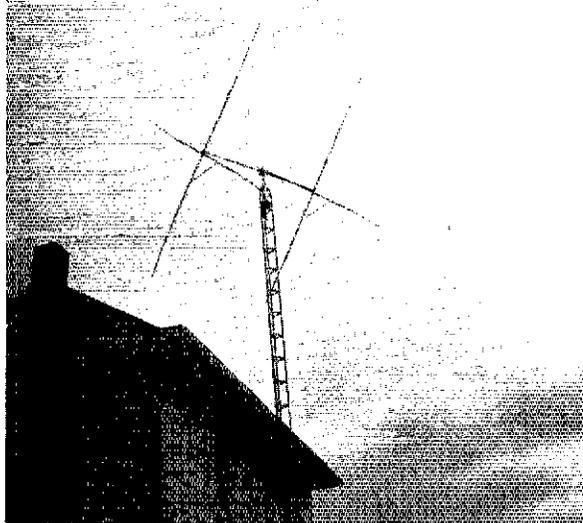


Fig. 5—Bottom view of the 220-MHz amplifier, showing the filament transformer and its dropping resistor. The rf choke and doorknob-type bypass capacitor, left, are in the high-voltage power lead.

• *Beginner and Novice*

A Two-Element 15-Meter Quad for The Novice



BY JOHN DAEBELLIEHN,* WN9BJC

The completed quad on the tower. For tune-up, the quad was temporarily mounted on the garage roof.

A SHORT time ago I began looking for a directional antenna that would help my 75 watts on 15 meters. Not being blessed with a large area for antennas here, I decided on an optimum-spaced, two-element monoband quad.

The standard formulas were used for sides and spacing, and the antenna is fed with 50-ohm cable through a quarter-wave "Q" section of 75-ohm coax cut to the standard formula. The reflector has a tuning stub.

The driven element grid-dips at 21,150 kHz and the reflector was tuned by using the grid-dip oscillator as a signal generator. I placed the grid-dip meter in a neighbor's home, turned the back of the quad in that direction, and then tuned the reflector for the lowest indication on my S-meter.

One of my checks on the antenna was with VE5XH, in Swift Current, Sask. Doug gave me the following information: The quad has two S-units gain over my $\frac{1}{4}$ -wave ground-plane which was at the same height. Strength off the front was S9 and to the rear was S2, indicating a good front-to-back ratio. Because the constructional details are rather novel, I felt that other hams might be interested in how I made the antenna.

Construction

I used $1\frac{1}{4}$ -inch TV steel mast pipe, 10 feet long, for the boom. Also, 10-foot lengths of TV

*1845 8th St., Moline, Ill. 61265.

WN9BJC was a Novice when he designed and built this 2-element quad for 15 meters. It cost less than \$30. Some of his design features are quite novel and well worth passing on to the fraternity.

mast sections, but aluminum, are used for the spreaders. However, 10-foot long spreaders are not long enough for a 15-meter quad, 20-foot lengths are required. In order to obtain the required length, 20-foot lengths of one-inch diameter, ridged plastic water pipe were run completely through the 10-foot aluminum pipe sections. Pieces of rubber hose were used as shims between the aluminum pipe and the plastic pipe and these were taped where the plastic pipe emerges from the aluminum.

The plastic water pipe I used comes in 20-foot lengths, 80 feet being required. I got this pipe from a local plumbing and lighting outlet and the cost was \$10 for the 80 feet. It is ridged plastic, but is not strong enough to support itself; so the aluminum mast pipe is used for the center portion of the spreaders.

The spreaders are clamped to the boom with standard U-bolts, and one spreader in each element is pinned to the boom with a 5/16-inch cotter key. Additionally, a piece of one-inch conduit is used in each element as a cross-brace, to hold the correct angle between the spreaders.

The formulas and element lengths for 21,150 kHz are as follows:

Driven element

$$\frac{1005}{f \text{ (MHz)}} = 47 \text{ feet, } 6 \text{ inches.}$$

Reflector

$$\frac{1030}{f \text{ (MHz)}} = 48 \text{ feet, } 8 \text{ inches.}$$

Boom spacing

$$0.2 \text{ wavelength} = 0.2 \times \frac{984}{f \text{ (MHz)}} = 9 \text{ feet, } 4 \text{ inches.}$$

75-ohm matching section

$$\frac{246 \times V}{f \text{ (MHz)}} = \frac{162.4}{f \text{ (MHz)}} = 7 \text{ feet, } 8 \text{ inches.}$$

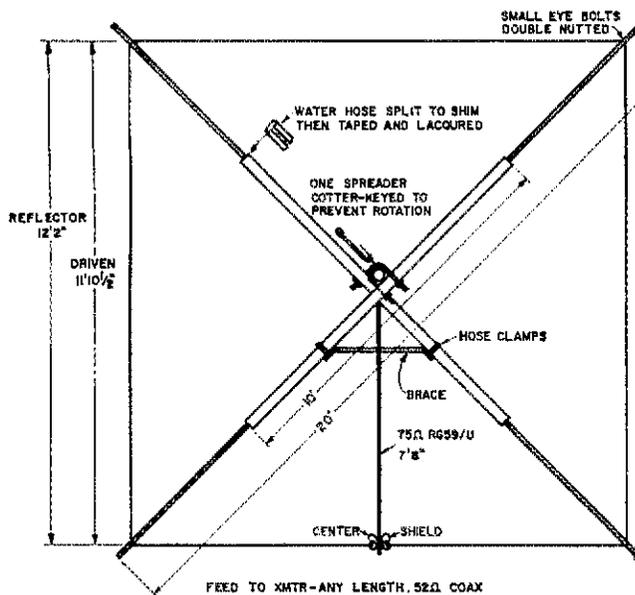


Fig. 1—Detailed drawing of the quad. The cotter pin and cross-brace are required to prevent shifting of the spreaders. Small sections of split water hose are used for shims between the aluminum tubing and the plastic water pipe.

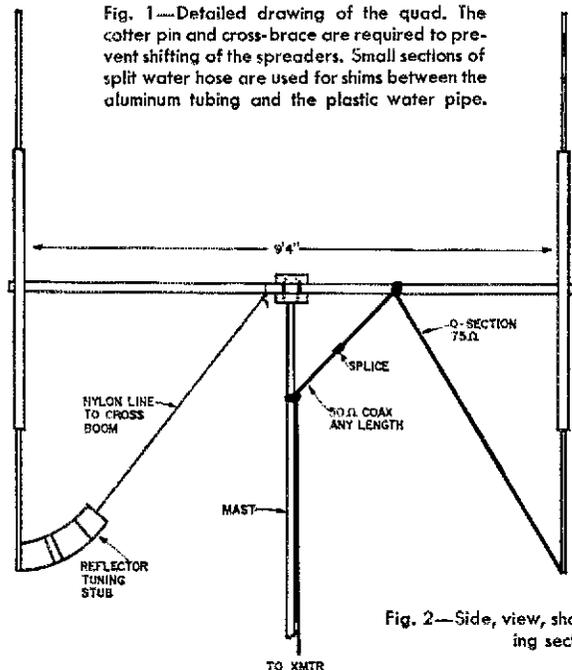


Fig. 2—Side view, showing the mounting plate, Q matching section, and coax feed.

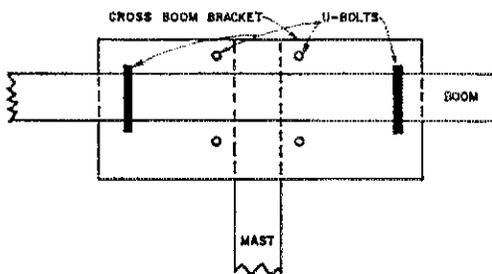


Fig. 3—The cross-boom bracket, made from 1/8-in. aluminum plate. Ordinary TV U-bolts are used to secure it to the boom and mast.

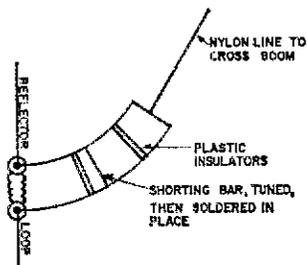


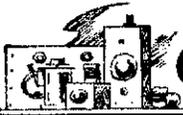
Fig. 4—The reflector tuning stub is 36 inches long. The shorting bar, a short piece of wire the same size as used in the stub was approximately 10 inches from the insulate when adjusted for maximum front-to-back ratio. Spacing between wires of the stub may be of the order of a few inches; this spacing is not critical since the stub length adjusted by the shorting stub in the tune-up procedure.

I used No. 14 soft-drawn enameled wire for loops and they were secured to the plastic pipe with double-nutted eye bolts. The reflector tuning stub was made from No. 12 copperweld wire. The total length of my stub is 36 inches, and after tuning, the shorting bar ended up approximately 10 inches from the loop.

The SWR showed almost a perfect match across the entire band. Since I have put up the quad I have worked all continents and 35

countries on the Novice band. Stateside contacts always run S8 to S9.

The total cost of the antenna was \$28, a very modest sum considering the results. More important, I believe this antenna helped my antenna theory as I recently took and passed both the General and Advanced Class license exams. I hope this article will stimulate more Novices into antenna work. There is a real sense of satisfaction in building your own. 



Gimmicks and Gadgets

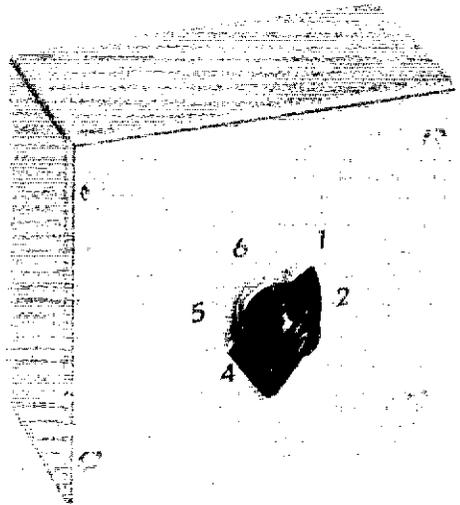
A Coaxial Switch With All Unused Contacts Shorted To Ground

THE unit shown in the photographs and in Fig. 1 is a homemade coaxial switch that shorts all unused antenna inputs to ground. This grounding feature, which permits antennas to drain off any electric charge that has built up because of nearby lightning storms, makes the switch a worthwhile addition to any station using coaxially-fed antennas.

Any antenna will always attract some electrical charge when a lightning storm is nearby. If the antenna system has no "easy" path to ground, these charges can damage the front end of a receiver or transceiver because the voltage developed can be quite high. It is always recommended that antennas be grounded when a lightning storm is nearby. By "nearby" we mean within a few miles of your installation. It doesn't take a direct hit on your antenna to cause problems and damage.

The switch shown is mounted in a 4 × 4 × 2-inch aluminum utility box. Although the switch is wired for four antenna inputs, more inputs can be added if necessary. The coaxial fittings are mounted on one cover of the box. Be sure to allow clearance room when mounting the fittings, so that the connector hardware will clear the lip of the box. Use No. 16 or larger wire to make the connections. When connecting the switch leads to the center terminals of the fittings, make the lead lengths such that, first, the entire switch assembly can be mounted in the box and, second, the front cover can be mounted over the switch shaft.

To reduce the capacitance between the center conductors of adjacent feed lines, ground every other switch contact when you wire the unit. The switch specified in Fig. 1 uses 30-degree indexing.



Assuming that every other contact were grounded, this switch could handle six antennas. The unit shown will easily handle the amateur legal power limit. — W1ICP

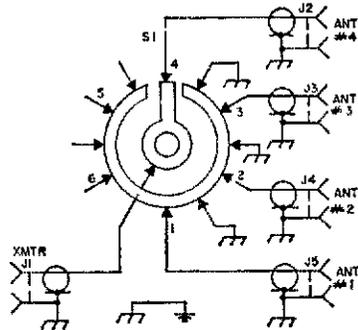
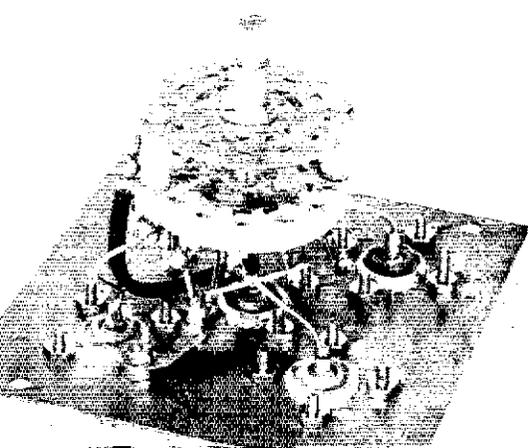


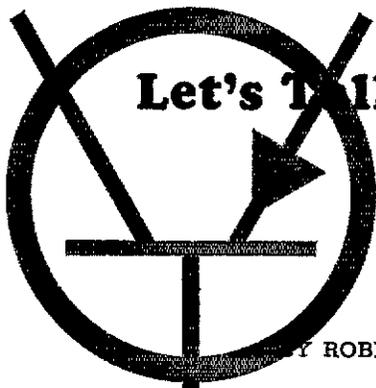
Fig. 1—Circuit diagram of the coaxial switch.

J₁, J₂, J₃, J₄—SO-239 coaxial receptacle.

S₁—Ceramic rotary, 1 section, 1 pole, 11 positions, all unused contacts shorted together (Centralab P-270 index assembly and either type GGD or FFD ceramic wafer).



Inside view of the coaxial switch. The leads should be the minimum length necessary for the switch to be centered in the front cover when the assembly is completed.



Let's Talk Transistors

Part 5—Transistor Circuits

BY ROBERT E. STOFFELS*

IN Part 4 we finally arrived at an actual transistor circuit. We found that a transistor is a three-layer device, not very much different in actual construction from the two-layer device called the semiconductor diode. The most profound difference in these two devices is the thinness of the center, or "base" section of the transistor.

In fact, for an understanding of the transistor, we considered the first two layers — the emitter and the base — as a diode, biased in a forward direction. The second and third layers — the base and the collector — were likewise considered a diode, except that in this case they were biased in the reverse direction.

We found that, as a result of this, the depletion region between the emitter and the base was very small indeed, and the current was actually permitted to flow through it. In like manner, the depletion region between the base and collector was quite enlarged, and current was not permitted to flow through it.

However, as we found, current flowing from the emitter to the base more often than not actually missed the base region entirely (remember, it is extremely thin), and the "holes" which constituted the current drifted into the collector region and were captured there. This complete bypassing of the base region by the holes provides the basic action of the transistor itself, and with careful construction, it has become possible to manufacture transistors such that about 98 per cent of all the holes leaving the emitter, ostensibly on the way to the base, completely bypass the base and end up in the collector.

* Director, EAX Operations, Automatic Electric Laboratories, Inc., Northlake, Ill. 60614. This series is reprinted from *Telephone Engineer & Management*, Brookhill Publishing Company, Wheaton, Illinois 60187

The author presents the evolution and operation of a transistor circuit and rearranges the circuit to apply different values to various components; the similarity between a transistor circuit and relay circuit are also examined.

The results of such action are immediately apparent. The current in the transistor is started by the forward bias and the slight current drawn in the base lead, but the final result of this action is the sizable current which takes place between the emitter and collector, and is caused to flow in the collector lead. The action of the transistor can be completely stopped by opening the wire connected to the base, thus removing the forward bias from the emitter-base junction. This, then, causes the much larger current in the collector to be completely (or almost completely) cut off.

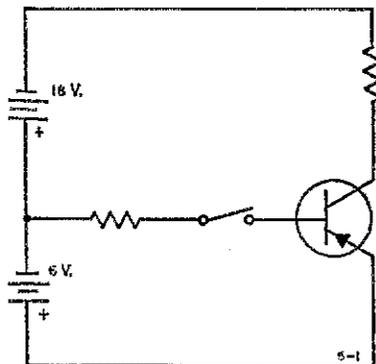


Fig. 5-1—Six-volt battery is connected between emitter and base, with protective resistor in base lead; note resistor also provided in collector circuit.

This type of action has been likened to a power brake of an automobile where we apply only a small pressure to the brake pedal itself, but cause a much larger pressure to be applied, by the brake shoes, to the wheels. In this case, also, we are not *creating* energy; the power to apply pressure to the brake shoes is derived from the hydraulic system of the car, powered by the engine, and so it is with the transistor. By permitting a small amount of current to flow in the base lead of the transistor, we are permitting — not *causing* — a much larger current to flow in the collector lead. This collector current is a result of the trigger action of the base lead (likened to the power brake pedal in your car) and the battery used in the particular transistor (equivalent to the hydraulic system of your car).

Please do not imagine that we are creating energy, or work, or anything; the more current that is permitted to flow in the collector of the transistor, the faster the collector battery will run down!

D. C. Circuit

Let us now study more carefully the evolution and operation of an actual transistor circuit. As you will recall, in the previous chapter of this series we concluded our discussion with a description of the circuit shown in Fig. 5-1. Notice that in this example, a six-volt battery is connected between the emitter and the base, with the necessary protective resistor in the base lead (remember, the emitter-base junction is no more than a forward-biased diode.) Also, an 18-volt battery is connected between the base and the collector, this time with the bias in the reverse direction; again, we have included a protective resistor in the collector circuit.

When the switch in the base lead is closed, there is a small current in this lead (as we learned in Part 4) — about 2 mA, for example — and a much larger current flows in the collector lead (about 98 mA, in the example chosen.)

Notice that the two batteries are actually in series or, to say it another way, the potential of the collector with respect to the base is 18 volts, but with respect to the emitter, it is 18 plus 6, or 24 volts.

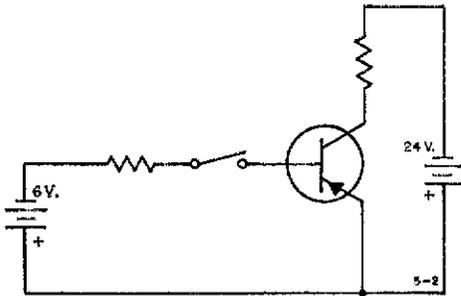


Fig. 5-2—Same circuit as Fig. 5-1 except collector battery is connected to emitter and 24-volt battery is used.

Fig. 5-2 shows another way of drawing this circuit, this time connecting the collector battery directly to the emitter, rather than to the base, and using a 24-volt battery. This type of connection is normally more "clean," since it permits us to use one lead of the transistor (the emitter) as a common point. This can be seen in Fig. 5-3, where we have eliminated the battery symbols entirely, and simply shown the base lead connected to -6 volts, and the collector lead connected to -24 volts. The emitter lead, of course, is connected to ground.

Now it is often somewhat inconvenient to provide batteries of more than one potential, and Fig. 5-1 shows a means of eliminating the 6-volt battery heretofore used between the base and emitter. Simply by making the protective resistor connected in the base lead about four times

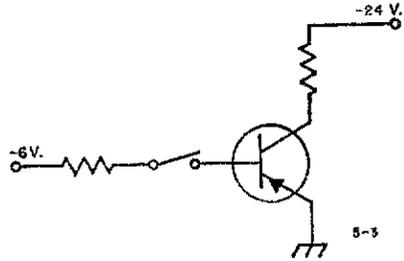


Fig. 5-3—Base lead is connected to -6 volts, collector lead to -24 volts and emitter lead goes to ground; battery symbols have been eliminated.

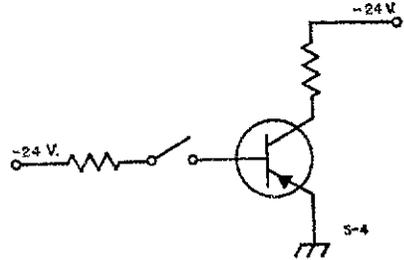


Fig. 5-4—We have eliminated the 6-volt battery between base and emitter and made the resistor in base lead four times greater; this permits use of single battery.

greater, we can tie this lead to -24 volts, and thus utilize a single battery for our circuit.

Fig. 5-5 shows a simple application of a transistor; in this case, it is desired to turn on a number of lamps with a single light-duty toggle switch. We are sure that you can conjure a number of other, more practical ways of solving the same problem. But for a first example, let's not try to get fancy!

In this case, we have connected together the base leads of a number of transistors. Furthermore, we have connected the protective resistor in this base lead to a single, 6-volt battery. Also, we have replaced the protective resistor, which we have been using in the collector lead with a lamp, and have connected this lamp to the same 6-volt battery. (We must of course be careful, in our selection of lamp and transistor, that the high inrush current to the lamp doesn't exceed the current limits of the transistor.) You will note that this circuit, or the top part of it, is almost identical to the circuit of Fig. 5-4.

Now, when the toggle switch in the common base lead is closed, current is permitted to flow in the base, and a great deal more current is permitted to flow in the collector. If we are to assume (and this is of course merely an assumption, since all transistors are different) that 98 per cent of the current entering the emitter leaves via the collector lead and only 2 per cent of this current leaves via the base lead, and if we are further to assume that each lamp draws 98 mA, then it is obvious that each base lead draws 2 mA, and that the toggle switch must be able to carry five times this 2 mA, or 10 mA total. Not

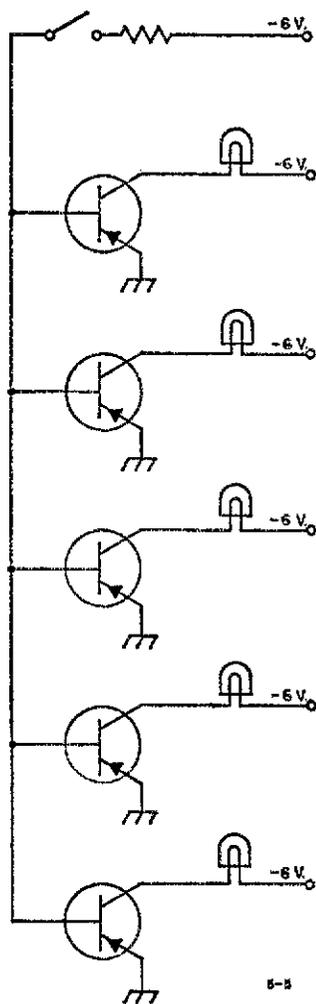


Fig. 5-5—Simple application of transistor in circuit to turn on number of lights with single switch; notice similarity of circuit to that of Fig. 5-4.

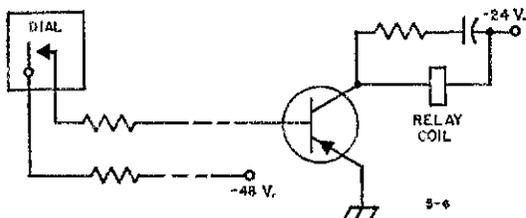


Fig. 5-6—Another example similar to Fig. 5-5; here, it was necessary to pulse a relay from a distant telephone dial.

bad, considering that the accumulated collector current is five times 98 mA, or almost 1/2 A.

Fig. 5-6 demonstrates one more example of this type of operation. In this case, it is required to pulse a relay from a distant telephone dial. The circuit length, however, precludes drawing the required amount of current from this line. Consequently, we have added a transistor to the circuit, and have pulsed this transistor with the distant dial, and caused the relay, shown in the collector lead, to be pulsed by the transistor. You might even say that the transistor is now serving as the dial, and is pulsing the relay. Note that the transistor is considerably more susceptible to transients than was the dial, and consequently spark suppression across the relay is an absolute necessity.

The examples we have mentioned here deal only with dc circuits. That is, they in no way explain the operation of a transistor with voice frequencies, radio frequencies, or any sort of ac at all. We shall, therefore, devote most of next month's chapter to operation in the voice-frequency range. We shall then see that a transistor is good for something more than simply turning relays and lamps on and off!

Transistor Manufacture

Before carrying the subject of transistor circuitry further, however, we should perhaps investigate briefly the manufacture of a transistor. It should be realized, of course, that there is no single method of transistor manufacture. In fact, the large number of manufacturing processes makes it very difficult indeed to keep track of the relative advantages and disadvantages of each. Words such as grown-diffused, meltback, planar, epitaxial, alloy, etc., all have special meaning so far as transistor manufacture is concerned. We shall not try to explain any of them, but shall simply give a single example of how a transistor might be manufactured.

It is first necessary to obtain ultra-pure germanium. We start with germanium dioxide, and reduce it in an atmosphere of hydrogen; this gives metallic germanium, but it is far from pure. To purify this germanium (and it is important that there be only about one part of impurity for every 10 billion or so parts of germanium) we employ what is called the "zone refining" process. This is based on the fact that most impurities are more soluble when a metal is in the liquid state — or, to put it another way, that most impurities tend to remain in the molten state.

Consequently, we fill a small graphite "boat" (about 3 inches long and 3/4 inch wide) with metallic germanium; place the boat within a quartz tube several feet long and about four inches in diameter; surround the quartz with several turns of copper tubing connected to a source of high-frequency electricity (induction heating); fill the quartz tube with some inert gas; and very likely cause running water to rim through the copper tubing to keep it cool. Then we start

pulling the graphite boat, very slowly, down the length of the tube. As it passes through the zone that is high-frequency heated, the metallic germanium at the front of the boat melts. As the boat moves on, the next part melts, while the first part cools off and hardens again. Thus, the molten region moves to the rear of the boat, and because of the aforementioned tendency of the impurities to remain in the molten state, these impurities are swept to the rear also.

More than likely, the apparatus is so constructed that the boat is pulled through several melting zones before it eventually arrives at the other end of the tube. When it does arrive there, however, most of the impurities in the metallic germanium have been "swept" to the last few inches of the bar, and the forward section is extremely pure, consisting of what is known as "intrinsic" germanium. It is this extremely pure germanium that is used to manufacture transistors.

Now, to actually grow a transistor, we take this very pure germanium and place it in a crucible; place the crucible within a vertical section of quartz tube (not horizontal, as before) and once again surround the apparatus with some turns of copper tubing connected to a source of high-frequency electricity. It is possible, by careful control, to cause the metallic germanium in the crucible to melt and to remain just a few degrees above the melting temperature; this accurate control of the temperature is very important.

A long rod is now inserted from the top (once again appropriate measures are taken to assure that only inert gases are present within the quartz tube), and at the end of this rod is a small "seed" crystal of pure germanium. The seed crystal is carefully dipped into the pool of molten germanium, and then, very slowly, it is withdrawn. As it was inserted, a small portion of this crystal was actually melted, and as it is withdrawn, the molten germanium gathers more molten germanium, and a column of hardening germanium forms (this column hardens, of course, because it is withdrawn from the zone formed by the induction heating apparatus). This column is one continuous crystal of germanium, very similar in appearance to an upside-down icicle.

We can now actually produce the three sections of the transistor by appropriately "doping" the molten germanium. That is, if we wish to manufacture pnp transistors, we first "dope" the molten germanium with p-type material, such as aluminum. Small amounts of aluminum are dumped into molten germanium from appropriate places, and now what is being grown is pure germanium with small amounts of "positive" impurities added — in other words, p-type germanium. As the crystal is slowly lifted, a layer of p-type germanium forms on its end. After growing the p-type crystal to the desired thickness, it is necessary to dope the crystal with some negative impurities. Consequently, the proper amount of such an impurity (for example,

arsenic) is now dumped into the molten metal. Because this will be the base region, and because the base itself must be very, very thin, only a short time is permitted to pass before once again doping the solution with p-type impurities.

You will note that we have grown a single crystal, and have not tried to physically combine three pieces of appropriately doped germanium. The impurities were added, in our case, by actually inserting atoms of impurities while the crystal was being formed.

After the process is completed, it is only necessary to remove the column of properly doped germanium (it is slightly thicker than a lead pencil) and to slice it into very small pieces with a diamond saw. These pieces are then mounted in the appropriate housing, and we have manufactured a transistor.

Questions:

1. In a circuit such as that shown in Fig. 5-1, why do we need the resistor in the base circuit?
2. Why, in the circuit of Fig. 5-6, have we included a resistor and capacitor across the relay?
3. Is there one basic way in which transistors are manufactured?
4. In a zone-refining process, is an entire chunk of germanium melted at once?
5. Because a transistor is symmetrical (p on each end and n in the middle, or vice versa) why can't we operate the transistor satisfactorily by reversing it in a circuit?
6. How does a manufacturer attach a wire to a region such as the transistor base, which is only about .001 inch thick?

Answers:

1. Remember that the emitter-base junction of the transistor is exactly equivalent to a forward-biased diode. Thus, its resistance is extremely low, and if a voltage is applied to this junction without such a protective resistor, the transistor will quickly overheat and destroy itself.
2. The relay is an inductive device, and when the transistor turns it off a voltage spike will appear at the collector of the transistor. If this voltage spike is not adequately suppressed, it will surely "shoot down" the transistor.
3. No. In fact, there are so many ways of manufacturing transistors that it is virtually hopeless to try to keep track of them all.
4. No, a very small region of the germanium is melted at one time — only that portion which is directly within the inductive heating "zone."
5. In some cases the transistor will work in the reversed condition. However, because some of the manufacturing techniques result in more impurities in one of the p regions than in the other, the transistor works best when applied as intended.
6. Very carefully!

QST



Hints and Kinks

For the Experimenter



RECEIVER MUTING—A SIMPLE METHOD

Click-free receiver muting is desirable for phone or cw work. Also, minimum lag time in the muting function is important if break-in operation is contemplated. The circuits shown in Fig. 1 satisfy both requirements.

Most tube-type receivers can be adapted to accommodate the solid-state muting system of Fig. 1B. It is necessary to break into the cathode return of the first audio amplifier—usually a 6AT6, one half of a 12AX7, or similar low-current tube. An npn transistor, Q_1 , acts as a switch to turn off the first amplifier. It receives its switching voltage—base bias—from rectified rf at the transmitter output, Fig. 1A. When the transmitter is in the key-up mode, Q_1 is biased into saturation by a plus voltage taken from the cathode of the af output stage. During transmit, negative bias overrides the plus voltage on the base of Q_1 , thus preventing conduction in the transistor and causing an open-circuit condition in the cathode of the first audio stage.

Typical voltages for key-up and key-down conditions are given on the schematic diagram. Almost any npn transistor will work in the circuit. Several types were tried in the test receiver, an HQ-100, and all worked well. A 2N2102 was the final choice because of its modest price, and because its ratings are much higher than needed in this type of circuit—a safety precaution. Doubtless, any number of bargain-house or computer-board transistors should work as well

as the 2N2102. Low-power transistors, in the 300-mW range, or higher, will be satisfactory.

The circuits shown in Fig. 1, if used in combination with a vacuum-tube TR switch, should provide the operator with complete break-in (for traffic work) without the click-causing transients so often associated with standby circuits which break receiver B-plus voltages by means of mechanical switching. — *WICER*

USING THE HY-GAIN BN-36 BALUN WITH THE TA-33

A BALUN is a desirable addition to the Mosley TA-33 trap beam, but adding the Hy-Gain BN-36 balun to this beam is not quite as simple a project as it might first appear. The BN-36 was made to mount below the boom and next to the feed point on Hy-Gain beams. The TA-33 has its feed point on top of the boom, so an installation on the TA-33, following the instructions packed with the balun, will result in long connecting leads that will lower the resonant frequency of the driven element enough to upset the operation of the beam. Mounting the BN-36 upside down on top of the boom will allow short connecting leads. However, the drainage hole will then be exposed and the balun will fill up with water during a driving rain, resulting in erratic operation and a high SWR.

Since the balun obviously must be mounted on top of the boom, the original drainage hole should be sealed off and a new hole drilled.

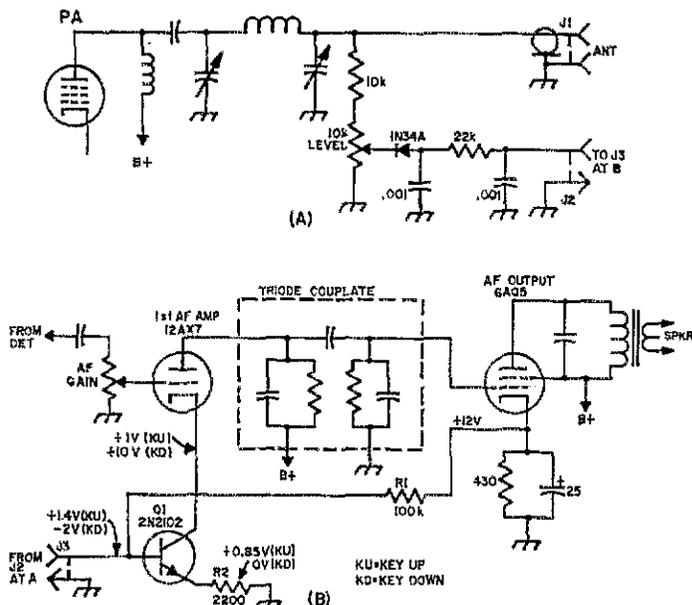


Fig. 1—At A, a typical transmitter output stage to which an rf sampling divider and rectifier have been added. It is suggested that the rf takeoff be at a low-power point in the system—for example, the exciter plate tank, rather than the plate circuit of a high-power linear amplifier. At B, circuit details for adding the receiver muting circuit. R_2 is the original cathode resistor for the 12AX7. Positive bias for Q_1 is borrowed from the cathode of the 6AQ5. R_1 should be selected for complete saturation of Q_1 in the receiver mode. However, no more positive bias should be used than is necessary to completely turn the receiver on. This modification is for an HQ-100 receiver, but the technique is applicable to nearly all receivers. Capacitance values are in μF . Resistances are in ohms; $k = 1000$. J_1 is a coaxial fitting; J_2 and J_3 are phono jacks.

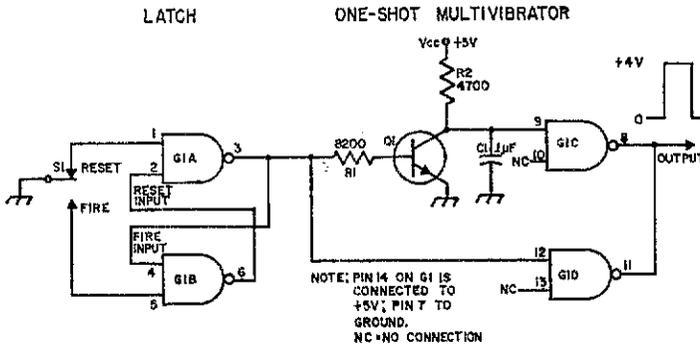


Fig. 2—DTL logic pulser. Resistances are in ohms.

C_1 —For text reference.

G_1 —Four 2-input NAND gate (MC846, MC946, μ L946 or 9946).

Q_1 —2N706, 2N708, 2N3894 or 2N3904.

R_1, R_2 — $\frac{1}{2}$ -watt composition.

S_1 —See text.

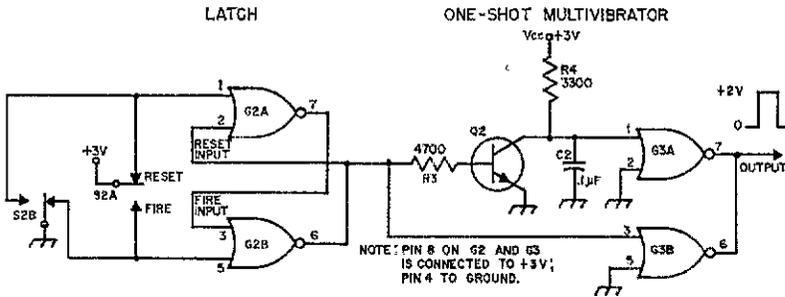


Fig. 3—RTL logic pulser. Resistances are in ohms.

C_2 —0.1 μ F.

G_2, G_3 —Two 2-input NOR gate (MC914, μ L914 or 9914).

Q_2 —2N706, 2N708, 2N3894 or 2N3904.

R_3, R_4 — $\frac{1}{2}$ -watt composition.

S_2 —Dpdt, spring-return toggle switch.

Silicone rubber or other cement can be used to block off the old hole, which is located just below the coaxial connector. A new hole should be drilled in a corner (any corner will do, as there are no internal parts in the corner areas) of the top. When the balun is mounted, this new hole will be aimed downward and will allow any accumulated moisture to dry out. — *WIKLK*

LOGIC PULSER

SINCE the appearance of inexpensive digital integrated circuits on the market, more and more experimenters are building counters, shift registers, and digital frequency dividers. Many times in testing a design it is helpful to put in a single pulse at a time. This is not always simple with these fast circuits that can actually count the pulses generated by the contact point bounce of a switch or the touching of two wires together.

To ensure that only one pulse is generated, a "latch" circuit can be mated with a monostable multivibrator (one shot). Such an arrangement using DTL elements is shown in Fig. 2.

The operation of the latch circuit is just what the name implies. Once S_1 is switched to FIRE, a positive pulse is applied to the RESET INPUT

and the circuit changes state. The circuit remains in this state no matter how many more positive pulses are applied to the RESET INPUT. A positive pulse must be applied to the FIRE INPUT (by switching S_1 to RESET) to cause the circuit to go back to its original state.

The output of the latch circuit drives a one-shot multivibrator. This multivibrator has a normally high input which results in a normally low output. Hence, switching S_1 causes the pulse output of the multivibrator to go from ground to four volts and back to ground. The pulse width of the output is determined by R_2 , C_1 , and the applied voltage. With the component values shown and 5.5 volts applied to the circuit, a pulse width of 50 microseconds was measured at the output.

A spring-return toggle switch should be utilized for the pulse RESET/FIRE switch, S_1 . This will ensure that a pulse will always be ready, and it will simplify the user's count of the number of pulses.

The logic pulser may also be built with RTL elements. This is illustrated in Fig. 3. With the component values shown and 2.8 volts dc applied, the resultant pulse was 60 microseconds wide. — *Walter Simciak, W4HXP*

Technical Correspondence

"MIXED-NUMBER" FREQUENCY MULTIPLIER WITH STEP-RECOVERY DIODE

Technical Editor, *QST*:

One of the hot projects at this station has been the construction of a frequency multiplier using a step-recovery diode. One of the results will amuse you. The objective (not yet reached!) is to obtain a few milliwatts of stable energy at X band, to use as the pump for a 2304-MHz parametric amplifier. The diode used is the Hewlett-Packard 5082-0375. HP's AN 920 is used as a guide but not as a bible. ¹

In one experiment the diode was mounted vertically across a special "thin" section of waveguide (2 mm high inside). The bottom of the diode was grounded, and the top connected to a built-in bypass capacitor, thence to the driving source and the bias supply. A resonant cavity was formed in the guide by the diode and an inductive post, and tuned by a capacitive screw. Thereafter the guide tapered up to a standard RG-52/U connector, which was connected to the input of a spectrum analyzer so I could inspect the harmonics in the region around 9 GHz.

The driving source put out about 100 mW on 130 MHz, and was crystal-controlled. This signal was coupled through a small capacitor to a circuit resonant at 230 MHz and mounted on top of the guide, and a tap on the latter circuit was connected to the diode and bypass capacitor. Bias was provided by a variable resistor.

I was especially interested in the 40th to 42nd harmonics, i.e., 9200, 9430 and 9660 MHz. Output at all these frequencies was readily identified on the analyzer. The bias resistance, cavity tuning, driver coupling and tap on the 230-MHz circuit were varied in an effort to optimize one or the other of the desired harmonics. Under some conditions of adjustment there appeared on the scope clumps of "brush" extending well above the grass, and these were taken to indicate that the diode was oscillating parametrically, as mentioned in the applications note. All this was about as expected.

After making a change in the bypass capacitor, additional strong "harmonics" in between the 40th, 41st and 42nd were noted. These turned out to be odd multiples of 115 MHz, or the 40% and 41% harmonics of 230 MHz. Since the driver included a crystal oscillator operating at 115 MHz, my first reaction was that something had become detuned, and that the input to the step-recovery stage was rich in 115-MHz energy. This idea was disposed of when a high-*Q* filter was inserted in the input line. With the filter tuned to 115 MHz there was no detectable output; with it tuned to 230 MHz the output was restored and the mixed-number harmonics were right there too! By proper adjustment of the bias resistance the 41% harmonic

¹ "Harmonic Generation Using Step-Recovery Diodes and SRD Modules," Hewlett-Packard Applications Note 920, Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, CA 94304.

could be made stronger (by 10 dB or so) than either of the adjacent ordinary harmonics.

It seems that I had unwittingly constructed a circuit wherein the diode bypass capacitor and the connecting lead were resonant at or near 115 MHz. Thus the diode oscillated at this frequency as a locked-oscillator divider or degenerative parametric amplifier.

The question arises as to whether this circuit might be put to practical use. One advantage is that it uses only one active device. One possible use would be to obtain harmonics at the edges of the extra-class frequency segments (e.g., 3825 kHz) from a 100-kHz standard-frequency source. While the 5082-0375 diode hits the budget a bit hard, Hewlett-Packard makes several other SRDs which sell for between five and ten dollars, no more than one might pay for a few transistors or integrated circuits. -- William L. Smith, W3GKP, 1525 Spencerville Rd., Spencerville, MD 20868.

SEMICONDUCTOR CONDUCTIVITY - NOISE POWER

Technical Editor, *QST*:

Two relatively minor points appearing in articles in the November 1969 issue of *QST* prompt me to send this note of amplification. I hope that it will prevent certain misconceptions from spreading further than they have.

Stoffels in his article on transistors² states that semiconductor materials such as germanium and silicon have that name because their resistance lies between that of the conductors and the insulators. This is true, but the true physical distinction between insulators and conductors is discovered when we consider the way in which a material's electrical resistance varies with temperature due to the greater ohmic losses from scattering of electrons by the vibrating atomic cores of the conductor. In an insulator, the resistance decreases with higher temperature. Even though the increased scattering effect mentioned before is present, it is far overshadowed by a more numerically significant result of the increased number of mobile charges, as higher energy thermal electrons jump the "energy gap" existing in insulators. As it happens, inspection of the conductivity of a large number of materials will show that it is possible to construct a chart in which material resistivities of all values march continuously across the map, with no distinct grouping of "conductors," "semiconductors," and "insulators." In fact, a semiconductor is merely an insulator which is being examined at a temperature which is high enough to allow a sizable number of electrons to have energies above the "energy gap" level. Thus an "insulator," such as diamond, can be used to make a transistor at very high temperature!³

Hyder states that thermal noise has constant power per Hertz at all frequencies from zero to essentially infinity.⁴ The formula given by Hyder, and known variously as the Johnson noise formula or the Nyquist formula, is actually a low-frequency approximation of a more general formula:

² Stoffels, "Let's Talk Transistors," *QST*, November, 1969.

³ Conversely, ordinary grades of germanium and silicon may not behave as "semiconductors" at low temperatures. See "Transistor Rigs and Cold Weather," Technical Topics, *QST* February, 1970, p. 46--Editor.

⁴ Hyder, "Atmospheric Noise and Receiver Sensitivity," *QST*, November, 1969.

$$P_N = \frac{k T}{\exp \frac{h f - E_0}{k T} + 1}$$

in which \exp is the exponential function, h is Planck's constant (6.62×10^{-34} watt-seconds per Hertz), and E_0 is the so-called Fermi energy level of the electrons, a "cutoff point" above which the power is less than half of the low-frequency value given by the approximate formula which Hyder presents. T is the temperature in degrees Kelvin, and k is Boltzmann's constant (1.38×10^{-23} joules per degree Kelvin).

One may easily verify that this formula is very closely equal to the approximate form when the frequency, f , is much smaller than E_0/h . In practice, for noise originating in a low-electron-density gas, this cutoff frequency may be over 10^{18} Hertz, which is in the X-ray region! As Hyder states, this is essentially infinity as far as we are concerned for any practical radio frequency.

Historically, it is interesting to note that the approximate formula corresponds to the principle of "equipartition of energy" in classical thermodynamics. This principle, applied to "black body radiation" by Rayleigh and Jeans leads to the incorrect conclusion that the electromagnetic power radiated by a heated black object (or, correspondingly, the noise power coming from the terminals of a resistor, or an antenna receiving atmospheric noise) continues undiminished at higher frequencies leading to total infinite power from a very finite object. Since Rayleigh was considering visible light and his difficulties originated in the frequency above the visible region, this problem of infinite predicted power was known at the "Ultra-violet Catastrophe," a picturesque and ominous name! This problem was the background which led Max Planck to develop the first historical steps of the quantum theory near the turn of the century, and the formula given here is a modern modification of Planck's formula, due to work by Enrico Fermi, which is particularly applicable to electrons in a solid but which also applies to electrons in the atmosphere.

These minor details are pointed out with the utmost admiration for the excellent discussions of their subject areas which the two authors have presented. However, in my experience of teaching college engineering students, I have noted that these two points have raised many misconceptions, even in the minds of students with adequate background in physics and mathematics. — Richard C. Levine, WA2DDU/W8JKE, 1122 Victory Ave., Plainfield, NJ 07060.

ATOM STRUCTURE

Technical Editor, *QST*:

Part I of "Let's Talk Transistors"⁵ is misleading in its description of the structure of the atom. Quantum mechanics has shown that although the paths which electrons follow around the nuclei of atoms are unknown, they cannot be elliptical, for the forces thus generated would cause the electrons to collapse into the nuclei. Instead, the electrons inhabit specific fields of probability, based upon the energy levels they have. There are several of these orbitals on each level, each having approximately the same energy as every other orbital on its level, and each containing a maximum of two

electrons. On the first level there is one orbital, the s_1 , which has a spherical "shape." (I use quotes because I am speaking of a probability field which has no definite boundaries.) The second level consists of one s_2 and three p_2 (dumbbell-"shaped") orbitals, or perhaps a better analogy of the p -orbital shape should be that of the radiation pattern of a dipole antenna. The third level has one s_3 , three p_3 , and five d_3 orbitals, and the fourth level has one s_4 , three p_4 , five d_4 , and seven f_4 orbitals. The d and f orbitals have a variety of shapes.

The designation of the atomic orbitals as s , p , d , and f was due to the studies of the light-emission spectrum of the hydrogen atom from which the concept of restricted energy levels or orbitals was formed. Thus, s denotes sharp, p denotes principle, d diffuse, and f fundamental. Subsequent orbitals are named in alphabetical order: thus s , p , d , f , g , h , and so on.

Books containing related information which may be of interest to readers of *QST* are, in alphabetical order by author:

Companion, Audrey; *Chemical Bonding*, McGraw-Hill, New York, 1964.

Nau, R.H.; *Basic Electrical Engineering*, Ronald Press, New York, 1958.

Ryschewitsch, G.E.; *Chemical Bonding and the Geometry of Molecules*, Reinhold, New York, 1963.

Semat; *Introductory Atomic and Nuclear Physics*, Rinehart, New York, 1954.

White, H. E.; *Introduction to Atomic Spectra*, McGraw-Hill, New York, 1934.

The first and third references above are presented in a nontechnical manner. The others are college textbooks. — Dana S. Nau, WA0RY, 1114 Joyce Ave., Rolla, MO 65401.

LIGHT-SENSITIVE CELL FOR AGC

Technical Editor, *QST*:

The light-sensitive cell used for agc in the circuit of Fig. 5A, "An RTTY Terminal Unit of Wide Dynamic Range,"⁶ should function. The use of such control circuits is common in broadcast equipment design, with improvement. Cell V_1 has such a high resistance when the lamp is out that the base of Q_1 looks at a very high impedance. A better scheme is to use V_1 as an arm of an unbalanced tee network, as shown in Fig. 1.

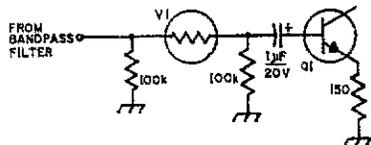


Fig. 1 — Improved agc circuit using light-sensitive cell. Refer to *QST* for May 1968, p.24, for complete schematic. V_1 is a cadmium sulphide cell.

The 100-k resistor should be connected by V_1 to another 100-k resistor before the capacitor. This will drop the input impedance to 50,000 ohms (two 100-k resistances in parallel) when V_1 is low in value, and will never be higher than 100,000 ohms when V_1 is dark. This is a more stable system. — Frank H. Maley, W1GZH, 84 Main St., St. Johnsbury, VT 05819.

⁵ Buttschardt and Olson, "An RTTY Terminal Unit of Wide Dynamic Range," *QST* May 1968.

⁶ See footnote 2.

A Trap-Filter Duplexer for 2-Meter Repeaters

Keeping Transmitter Power out of the Receiver Line

BY EDWARD P. TILTON,* W1HDQ

A common problem in vhf repeaters is desensitization of the receiver when the transmitter comes on. Almost everyone who has set up a repeater with the customary 600-kHz frequency separation between transmitter and receiver is familiar with it. High-Q coaxial tank circuits in the receiver line may help, but even well-made devices of this kind are of limited value, and insertion loss may be prohibitive.

The filter shown here was built at the suggestion of A. H. Groff, K0VQM, who supplied details of a similar filter that he built for MARS frequencies. His channels, 142.155 and 143.46 MHz, are more than twice the usual separation of in-band 2-meter repeaters, but his reported 80-dB isolation encouraged us to try the idea for 146.34-146.94 MHz and similar in-band frequencies used in 2-meter repeaters.

K0VQM used $\frac{3}{16}$ -inch sheet aluminum for sides and partitions. This being difficult to handle, if you're not well equipped with tools, we tried thinner sheet metal and bent-up partitions and sides, aiming for dimensions that would permit using a standard aluminum chassis for the housing. Results were good enough so that we feel that repeater operators may find this version useful.

The equivalent circuit, Fig. 1, was suggested by K0VQM to explain operation of the filter. This circuit could actually be built, and it might help in some repeater applications where frequency separation and other desensitization factors are not too severe. More on the nature of the problem later; for now let's imagine that the circuit of Fig. 1 is connected in the coaxial line to the repeater receiver, by means of J_1 and J_2 .

The circuits at the middle, L_2-C_2 and L_3-C_3 , are tuned to the receiving frequency. They peak rather broadly, being loaded down by the antenna on the input side and the receiver on the output. The link L_5-L_6 represents low-impedance coupling between these two circuits, achieved in

* VHF Editor, QST.

the K0VQM filter by the "aperture" in a partial shield between the two lines.

The circuits L_1-C_1 and L_4-C_4 are transmitter-frequency suck-out traps, coupled to the receiver-frequency circuits through apertures in the partitions that separate them physically. These apertures, at the hot end of the lines, are represented in Fig. 1 by the capacitors C_5 and C_6 . The trap circuits tune very sharply, as they must if they are to have negligible effect on reception of a signal only 600 kHz away. All this may help to make Fig. 2 and the interior photograph of the filter a bit more intelligible to anyone not acquainted with linear circuits and aperture coupling. Features of the equivalent circuit are marked on the sketch of the interior, Fig. 2.

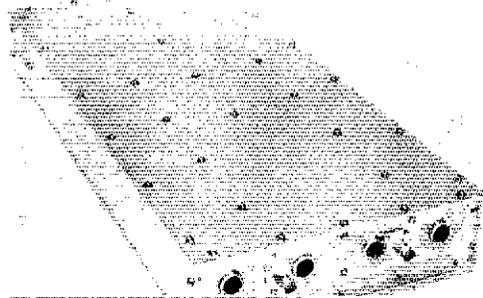
Construction

The $\frac{3}{16}$ -inch sheet aluminum used by K0VQM will make a desirably sturdy assembly, and no bending of parts is involved. If this technique is used, we suggest making the assembly an inch longer than the one described, to allow the capacitors to tune the lines with wider spacing, in the interests of ease of adjustment. Our design is for inclusion in a standard 8- by 17- by 2-inch chassis, if the builder wishes. With a bottom cover, and partitions made from bent-up sheet metal fastened to both top and bottom, stability of the finished product should be adequate.

We used 0.04-inch sheet brass for end plates, because it works so nicely, and can be silver-plated readily. Brass facilitates soldering in the lines, and is recommended for auxiliary end plates even if an aluminum chassis is used, as the best possible electrical contact between the lines and the end plate at the grounded end is a must. Do not attempt use of a conventional variable capacitor; anything but air insulation at the hot ends of the lines will degrade the circuit Q markedly. Highest obtainable circuit Q is a must, for really high rejection of the unwanted frequency and minimum insertion loss on the desired one.

The four lines are $\frac{3}{8}$ -inch (outside diameter) hard-drawn copper tubing, obtainable at plumb-

Exterior view of the completed duplexer, looking at the grounded end of the tuned lines. It will be seen that these project through the end plate about $\frac{1}{2}$ inch, for good soldering on both inside and outside surfaces. Silver-plated brass or copper is recommended, but plating is not mandatory.



ing supply houses and some hardware stores. We bought two 36-inch lengths to make four 16½-inch lines. These solder into holes in the end plate (right side of Fig. 2), projecting through the plate about ¼ inch, to allow for good soldering inside and out. The holes were made with a ⅝-inch chassis punch, in preference to a drill, the punch giving a smoother hole and better fit. Reaming the hole for a press fit to the tubing is also good. Filing the hole to fit may also be satisfactory, if done with care. A close fit is important, as the solder should be mainly for strengthening the joint and maintaining alignment, not to achieve electrical contact.

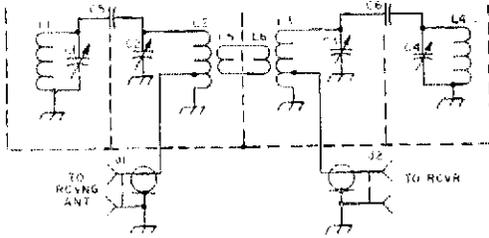


Fig. 1—Equivalent circuit of the trap filter. The two tuned circuits at the center represent the two middle lines of the filter, which are tuned to the receiving frequency of the repeater. The two outer circuits are suck-out traps tuned to the transmitting frequency. Aperture coupling between sections is simulated by the capacitors C_1 and C_2 and the link between the receiver tuned circuits.

The stationary plate of each tuning capacitor is a 1-inch square piece of brass or copper, soldered to the other end of the line. The movable plate is a 1-inch disk of the same material soldered to the end of a 10-32 brass screw. The latter runs through the brass end plate, to which brass nuts have been soldered on either side, to make a bearing for the adjusting screw.

Soldering was done with a 300-watt iron. Do not try it with anything smaller. A torch is preferable, if you're experienced in its use. The bearing nuts can be soldered to the brass plate easily if they are run onto a 10-32 screw to a "finger-tight" condition, and soldered in place, taking care not to run the solder up over the nut and onto the holding screw.

We are indebted to WICER for an easy way to solder the disks to the adjusting screws. He suggested chucking the screw in a drill press vertically, running a brass nut onto the bottom end, and then bringing this down against the center of the disk, resting on a flat piece of wood on the drill-press table. The assembly can be held in alignment this way while soldering. Don't let go too soon; using that much heat requires an appreciable cooling-off time, before the joint is mechanically solid. Some similar holding arrangement is also a great aid in doing a neat job of soldering the plates onto the line ends.

Joining of the lines and the end plates also calls for some kind of jig or fixture. We clamped

one line in a vice between wood blocks, and then lined it up vertically with a square and a level. The end plate was then pushed on, adjusted carefully to a level position, and soldered in place. A piece of wood planed to the right thickness can be used as a separator between this line and the next one to be soldered, to help maintain alignment.

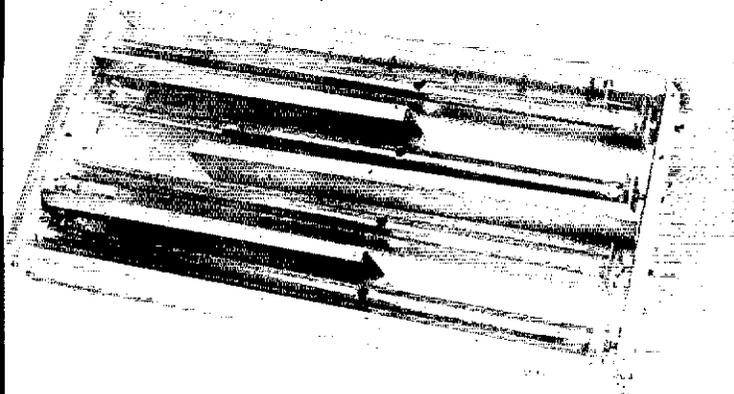
Don't be alarmed if your handwork comes out looking like something less than the product of a precision machine shop. Individual line sections roughly 2 by 2 inches in size, with the tuned inner conductors approximately centered therein, is good enough. What is important is the best possible rf path between the lines and the end plate at the grounded end. Silver plating helps here, and is recommended. Three ways to do the job are outlined in any edition of our *Radio Amateur's VHF Manual*. Again we acknowledge the assistance of WICER, who furnished the plating solution and a silver anode, for use in the method he originally outlined in Chapter 13 of the *Manual*. It is easily done, and in this instance a great help in soldering. Don't let lack of silver-plating facilities stop you, however. The filter will work well unplated, if the principles are followed otherwise.

Mechanical rigidity is very important, as even minute changes in line capacitance or inductance cannot be permitted. The lines are supported about 10 inches out from the grounded end by means of ¼-inch ceramic cone standoffs. Do not go farther out on the line, as even the best insulation near the hot end will affect the Q adversely.

Some features of the filter may show in the photographs but not in the drawings. We made the partitions adjustable in length, to check the effect of different size apertures, settling on those given in the drawings as most desirable for our purposes. With the fine lengths used, our 1-inch capacitor plates tune the lines at quite close spacings, and tuning is tricky. We added I-shaped capacitor tabs to the side walls of the filter, with a surface 1 by ¼ inches in size spaced about ⅛ inch from the side of the line, near the open end. This allows greater spacing of the tuning disks from the fixed plates on the line ends, giving some vernier effect.

Input and output coupling leads are ¼-inch straps of flashing copper, soldered to the lines at points 1½ inch out from the grounded ends, and bent parallel to the lines and about ⅜ inch from them, running to BNC fittings on the end plate.

Partitions and end plates are 2 inches high when bent, with ⅜-inch lips top and bottom, and on one end in the case of the partitions. Whether you use a standard chassis or make the whole assembly of sheet metal as was done here will have some bearing on how the metal work is done. Partitions will be the same either way, but the end plates will be simple flat pieces that fasten to the ends of the chassis, whereas ours have lips bent over on all four edges. A chassis cover plate will be 8 by 17 inches, instead of the larger size used here for top and bottom plates.



Looking into the filter from the top, we see the disk-type tuning capacitors at the right. Each tuned line is supported on a cone insulator, to provide rigidity, as tuning for optimum performance is critical. Though a handmade assembly is shown, the dimensions are such that a standard 8 by 17-inch chassis could be used.

Holes in the bottom of the assembly drilled for mounting the cone standoffs can be a bit larger than necessary to pass the mounting screws. This will allow some movement of the cone before tightening in place, to correct any small misalignment of the four lines.

Adjustment

One problem with fm equipment is that precise adjustment of receiving gear may not be easy if you do not have test equipment designed for fm servicing. Our duplexer can be tested much more readily with an unmodulated signal source and an a-m receiver equipped with an S-meter than with the repeater transmitter and receiver. A signal generator that can be moved to any desired frequency is also useful as a signal simulator. No modulation is necessary, and the generator need not be accurately calibrated, if you can listen to the repeater transmitter and zero the generator on it with the aid of an a-m

detector. (This same technique is useful in solving other frequency problems with fm gear.)

Put your signal source on the receiving frequency of the repeater first. With the duplexer in the receiver line, tune C_2 and C_3 for maximum signal. These circuits tune uncritically, but a relatively weak signal will help in optimum tuning.

Now put the signal source on the transmitting frequency, and tune in the signal on the receiver. Leaving C_2 and C_3 as set, adjust C_1 and C_4 for minimum signal. These circuits tune *very* sharply, and you may be surprised at the depth of the suck-out of the unwanted signal. Unless you started with a receiver-blocking signal, the signal may disappear completely, in which case increase the strength of the signal source and repeat the suck-out capacitors. Tighten the lock nuts just enough so that the screws will not move unless turned with a screwdriver. Final adjustment should be checked with the duplexer in the posi-

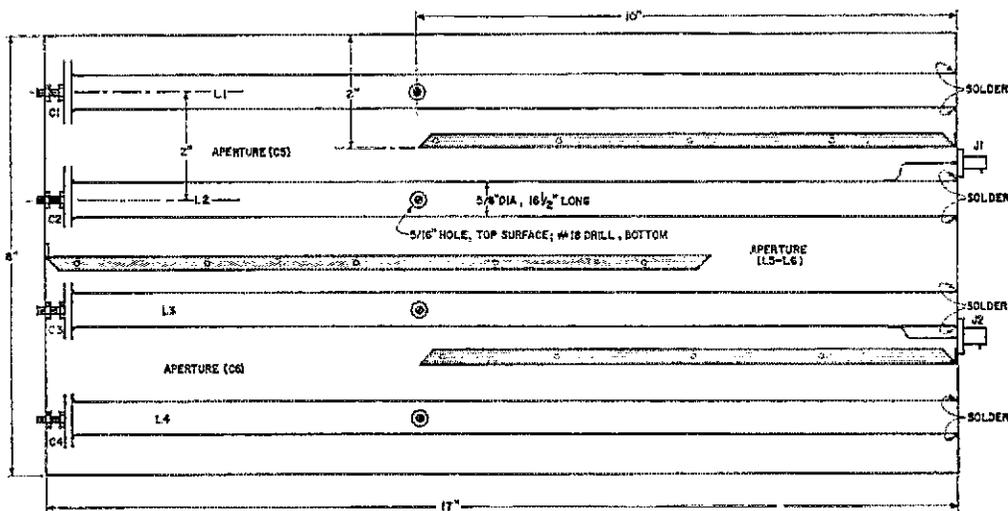


Fig. 2—Principal details of the trap filter, designed for inclusion in an 8 by 17-inch chassis, or assembled from sheet metal as described. Assembly can be made longer, for lower-C tuned circuits and less critical tuning, if greater than standard chassis length is permissible.

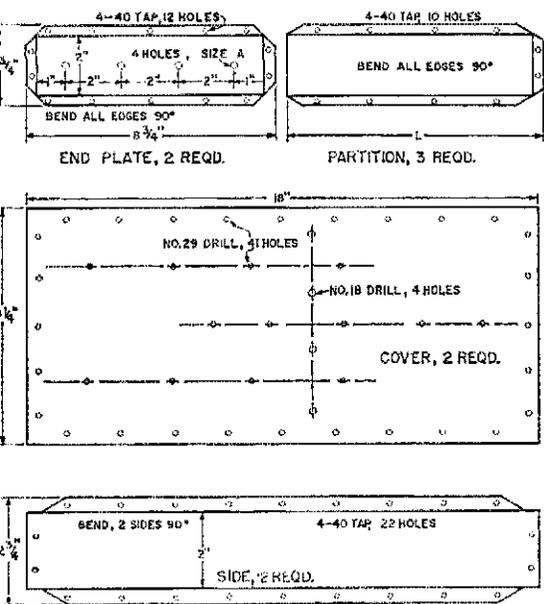


Fig. 3—Metal work suggestions for duplicating the filter described. As some dimensions will depend on available materials and assembly methods used, dimensions given should be regarded as approximate only. End plates are silver-plated brass. The size-A holes are No. 10 drill, for the tuned end of the filter, and $\frac{3}{8}$ -inch diameter for the grounded end of the lines. Two different-size partitions are needed, dimension L being 13 inches for the center one and 10 inches for the two on either side. No side plates would be needed if a chassis is used, and only one cover plate would be required. The 4 holes for mounting the line supports are needed in the bottom cover (or chassis surface) only.

in one repeater that used ground planes 10 feet apart, whereas a 60-foot or greater separation would have been needed without it.

A common but frequently neglected cause of receiver desensitization is the radiation of broadband noise by the transmitter. This varies greatly with transmitter design, but is to be expected in most commercial fm transmitters designed to operate over wide frequency ranges without major retuning. Noise from the transmitter is discussed in detail in two very useful articles in *Ham Radio*.^{1,2} Incidentally, the footnote reference in the second article to the first gives the wrong year. They're both 1969 issues — and well worth your time.

Our duplexer was first checked on a repeater using the same equipment as that treated by W6GDO in the second of the referenced articles — and it did only a perceptible amount of good. In tests at various levels of transmitter power and with different antenna separations, we measured only $2\frac{1}{2}$ to 4 dB improvement in receiver desensitization with the duplexer; not enough to be worth the trouble of building and adjusting it. But with other signal sources and other receivers we made complete cures in situations where the receiver performance had been degraded by as much as 16 dB when the transmitter came on.

This led us to try running the duplexer in the transmitter line, just out of curiosity, tuning the rejection circuits to knock out radiated noise at the receiving frequency. Transmitter power had to be reduced, from 50 watts down to 17, to prevent flashover in the duplexer. At this level an initial desensitization of 11 dB was reduced to a barely detectable 2 dB with the duplexer in the circuit. Transmitter power loss was only 3 watts in 17, or under 1 dB. The right way to solve this problem is to fix the transmitter, as outlined by W6GDO,³ but it is interesting to see how much the duplexer helped when used in this originally-unintended way. It would appear from this that the duplexer might help in other situations where cross-modulation and other forms of receiver overloading are encountered from signal sources of fixed frequency.

¹ Murphy, "Receiving System Degradation in FM Repeaters," *Ham Radio*, May, 1969, p. 36.

² O'Brien, "Improving the FM Repeater Transmitter for Amateur Use," *Ham Radio*, October, 1969, p. 24.

tion in which it is to be used, as best rejection is achieved only with very precise adjustment, and even the slight mechanical stresses introduced in the mounting process may detune it appreciably.

Performance

With the simple procedure outlined, we came up with a rejection of the unwanted frequency higher than we could measure by simple methods, but it was determined to be well in excess of 50 dB. Insertion loss at the desired frequency was only about 1 dB. Either quality can be improved by adjustment of the aperture sizes, but at the expense of the other quality.

It should be emphasized that there are many causes of receiver desensitization in vhf repeaters, some of which are only slightly affected by a device of this kind. Achieving high isolation between transmitter and receiver is rather like curing most TVI problems, in that a combination of factors is usually involved. As with TVI prevention and cure, you "peel them off in layers," and often no one corrective measure does the whole job. Keeping transmitter rf power out of the receiver antenna line will do little good if transmitter and receiver shielding is inadequate, or if power cables tend to couple transmitter power into the receiver. Solutions for these problems almost exactly follow TVI-proofing practice, which is well established.

The transmitter power level and the separation between the transmitting and receiving antennas are two obvious factors, having obvious but not necessarily easy solutions. Proper use of the duplexer makes both relatively unimportant. The duplexer is very helpful in the situation common to many repeaters: lack of space on a tower for appreciable vertical spacing of vertical radiators. A duplexer cured receiver problems

Reducing Transmitter Noise

Our Motorola transmitter being similar to the one modified by W6GDO, we made his recommended changes first. Then some additional work was done to improve circuit selectivity. Modifications currently in the transmitter are as follows:

7V7 First Doubler — 10 pF added, plate to ground. 7C5 Tripler — 10 pF grid to ground, and a 20-pF miniature mica trimmer, plate to ground. 7C5 Second Doubler — 20-pF miniature mica trimmer, grid to ground, and 11-pF miniature air trimmer (Johnson 189-504-5), plate to ground. 2E26 Doubler-Driver — 11-pF miniature air trimmer, grid to ground. 829B Amplifier — 11-pF miniature butterfly (Johnson 160-211), grid to grid, rotor grounded. This was mounted in a hole drilled in the edge of the chassis, to permit tuning with the bottom cover on.

Variable capacitors were set to the highest value that would permit tuning the associated circuits with their core slugs. Two turns were removed from the top ends of the 73-MHz coils, L_3 and L_4 , and the air trimmers were set so that the circuits tune with their brass studs near to the all-out position. Brass slugs lower circuit Q as they are run into the coils, so this improves circuit selectivity markedly. The transmitter was tuned up for maximum grid drive and output with the bottom cover off, and only slight repeaking was needed after the cover was installed.

Though W6GDO reports that only a slight improvement in receiver desensitization resulted from critical tuning of the transmitter circuits, we found transmitter adjustment to be all-important. With weak signals on the repeater input frequency, tuning the transmitter circuits for minimum noise in the receiver made the difference between complete readability and complete inaudibility. With the duplexer in the receiver line it is now possible to practically eliminate receiver desensitization, even with close antenna spacings.

Transmitter adjustments for this ideal result are so close to those for maximum transmitter output that there is no discernible loss in radiated power. Very likely the rather critical tuning is the result of steps taken to improve the circuit Q all along the line — but it would have been interesting to have tried transmitter adjustment before the circuit modifications were made.

Comment from KØVQM

Line length: The lines should preferably not be shortened below about 0.22 wavelength, as this makes tuning increasingly difficult.

Coupling: The primary coupling aperture, between L_2 and L_3 , should be adjusted for near critical coupling for a given input and output loop size, with the trap circuits detuned. The size of the input and output loops determines the loaded Q of the lines, and consequently the bandpass. They should be of equal size and should be adjusted, along with the primary coupling aperture, for minimum bandwidth consistent with

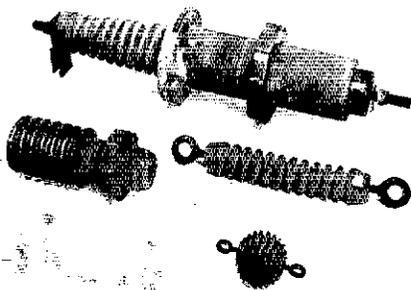
insertion-loss considerations. The secondary coupling apertures and line spacing between L_1 and L_2 , and L_3 and L_4 are major factors affecting notch depth and shape. Moving the trap lines with respect to the bandpass lines can make the difference between a 60-dB and an 80-dB notch depth. The antivibration supports (the cone insulators in our version) allow some experimentation with this, without rebuilding the filter.

Use as a diplexer: The high attenuation at the transmitting frequency would indicate the possibility of combining this filter with a suitable transmitting version to form a diplexer utilizing one antenna for both transmitting and receiving. It is anticipated that this should provide adequate isolation for repeater work with a transmission loss under 1 dB and a receiver loss of less than 1.5 dB.

Effect of Temperature Changes: It is suspected that there may be some detuning with large temperature variations. This has not been verified, but should be taken into account when the installation is made, and temperature change kept to a minimum, if possible.

Dimensions for the MARS Frequencies: Inside of case — $8\frac{3}{4}$ by $20\frac{1}{2}$ inches. Lines — $\frac{1}{2}$ -inch tubing, $19\frac{1}{2}$ inches long. Apertures — $8\frac{1}{2}$ -inch openings for rejection coupling, 4-inch opening for bandpass coupling. These dimensions give 80 dB rejection at 143.46 MHz with 1.2 dB insertion loss at 142.155 MHz. Tuning disks are $\frac{3}{4}$ -inch diameter. No plates on line ends. QST

From the Museum of Amateur Radio



Here are some insulators, both feed-through and strain. Many old timers will recall the little round one and the longer-type. These are all Electrose except for the glass one which is the first Pyrex antenna insulator made by Corning. It is quite massive. The design was suggested to Corning by WITK and six were made. As far as is known, this insulator is unique. — W1ANA



Recent Equipment



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

Lafayette 99-35313L 146- to 175-MHz FM Receiver

A COUPLE of months ago a catalog search was undertaken to find the least expensive receiver that would provide satisfactory reception of 2-meter fm signals during unrowded band conditions. The results of this search are the Lafayette 99-35313L unit shown here and the Allied A-2587 receiver described in the next article.

The Lafayette 99-35313L receiver is a single-conversion superheterodyne that supposedly tunes from 146 to 175 MHz. Fortunately, the unit provides a little greater coverage — at least the one we received did — and it tunes the entire 2-meter band. Even if the receiver as supplied didn't tune the 144- to 148-MHz range, it would have been no trouble to reset the tunable oscillator to get this coverage. The 148- to 175-MHz coverage of the receiver may at first thought appear to be of no value to the ham. However, because there is a great deal of public service activity (police, fire, utilities, taxicabs, etcetera) in this tuning range, the amateur can easily determine if his receiver is working properly or if propagation conditions are good, even though there may be no ham activity at the time. Even when there are many hams on the 2-meter band, monitoring of the public service activities can provide some most enjoyable listening.

Ten bipolar transistors and three semiconductor diodes are used in the Lafayette 99-

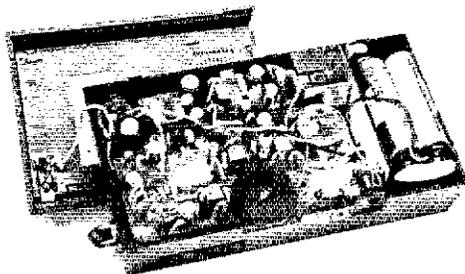


35313L receiver, which measures $6 \times 3 \frac{5}{8} \times 1 \frac{1}{8}$ inches and weighs only 8 ounces. The set's features include a handy carrying strap for the case, a telescoping whip antenna, a jack for an external antenna, a loudspeaker, an earphone jack, a built-in power supply, and a jack for connecting the receiver to an external power source. Supplied with the receiver are four penlight cells, a single earphone, and a sheet on which are printed the unit's specifications, operating instructions, and a schematic.

Circuit Details

A block diagram of the Lafayette 99-35313L is shown in Fig. 1. Signals coming from the collapsible whip antenna or from an external antenna are fed to the emitter of a grounded-base rf amplifier, Q_1 . The 146- to 175-MHz output of Q_1 is fed to the emitter of a grounded-base mixer, Q_2 . Also arriving at the emitter of Q_2 is the 135.3- to 164.3-MHz output of a Colpitts VFO, Q_3 . The 10.7-MHz output of Q_2 is amplified by three i-f stages, Q_4 , Q_5 and Q_6 . Single-tuned transformer coupling is used between Q_2 and Q_4 , between Q_4 and Q_5 , and between Q_5 and Q_6 . CR_1 , a diode across the primary of Q_4 's collector transformer, acts as a limiter.

The 10.7-MHz output of Q_6 is fed to a ratio-detector type of discriminator, CR_2 and CR_3 . A three-stage audio channel amplifies the audio output of the discriminator and feeds it to an 8-ohm speaker. The audio volume of the set is controlled by a potentiometer in the base



Inside view of the Lafayette fm receiver. The rf stage, mixer, and oscillator are in the lower left corner of the photo, and the i-f circuitry is between the speaker and the front end. Above the speaker is the discriminator, and to the left of the discriminator is the audio channel.

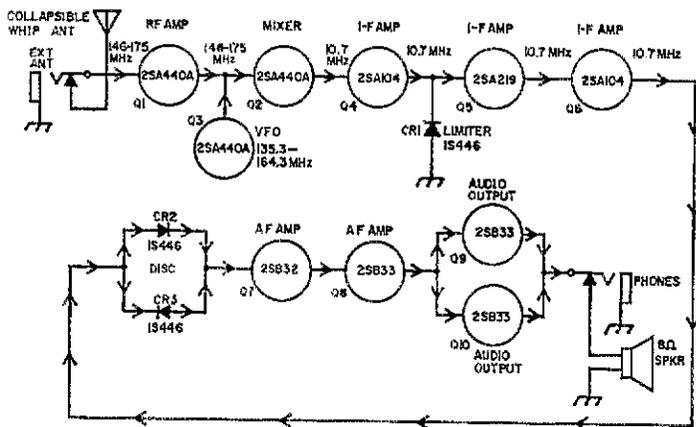


Fig. 1—Block diagram of the Lafayette 99-35313L fm receiver.

circuit of the first audio amplifier, Q_7 . RC-coupling is used between Q_7 and the second audio amplifier stage, Q_8 . The audio output stage, which employs Q_9 and Q_{10} in a push-pull configuration, is transformer coupled to Q_8 and to the speaker. The earphone jack is wired to the output circuit in such a manner that plugging in the earphone supplied with the unit disconnects the speaker. Audio output is rated at a maximum of 180 milliwatts.

The four penlight cells mentioned earlier are connected in series to provide a supply voltage of six volts. Under normal operating conditions, it is claimed that these cells will provide 100 hours of receiver operation.

Physical Details

The physical details of the unit should be quite evident from an examination of the photographs. The case of the unit is a three-piece affair made of plastic. Prying up the smallest section of the case with a coin makes the receiver's AA-cell holder accessible for battery replacement. The set's collapsible whip antenna is swivel-mounted on a bracket at the rear of the case. This arrangement permits the antenna to be positioned vertically or horizontally, or collapsed against the case, while the set sits upright.

Most of the components in the receiver are mounted on a printed-circuit board. The general parts arrangement of the set, a Japanese import, resembles that used in most of today's transistor BC portables.

Performance

In this writer's opinion the Lafayette 99-35313L receiver performed quite well, considering the set's simple circuitry and \$17.95 price tag. Signals of about $0.15 \mu\text{V}$ were the weakest that were discernible, and signals of about $0.5 \mu\text{V}$ and greater were solid copy. After the set was

adjusted for optimum performance in the 144- to 148-MHz range, the image response was about 35 dB down. With no signals tuned in, the set idles at about 8 to 10 mA. When a signal was tuned in and the volume control adjusted for a comfortable listening level, the current drain increased to about 20 mA.

The set was tried in the writer's home and car, and the only difficulty found with ignition noise was on the weakest of signals. Fortunately, because the Lafayette receiver seems to detect a-m signals just as well as fm signals, the receiver can be quite useful in areas where there is only a-m activity. At the times the receiver was tested, most of the amateur stations heard were on a-m. Using only the set and its collapsible whip antenna, we were able to copy with ample volume several stations up to 20 miles distant.

Because of the receiver's small size and low-power drain, the set should make a fine unit for hidden-transmitter hunts and for emergency communications. An ac adapter is available for those who want to do a lot of home-station receiving, yet keep their batteries in tip-top shape for portable or emergency operation.

A 27- to 50-MHz version of this receiver is also available. Listed as the 99-35339L, it probably can be readjusted to provide 6-meter coverage. — W1YDS

Lafayette 99-35313L Receiver

Height: 6 inches.

Width: $3 \frac{5}{32}$ inches.

Depth: $1 \frac{1}{8}$ inches.

Weight: 8 ounces.

Power Requirement: 6 volts dc, 10-50mA.

Price Class: \$18; ac adapter: \$4.

Distributor: Lafayette Radio Electronics,
111 Jericho Turnpike, Syosset,
Long Island, New York 11791.

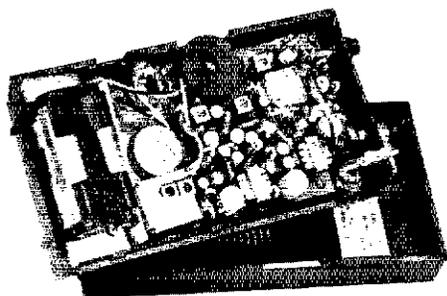
Allied A-2587

146- to 175-MHz FM Receiver

THE Allied A-2587 fm receiver pictured here is quite similar to the Lafayette 99-35313L described in the preceding article. From a close examination of the two units it appears that both receivers were built by the same Japanese manufacturer. Because the units are so much alike, mainly the differences will be discussed here.

Both Lafayette and Allied advertise that their respective receivers tune from 146 to 175 MHz. Fortunately, however, the Allied A-2587 we received tuned below 146 MHz, as did the Lafayette unit. Because the A-2587 didn't quite tune down to 144 MHz, we readjusted the tunable VFO until the Allied receiver covered the entire 2-meter band.

Electrically there are few differences between the two receivers. Except for the diode types used for CR_1 , CR_2 and CR_3 in the block diagram of the Lafayette set (see page 48), the block



Inside view of the Allied receiver. The rf stage, mixer, and oscillator are at the right, the i-f stages are at the top center, the discriminator is below the speaker, and the audio channel is to the right of the discriminator.

diagrams of the receivers are identical. CR_1 is a 18426 in the A-2587, and CR_2 and CR_3 are each 1S188s. The only other electrical difference between the two sets is found in the input circuits of the rf amplifiers. Fig. 1A is a schematic of the Lafayette rf amplifier, and Fig. 1B is a schematic of the Allied rf stage. The Allied front end has two extra tuned circuits: L_1C_4 and L_2C_2 . By adjusting L_2C_2 for maximum sensitivity in the middle of the 2-meter band (146 MHz) and by adjusting L_1C_4 for maximum attenuation of the image frequency (124.6 MHz), we were able to obtain about 50 decibels of image rejection for the 144- to 148-MHz range. A high image rejection ratio is desirable, since the image frequencies (on these receivers) for the 2-meter band are in the aircraft band, where signals tend to be rather potent. Except for image

(Continued on page 65)

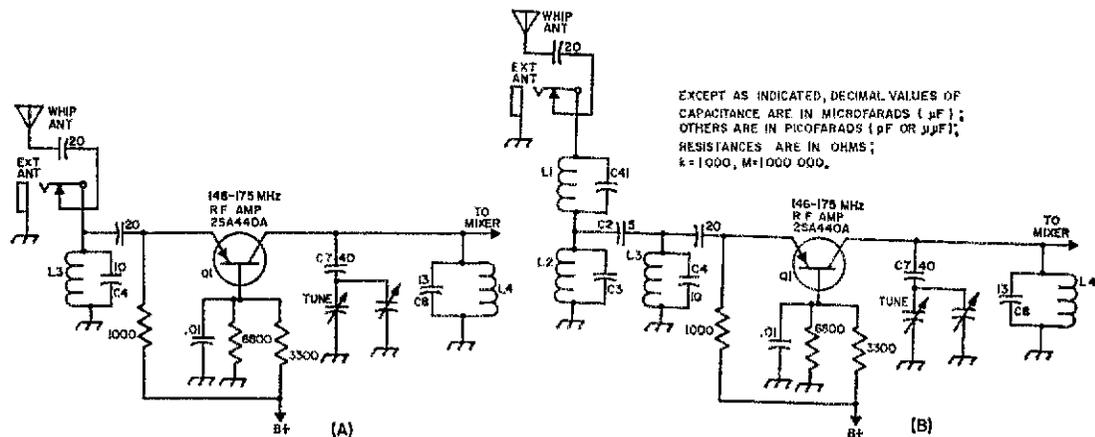


Fig. 1—(A) Schematic diagram of the rf stage of the Lafayette 99-35313L, and (B) schematic diagram of the rf stage of the Allied A-2587. Component labels are for text reference.

An Aid for Plotting Satellite Orbits

BY LAWRENCE A. EDLER,* WB6MVK

MUCH has been written to aid the amateur in plotting and obtaining data from the various amateur satellites. The October issue of *QST* contained an excellent article by WA1IUO and W. Danielson¹ describing techniques for plotting the orbit of the Australis Oscar. In my own attempts to get ready for receiving this satellite I used several hypothetical examples in order to train myself to construct the orbital projections I would need to track the satellite.

Following directions², I first drew a circle with a radius of 1235 nautical miles from my QTH. I used a modified polar projection published by the ARRL centered on the central USA. I then proceeded to plot a hypothetical orbit assuming that the satellite crossed the equator at 100 degrees west longitude. I took the data listed on page 56 of the October *QST* and determined a point for each two-minute interval given in the table. By connecting these points I determined the possible path of the satellite. Whenever the orbit of the satellite passes within the circle, I am in business.

It then occurred to me that any plot of an orbit based on the same inclination and period would be

Here are a few practical ideas on plotting satellite orbits. The info relates particularly to Australis-Oscar 5 but it's also of use to amateurs tracking weather satellites in similar orbits.

exactly the same as all the others, given a different starting point on the equator. In other words, each plot would be a Chinese copy of all the others. This fact lends itself to a more efficient manner of plotting succeeding orbits.

I made a template by tracing the orbit I had plotted on a piece of heavy cardboard and cutting it to size. Using a projection such as the ARRL map, it is best to let the equator be the bottom side of the template, the ascending phase the right side and the descending phase the left side. By simply lining up the template with the correct longitude at the time of the satellite's crossing of the equator, a crayon can be used to trace that particular orbit.

I found the best projection was a straight polar projection. In my case it was an old aeronautical chart.³ Here again I repeated the process used to

(Continued on page 65)

* 102 Northrop Place, Santa Cruz, CA 95060.
¹ W. Danielson and S. Glick, "Australis Oscar 5 Where It's At," *QST*, pages 54-56.
² *Ibid.*

³ Polar projection maps, called APT Plotting Charts, are available from Mr. Robert W. Popham, APT Coordinator, U.S. Department of Commerce, Environmental Science Services Administration, National Environmental Satellite Center, Washington, D.C. 20233.

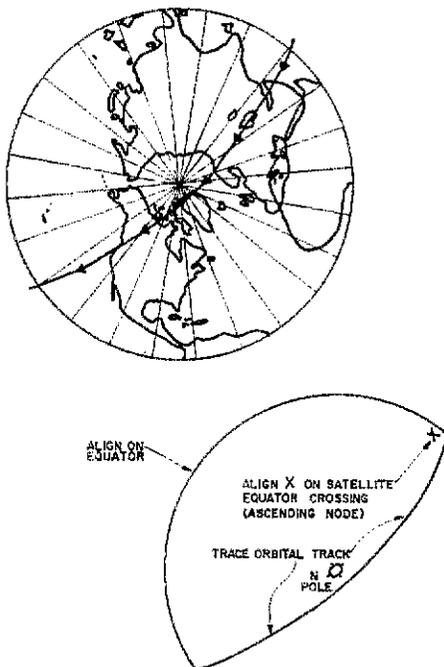


Fig. 1. Orbital plot of satellite and a template for a North Polar projection.

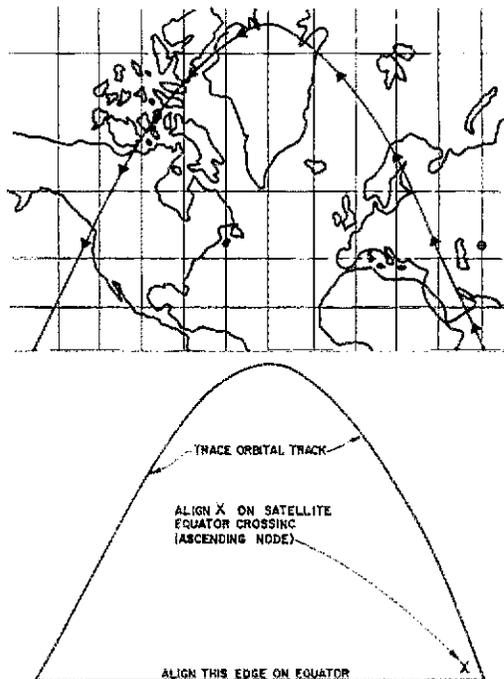


Fig. 2. Orbital plot of satellite and a template for a Mercator projection.

Results, 9th World-Wide RTTY DX

"Medallion" Sweepstakes

THE SEQUEL to any DX RTTY SS is almost always the story of propagation — conditions. This year, as contrasted to last year, they were fair. Activity throughout the world is picking up, especially in America as is evidenced by the number of stations heard.

Some 39 countries were worked, and 3 stations QSOed all continents. VU2KV, ZS6OY, TU2AK, KC4ADD and EL2BD are but a few of the more exotic stations worked. Fifteen meters was a very popular band, and 20 had its moments.

Many requests have been made for a complete summary of the contest activity. Such information and complete statistics are available, and can be obtained by sending a large envelope 9 x 12 inches to CARTG, 85 Fifeshire Rd., Willowdale, Ont., Canada, with an IRC to cover postage.

The 12 Medallion awards are presently being hand engraved. Certificates are about ready and a big effort is being made to have them delivered early in the New Year.

Our thanks to all who contributed so much to make the 9th RTTY DX "Medallion" SS a success. — VE3GK, CARTG Contest Chairman.

SCORES

Listed below are the final scores of all entrants who submitted logs. A single asterisk denotes a Medallion Award winner; double asterisk equals a station listed for record purposes only, not eligible for awards.

Top Ten	
ON4BX . . . 756,360	G3MWI . . . 357,416
W3KV . . . 415,765	WA3HXR/YV . . . 306,072
W4YG . . . 367,540	VK3DM . . . 304,640
W3ABT . . . 364,752	WIBZT . . . 284,200
W9HHX . . . 362,480	W8CQ . . . 280,060

(All Medallion winners)

Other Scores	
W7FZL . . . 275,570	WB6JSY . . . 108,836
HP1HXG . . . 251,392	XE1YJ . . . 104,928
YV5AVW . . . 237,650	WB6RXM . . . 102,344
11CGE . . . 226,484	ON4CK . . . 100,068
11CAQ . . . 225,992	VE7UBC* . . . 94,930
SM4CMG . . . 209,120	HK3SO . . . 92,488
K7MNZ . . . 202,440	ZM2ALW/ . . . 91,840
11CLC . . . 200,096	DL1VR . . . 91,476
W3PYW . . . 198,932	HA5KBF . . . 89,100
DJ6JC . . . 191,216	W8CAT . . . 89,088
HB9P . . . 190,476	W6JOX . . . 86,268
WA2YVK . . . 132,000	K2LJG . . . 73,500
11EVK . . . 129,760	11ROL . . . 66,120
G6JF . . . 115,248	K6NCG . . . 61,992
WB2JBH . . . 115,220	VE5DR . . . 60,060
WA6WGI . . . 113,568	WA6GED . . . 57,035
W3ILZ . . . 109,944	W6DDW . . . 50,048
K4VDM . . . 109,080	VE2HU . . . 48,360
	CE3EX . . . 43,008
	DL8VX . . . 42,054

11CWX . . . 40,600	W1BFS . . . 4860
K8ILL . . . 36,790	HA5KFB . . . 4674
11KFL . . . 33,422	EL2BD . . . 3564
DL8CX . . . 32,500	VE2AXO . . . 3552
VE3RTT** . . . 30,624	W9TFP . . . 3000
W2DIZ . . . 29,448	K7JGM . . . 2618
VE5LG . . . 27,180	W9ITU . . . 2430
WB6QFE . . . 24,795	K2YEQ . . . 2340
HA5FE . . . 20,538	VE3FJB . . . 2338
F9RC . . . 20,032	VE7LL . . . 2280
VE6MM . . . 19,136	W7VKO . . . 2152
W2FAN . . . 18,411	E15BH . . . 1968
WA4VYL . . . 17,280	ON5WG . . . 1800
W6FFY . . . 16,002	VE7BWL . . . 1750
K9BJM . . . 15,888	WB2UYD . . . 1472
W2HAJ . . . 15,435	GB3RS . . . 1368
WA6FLA . . . 15,408	W6AEE . . . 1352
K9JHE . . . 14,544	WA1HOL . . . 1200
K4GJW . . . 14,520	VE5DO . . . 936
K6LFM . . . 13,257	VE7AFJ . . . 580
VE3FBP . . . 13,146	W7CBY . . . 450
VO1EE . . . 12,930	K8QLO . . . 432
KH6GLU . . . 11,670	VE7CZ . . . 384
K8KAG . . . 10,968	OK1MP . . . 210
K2RYI . . . 10,584	OZ6OB . . . 174
11YRK . . . 10,317	DJ5JK . . . 150
K4AT . . . 9040	VE3RH . . . 84
SM3BHT . . . 8505	W8TCO . . . 36
VE4FG . . . 7788	K9WJB . . . 8
PJ2CR . . . 6480	VE3AFK . . . 2
WA9GYQ . . . 6024	
K9IBB . . . 5697	Late Logs
SV0WO . . . 5434	11THB . . . 12,144
F3PI . . . 5130	SM0KV . . . 416

Soapbox

Without doubt this is the best DX contest of the year. Propagation was very bad here. Rest period of 12 hours is excellent. — ON4BX. Had a good time and learnt a lot. Many thanks to CARTG from the Valley of the Green Keys — VE7BWL. I returned from travel abroad on Sunday 5th and just wanted to show the flag! — OZ6OB. It was a very good contest and conditions were excellent. I was astonished to see so few narrow shift stations, only six contacts out of 84 were 170 Hertz shift — HB9P. I didn't hear the countries on the air this year that I did last year. Enjoyed the test, hope others had as much fun — W7TZL. Contest very difficult for the bad and poor propagation on all bands. No Asian and African stations heard — 11CLC. There were many more narrow shift stations on, and sure this made things easier as the band was not so jammed up — ZM2ALW/ZM2. Please reschedule so that the contest does not come on the same weekend as the VK/ZL Oceania phone contest — KH6GLU. The contest was to me the best yet. I wish you every success with the arduous paper work — VK3DM. Have only been on RTTY since May of this year. Had a ball on my first weekend on 20 meters — W1BFS. Had been planning full time this contest but had to work on my job this weekend — SM4CMG. Thoroughly enjoyed participating in your contest as a newcomer — WA3HXR/YV5. Unusual to hear so many Eastern U.S. stations with antenna pointed west — W6ORXM.



AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* WINJM

IMPACT REPORT

Minute 75 of the May, 1969, ARRL Board of Directors meeting states that "the Communications Department is instructed to conduct a study into, and at the next meeting of the Board report on, the impact of citizens-band groups, MARS and other operations in areas in which emergency preparedness activities have traditionally been carried on by amateur radio, and to recommend possible adaptive changes in the structure of our emergency preparedness service." The report was prepared by the Communications Manager and presented to the Board at its Nov. 1, 1969, meeting. It was published, partly in paraphrase form, in the January, 1970, *CD Bulletin*. The subject has become known simply as "Impact."

At the behest of Roanoke Division Director Clark (W4KFC), who made the original motion, we present herewith the substance of the report submitted to the Board last November, since the subject is of concern to *all* amateurs, in addition to those holding ARRL appointments.

The report is divided into eight sections, seven of which trace the history of ARRL's public service efforts, explore diverging views on the subject, compare ARRL and government amateur programs, evaluate the extent of ARRL influence, discuss the function of the National Industry Advisory Committee, and examine the extent of "Citizens Band intrusion" on traditional amateur functions in this field. Here is a summary of the report:

* Communications Manager, ARRL.

History

ARRL sponsorship of public service by amateurs goes back to the teens (the Trunk Lines) and has continued to the present day in administration and implementation of the ARRL Emergency Corps (later the AREC), the National Traffic System (NTS), the Radio Amateur Civil Emergency Service (RACES) and the Amateur Radio Public Service Corps (ARPSC, combining AREC and NTS). Assistance and cooperation during this period has been rendered to the Army Amateur Radio System (AARS), the U.S. Naval Communications Reserve (NCR), and the Military Affiliate (Amateur) Radio Service (MARS, three separate military services). The Citizens Radio Service ("Citizens Band") had a "practical" birthdate of 1958, when it was assigned the 11-meter band. It enters into the current study because of its increasing participation in public service communications, especially those which perform services which have traditionally been the function of amateurs.

Diverging Views

Despite the obvious perspicacity of those who took the trouble to comment (not very many, considering the potential), it appears obvious that regionalness or provincialism in viewpoint is a handicap to anything approaching unanimity; thus the divergence of views makes specific or definite conclusions difficult to come by.

League Vs. Government Programs

Somewhat disturbing is the apparent lack of any strong support for the League's traditional stand for a "single strong facility" of amateurs. Consideration of this factor leaves us with the question: "Should we continue to sponsor our own public service organization while government agencies drain more and more of our people away, or should we abandon our efforts and lend full support to those amateur groups sponsored by government?"

The Mt. Airy VHF ARC of Philadelphia sponsors an annual traffic program at Christmas time as well as providing outlets to the USO the year around. Seated are W3KKN, President of the radio club, and S. Harry Galiand, representative of the city, who is reading a message sent to Vietnam by Philadelphia's Mayor Tate. Standing are Jeanne B. Cressy, Assistant Director of the Philadelphia USO, and K3WEU. (Photo by City of Philadelphia)



Extent of ARRL Influence

Actually, the extent of ARRL's influence on any program influencing amateurs has been great — whether it be government, semi-government, quasi-government or non-government. Almost without exception, the agencies have come to the League for assistance and support and have invariably received it. Thus, amateur participation in these groups is a tribute to the League's assistance in getting them started, and in this light it is the League's program as well as that of the sponsoring agency.

But even beyond and above this, any service rendered by amateur radio is a service of the League, since the League is primarily responsible for the amateurs' interest in public service, and since the League's own programs are open to all amateurs. The general public does not care what organization is responsible for the service; its gratitude descends on the general institution of amateur radio, and through this we all benefit.



NIAC

This is the National Industry Advisory Committee, set up by FCC to form a national emergency communications plan. The amateur radio subcommittee has the task of devising an overall basic amateur radio plan. With the prospect of slow progress, the present RACES rules were designated the "interim" amateur radio plan. Unfortunately, progress has been even slower than envisioned, and NIAC is not on the verge of producing a solution to the dilemma.

Citizens Band "Intrusion"

Many amateur organizers feel frustrated in not being able to offer as good a service as their local CB groups. Some have tried to enroll CBers in the AREC, some have set out on a course of cooperation, but in most cases there is bitterness or contempt between the two groups, with an overwhelming majority of ARRL appointees opposed to having any "truck" with them. The element of legality of present CB public service operations enters the picture, with many CD directors now utilizing their services unaware that there is at present no provision for their continuance in the event of a national emergency or that some of their present public services are technically illegal.

Recommendations

(This part of the report is quoted in full, because it represents the culmination of the study.)

"A specific recommendation is hard to make along definitive lines because the situation is so fluid. In general, however, it would appear that the best interests of the amateur will be served by (1) continuing to exhort amateurs to perform emergency communications services, both in preparation and during emergencies, to the extent of their ability, while at the same time (2) coordinating efforts with the CRS wherever this is well enough organized locally to be recognized by served agencies such as c.d. and (3) concentrating on those areas which, by their nature, can be served only by amateur radio. In my opinion it would

The Franklin County (Ohio) AREC assisted the Sports Car Club of America on September 20 with communications for the U.S. Championship Road Rally. Because of the heavy volume of traffic (2 cars per minute for ten hours) some special message routing schemes were developed. Apparently they worked, because 1300 messages were passed in the ten-hour period. Pictured here are K8DDG (behind car), his father (standing) and WB8AGD (operating six-meter rig) at one of the relay stations.

not, at this time, be advisable to attempt to make any CB services a part of our own sponsored organization.

"Additionally, because of the increasingly apparent need for coordinated planning at the national level, and the unlikelihood of early improvement of the situation through NIAC alone, I would propose to redouble the League's efforts to strengthen liaison with the several MARS headquarters and with OCD in Washington, looking toward promulgation by all concerned of definitive guidelines which will enable better planning and cooperation in the field, and help to avoid jurisdictional conflict and inefficiency."

The study continues, and additional reports will be forthcoming. All League members are involved, as indeed are all amateurs. If you want your ARRL to become more deeply involved in this crucial aspect of amateur radio, write your director and tell him so and let him know how you feel about it — because you are ARRL.

Change in PSHR Standard

Effective with January activities, the requirement for Public Service Honor Roll is raised from 25 to 30 points. The very first PSHR listing showed a great interest on the part of those amateurs actively participating in the organizational aspects of traffic handling and emergency

communication — so much, in fact, that the column took a bit more than the amount of space anticipated for it. While it is not desired to make achieving the Honor Roll so difficult that only a small handful can reach it, nor base it on space availability alone, it is desirable to keep it down to a reasonable level and retain its "selectness." As a rule of thumb, if it exceeds half a *QST* page, something will have to be done to (1) reduce the number of achievers or (2) alter the format so that more achievers can be accommodated in the same space. So, the April *QST* PSHR will require thirty points instead of the former 25.

Your PSHR points are normally reported to the SCM, who forwards them to headquarters with his monthly report. Your report to the SCM should reach him by the fifth of the month to insure being included in his report. If for some reason you do not make this deadline, you may send it *direct* to headquarters for PSHR listing *only* — that is, if you aren't eligible for the Honor Roll, forget it. But if you have the required 30+ points, we can still get you in the PSHR listing if it gets here *not later than the 20th*.

Keep the comments coming. We can't always acknowledge them, but we do study them carefully. — WINJM.

Traffic Talk

A minor point, but the question comes up, about net traffic count, regarding a QNC message which is QSL'd by part but not all of the net. Does it count? One for each QSL, or one for every three QSLs, or just one? How do the net stations count it in their individual totals?

The basic thing to remember is that a message does not count anything for anybody on the air unless it is *both* transmitted and received for. Thus, a QNC or a one-way transmission of any message without a QSL from the receiving end is not countable for the message or BPL total. Also, there is only *one* count per handling; there is no magic, easy way of counting a handling as two or more points.

The question which arises, in the case of a QNC, is *how many* of the net stations have to QSL it in order for it to count? One? Half? A majority? All? It's a question that hasn't really come up, but a

QNC is addressed to all net stations, so logically one would assume all net stations should QSL it. But then supposing one or more of them does not and is not heard from again, does this mean the message cannot be counted? Or supposing one or more of the net stations don't copy it at all and the NCS or whoever is sending it has to repeat the whole thing, does it count again? If so, what is to prevent a NCS from sending the same message to each net station individually and getting a QSL to run up the net traffic total?

Whoa, let's back up and tackle these questions one at a time. First of all, let's establish a majority as the required QSL for a QNC to count as a net message. That is, the net counts it as one *handling* the sending station counts it as one *originated* (or relayed if he did not originate it) and each station who QSLs counts it as one *received*. Usually after a QNC, the sending station calls for QSL (and the NCS calls the roll), or "no QSL," in which case there is no count involved. If a copier says he received the message, it is assumed he has a written copy; if not, he should not give himself a "received" point. In message handling parlance, QSL does not just mean "I hear you talking, man." It means "I have received your message correctly and completely *in writing*."

Does it count again if it has to be repeated? Yes, if it is necessary to repeat the whole thing, but not just to repeat part, or to give "fills" to those who are missing words or phrases. What is to prevent a net from padding its total by sending the same message a number of times? Not a thing, except its conscience in the knowledge that this is a form of cheating.

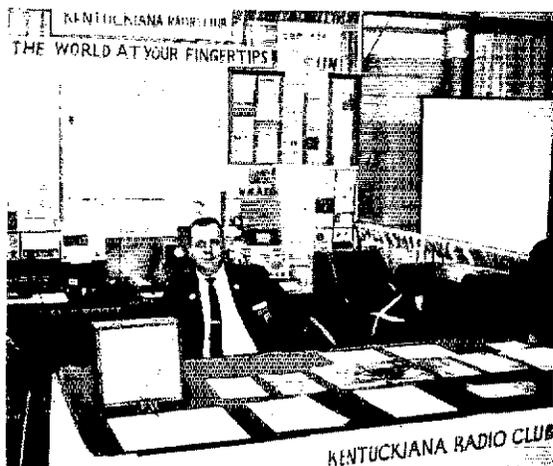
No doubt this discussion will leave half a dozen or so more questions. Let's have 'em. — WINJM.

National Traffic System. First Region Net Manager WIEFW has issued certificates to W1s BUF EJJ KK, K1s QFD PRB, WA1s FCM HOL. W2FR says 2RN came close to 200 percent representation since there were dual reps nearly all the time to handle the extra Christmas load. Howie also says that after last month's black mark for the net, he has nothing but superlatives for December; what with perfect rep from the sections and largest traffic total since December, 1964. W3NEM also reports a good month for 3RN with traffic much better than in 1968. Still, some nets have traffic problems and W7BQ reports traffic on RN7 is still down from a year ago although representation has improved especially from Montana and Oregon. WA6s OTQ TZK and WEZ have earned TEN certificates issued by W9LGG. TWN manager K7NHL claims he is a failure because he made BPL again. He says that's a sure sign that he isn't persuasive enough in getting other people to take some TWN duties; come on you guys, why not give Bob a rest?

December reports.

Net	Sessions	Traffic	Rate	Avg. Rep(%)
1RN	62	905	446	14.6 94.0
2RN	62	1002	978	16.2 100.0
3RN	62	684	453	11.0 98.9
4RN	59	722	394	12.2 84.7
RNS	62	789	418	12.7 90.3

The Kentuckiana Radio Club of Louisville participated in a hobby show held at the state fairgrounds from November 8 to 16. Twenty-one of the club members participated by manning the booth and operating W4ABK/4 during the show. More than one hundred messages were originated and fifty prospective licensees were signed up for a Novice trainin class. Closed-circuit TV and a microphone connected to an oscilloscope were used as additional attention getters. K4YZU is shown manning the booth during one of the less active periods.



RN6	62	1595	.809	25.7	98.9
RN7	58	513	.363	8.8	47.4
8RN	62	847	.460	13.7	96.7
9RN	62	812	.572	13.1	90.7
TEN	62	816	.683	13.8	84.5
ECN	57	284	.269	5.0	88.1
TWN	57	538	.394	9.4	72.6
EAN	31	2704	1.742	87.2	96.2
CAN	31	1679	1.412	54.2	100.0
PAN	31	3200	1.303	20.9	100.0
TCC Eastern	159 ¹	1332			
TCC Central	115 ¹	1176			
TCC Pacific	147 ¹	1714			
Sessions ²	2085	19093		6.6	

Summary	2901	39405	EAN	19.6	--
Record	3450	51705	1.916	27.3	--

¹TCC functions, not counted as net sessions.
²Section and local nets reporting (64); VSBN, VN (Va.); EPA, PTTN, EPAETN, PPN (Pa.); KTN, FCAIN (Ky.); QIN (Ind.); MTN (Man.); NCNL, NCNE (N.C.); PVTE (N.J.); GN, FMTN, VEN, WFPN, EAST, QFN, FPTN, TPTN (Fla.); SCN, NCN (Cal.); AENB, AEND, AENH, AENR, AENT (Ala.); WSSB, QMN (Mich.); NYS, NYCLIPN (N.Y.); WSN, WARTS, NTN (Wash.); QCEN, Central Ohio, OSN, OSSB, BN (Ohio); W. Que. VHF; BUN (Utah); OLZ, SSZ (Okla.); MDCTN (Md.-D.C.); SCN (S.C.); CCN (Colo.); WVN (W. Va.); WRN, WSBN, BWN, WIN, WSSN (Wisc.); CN, CPN (Conn.); GSN (Ga.); QKS (Kans.); MSBN (Miss.); MNVN (Me., N.H., Vt.); ILN (Ill.); RISPN (R.I.); MSN, MJN, MSPN (Minn.).

Transcontinental Corps. With this December report, W7DZX is concluding his career as Director of TCC Pacific. Taking over the job is W6VNO, recently retired manager of PAN. You just can't keep a traffic man out of the game. Jack, to you many thanks for your service and we hope you will remain active in NTS; and Bob, welcome back to the saddle and good luck in the new job.

December reports.

Area	Functions	% Success	Traffic	Outof-Net Traffic
Eastern	159	90.0	3477	1332
Central	115	94.7	2472	1176
Pacific	147	87.1	3428	1714
Summary	421	90.6	9377	4222

Public Service Diary

At about 0200 GMT on Nov. 20, K2AYQ, EC Glens Falls (N.Y.) was notified of a commercial airliner crash about 14 miles north of Glens Falls on Pilot Knob Mountain on the shores of Lake George. K2AYQ called W2OP, the Red Cross Communications Chairman, then activated the six meter emergency net. Soon after, W2OP checked in advising that his telephone was out of order. WB2UEX was able to phone patch W2OP through to the executive chairman of the Adirondack Chapter and arrangements were made to have the Red Cross disaster unit dispatched to the scene. WB2FRV volunteered to escort the station wagon while WB2BZJ rode in the unit with a temporary rig that had been installed. Assistant EC W2BOR was contacted to operate from the Red Cross headquarters.

Because of the bad weather, traveling was difficult and the precipitation static made it difficult to communicate at times. However, with the routing instructions supplied to the disaster unit, locating the search and rescue parties was not too difficult.

The plane was eventually reached but all fourteen persons aboard had perished. The operation was secured at 0917. A total of thirteen amateurs helped with the communications. - K2AYQ, EC Glens Falls Area, N.Y.

Vancouver (B.C.) Police requested amateur communications assistance at 2100Z on Nov. 23. A



A number of amateurs responded on December 13 when a fire broke out near a 50,000-gallon gasoline-storage tank in Houston, Texas. The two-meter fm repeater net was activated to help with communications for the six alarm blaze in the north central section of the city. The net was in session for slightly longer than five hours. One of the units turned out during the emergency was the communications van owned by K5CNU, Disaster Communications Chairman for the local Red Cross. One of five in the area, the van is equipped with two-meter fm gear, several walkie talkies, police and fire monitors and a 3-kw generator. Enough food, clothing and other supplies are stocked in the van for a two-day outing. Here K5MVX and W5DLC are operating from the van.

small girl had become lost in the area near Oak Ridge Shopping Center and a number of search parties were gathering to help look for the child. Using two meters, VE7FB put out a call for mobiles to converge on the area. EC VE7AMN was notified. He arranged for a base station, in the person of VE7BCM, to act as relay for the mobiles. Eventually eight amateur mobiles were in action but as darkness closed in, the girl still had not been located. At 0200Z the following day the search was cancelled without results. - VE7FB, SCM British Columbia.

While mobiling home at about 0345Z on Dec. 11, VE2KT was involved in a collision. Using the VE2RM repeater he called for assistance and was answered by VE2TD who then telephoned the necessary information to the Montreal, Que., police. VE2APT was mobiling after a meeting of the VE2RM repeater committee and also heard the call. Since he was near the scene, VE2ALE rendezvoused with VE2KT and drove him home after the police collected the necessary particulars. - VE2ALE, SEC Quebec.



WØHDX and WØEIT display the ARRL Midwestern Division Directors Awards they received for their many years of public service activity. At the extreme left is William Bjorensen, Civil Defense Director of Linn County, Iowa, and at the far right is WAØQOX, Vice-President of the Cedar Valley ARC, who were present at the presentation.

During the week of Dec. 21, most of the eastern coast of the United States was hit by a large snow storm. In Pennsylvania things weren't too bad except in the northeastern part of the state. Because of the bad weather conditions and many requests for information, the Eastern Pennsylvania Emergency Phone and Traffic Net was put on special session. Stations in the northeastern part of Pennsylvania (WA3s EEC FMI GLI and JZB) were in contact with local authorities and were able to supply information on road conditions to those requesting it. On Dec. 28 Pennsylvania's governor declared a state of emergency in existence because of the heavy snow and winds. The Luzerne County Civil Defense Net was activated and remained on for about two hours during which time weather and road conditions throughout the Wilkes-Barre area were gathered. A liaison was maintained with EPAEPTN and additional information exchanges were made with stations in New York and Vermont. In all, about 200 requests for information were handled. — *WA3HV, Asst. EC Montgomery Co., Pa.*

On Dec. 26 weather conditions were also bad in the Montreal area. At about 2200Z VE2ZA was driving from the Doral Shopping Center to his home when he discovered two stalled cars which had been involved in an accident. Using the VE2RM repeater, VE2AKM was contacted and the Mercier Bridge office of the Quebec Provincial Police was notified. VE2ZA then proceeded on his way to Sources Road and discovered another accident, this time involving three vehicles. VE2AKM was again on hand to summon the police. — *VE2ALE, SEC Quebec.*

On Saturday, Sept. 27, the Fairfax County (Va.) AREC held a drill in which conditions prevailing during a civil disorder were simulated. All land line service was assumed inoperative and normal police and fire radio channels were presumed to be jammed. Operators of the Citizen's Radio Service also participated in the exercise as a demonstration of the usefulness of cooperation between the amateur and citizens band services.

A mobile amateur station was set up at the Fairfax police station and was operated on the ten meter band; CB mobiles were also stationed at the police station as well as at other fixed amateur stations throughout the area. Thus the two services augmented each other's inherent weak points. The amateurs had the necessary long distance, well

disciplined and trained facilities but lacked sufficient manpower to blanket the area sufficiently. The CBers had the necessary manpower and mobile capabilities to cover the local area, but lacked the longer distance coverage and organization the amateurs could provide. By working together a more functional emergency organization was established. All in all, the test seemed to be a success. — *WB4CVY, EC Fairfax Co., Va.*

Several reports of Halloween Goblin Patrols have reached headquarters. In Vancouver, B.C., VE7FB reports that nearly sixty amateurs took part in an operation in that area on Oct. 31. Four nets were operated on the same frequency in the two-meter band, but stations were separated by ten to twenty miles and mutual interference was not a problem.

The East San Gabriel Valley (Cal.) AREC provided the city of Baldwin Park with a "Witch Hunt." Twenty-three amateurs in fifteen mobile units turned out, making it one of the biggest operations of the year. W6NRY was at the police lieutenant's office to act as net control station. EC WA6JXG says a few embarrassing moments did occur, for instance when one of the AREC mobiles reported some "hippy" types on a dark side street. These turned out to be undercover police officers. Another mobile reported a car with two men in it slowly circling a school building. Yep, you guessed it — that was another AREC unit! City officials were pleased with the operation and plan to again enlist the aid of AREC in 1970. — *WA6JXG, EC East San Gabriel Valley, Cal.*

For the second year in a row, operators of the Coffee and Franklin County (Tenn.) AREC provided communications for the Tullahoma Christmas Parade on Dec. 5. Fourteen amateurs under the direction of EC K4EGC linked the reviewing stand with each major intersection along the route where National Guardsmen controlled the pace on cue from the parade marshal, WB4IDD and WB4NCW were at the starting point while W4WJH and WB4JHK stood by at the reviewing stand to receive verifications on order of appearance before various entrants reached the judging booth. The work of the amateurs was praised by the local Chamber of Commerce in a letter of thanks to K4EGC. — *W4WJH, SEC Tenn.*

KØICG and his XYL were traveling east on Highway 14 west of Janesville, Minn., on Dec. 6 following an all-day snow storm that had covered the pavement making travel dangerous, when the car skidded on a particularly slick spot and came to a stop in snow-filled ditch at the side of the highway. There were no injuries, but traffic was light and it might have been a while before help could have been summoned had it not been for the six-meter fm gear in the car. Both WAØDFT in Mankato and WØTCK south of Janesville responded to the request for aid and a tow truck was soon at the scene to dislodge the badly stuck car. — *WAØMZW, SEC Minn.*

Public Service Honor Roll
December, 1969

This listing is available to amateurs whose public service performance during the month indicated qualifies for 25 points or more total in the nine categories below. Use form CD-189 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)	Totals
Max Pts.	10	5	16	12	12	20	3	-	5	70
K3ZNP	10	5	16	12	12	7	3	-	5	70
WA2HAN	10	5	16	12	12	3	3	-	5	66
W4BFQW	10	5	16	12	12	24	-	-	5	64
W4BETX	10	5	16	12	12	4	3	-	5	62
WB2FEH	10	5	16	12	12	-	-	-	5	60
WA0LAW	10	5	16	12	12	-	-	-	5	60
WA2CAL	10	5	16	12	12	3	-	-	5	58
W2MTA	10	5	16	6	12	3	-	-	5	57
W4SHBG	10	5	16	12	12	-	-	-	5	56
WA8UPL	10	5	12	12	6	-	-	-	5	55
W71WJ	5	12	12	20	-	-	-	-	5	54
WA7KIH	10	5	16	9	12	-	-	-	5	52
W3MPX	10	5	16	12	-	3	-	-	5	51
W70CX	10	5	4	12	12	3	-	-	5	51
WA2FRZ	10	5	8	12	12	3	-	-	5	50
W7AXT	10	4	16	12	-	-	-	-	5	50
W7BQ	10	5	6	12	12	-	-	-	5	50
WA3JKB	10	5	16	12	6	-	-	-	5	49
WA3AKH	10	5	16	12	-	-	-	-	5	48
W2FR	10	5	16	12	-	3	-	-	5	46
W3EML	10	5	16	12	-	3	-	-	5	46
WA1IKY	10	5	16	12	-	-	-	-	5	43
K2KIR	10	5	16	12	-	-	-	-	5	43
W2RUF	10	5	16	12	-	-	-	-	5	43
WB4HJW	10	5	16	12	-	-	-	-	5	43
W4PED	10	5	16	12	-	-	-	-	5	43
W7PI	10	5	16	12	-	-	-	-	5	43
WA0OEJ	10	5	8	12	3	-	-	-	5	43
WA0TGM	10	5	16	12	-	-	-	-	5	43
WA0WEZ	10	5	16	12	-	-	-	-	5	43
W5QGZ	10	5	16	12	-	3	-	-	5	41
WA3TPU	10	5	16	12	-	3	-	-	5	41
W3KUN	10	5	16	12	-	3	-	-	5	41
WA7ZR	2	5	12	12	-	-	-	-	5	41
WA8MHO	10	5	4	6	16	-	-	-	5	40
WA0VAS	5	12	15	3	-	-	-	-	5	40
K4BSJ/4	10	5	8	9	2	-	-	-	5	39
W8IM	10	5	16	3	-	-	-	-	5	39
WA0EPX	10	5	12	12	-	-	-	-	5	38
WA0KRF	10	5	12	12	-	-	-	-	5	38
W1HKJ	10	5	16	12	-	-	-	-	5	38
W2QC	10	5	16	12	-	-	-	-	5	38
W5JSM	10	5	8	12	3	-	-	-	5	38
W6VNU	10	5	16	12	-	-	-	-	5	38
W7IEY	10	5	16	6	-	-	-	-	5	38
W5QMJ	10	5	16	6	-	-	-	-	5	37
WA8YB	10	5	12	9	1	-	-	-	5	37
K1ESG	8	16	12	-	-	-	-	-	5	36
WA3JZB	10	5	4	12	1	4	-	-	5	36
WA1JVL	10	5	16	9	-	-	-	-	5	35
K3OIO	10	5	16	9	-	-	-	-	5	35
W0PAN	10	5	4	12	3	4	-	-	5	35
WA4FFC	10	5	12	3	3	-	-	-	5	33
W7EKK	10	5	6	12	-	-	-	-	5	33
W3EJT	10	5	16	12	1	3	-	-	5	31
WB4JW	10	5	16	12	1	3	-	-	5	31
K7CTP	10	5	16	12	-	-	-	-	5	31
W0GB	10	5	16	12	4	-	-	-	5	31
VE5LI	10	5	16	12	-	-	-	-	5	31
K2KTK	10	5	16	3	-	-	-	-	5	30
W0BUC	5	12	6	7	-	-	-	-	5	30
WA0GRX	5	12	6	-	-	-	-	-	5	28
WA1JKJ	10	5	9	3	-	-	-	-	5	27
K3LFD	10	5	12	-	-	-	-	-	5	27
K4GJ	10	5	12	-	-	-	-	-	5	27
W0AAU	10	5	12	-	-	-	-	-	5	27
WA0HRM	8	5	9	-	-	-	-	-	5	27
W1BUF	10	4	12	-	-	-	-	-	5	26
W2PRY	10	5	16	-	-	-	-	-	5	26
WA3LAK	10	4	12	-	-	-	-	-	5	26
W4DVO	10	5	16	-	-	-	-	-	5	26
W4LHW	10	5	16	-	-	-	-	-	5	26
K4IEZ	10	5	16	-	-	-	-	-	5	26
WA8GDD	5	16	9	12	-	-	-	-	5	26
WA0VIS	10	5	16	-	-	-	-	-	5	26
WA0VFN	10	5	16	-	-	-	-	-	5	26
WA0VIV	5	12	9	-	-	-	-	-	5	26
WA5DQP	4	16	12	-	-	-	-	-	5	25
W6FOT	10	5	12	3	-	-	-	-	5	25
W6FJT	5	6	14	-	-	-	-	-	5	25

The following stations were listed by SCMs with PSRR totals above 25, but no break down was furnished: W5QJA, W5EZY, K4ROZ, WA5WFP, K7NHL, WA7EXL, W7UZZ, W7CAF, VE3DPO, WA4RAK, K5MAT, W0H1, K0MRI, K0BKF, WA1HOL, K1SXF, W0FRY, W0PMT and W0BV.

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

Forty-six SEC reports were received for the month of November, indicating an active AREC membership of 16,203. This is two more reports and 353 more members than in November, 1968. This is still one report less than the record for the year (Oct.) and more than 300 fewer members than the maximum number reported thus far during 1969 (Aug.). Will December top the old marks? Tune in again next month for the answer. Meanwhile, keep those reports coming in!

Sections reporting: Ala, Alta, Ariz, Ark, BC, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Ky, La, Mar, Mich, Minn, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVA, WFla, WNY, WPa.

	Sessions	Check-Ins	Traffic
Northeast Traffic	31	408	719
Mike Farad E&T	27	496	460
North American SSB	27	649	765
All Service Net	4	90	112
Interstate SSB	22	438	3439
Clearing House	28	523	400
Eastern U.S.	31	140	191
7290	45	2213	1288



Stolen Equipment

On a recent trip to Florida, December 22, 1969, my car was burglarized at Osprey, Florida while I was parked in a motel parking lot. Stolen was the following equipment: Drake R4A receiver, Serial No. 0685; Omega T-Noise Bridge and plug; Drake MN4 matching network, Serial No. 426; and a Heath depth sounder, Model M111A. Anyone with information can contact me at my home address. Daniel Gawne, 12118 South 88th Avenue., Palos Park, Illinois 60453.

Feedback

If you've had any difficulty in making the shift register in W4UX's keyboard keyer (July 1969 QST) trigger properly, reverse the secondary leads of the toroid transformers so that the right-hand terminal in the drawing on page 13 goes to the preset terminals and the left-hand one is grounded. The original drawing showed incorrect phasing.

A recent letter from W4UX suggests that a Motorola type MU4892 unijunction transistor may be better for QJ than the 2N3646 originally specified. Also, if troubles often can be cured by connecting an rf choke (30 to 50 turns on a form about the size of a 1-watt resistor) in series with the keying lead. Finally, some transmitters may not like the plus 1.25 volts which the transistor keying circuit puts across the keying leads; this can be reduced to about 0.3 volt by connecting a germanium diode (1N34A or equivalent) across the keying line, cathode to ground and anode to the hot keying lead.

The 25,000-ohm printed-circuit control specified in the parts list for the "In-Line Power Meter," QST December 1969 should bear the part number IRC R253B. Part number IRC R252B was incorrectly given, and is assigned to a 2500-ohm control.

COMMUNICATIONS DEPARTMENT RULES REDRAFTED

A New Look Without Extensive Changes

PURSUANT to various actions by the ARRL Board of Directors, its Executive Committee and the Communications Manager, the Rules and Regulations of the Communications Department, which have the force and effect of By-Laws of the League, have been extensively redrafted, although there have been relatively minor changes in their effect. The number of rules has been reduced from 20 to 13 and more extensive reference has been made to standard ARRL publications issued free to members, to avoid duplication.

We reproduce herewith the complete redrafted rules. Parenthetical comments will explain changes and new wording will be in italics. The leaflet entitled "Articles of Association and By-Laws of the American Radio Relay League, Inc." will eventually be reprinted and the new rules included in the back thereof as per past custom.

RULES AND REGULATIONS OF THE COMMUNICATIONS DEPARTMENT

1. The League maintains a Communications Department to effectuate the following purposes and objectives: The organization of members for practical communication, with particular attention to emergency preparedness and communications service in public interest; the promotion and sponsorship of message traffic and emergency networks and systems; the promulgation of contests and other tests dedicated to furthering skill in amateur radio operating; the conduct of training and other programs for societies affiliated with the League; the recognition of outstanding public service and operator proficiency by the issuance of appropriate awards; the advancement through its operations of the spirit of fraternalism and a high standard of conduct among the members.

2. For the activities of the Communications Department the operating territory of the League is defined as consisting of the territorial Divisions described in By-Law 25. This operating territory is apportioned from time to time within the Divisions into Sections for the purpose of Communications Department field organization, by the Communications Manager.

3. In each Section there will be a Section Communications Manager (SCM), who, under the direction of the Communications Manager, will have authority over field organization appointments and ARRL operational programs within his Section. He shall be responsible to and report to the Communications Manager.

4. Any candidate for the office of Section Communications Manager must have been both a member of the League for a continuous term of at least two years and a *licensed amateur of general or conditional class (Canadian advanced amateur certificate) or higher* for at least two years immediately preceding receipt of his petition of nomination. (SCM requirement raised to two years as a League member, class of license eligibility defined, including Canadian equivalent.)

5. Each section Communications Manager shall be elected for a two-year term of office. Whenever a vacancy occurs in the office of a Section Communications Manager, the Communications

Manager will announce such vacancy, and the date for receipt of petitions, and call for nominating petitions signed by five or more Full Members of the Section in which the vacancy exists, and naming a Full Member of the Section as candidate for Section Communications Manager. After the closing date the Communications Manager will arrange for an election by mail and set a closing date for receipt of ballots. Ballots shall be sent to every Full Member of the League listed in the Section concerned. Candidates' names shall appear on the ballots in alphabetical order. The Communications Manager will determine the count of the ballots at the conclusion of the election. The candidate receiving a plurality of the votes will become the Section Communications Manager. If there be but one eligible nominee, the Communications Manager shall declare him elected. Section administration during the period required to complete an election may be covered by interim appointment by the Communications Manager. (Eliminates entire sentence dealing with associate members, since no associate members at present in our field organization.)

6. The office of any Section Communications Manager may be declared vacant by the Executive Committee whenever it appears to be in the best interests of the membership so to do. On such declaration the Communications Manager will thereupon cause the election of a new Section Communications Manager as provided in Rule 5. (Eliminate words "upon recommendation of the Communications Manager," to avoid any implication that Executive Committee cannot remove an SCM without the CM's recommendation.)

7. (Formerly Rule 8; old Rule 7 completely eliminated.) The Section Communications Manager (SCM) shall be *the administrative and operational supervisor of on-the-air activities within his section*. He shall be responsible for operational planning and the holding of organizational meetings in his section. He shall *report to the communications manager for publication in QST comprising the reports of members, appointees and clubs in his section*. He shall be responsible for maintenance of accurate records of dates of appointments and cancellations. *He shall issue and endorse appointment certificates of all qualified appointees, issue other certificates and perform other functions as may from time to time be required in accordance with provisions published in the ARRL booklet Operating an Amateur Radio Station.* (Rewording intended to update SCM functions and eliminate details by referring to Operating Booklet.)

8. (Formerly Rules 9 thru 12). An Amateur Radio Public Service Corps (ARPS) is sponsored by ARRL, consisting of the Amateur Radio Emergency Corps (AREC) and the National Traffic System (NTS) *and administered by ARRL through its headquarters and field organization. The Radio Amateur Civil Emergency Service (RACES) is also recognized as an unofficial part of ARPS but is administered by federal, state and local governments through appropriate government entities at each level. Operation of ARPS shall be as detailed in the ARRL publication Public Service Communications.* (This paragraph boils former Rules 9 thru 12 into one, with reference to the Public Service manual taking the place of details formerly included herein.)



March, 1945

9. (Formerly Rules 13 thru 16.) *SCM leadership appointments shall be available to ARRL full members as Section Emergency Coordinator, Emergency Coordinator, Route Manager and Phone Activities Manager to assist the SCM in specialized functions. Other leadership appointments may be set up by the Communications Manager with the approval of the Executive Committee. Complete details of the qualifications, duties and functions of these appointees shall be published in Operating an Amateur Radio Station.* (This paragraph boils former Rules 13 thru 16 into one, with reference to the Operating Booklet taking place of details formerly included herein.)

10. (Formerly Rule 17.) *SCM station and individual appointments shall be available to full ARRL members as Official Relay Station, Official Phone Station, Official Bulletin Station, Official VHF Station and Official Observer to those amateurs having the qualifications and performing the functions and duties detailed in Operating an Amateur Radio Station. Other station and individual appointments may be set up by the Communications Manager with the approval of the Executive Committee.* (Shortening of former Rule 17, eliminating appointment descriptions and referring to the Operating Booklet for details.)

11. (Formerly Rule 18.) Awards will be made and test or contest activities announced from time to time to extend encouragement to individual progress in operating procedures, in the accuracy and speed of making contacts and handling record communications and in furtherance of individual and group ability to render practical communications efficiently. Certifications or awards as recognition for progress and accomplishment in Amateur Radio also will be made under detailed provisions published in *Operating an Amateur Radio Station* or from time to time in QST. General operating procedures may be codified with consideration to the practice and suggestions from the field organization. The minimum procedures helpful to clear-cut and efficient operations will be recommended and set forth in *Operating an Amateur Radio Station*. (No change, except in number.)

12. (Formerly Rule 19.) The League list of clubs or appointees is not available for commercial solicitation or advertising purposes. *The Communications Manager may make such lists available to the SCM or leadership SCM appointees as is desirable in effectuating amateur organizational needs within their sections.* On petition of an affiliated club, on request of the members signing petitions to nominate for ARRL elected office, or on petition of ten or more full ARRL members, such lists of not more than a division in scope may be furnished. *Lists of more than a division in scope must have authorization of all division directors concerned.*

13. (Formerly Rule 20.) These rules and regulations shall have the force and effect of by-laws of the League, *including details contained in referenced publications.* They may be amended as necessary from time to time by the Communications Manager upon approval of the Executive Committee. The Communications Manager shall cause more detailed provisions to be published as needed in the current editions of the League publications *Operating an Amateur Radio Station* and *Public Service Communications*. Amendments to the current edition shall be effective on publication in QST.



... It now looks as though the Amateur is going to have a pretty good place in the frequency allocations after the war. K. B. Warner discusses the announcement of the FCC with regard to proposed recommendations to be finalized at a later date. There appears to be plenty of space above 25 Mc for us to use and explore. FCC is also contemplating the creation of a new "Citizen's Band" to extend from 460 Mc to 270 Mc. This is a brand new thing. Warner is a little fearful we might be called on to police it!

... A new idea in rf circuits involving polyphase systems is described by Robert W. Bickmore, W6QDV. The principles can be applied to automatic tuning, automatically rotating an antenna and other "limitless" possibilities. Numerous circuit diagrams are given. Somehow, this doesn't seem to excite me very much.

... Harvey Pollack, W2HDL, has a fine piece on the fundamentals of panoramic reception. This might be profitable read today by those not too familiar with present scanning rigs.

... In a fascinating article by Cy Read, W9AA, the story is told of how Lt. Iliff Richardson, USNR, with no experienced help and only an ARRL Handbook to guide him, built a complete network of stations in the Jap-infested Philippines. No ham himself, he learned it all from the precious book. He even had to learn the code! — W1ANA



March, 1920

... This is the largest issue of QST to date. The "QST" is almost hidden by Harry Hick's cover picture.

... Fred Schnell and R. H. G. Mathews have the leading article on "Radio Club Organization." Very timely, likely enough.

... THE OLD MAN bewails the habit he has gotten into of staying up all hours to move a few messages. Says the QRM is very fierce indeed.

... The Editor describes a selectivity circuit developed by the British Navy. Looks like an antenna tuner to me using a very high-Q with minutely-adjustable inductance. Said to tune to 1%.

... The New Grebe GR3 is announced and described by Wm. F. Diehl. It embodies a coupler, grid variometer and plate variometer, with a minimum of controls. This rig worked very well indeed, in the old spark days, and would be OK for cw. Of course, in those days everyone had his pet detector. There was often a surprising difference between them.

... Nine pages are devoted to the doings of the Operating Department. J. O. Smith conducts this department. The different divisions report newsy letters from members.

... One of the new Directors is John Clayton, 5ZL. Had lunch with John a while back. We swapped tall tales most of the afternoon. Claims he doesn't know what a microphone is. — W1ANA

Changes of Address

Please advise us *direct* of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.

INCENTIVE LICENSING

AN ANALYSIS — —

AND AN APPRAISAL

FCC's Amateur Division Chief presented these comments at the Roanoke Division Convention in Huntington last October. We believe W3BG's remarks answer a lot of questions on incentive licensing from the official regulatory agency standpoint.

BY EVERETT G. HENRY, W3BG*

IT HAS BEEN some weeks since the Commission adopted its Order concerning the second phase of the incentive-licensing frequency reservations. However, there may be a few of you who are not aware of the action taken. The effect of the Order is to freeze the telegraph reservations for Extra Class licensees at the present level, to go forward with the implementation of the additional radiotelephony reservations, and to keep the 50 Mc/s reservation at the present 50.1 Mc/s mark.

These decisions were the result of careful attention, and critical examination and investigation of, the information available. The Commission, through its monitoring division, had spent an appreciable amount of time collecting band occupancy data. In addition, several of the more active amateurs on the Commission's staff had made independent, and what I believe were objective, evaluations of the reserved-band occupancy. Also we had some useful input from other amateur sources, particularly the League's Intruder Watch program.

The decision with respect to the telegraphy reservations was relatively easy. The number of Extra Class licensees, which has increased substantially since incentive licensing was first proposed, certainly, at this point in time, is not sufficiently large to warrant the exclusive right to additional frequency space. This conclusion was easily verified by band-occupancy observations made over a reasonably-long period of time. Statistically, the Extra Class operators constitute 4.4 percent of the amateur operators having access to the 3.5, 7, 14, and 21 Mc/s bands and have exclusive use of 11.6 percent of the telegraphy space in these bands. Excluding the Novice Class operators and their subbands from consideration, it is expected that by November 22 the Extra Class operators will constitute 5.3 percent of the total number of operators and have 24.3 percent of the available space in which only telegraphy is permitted. These reservations, except perhaps to the die-hard, telegraphy-only, Extra Class licensees would seem to be adequate.

One petitioner requested that the present reservations be reduced to 10 kc/s. This proposal was not adopted, primarily because if the benefits of incentive licensing are to be fully realized, there must continue to be an incentive to the cw operator for self-improvement.

* Chief, Amateur & Citizens Radio Division, F.C.C., Washington, D.C.

Radiotelephony Aspects

The resolution of the radiotelephony reservation problem was not as easy. Looking at numbers alone, we found that approximately 32 percent of the amateurs are Advanced or Extra Class licensees, and that they had exclusive rights in about 33 percent of the telephony bands. If the scheduled November 22, 1969, reservations were allowed to stand, the 32 percent of the operators would have exclusive privileges in approximately 49 percent of the telephony space. Occupancy data gathered from several sources was not too helpful in deciding what should be done for the phone operators since band occupancy both in the reserved and unreserved portions seemed to be fairly evenly distributed.

The ideal incentive, from the standpoint of frequency reservations, would be the provision of a segment in each amateur band which was always less crowded than the remainder of the band. Thus, this possibility of relief from interference would motivate General and Conditional Class licensees to qualify for the Advanced or Extra Class operator privileges. However, during peak activity it is not practicable to provide such frequency incentives. The most we could hope to accomplish, short of a complete reallocation of space within the bands, would be to divide the currently-available space so that there would be a continuing incentive to qualify for the higher classes of operator licenses. Because of the impracticality of providing the ideal in frequency reservations, and because of our continuing confidence in the incentive-licensing program, we concluded that the second phase of the radiotelephone reservations should be allowed to become effective without change.

The matter of frequency distribution between the various classes of licensees and modes of emission is far from concluded, since there are several petitions pending which request various frequency readjustments within the bands and the extension of operating privileges for Novice and Technician Classes.

Novices and Technicians

With respect to the latter, petitioners request the restoration of radiotelephone privileges to the Novice Class, including telephony privileges in the 10-meter band. Technicians are requesting telegraph privileges in the high-frequency bands and

additional cw privileges in the 6-meter band. Other petitions request a revision of the distribution of space within the band so that additional space would be available for radiotelephony. Realizing the intense interest in the matter of radiotelephony allocations, we plan to give high priority to this subject.

The many requests for extension of operating privileges for Technicians and an apparent lack of interest on the part of Technicians to obtain higher classes of licenses lead us to believe that the Technician Class of license is not fulfilling the purpose for which it was created. We plan to look into this matter, and maybe propose some changes which would be intended to effect a change for the better.

We have done considerable work on the preparation of proposed rules covering the operation of amateur repeater stations. There has been considerable publicity in some of the amateur publications and much conjecture as to the substance of the contemplated rules. As a matter of fact, we have gotten some pretty good ideas from those who purport to know what we are going to do. There are a few controversial aspects of repeater operation to which we hope to find answers so that the proposed rules can be issued soon.

You can be assured that the decision to go forward with the additional phone reservations on November 22 will in no way influence or prejudice our decisions on any pending petition.

We realize, of course, that the decision to go ahead with the additional frequency reservations at this time will not be greeted with loud acclaim by all amateurs. However, our past experience has been that many of the most vocal critics will, in self-defense, if for no other reason, do the necessary to get a piece of the action in the reserved bands.

Inequities Recognized

We know that there are inequities in incentive licensing as it exists today, and we intend to do what we can to give everyone a fair shake without undermining the objectives of the program. For years we have had provisions in the rules to help the physically handicapped obtain licenses. These provisions have been extended to permit handicapped applicants for Advanced and Extra Class licensees to be examined by volunteer examiners. We will also give the handicapped the same consideration with respect to the code and technical examinations that we have given in the past. Some of the older amateurs feel that incentive licensing has done them an injustice by restricting their operating privileges. This feeling is also shared by some Advanced and Extra Class licensees.

Without question, some of our amateurs are reaching a point in life where examinations, both theory and code, are difficult, if not impossible. We have petitions on file which go to this matter. This is a matter to which we have given considerable thought, but one for which there doesn't appear to be a ready answer which would be acceptable to all. I don't know what decisions will be reached after consideration of the petitions, since these decisions are the prerogative of the Commissioners; however, due consideration will be given for the requested relief.

Arguments of Opponents

There has been considerable reactance to incentive licensing from both the proponents and the opponents of the program. As one would expect,

the opponents are more vociferous. The opponents fall into three general categories: Those who claim they are too busy to study; those who prefer to spend their time beating the drums against the alleged invasion of their rights; and those who claim one must be an electronic engineer to qualify for an Advanced or Extra Class license. The lack of time argument is not persuasive, nor are the allegations concerning rights. Lack of time probably could be better classified as a lack of ambition -- or laziness if you prefer.

Those who talk about infringement of rights should read Section 301 of the Communications Act which states that the purpose of the Act is, among other things, to maintain the control over all of the channels of interstate and foreign radio transmission and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time under licenses granted by Federal authority. Section 301 further states that such license shall not be construed to create any right, beyond the terms, conditions, and period of the license. Section 303 of the Act authorizes the Commission to classify radio stations, and to "prescribe the nature of the service to be rendered by each class of licenses station and each station within any class." This means, in effect, that even though you have qualified for an amateur license, possession of that license does not give you any right to operate as you please during the license period.

Finally, for those who complain about the difficulty of the examinations, the record is replete with instances of amateurs of all age groups who have successfully qualified for the higher grade licenses. By far, the majority of the successful candidates have not been the so-called electronic types -- engineers or professional technicians. During one month, 635 examinations for the Advanced Class were given. Ninety-one of the applicants were required to take the code test. Fourteen of those failed. Of the remaining 621 applicants, 495 passed element 4(A) and 126 failed. This is an average of 80 percent. Of 230 applicants for the Extra Class license, 61 failed the code. Eighty-two percent of those required to take element 4(A) passed and 77 percent passed element 4(B). To me these figures show that the examinations are of a reasonable level of difficulty, and that the demonstrated degree of success is the result of serious effort on the part of those amateurs who have chosen to improve themselves and, hopefully, the overall quality of the amateur service.

Serious amateurs should, and I believe they do, direct their efforts in amateur radio to those things which will in the ultimate make their hobby appear at its best. This should be a basic consideration for all amateurs and one which is important to the future of the service.

The incentive licensing program is well on the way towards its objective of encouragement and improvement of the amateur service through rules which provide for advancing skills in both communication and technical phases of the art. This is not to say that the present rules are the complete answer to a continuing improvement and growth of the service. The realization of the objective of incentive licensing can come about only through the joint efforts of the amateurs and the Commission. We try to be objective in fulfillment of our responsibilities. Objectivity on the part of the amateurs will do much to demonstrate that they are deserving of the spectrum space now available to them.

QST

Happenings of the Month

BEACONS IN CANADA

Canadian regulations permit, among other things, transmission of signals to receiving apparatus for the measurement of emissions, temporary observation of transmission phenomena, etc. A limited number of amateur "beacon" transmitters may be licensed in the bands above 28 MHz for studies of propagation phenomena. Each application will be on a case-by-case basis through the Regional Offices of the Department of Communications for operation in the least-used portions of the various bands for stations located beyond the ground wave coverage of populated areas.

The question arose in connection with the proposed world-wide network of beacon stations under the auspices of the International Amateur Radio Union, which was discussed at the Region 1 IARU Conference in Brussels last year.

COVER-AWARD WINNERS OF 1969

The ARRL Cover Plaque Award is presented each month to the volunteer *QST* author whose article is chosen "best" by the directors in mail balloting. A zinc printing plate made from the cover negative of the issue is mounted on a walnut plaque to form the award.

Winners for 1969 were:

- January:* "The HRH Delta Loop Beam," by Harry R. Habig, K8ANV
- February:* "A Transmitting Converter for 50 MHz," by H. Gordon Douglas, W8PMK
- March:* "Phone Patching -- Legitimately," by George P. Schleicher, W9NLT
- April:* "An Examination of the Gamma Match," by D. J. Healey, III, W3PG
- May:* "A 500-Watt F.M. and C.W. Transmitter for 220 MHz," by Richard B. Stevens, W1QWJ
- June:* "Three Innovations for Field Day," by Wayne E. Overbeck, K6YNB
- July:* "Touchcoder II," by J. A. Bryant, W4UX
- August:* "Fixin' the Station Receiver," by Joe Carr, K4IPV
- September:* "A Direct Conversion S.S.B. Receiver," by Richard S. Taylor, W1DAX
- October:* "Amateur F.M. and Repeaters," Les Cobb, W6TEE and Jay O'Brien, W6GDO
- November:* "A Solid State Speech Processor," by Joseph J. Spadaro, WB2EYZ.
- December:* "MOSFETS for Tubes," by Albert Helfrick, K2BLA

Will your name be listed here someday? Do you have a recently-completed project you'd like to

share with your fellow amateurs? Our technical editing staff can smooth out any rough spots in the actual writing -- have a go at being an author!

There's also an ARRL Technical Merit Award for a major contribution to the technical side of amateur radio. As was reported in the Minutes of the 1969 Annual Meeting, the 1968 award went to Dale Covington, K4GSX, of Marietta, Georgia. It recognized "his outstanding work on the analysis of typical amateur antennas using modern computer techniques and at a level which will provide source material for the communications industry for many years to come..." (Minute 81).

The presentation was made by then-Director Charles J. Bolvin, K4KQ, at the Georgia State Convention, in Augusta, on September 14, 1969. A photo appeared in December *QST* page 78.

Nominations are now in order for the 1969 Technical Merit Award, and can be made by any person directly to the chairman of the Merit and Awards Committee, ARRL Vice President Wayland M. Groves, W5NW, 1406 West 12th Street, Odessa, Texas, before April 15, 1970.



Leo E. Yob, WBKYY, is presented a plaque by Rear Admiral William F. Rea, USCG while his YF Amelia, W8NNH, looks on. It was the Coast Guard's "Thank you" for two years of daily message handling for personnel stationed at Cape Christian, Baffin Island, near the Arctic Circle. (Thanks to Carmella Cicerello, W8NAL, for the photo)

Phil Haller, W9HPG, director from the Central Division, receives a trophy from Larry Kleber, K9LKA and the Big Thunder Amateur Radio Club presented for "Outstanding Service to Amateur Radio."



SHIFTS FOR 10-METER RTTY AND 2-METER C.W. . .

The Federal Communications Commission has adopted the rules proposed in Docket 18508 (page 76, June 1969 *QST*). Accordingly, effective March 2, Section 97.61 is amended in pertinent part to read:

<i>Mc/s</i>	<i>Emissions</i>
28.0-29.7	A1
28.0-28.5	F1
28.5-29.7	A3, A5, F3, F5
144-148	A1
144.1-148.0	A0, A2, A3, A4, A5, F0, F1, F2, F3, F5

(In the case of F3 on ten meters, it is further divided by Section 97.65 into narrow-band f.m. 28.5-29.0 and narrow or wide f.m. 29.0-29.7 MHz.)

QST

Behind the Diamond

Number 23 of a Series



Perhaps the League's greatest strength is the vast number of hard-working volunteers from all over Canada and the United States who really make the organization go. One of the go-ingest is Harry J. Dannals, W2TUK, who has been director from the Hudson Division since 1965. Prior to that, he served as vice director from 1961 through 1964 and as assistant director 1958 through 1960. He was SCM for New York City-Long Island 1955-1961; past president, Hudson Amateur Radio Council, 1959-1964 and a director of HARC since then; past vice president SSB-ARA; past director Suffolk County Radio Club; past vice president, Lake Success

Radio Club; past president, Nassau Radio Club; past assistant radio officer Nassau County and past assistant State radio officer, RACES; and co-chairman, 1964 ARRL National Convention in New York City.

Harry is a commander in the U.S. Navy Reserve, and was a prime mover in having amateur radio at the World's Fair, K2US. He holds ORS, OPS, OO, OES, appointments, and is a member of AREC and the A-1 Operator Club. First licensed in 1946, he acquired "Class A" in 1947 and Extra in 1952.

Harry's father, the late Earl W. Dannals, was well known as W2GG and K4GG; Harry's son Foster W2LZU and an avid DX chaser. The family also includes two girls and another son, an engineer for Sperry Systems Management Division at Great Neck, and his home is in Dix Hills on Long Island. The station operates 160 through 1 1/4 meters, most meters, and in the MARS bands as NØTUK.

During his tenure on the Board, Harry has served on the Public Relations Committee in 1965 and in 1968; was chairman of the Planning Committee in 1966 and 1967, and currently serves on the Merit and Awards Committee. He's been serving on the Executive Committee since May 1968.

In short, Harry accomplishes so much for ham radio and the League, we wonder how he can possibly find the time - but we're sure glad he does!

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope, about 4 1/2 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

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

W1, K1, WA1, WN1 — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KLT, RD 1, Balley Hill Rd., Malvern, Pennsylvania 19355

W4, K4 — H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4 — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 31367, El Paso, Texas 79931.

W6, K6, WA6, WB6, WN6 — No. California DX Club, Box 11, Los Altos, California 94022.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

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

W8, K8, WA8, WN8 — Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.

KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.

KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

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

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S. VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ontario.

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

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

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

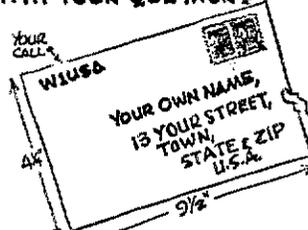
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹ These bureaus prefer 5 X 8 inch or #60 manila envelopes.

**IS YOURS ON FILE
WITH YOUR QSL MGR?**



COMING A.R.R.L. CONVENTIONS

May 15-17 — Pacific/Southwestern Division, Fresno, Calif.

June 19-21 — Oregon State, Bend.

July 4-5 — West Virginia State, Jackson Mills.

September 25-27 — NATIONAL, Boston, Mass.

October 17-18 — Hudson Division, Tarrytown, N.Y.

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

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15	16	17	18	19	21
22	23	24	25	26	28
29	30	31			

Hamfest Calendar

California — The San Gabriel Valley Radio Club auction will be held at 7:00 P.M., Tuesday, April 7, at the Bowling Green Clubhouse, Arcadia Park, Arcadia.

Illinois — The Chicago Suburban Radio Assn. will hold their annual Hambooree on March 22 at East Ave. and 55th St., Countryside (La Grange), Ill. Flea market and prizes. For information and directions call Col. Wilson Thomas, W9KWA, 4017 Vernon Ave., Brookfield Ill. 60813. Phone 512-485-0451.

Illinois — The Twin City ARC is sponsoring an auction on March 22 at Lamb's Auction House, 1600 N. Oak, Champaign, Ill. For more details contact K9QZL, Milt Forsberg, 507 W. Charles St., Champaign, Ill. 61820.

Illinois — The Sterling-Rock Falls ARS will hold their annual Hamfest at the Sterling Coliseum in Sterling on Sunday, March 8. Advance ticket \$1.00, \$1.50 at the door. Free coffee and donuts until 10:00 A.M. Plenty of parking, food, and fun. Bring the kids and the XYL. Talk-in on 50.52 and 3.900 MHz. For advance tickets and information write P.O. Box 11, Sterling, Ill. 61081.

Michigan — The 3rd Annual Blossomland Amateur Radio Auction will be held Sunday, March 15 at the Youth Memorial Building, Berrien County Fairgrounds, one mile northwest of beautiful downtown Berrien Springs, Mich. Acres of free parking are available. Don't pack a lunch, we'll have hot food. Prefer to do your own selling? Rent one of our swap tables. If that fails, let our skilled auctioneer put your gear on the block. Coming from out-of-town? Get on US 31-33 to the Fairgrounds north of Berrien Springs. Talk-in on 3.925 or 146.94 MHz. Auction time is 10:00 A.M. to 1:00 P.M. See you there.

New Jersey — Ham auction, Friday, April 3 by the key clickers of Stirling. The place is Central School, Stirling, N.J. Refreshments, talk-in stations, bring your own gear. Two auctioneers all evening. Easy to reach from Pennsylvania and New York. Make plans to attend now. Contact L.S. Van't Slot, W2DLT, 302 Z Passaic Ave., Stirling, N.J. 07980.

New York — Auction time — The New York Radio Club cordially invites all hams and SWLs to its 15th Annual Auction, Sunday afternoon, March 15 at 2:00 P.M. Free parking. Bring items to sell and money to spend. Families are welcome. The George Washington Hotel at 23rd St and Lexington Ave., New York City.

Texas — The Annual St. Patrick's Day Swapfest, sponsored by the Midland ARC, is scheduled for March 14 and 15. For details write MARC, Box 967, Midland, Texas 79701.

Recent Equipment

(Continued from page 49)

attenuation, the performance of the A-2587 was found to be identical with that of the 99-35313L.

As can be seen from the photographs, a different-looking case is used to house the Allied receiver. The A-2587 is slightly larger than the Lafayette unit and it weighs an ounce more. It is easier to change the penlight cells in the A-2587, since only a slight amount of finger pressure is necessary to slide back the battery cover.

A 27- to 50-MHz version of the A-2587 is available, and its model number is the A-2586. An ac adapter can be obtained to power either receiver. — *W1YDS*

Allied A-2587 Receiver

Height: 6 inches.

Width: 3¼ inches.

Depth: 1¾ inches.

Weight: 9 ounces.

Power Requirement: 6 volts dc, 10-50 mA.

Price Class: \$18; ac adapter: \$4.

Distributor: Allied Radio Corporation,
100 N. Western Ave., Chicago,
Illinois 60680.

Ham-Band Receiver

(Continued from page 19)

power supply, audio system, LMO, i-f system, and front end were constructed. Each block was tested outside the arrangement and inserted for final alignment. A disgusting but nevertheless very important problem to avoid is unwanted coupling. Supply voltages are therefore applied with feedthrough capacitors to each block and in some cases to each amplifier stage. Rf interconnections were made with small-diameter coaxial cable and appropriate connectors.

The main tuning gear was built around an old BC-221 tuning capacitor and reduction gear. The counter dial and tuning knob are the result of four weeks of labor. The counter dial reads tens of KHz, where the main tuning knob has a calibration of 200 Hz per division, from an HRO inspiration. The front panel was covered with a special 3-layer plastic which allowed direct engraving of the function titles.

The metal cabinet and chassis frame is a commercial one. By the way, this transistor receiver has a weight of 52 lb; excessive shielding pays in electrical performance, but not in weight!

Conclusion

The idea for this receiver was born one year ago by reading application literature about linear integrated circuits and hot carrier diode mixers published by RCA and Hewlett-Packard, and other information in references listed at the end of this article. As the author himself has done

some development work in the crystal filter field, this project was started to replace that old station receiver showing lack of selectivity and cross-modulation performance.

I would like to stress the following point of view: this is no receiver to be duplicated by the ham without some engineering background, and expensive measuring equipment must be temporarily at hand. Without an rf millivoltmeter, a good high-frequency oscilloscope and a perfect signal generator, projects of this size have no chance to become completed. But probably one useful detail or another has been covered in this article, and, to be sure, there is some similarity to the receiver you will buy in the 1970s.

I am indebted to Mr. Klingsporn for his assistance with measuring equipment. Finally I would like to thank my wife for the reserved "laboratory space" in our flat and for her patient persuasion in stopping me from buying a . . . well, there is nothing at all to buy in this respect now. QST

References

1. "The Hot Carrier Diode, Theory, Design and Application," Hewlett-Packard Associates, Application Note 907.
2. Carlson, F. M., "Application Considerations for the RCA 3N128 VHF MOS Field Effect Transistor," RCA Application Note AN-3193.
3. "RCA Linear Integrated Circuits Application Notes," Technical Series Documentation IC-41.
4. Hacks, J., "Treffericherheit bei KW-Empfängern," Rohde & Schwarz Publication 10, 1958.

Plotting Satellite Orbits

(Continued from page 50)

plot a hypothetical orbit and found that the orbit subscribed an arc across the map passing near but not over the North Pole. Also since the equator was in effect the edge of my map, I made a template with an index hole through which I could locate the North Pole. Now, by simply aligning the edge of my template on the equator and putting the Pole in the index hole, I can quickly trace that particular orbit.

From there on it's a matter of following *QST's* directions to determine the proper beam heading and elevation to track the satellite.

The type of projection used on your map will affect the shape of the template you make. A Mercator projection for instance will give you the familiar orange-peel shape. Other projections might give you a shape more resembling a triangle. Regardless of the shape, however, it will always be the same for every orbit. Only the starting point will change.

Both the October *QST* article and this one are based on hypothetical data. It will be necessary to wait until the actual orbital data is announced in order to construct an accurate template. Since there is plenty of time between passes and since this whole job takes about half an hour, the template method bears consideration in light of the time that can be saved later by not having to lay out a series of points for each orbit. QST

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

RECIPROCITY EXTENDED

Effective December 11, 1969, the reciprocal agreement between the United States and the United Kingdom was extended to include territories and possessions. An annex to the agreement, entitled, "Territories for the international relations of which the government of the UK of Great Britain and Northern Ireland is responsible," lists the following which are now included in the reciprocal agreement: Bahamas, Bermuda, British Honduras, British Virgin Islands, Cayman, Falkland Islands, Fiji, Gibraltar, Hong Kong, Montserrat, Seychelles, St. Helena, Turks & Caicos, Western Pacific High Commission Territories (British Solomon Islands Protectorate, New Hebrides, Gilbert & Ellice, Central and Southern Line Islands), Associate States (Antigua, Dominica, Grenada, St. Lucia, St. Vincent).

Last month we reported the extension of the French/U.S. reciprocal agreement to include terri-

ories and possessions. For the record, here are the French overseas entities involved: Afars & Issas Territory (French Somaliland), Comoro Islands, Reunion, Guadeloupe, Martinique, St. Pierre and Miquelon, French Guiana, French Polynesia, New Caledonia, Wallis & Futuna Islands, French Antarctica, and New Hebrides.

NEW RSGB PRESIDENT

On January 26, Dr. J.A. Saxton was installed as the 36th president of the *Radio Society of Great Britain*. Although not a radio amateur himself, Dr. Saxton is a renowned radio scientist and has been a participant in many meetings of the International Telecommunication Union. He was recently appointed chairman of CCIR Study Group V. Dr. Saxton is also chairman of the electronics division of the Institution of Electrical Engineers. As a result of these many activities, Dr. Saxton is well acquainted with the international problems which face all of the radio services in general and the amateur radio service in particular.

DX OPERATING NOTES

Reciprocal Operating

United States Reciprocal Operating Agreements exist *only* with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France,* Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Kuwait, Luxembourg, Monaco, Netherlands,* New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom,* and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write League headquarters for details.

(* Agreement includes overseas entities.)

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Nicaragua, Norway, Senegal, Switzerland, United Kingdom, U.S. and Venezuela.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Barbados (only

U.S. stations/8P) Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU QA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

DX Restrictions

U.S. Amateur 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 (195) conference.

Cambodia and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateur should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided by Canadians are HS JY XU XV XW8 and 3W8.

NOTES

The Hungarian amateur radio society, *Magyar Radioamator Szovetseg*, has printed 36 different types of QSL cards representing that number of national historical castles and fortresses. These cards, numbered 1 to 36, come from the 10 HA districts as follows: HA1 - 7,22, 25,31; HA2 - 6, 8, 12, 15, 21, 23, 30, 32, 35; HA3 - 3,14,23,30,32,33,35; HA4 - 17, 23,30,32,35; HA5 - 1,13,36; HA6 - 4,10,11,34; HA7 - 2,5,19; HA8 - 16,20,24; HA9 - 18,27,28,29; and HA0 - 9,26,29.

The Hungarian Castles Series award can be obtained with cards in 3 classes: Class 1 (Gold award) requires 36 QSLs, 1 to 36, and 10 IRCs. Class 2 (Silver) requests 24, numbered 1 to 24 or 13 to 36, and 8 IRCs. Class 3 (Bronze) requests 12 cards, 1 to 12 or 13 to 24 or 25 to 36 and 5 IRCs.



There is no need to send the QSLs; cut the coupons attached to these cards, enclose a log and the IRCs, and send them to MRS. Box 214, Budapest 5, Hungary. QSOs after January 1, 1968, on any bands and modes are valid. A maximum of 2 cards are accepted from any station. SWLs can also apply for the HCS award. (Info via George Pataki, ex-YO2BO.)

The *Reseau des Emetteurs Francais* is sponsoring the Leon Deloy 8AB Memorial Certificate. It was Deloy, in 1923, who with ARRL Traffic Manager F.H.Schnell, IMO, discovered the usefulness of short waves by establishing contact between France and the U.S. on 103 meters.

Each participant of the 1970 ARRL International DX Competition or the French Contest who operates on 80 meters (i.e., near the frequency region used by Deloy) using A1, A3 (including ssb), or RTTY, can qualify for the "Memorial Certificate." At least one contact must be made between France (or French territories) and a North American country.

Requests for certificates should be sent with details of the qualifying contact or contacts along with 4 IRCs to REF, Boulevard de Bercy 60, Paris 12, France.

**SWITCH
TO SAFETY!**



Silent Keys

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

- W1AGR, Chester M. Capen, Norwood, Mass.
- WA1BLA, William F. McDonald, Jr., Weymouth Mass.
- W1DAW, Hugh J. Avery, Millinocket, Me.
- W1HVV, Harold M. Jenkins, Sr., Greenbush, Mass
- W1MJ, Roland E. Burditt, Wakefield, Mass.
- K1PHZ, Frederick A. Thompson, Warwick, R.I.
- WB2ALP, G. W. Hunt, Jr., Whiting, N.J.
- K2DJ1, Norman W. Sofield, Albany, N.Y.
- W2DJW, Peter R. Contant, Rochester, N.Y.
- W2HDM, Kenneth B. Grayson, Glen Head, N.Y.
- W2JD, James B. Frye, Homer, N.Y.
- K2JLJ, Patrick Keogh, N. Tonawanda, N.Y.
- W2LQN, Frank C. French, Tuckerton, N.J.
- W2NQC, Philip W. Herrle, Sr., Jersey City, N.J.
- W2RRD, William Hereth, Tonawanda, N.Y.
- W2RWY, Allen K. Pound, Dexter, N.Y.
- WH2VNK, Richard W. Burgess, Tuckerton, N.J.
- W3APY, Charles W. Greb, Baltimore, Md.
- W3EHE, J. Stanley Brown, Pittsburgh, Pa.
- W3FOH, Willis N. Weaver, York, Pa.
- WA3FTK, Esther A. Ridenour, Coraopolis, Pa.
- W3JLZ, Dominic Rossi, Philadelphia, Pa.
- W3JPP, Fred H. Travers, Philadelphia, Pa.
- K4DPV/W2KQS, William F. Hickson, St. Petersburg Beach, Fla.
- K4H1B, Daniel O. Smith, Jr., Holmes Beach, Fla.
- WA4LTP, Herbert T. Boggs, Lexington, Ky.
- W4QR, Newell B. Davis, Orange City, Fla.
- WA4TIC, Rev. John Riles, Jr., Jamestown, Tenn.
- W4TJD/W1FNX, Holbrook B. Ellis, Holmes Beach, Fla.
- W5IWQ, L. E. "Noisy" Jordan, Skellytown, Texas.
- W5KBU, Vernon G. "Buster" Parker, Odessa, Texas.
- K5MNF, Robert J. Holt, Jr., Wheeler, Texas.
- W5ASNJ, Fred K. Facundus, Baton Rouge, La.
- W5SPOO, Harold E. Owens, Hernando, Miss.
- W5SZDK, Bruce K. McCasland, Midland, Texas.
- W6BAG, W. Stuart Foote, Newport Beach, Calif.
- W6NGO, Hugh B. Ruffner, Paradise, Calif.
- W6HSP, Edward H. Brunemeier, Placentia, Calif.
- W6KVV, Gen. John B. Bestic, USAF Ret., Corona Del Mar, Calif.
- K6MJU, William Kirchner, Fountain Valley, Calif.
- W6GOFN, Brian L. Wendell, Desert Hot Spring, Calif.
- W6GQMX, Henry A. Johnson, San Ysidro, Calif.
- W7AC, S. Crane, Portland, Ore.
- W7DIE, John S. Duffy, Medford, Ore.
- K7LIR, Stanton Warburton, Jr., Tacoma, Wash.
- K7RZL, Cliff Lewis, Beaverton, Ore.
- *K8DDG, Roger A. Barnett, Columbus, Ohio.
- K8HQT, Howard Rotrock, Grand Rapids, Mich.
- K8MAN, Allen B. Rush, Port Huron, Mich.
- W8OG, Donald G. Ream, Springfield, Ohio.
- WA8OGM, Gordon Cassel, Detroit, Mich.
- W8SPTZ, William A. Dow, Sr., Cannonsburg, Mich.
- WA8RPN, Ronald Beckwith, Williamsburgh, Mich.
- K8USW, Hanford Garver, Vermilion, Ohio
- WA8UZY, Robert C. Miller, Ottawa, Ohio.
- K8VPU, Phillip S. Majeske, Detroit, Mich.
- W9CA, George W. Bergman, Des Plaines, Ill.
- W9DJA, Leonard E. Onese, Poynette, Wis.
- W9DPP, Walter B. Roe, Evanston, Ill.
- K9RHF, Evelyn F. Glasscock, St. Louis, Mo.
- K9WFG, Gerald E. Scott, N. Platte, Nebr.
- W9WRO, Walter M. Reed, Denver, Colo.
- KH6GRP, Robert V. Beadles, Honolulu, Hawaii.
- VE3BUT, Homer Abraham, Welland, Ontario.
- VE3JW, J. W. Cotter, Ottawa, Ontario.
- VF7LI, S. Gordon Paterson, W. Vancouver, B.C.
- HA5BU, Istvan "Pista" Ordog, Budapest, Hungary.
- KP4BOD, Francisco "Frank" Hou, Arbonito, Puerto Rico.

*Charter Life Member, ARRL



Correspondence From Members-

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

ANNIVERSARY PREFIX

☐ Your League Lines in the January 1970 issue comments on a distinctive prefix for 1976 for the 200th anniversary of American Independence. Why not say it as it is and use AI for the world to hear! - *H. C. Keil, WA9AIH, La Grange, IL 60525.*

☐ Nix to the whole idea. The potential of 300,000 U. S. hams changing their prefixes for a year could be very confusing to all concerned. Other countries' experience is not valid in this case because of the relatively small number of hams in the rest of the world. - *Thomas F. Carten, WA1DJC, Gloucester, MA 01930.*

☐ Yes, lets have a 200th anniversary prefix. Try to keep all call holders happy! - *Richard W. Randall, K6ARE, Livermore, CA 94550.*

☐ Suggestions for and actual uses of special calls have been known in the recent past when some nation was in a great year. However, the world knows the United States and the world knows our W and K calls very well. We don't need a special red, white and blue paint-job to let anyone know we are Americans. In fact, it would be confusion to do anything but go by no alias, only by our "right names." We are not children who must act like pompous primitives. - *Temple Nieter, W9YLD, Evanston, IL 60202.*

☐ I wish to go on record as being vehemently opposed to the idea on the grounds that it would cause untold confusion. I am all for commemorating the event but not in this manner. - *James E. Thayer, W1FZ, Farmington, NH 03835.*

WEAK GRIPE

☐ Of all the gripes and groans in ham radio, I believe that mine is the weakest of them all.

Many old timers can tell that my age falls in the high school category by the way I speak. They then start sermonizing on why ham radio is good for you and you'll never regret having a ticket and how it can help you in college and the rest of your life thereafter. When you're my age your parents or guardians tell you what's best and good for you. The same goes for guidance counselors and teachers in school. Both are fine in my book; but when I turn on the rig I like to talk to people and have a good time and escape the daily rat race of people telling me what's best. - *Gordon Belle, WA1JWQ, Brookline, MA 02146.*

WX3MAS

☐ On behalf of the officers and members of The Delaware-Lehigh Amateur Radio Club (W3OK) located in Bethlehem, Pennsylvania, I would like to express our thanks for your help in promoting our recent club project WX3MAS Christmas City U. S. A.

The official bulletin sent out from WIAW really played a big part in our tremendous success. Literally hundreds of the stations worked during the project commented that they heard the bulletin about our project and were there waiting for us to put WX3MAS on the air. A total of 7,186 contacts in all 50 states and 102 DX countries were made. We felt it was a tremendous success and also a heart-warming and rewarding experience which will long be remembered. - *Norman Zoltack, WA3FGS, Bethlehem, PA 18017.*

IT SEEMS TO US

☐ An editorial column like "It Seems to Us..." does NOT belong in a magazine like *QST*, and should be removed.

Why do magazines print editorials? Most publications are privately-owned, and their editorials express the ownerships' opinions. But *QST* is owned by tens of thousands of League members. John Huntoon may be the editor, but beyond that, he is a League member, just like the 90,000 or so others of us. So why does he get a page and a half of prime editorial space each issue, while the rest of us are confined to a few column inches in the correspondence column?

It should be fairly obvious, then, that a column like Mr. Huntoon's represents an imbalance, as well as a threat to the democratic spirit of the ARRL. In view of this, the column should be deleted immediately. Do any other League members agree? - *Frank O'Donnell, La Habra, CA 90631.*

FIVE-BANDERS

☐ Congratulations! For the first time I feel compelled to write you to commend you on one of your actions, which I believe has done an outstanding service to amateur radio - the institution of the SBDXCC and 5BWAS awards. I am a college student, and while home for Xmas I was so shocked to see the activity on ten and fifteen meters - never have I heard the bands so populated! Although the awards do not encourage long QSOs, at least people are operating and showing FCC there is significant activity to warrant that the "seldom used" amateur bands be kept for amateurs. I also hope that those operating on these bands for the 5B awards will also discover that they are good for the longer, friendly QSOs that hams are noted for. - *Timothy G. Juhl, WA8QWR, Almont, MI 48003.*

JANUARY'S OUCH

☐ I know it is in the interest of fairness that you publish criticism as well as plaudits in the "Correspondence from Members" column of *QST*. This practice is laudable when the criticism is thoughtful and constructive. I am disgusted, however, with the occasional "rabid ravings" of angry, ill-informed people which you see fit to print. It is distressing to see their bitter invective given the attention of being published.

This practice does not increase the effectiveness of the correspondence pages of *QST* as a forum for the expression of legitimate concerns about League activities. In fact it may actually deter correspondence from members with reasonable suggestions or complaints who are loath to be compared to these irrational, egotistical protesters.

The subtlety of allowing their own words to condemn them is, I believe, wasted on the kind of person who would write the sort of comments I'm referring to.

Formality is certainly not required in our communications, but dignity and reason are surely prerequisites to useful discussion of controversial issues. - *Kenneth H. Beck, W3VOX, Newtown, PA 18940.*

☞ I have observed that ignorant individuals are seldom content to keep their ignorance hidden, but are happy only when they are braying it to the world. This "ouch" correspondence is one of the most blatant examples of ignorance that I have ever witnessed. - *Earl D. Crawfis, W7KS, Phoenix, AZ 85032.*

☞ I have just finished reading the January "Correspondence From Members" and I find it depressing that some amateurs can be so narrow-minded and selfish. My roommate and I, both hams of seven years experience, have found the WIAW code practice and Official Bulletins very helpful in keeping up our code speed.

It seems to me that since WIAW operates on a fixed schedule that it would not be a tremendous inconvenience for a ham not to solicit a QSO near the scheduled frequency at a time scheduled for a WIAW transmission. If one doesn't appreciate the fact that there are many amateurs and non-amateurs who would like to be able to hear WIAW, I would at least expect him to realize that one can't carry on a QSO in competition with WIAW and therefore to QSY out of common sense.

Is a clear frequency at a scheduled time for the benefit of many too much to ask? Or is your particular QSO more important to the amateur community? - *Jonathan W. Pearce, WB2MNF/WA-3LJG, Haddonfield, NJ 08033.*

☞ I have discovered a very interesting and useful fact about the dirty old men who wait eagerly for the arrival of 0230 each evening to have another crack at sending WIAW's code practice sessions into a screaming and howling tailspin. Evidently these fellows, for all their efficient and well tuned 10-Kw rigs, can only jam one of ARRL's frequencies at any one time! The obvious solution (unfortunately only applicable to those of us with a crystal-controlled first converter) is to tune the receiver VFO to X.020 MHz. and keep, the left hand on the bandswitch while taking copy with the right hand (naturally left-handed amateurs will have to reverse that procedure). In this way a quick switch can be made with scarcely a missed code character whenever The Enemy starts to jam one frequency after murdering another. In my case 80 and 40 meters work very well. - *Herbert Drake, Jr., WB6IMP, Mill Valley, CA 94941.*

NEVER TOO OLD

☞ Thought you might be interested "that it's never too old to learn." After being a Technician for many years and at the age of 67, I recently received my General and Advanced ticket, and work all of the other "over the hill boys" on 40 meters each day. Incentive licensing has stirred up

the old noodle and I highly recommend ham radio to keep you young. Keep up the morning code practice on WIAW. It's real good practice. - *Arthur Beckman, W9DIW, Indianapolis, IN 46222.*

ARRL FILM

☞ I must compliment you on "The Ham's Wide World." It was shown in Cleveland on one of the local TV stations. I am glad I got up out of bed a little earlier to watch it. It was an excellent presentation of amateur radio to the person who would know nothing about the hobby. I enjoyed the film very much and I am looking forward to seeing it again. - *Gary Jones, WA8YXI, Euclid, Ohio 44132.*

☞ I was passing some traffic to a station back home when my wife came running in to tell me of a TV program about ham radio that was about to come on. I had read the *QST* references, but I found the film even more thorough, effective, and delightful than anticipated. The varied and valuable aspects of our hobby which were depicted in "The Ham's Wide World" made me feel proud to be a ham. Congratulations to all those involved for an excellent job. - *Erte A. Lundau, WA2KER/JQ, Ft. Riley, KS.*

☞ Congrats to everyone involved for excellent film on ham radio. - *Marshall L. Lincoln, W7DQS, Wickenburg, AZ 85358.*

☞ It is difficult to believe that so much information on the many facets of ham radio could be packed into a half hour movie, and still be as entertaining as this one is. I hope the movie gets the widest possible circulation to the general public. - *Robert Wilcox, K8OMS, Owosso, MI 48867.*

☞ The program was very informative and interesting, and was presented in such a manner that a non-amateur wasn't left in a cloud of confusion. I'm amazed that so many aspects of hamming were squeezed into a half-hour film without losing continuity. True, a lot of hamming's activities were not included, but what did appear should be enough to stimulate a keen desire in anyone who is interested in getting a start in amateur radio. - *Art Pahr, WA9UEK, Plymouth, WI 53073.*

GRANDFATHER

☞ FCC Bulletin No. 1003 on Amateur Radio Service contains this excerpt, "An applicant for the Amateur Extra Class operator license who was a licensed amateur prior to April, 1917 may receive credit for the twenty-word per minute code test and written examination Elements 4A and 4B provided he currently holds a General or Advanced Class license or qualifies for the General or Advanced Class license." This bulletin is dated 1968.

The period from 1917 to 1968 represents approximately 50 years. It would appear to be reasonable to request a change from, "prior to April 1917," to, "at least 50 years." If this could be done then, as time moved on, new, "old timers," would automatically become eligible for the Extra Class license.

I do not believe that all, "old timers," are exemplary amateurs but I do think that an amateur who has maintained his interest in radio for 50 years is probably sincere, dedicated and worthy of this consideration. - *Wolcott B. Louis, W8BHJ, Parma Heights, OH 44130.*



CONDUCTED BY BILL SMITH,* KØCER

The Buzz

AURORA is the watchword for March. While DX on the high-frequency bands has remained excellent through the fall and winter months, the near total lack of *F-layer* DX at 50 MHz is evidence that sunspot cycle 20 is declining. Prospects for cross-country and inter-continental *F-layer* DX on 50 MHz are not good, but those of auroral DX are. Past sunspot cycles, during their decline, have produced excellent auroral openings. March should be no exception and some of the more intense auroras, while not as frequent as during equinox periods, have occurred in the summer months.

Portions of the information to be presented here will be old-hat to most vhfers, but a once-over-lightly review is appropriate for the newcomer to vhf. A basic background in what to look for and expect may be found in the *ARRL VHF Manual*, Chapter 2. Later we'll touch upon some areas of interest to the more experienced in auroral propagation.

The *GEO* alerts broadcast on WWV during the first half of the 19th minute of each hour provide some clue. New forecasts are broadcast each day at 0400 GMT. The *GEO* forecast, combined with the regular propagation forecast transmitted by WWV the last half of every fifth minute, may be used as a guide for predicting an aurora. A "W" or "U" forecast is the tip-off to be on the alert and to start your antenna searching the northern sky for aurorally-propagated signals. CW signals have a characteristic buzz. Sideband often becomes so badly distorted that it is difficult to understand, and a-m is usually unreadable.

In addition to WWV forecasts, which are not to be relied upon entirely, a check of the 80-meter band in late afternoon may reveal an aurora in the making.

Weak, watery-sounding signals give good cause to be on the alert. Similarly, the signals from Canadian time station CHU, on 7.335 MHz, or Radio Moscow may be the clue. But these are only clues; the sure way is to get on the air and make some noise. Undoubtedly many aurora contacts are missed because everyone is listening, particularly during auroras of short duration.

The auroral zone extends outward from the magnetic north pole in the northern hemisphere, the reverse being true in the southern hemisphere. Because of geographic location of the north magnetic pole, aurora is much more common in the northeast than in the western states of the same

geographic latitude. Aurora signals have been heard in Florida, but never in western areas of the same latitude.

In most instances antennas must be pointed in a northerly direction for signal reflection from the auroral curtain. Great Circle distances (the shortest direct distance between two points) for auroral contacts range upwards of a few hundred miles. However, some auroras produce DX in excess of 1000 miles, most common immediately after the disappearance of shorter distance signals. The long-range DX will likely be workable for only a few minutes, so it is the alert operator who is successful. There is no substitute for calling many short CQs, and careful listening.

Another interesting aspect of auroral signals is their occasional correlation with sporadic-E propagation. It has been found that at times signals reaching the auroral curtain may be contained within the curtain or along its edge and propagated over long distances. There is conclusive evidence of this over paths from Alaska to Europe on frequencies up to near the six-meter band. Amateurs have made contacts between New England and the Pacific Northwest and between Alaska and the Central States westward on 50 MHz under similar, but rare, conditions.

One amateur looking into this type of propagation is VE2AIO. Geoff is investigating work across the North Atlantic. The path from VE2AIO to the United Kingdom is not much different in length than from VE2AIO to the West Coast. Geoff says his observations during the past two years indicate the trans-Atlantic path to be even more favorable. He has heard the 41.5 MHz BBC television audio signal three times on aurora. (See the June, 1969 edition of this column, page 92, for similar observation by W2BOC.) On two of the three occasions, no North American auroral opening took place. With regard to E_s , Geoff has logged the 41.5 signal seven times on summer days, but not always on days when there was stateside E_s . On December 22, 23 and 24, 1969, VE2AIO logged the BBC on what he believes was E_s . The long, slow fade normally associated with *F-layer* DX was not evident, and on these same days there was stateside E_s shortly thereafter.

In pursuit of a trans-Atlantic 50-to-70 MHz contact with the United Kingdom, Geoff has built a 70-MHz converter and beam, and has enlisted several English stations to participate. Note that English amateurs do not have use of the 6-meter band, but rather the 4-meter, 70-MHz band. Certainly this is worthwhile work with interesting possibilities. Six-meter DXers located in the North-

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

eastern states might do well to equip themselves with 70-MHz receiving gear. VE2AIO has laid the groundwork for the across-the-pond DXers to search our 50-MHz band.

If such an opening does occur, please be sure to document it carefully as to complete time and signal characteristics. Even the most obscure observation could prove of great value not only in amateur circles, but professional as well.

Much professional study in this field is underway and we shall discuss some of the findings at a later date. This is still another possibility for amateurs to contribute to propagation studies, and it was amateurs who discovered auroral propagation.

Sorry About That

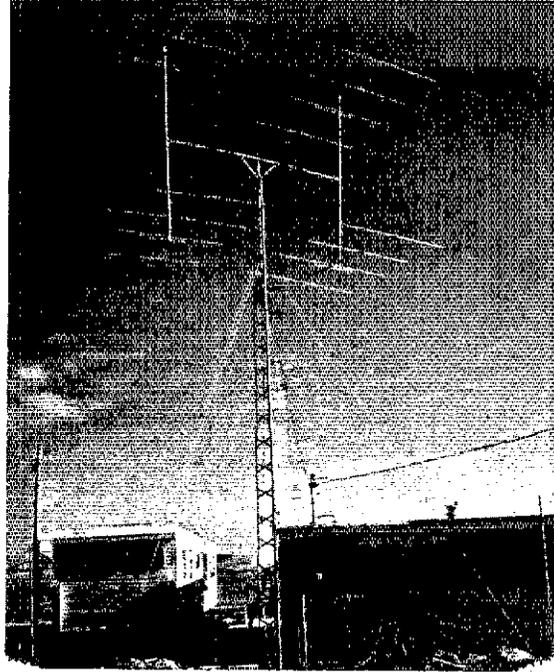
I have received several cards and letters telling me a number of the box standings were wrong in the January column. What apparently happened is this. Type set for a previous month's listing was accidentally reused in part for the January column. It wasn't until after the February column was already set that the error was discovered. Therefore the January errors were carried over to February, but through the sharp eyes of my wife, WBØAFL, I hope this month's listing is back in order. If not, just keep those cards and letters coming folks! And while you're writing, how about a picture of yourself in the shack, and some operating news for the column?

OVS and Operating News

50-MHz E-openings provided much fun during the holiday season. Here's a look by areas reporting DX activity. WA1DPX, Mass., caught an one-hour opening Dec. 13 working 4s, 8s, 9s, and 0s. The next evening Ray worked 9s but said the opening was spotty. WA1IFE heard multi-hop to California on the 14th and on the 21st John worked 4s and 9s.

From Pennsylvania we have four reports. WN3LYC reports several December openings, saying the 24th was the best day. Paul logged states from the east coast west to Kansas. WA3JWL says the evenings of Dec. 23 through 30 were excellent; he worked 4s on Dec. 20 and 5s on the 22nd, and WA3FMI noted similar openings, highlighted by a Dec. 14 break to California.

Two reports from Kentucky this month: WA4GHQ worked New England, Texas, Oklahoma and Missouri Dec. 16, and W4OTP chatted on ssb with several New England stations on the 14th. In Florida, K4PKV found conditions very good. Dec. 11 and 12, Dick worked 5s, on the 13th he worked KP4s BBU and DEC. Dick says KP4DEC had an excellent signal from a new linear. On Dec. 21 K4PKV worked all U.S. call areas except 5, 6 and 7, and on Christmas day, he worked W6ABN. Dick says WB4ILZ worked seven California stations within 15 minutes on Christmas. K4PKV reports also fair E₃ January 5-7. WB4BND, Miami, reports working Puerto Rico Dec. 6 and stateside Dec. 7, 8, 10, 13, 16, 19, 21, 23-25. Hoppy says the Christmas opening was by far the best, seven hours to everywhere east of the Mississippi. He also caught several early January openings, and on the 2nd WB4ILZ worked 6s and Idaho, the latter being an excellent catch from Florida. K4RBR, also Miami, is giving WB4BND's kw, some competition, with a pair of 3-400Zs in his final.



Bill, WØMTK, has erected this array of 4-element Yagis for his 50 MHz scatter work. The bays are spaced 13 feet, the top is 40 feet above ground, but look at the location! Bill's transmitter is a Swan 250.

W6YKM reports a 5-hour opening Dec. 12, during which he worked all call areas except 1, 2, and 3. Fred also worked VE6 and VE7, all with exceptionally strong signals. WA6HXM noted the Dec. 14 opening, working a number of Oklahoma, Texas and Pacific Northwest stations. The next day Pete again worked into Washington and Oregon.

WB6ZSO, a newcomer to six meters, worked his first E₃, while on Christmas vacation from California Polytech. Charlie worked Oregon on the 13th; Texas, Washington and Oregon the 14th; WA7FHP in Montana the 24th; and on Christmas, W5SFW and WB4ILZ. Not a bad introduction to 50 MHz.

K7ICW notes six meters being active in Nevada, with himself, K7ZOK and WA7s DSP, 1ER, and JTH handing out contacts. Al reports Dec. 13, 14, and 17 and 19 openings from VE7 to Minnesota to Louisiana. K7NVU, Wash., says the E season peaked on the 14th with a 5-hour opening to most western states.

WA81BK, Ohio, says "mostly quiet with a few 4-landers breaking through on the 29th." WA9YXA, Indiana, reports a Dec. 14 contact with VE2AIO, and work with W1s and 4s on the 22nd. WØEIT, Cedar Rapids, Iowa worked 1s, 2s and 3s, Dec. 24. WØPPF, also Iowa, worked Florida and Colorado Dec. 22; 2s, 3s and 8s the next two days. In Colorado, WØMTK reports E₃ on Dec. 14-16 and 19-29 except the 26th! Bill worked just about everywhere except the northeast states. Bill's neighbor, WØMXA, reports similar success, including a generous helping of Washington, Oregon and California stations which would make eastern DXers envious. At least it's nice to know there is a chance.

In the Caribbean, VP2MJ, who signs VE3EVW when not wintering on sunny Montserrat, worked

2-METER STANDING

K1ABR	..34	8	1478	W5AJG	..33	9	1360
W1AZK	..34	8	1412	W5UKQ	..30	8	1150
K1HTY	..33	8	1310	W5LO	..29	7	1325
K1WHT	..31	8	1300	K5PTK	..18	6	1330
K1UGO	..30	8	1370	W6GDO	..18	5	1326
K1WHS	..29	8	1300	W6WSQ	..16	4	1360
W1VTU	..29	8	1296	K6HAA	..13	4	1360
K1HKK	..28	7	1275	K6JYO	..12	4	1240
W1FJH	..27	7	1100	K6HMS	..11	4	1248
W1HSD	..24	7	1040	W7IRG	..27	6	1320
W1SM	..23	7	1000	K7NII	..25	5	1290
K1RJH	..21	7	1450	K7ICW	..16	4	1246
K1MJI	..20	7	1225	K7VTM	..19	6	950
W1MX	..18	6	850	W8PT	..41	9	1260
K1JIX	..18	6	800	K8AXU	..38	8	1275
W2NLY	..37	8	1300	W8IDU	..36	8	1150
W2CXV	..37	8	1360	W8YIO	..36	8	1100
W2ORI	..37	8	1320	W8IDT	..35	8	1150
W2AZL	..36	8	1380	K8EDO	..32	8	1150
W2BLV	..36	8	1150	W8NOH	..26	8	1165
W2ZFGK	..33	8	1340	W8THU	..24	8	1060
K8RTH	..33	8	1215	K8ZES	..22	8	675
W6PWL	..32	8	1160	W8VHG	..15	6	540
W6ZJK	..31	8	1160	K9SGD	..42	9	1300
W2CUK	..27	8	1334	W9ADT	..41	9	1303
W2CRS	..26	8	1270	K9AAJ	..41	9	1200
W8SIF	..25	6	1000	K9JIF	..41	9	1150
K2DNR	..24	7	1200	W9AAG	..39	9	1200
W9ZEM	..23	8	1335	W9YFF	..36	8	1050
W2CNS	..23	8	1150	W1FA	..33	8	1060
W2DWJ	..23	6	860	W9PFB	..32	8	820
W9ZPMW	..21	6	1000	W9RFB	..45	10	1380
W8ZFXB	..21	6	915	W9NKF	..41	10	1369
K2YCO	..20	7	750	W9DOY	..41	9	1300
W3RLE	..36	5	1100	W9LER	..40	9	1440
W3KWH	..35	8	1335	W9LFE	..40	9	1160
W3GKF	..32	8	1108	W9EYF	..35	9	1380
W3BHG	..30	8	1140	W9ENC	..35	9	1360
K3CEA	..25	8	1200	W9MOS	..28	9	1320
W3BDP	..25	8	1100	K9CER	..28	8	1205
W3HB	..23	8	1310	W9LCN	..28	8	1000
K3CFY	..21	7	950	W9DLR	..25	9	1295
K3OBU	..21	7	930	W9AUC	..7	2	500
W3TFA	..20	8	1342	W9ZDF	..28	7	1340
W3ZD	..19	6	700	W9JHW	..11	5	800
W9AGPL	..19	6	625	W9BQN	..34	8	1250
W4HJO	..29	9	1150	W9ASO	..33	8	1290
W4WNB	..28	9	1350	W9EFC	..33	8	1283
W4HBR	..28	9	1280	W93AIB	..29	8	1340
K4GL	..27	8	1325	W93EUV	..25	8	1100
K4LJO	..27	8	1125	W93CWT	..18	7	1072
K4IXC	..26	8	1403	W97BQH	..9	3	1248
W4CKB	..25	8	1440	W93ATN	..3	3	10417
K4QIF	..25	8	1225	F9D	..1	1	5100
W4VHH	..25	8	1100	K96UK	..2	2	2540
W4EF	..24	8	1150	OHNU	..1	1	5850
W4AWS	..24	8	1350				
W5HGO	..43	10	1398				
W5RCL	..42	9	1289				
K5WXZ	..36	10	1450				
W5HFV	..36	10	1285				

The figures after each call refer to states, call areas and mileage of best DX. Revised March, 1970.

W8RSL, Ohio, and W9KXQ, Illinois, on E₁ December 23, at 1500 GMT. Monty says he heard several 3s and 4s until 1710 GMT but couldn't raise them. He suggests DXers look towards the Caribbean more often. Monty also says, "no TE noted since I arrived on Montserrat December 19th." He should be having it by now. VP2MJ will be active until April.

K7HIX/KG6 closed on Guam December 26th, after 2 years in the Pacific. Ken worked Japan on Dec. 17, 19 and 26. He says KA2OO and a number of JAs (Japanese nationals) operate around 50.11. From March 1968 until his departure, K7HIX/KG6 logged 202 six-meter DX contacts; mostly Japan, but also including Okinawa, Australia, Hong Kong and Hawaii. Ken says Morry, KG6ARW, remains active on Guam and that KL7DTH/KG6 has a kw. on 144 MHz, looking for Pacific stations to schedule on tropo or meteor scatter. Any EME possibilities, Lee?

We've been requesting more scatter reports, and this month we have several. Some are typically ionospheric scatter, others are enhanced meteors

during the December Geminids and January Quadrantids showers.

W6YKM says scatter was excellent Dec. 10-13 as the Geminids meteor shower peaked. Ionospheric scatter is popular on Saturdays and Sundays from 1600 to 1730 GMT. Stations in the Bay Area transmit the first 2½ minutes of each five-minute period. Stations in Oregon and Washington transmit the second 2½ minutes. Frequencies used are between 50.102 and .105. W6YKM has worked W7FN every weekend since mid-August, with 80 percent copy on most contacts. He lists the following stations as active every weekend: W7FN, WA7GCS, K7VNU, K7BBO, and W7CNK. They are often joined by W7UBI and K7WUP.

The Quads shower brought several observations on six and many on two meters, and all closely agree the meteor shower peaked Jan. 3 between 1800 and 2100 GMT. W6BJI worked W7FN, K7BBO, WA7FVT, all Washington; WA7AWJ and WA7GCS, both Oregon; W7UBI in Idaho and WA5OOP, New Mexico. WB6NMT ran a series of schedules with W7FN and W7CNK during the Quads shower, Jan. 3 and 4, from 0700 to 1200 GMT. At 0700 signal levels were about normal with nearly continuous detectable residual and a few bursts. By 1000 GMT, signals had started to increase in residual strength, and bursts were longer and more frequent. At 1100 GMT, the residual level had increased to almost continuous 10 to 20 dB over the noise, and bursts up to 60 seconds duration were S9. W7FN and W7CNK live within 30 miles of each other, so Louis had them transmit simultaneously. WB6NMT copied them at times on different bursts or at differing times during the same burst.

In Washington, K7VNU says scatter conditions during December were generally poor, though he copied WB6NMT nightly, making contact about 50 percent of the time. WB6NMT, W6YKM, WB6OKK, WB6GKK and K6PXT are the most often heard at K7VNU. John runs 150 watts to stacked 5-element Yagis up 70 feet.

Colorado's W0MTK reports excellent scatter success. See the picture of his array elsewhere in this column. Bill works scatter just about anytime, but on the Jan. 3 Quads peak he worked W0QIN, Minnesota, several Texans, California, Washington and Oregon. "Best scatter I've ever heard — up to S9," Bill reports. He and neighbor W0MXA regularly work into Denver, a path of 185 miles. So what, you say? W0MXA and MTK live near fruita, elevation 4500 feet. Thirteen miles away the mountains rise to 7000 feet and keep rising to 13,000 feet at 147 miles. The signals then drop into Denver, the mile-high city, 185 miles away. In the Denver area, W0AJY and W0KIN are the most often worked. W0MXA, like W0MTK, works 6s on scatter without difficulty, WA6AKM being the most consistent. One last report on the Quads, W0PEP says the most activity was on Jan. 3 between 1838 and 1930 GMT.

WA2CVF, long-time NCS of the East Coast VHF Sideband Association, says their weekly Sunday morning net, 1600 GMT, has moved to 50.175 to avoid scatter operators in the lower portion of the phone band. K7BBO, Washington, is nearing completion of a new kW final to go with one just finished for 144; and at Everett, Washington, W7MZN says he likes six for its uncrowded frequencies and wonders why more operators don't take advantage of vhf for local contacts.

144 MHz. Meteor scatter was excellent during the January Quadrantids shower. W0LER, Minn-

esota, says the shower peaked late the morning of the 3rd and estimates a radio count perhaps as high as 300 per hour. John copied eight consecutive 15-second bursts from W7RQT at 1830 GMT. The ionization was dense enough to produce a meteor-related E_s opening on 50 MHz. Similar observations were made across the country and there were reports of meteor backscatter on 144. WØLER wonders who the W4 and W7 were who were scheduling on 144.056 at 1830 GMT. At column deadline we have these reported contacts, mostly on the 3rd.

K4GL: WAØCHK
 K4IXC: K2RIH, W2AZL (without skeds)
 W7RQT: KØCER, KØMQS, VE7BQH
 WØLER: K2TXB, W7RQT
 KØCER: W7RQT
 KØMQS: K7NII, WØJYC, VE2DFO, VE3CWT
 WAØCHK: K4GL, WØJYC
 VE3CWT: K4GL, KØMQS
 VE7BQH: W7RQT

Surely there were more contacts, how about more reports, fellows?

W8IDU says the Geminids was quite poor, though he did hear many bursts from W4CKB scheduling KØCER. Both Bev and myself wish we had done as well hearing each other as W8IDU did hearing us! K4GL reached 37 states worked by contacting WAØCHK, Missouri, during the Quads. The contact with K4GL was WAØCHK's first on ns, then he worked WØJYC, who is providing much Colorado 2-meter activity. VE2BGJ is now signing VE3CWT and has worked 18 states.

A meteor shower receiving little attention is the Ursids, Dec. 20-22. W1FJH says the shower has a "minor" rating but during his successful Dec. 20 schedule with KØMQS, it sounded quite good. K1ABR worked KØMQS on the 21st and WØLER worked WB2SH. W1FJH reports also he and VE1AFB, Nova Scotia, have been scheduling over a 500-mile path. Since VE1AFB erected a 40-element collinear regular contacts are made with signal levels usually 30 dB out of the noise. Shows you what decent antennas will do on a mostly over-water path. W1JSM is back to 23 states worked after leaving Massachusetts in favor of New Hampshire. Don is scheduling WØLER, Minnesota, daily at 0400 to 0500 GMT, on .045 and .039 respectively, for those wishing to check meter counts.

Another schedule of interest is that between W5ORH and XE1PY, Mexico City, daily 1315 to 1345 GMT; both stations near .09, but XE1PY perhaps 1 KHz higher. Their first contact was Dec. 26, and several have been made since. XE1PY is running good power and KØCER has heard pings and letter bursts from him in South Dakota, a 1615-mile path!

WB2WIK, New Jersey, enters the states-worked boxes this month with an impressive 32. Steve runs a kw, and 15-element Yagi. VE3BQN has raised his total to 34, tops for Ontario. VE3ASO stands at 33 worked. WØHOZ, Missouri, nears a box listing with 18 worked in 7 call areas plus VE3. W7RQT is active again from near Salt Lake City and says he's accepting schedules on a first-come, first-served basis. Pat runs a kw, and 20+ dB array, putting out an excellent signal. W7JRG, Billings, Montana, has moved to a new home. Ken is preparing for a renewed assault on the bands and says he regularly receives television channel 10 over a 300-mile path at his new location. KØMQS is back to 28 states worked, and during the past four years has made more than 70 ms contacts.

Before the Geminids shower, VE2DFO ran four times a week 13-minute skeds with K4GL. Pings and bursts average 25 per schedule, but of real interest to VE2DFO was that the 940-mile path seemed to show tropo scatter possibilities. This observation coming in winter lends hope of successful tropo scatter contacts during the more favorable tropo months.

Now some random 2-meter news:

W3LHF is now W3ZD, and his states worked standing has been changed accordingly. WØWRT, Omaha, says the Ak-Sar-Ben Radio Club's repeater, WØEQU, is prompting much fm activity around Omaha. The frequencies are 146.34 in and 146.94 out. W5UKQ says most Baton Rouge area 2-meter activity is on 146.94 fm. K3CZ1 and W3MFY are running a ssb net Sundays at 1500 GMT on 145.025 and checkins are welcome. Nine members of the Tu-Boro Radio Club, College Point, New York are on 145.62 rtty at 0130 GMT daily. They welcome new participants. Contact W2LXC for details. This information is from WA2PMW.

In preparation for the March aurora period, VE2DFO suggests aurora DXers adopt ms techniques with eastern stations calling CQs the second 30 seconds of each minute. Don says voluntarily setting aside a segment between 144.11 and 144.125 for this could lead to more long-haul aurora contacts.

(Continued on page 76)

220- and 420-MHz. STANDING

220 MHz.		420 MHz.	
W1HDQ ...13	5 450	K2RIW ...19	3 700
KJIX ...12	4 600	W2SEU ...16	4 220
K1BFA ...10	3 225	K3IUV ...16	5 720
		W3RUE ...14	7 585
		W3UJC ...19	4 400
K2CBA ...17	5 1090		
W2DWJ ...15	5 740	W4FJ ...20	7 995
K2DNR ...13	5 600	K4QFF ...19	7 1065
W2SEU ...12	5 325	K4SUM ...15	5 482
K2RTH ...12	4 600	K4EJQ ...14	6 600
W2CRS ...10	4 440	W4HJZ ...13	5 560
		W4VIH ...12	4 750
W3IUG ...14	5 460	K4NTD ...9	2 835
W3RUE ...10	5 480	K4GL ...17	3 585
K3IUV ...10	4 310		
K4IXC ...13	2 1090	W5RCL ...19	6 880
K4GL ...13	2 485	W5ORH ...12	4 700
		W5AJG ...17	3 1010
W5RCL ...10	5 910	W5UKQ ...16	2 590
W5AJG ...13	2 1050	W5AWK ...13	2 222
W5LO ...12	2 660		
W6WSQ ...15	4 1142	W6DQJ ...14	2 360
		K7ICW ...14	2 225
K7ICW ...14	2 250	W7JRG ...12	2 420
W7JRG ...12	2 959		
W8PT ...11	6 660	K8RRG ...20	7 700
		K8DEO ...20	7 675
WØEYE ...9	4 910	W8YIO ...19	7 650
		W8HVX ...16	8 660
VEAIB ...7	4 450	W8CYA ...13	7 625
		W8MNT ...13	7 600
		W8RQI ...10	6 425
		W8CVO ...10	6 400
		W8VHG ...8	6 625
		W8EWF ...7	4 450
		W9WCD ...19	7 825
		W9HUV ...17	7 780
		W9AAG ...14	5 800
		W9NKT ...12	6 560
		W9IIV ...12	6 550
		K9AAJ ...12	5 425
		K9CNN ...12	5 ..
		WØDRL ...18	6 1185
		WØLER ...9	3 709
		WØLCN ...8	3 700
		WØEYE ...7	2 703
		VE2HW ...4	3 750
		VE3DKW ...12	7 940
		VE3E2C ...7	5 510
		VE3AIB ...5	4 450



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

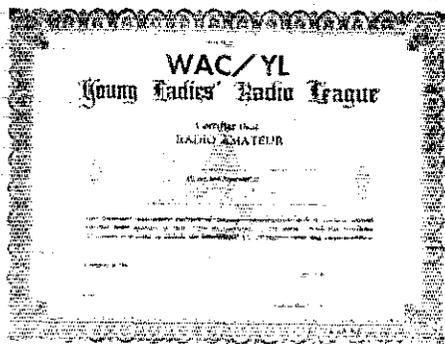
W A C -- Y L

MURPHY is the old man of the sea that everyone of us finds as a constant companion from the moment that we make our first attempt on the air. He makes very sure that we can't depend on anything except his whims. We can't expect arm-chair copy on every contact, in fact, we are never sure whether we will get out of the backyard sometimes. We come to know that we probably won't log a badly-needed section or country in the contests, and we can only hope that conditions will be half decent when we plan to keep a schedule. But one thing we can expect to have to do the minute the word leaks out that we hold a license is answer lots and lots of curious questions about it, and there is one that we can be sure we can get from everyone: "How far can you get with your set?"

One of the many tangible awards of amateur radio is the vast array of certificates available to mark our achievements in just about every part of the amateur radio service. YLRL offers a parallel of some of the major ones but in this case there is the additional requirement that all the contacts must have been made with women operators.

Among the most popular of these certificates is the WAC-YL that proves two-way contact with women operators in each of the six continents of the world. Antarctica is not included because there are no women on the ice who are licensed amateur radio operators - not yet, but Evelyn Scott, W6NZP, will be heading for Antarctica this spring and hopes to be able to operate, with proper permission of course, W6NZP/KC4. While a contact with her will not alter the rules for WAC-YL,

*YL Editor, QST. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



WAC-YL Certificate.

it would add a really rare flavor to the certificate for those fortunate enough to log Evelyn during her brief touch with "the ice."

Of the 807 certificates that have been awarded since its inception, the first was issued to none other than W2QHH, in 1948. There is a gap of seven years following Howie's acquisition until two more OMs, ZL1BY, and G4ZU, were the second, and third persons to receive it. Since that time the search for YLs on each of the continents has become extremely popular with both YLs and OMs, for unlike the DX-YL, WAC-YL is available to any amateur radio operator who submits the required qualifications.

The rules for acquiring this blue and silver certificate are: 1. The YLRL issues a Worked All Continent-YL certificate to any licensed amateur in the world. 2. Two-way communication must be established on the amateur bands with the six continents: North America, South America, Europe, Africa, Asia, and Oceania. Any and all bands may be used. Cross-band contacts are permitted. Contacts may have been made over any period of years. 3. Contacts with all six continents must be made with duly licensed woman operators. 4. Contacts with all six continents must be made from the same location. Within a given community one location may be defined as from places no two of which are more than 25 miles apart. 5. Six QSL cards, or other written confirmations, showing proof of contacts, must be submitted with application. IRCs, or equivalent thereof, must be sent with the confirmations to finance their return by first-class mail. The YLRL will not be responsible for any loss or damage to same. 6. Decisions of the WAC-YL custodian regarding interpretations of these rules as here stated, or later amended, shall be final. 7. Send applications and confirmations for this award to: Miriam V. Blackburn, W3UUG, WAC-YL Custodian, Box 2, Ingotown, Pennsylvania, 15127.

Mid-West YL - Plan Ahead

What? Annual Mid-west YL Convention.

When? June 19,20,21, 1970.

Where? Ramada Voyagers Inn, 401 Detroit Street, Flint, Michigan.

The registration will be closed April 1, 1970. The total fee of \$8.60, includes registration; Saturday luncheon; Saturday banquet. For the OMs who will accompany their ladies, the banquet is \$4.75. For all registrations after the April 1, deadline, there will be an additional fee of \$.50. Send to: Marion Bees, W8UAP, 2039 East Whittemore Avenue, Flint, Michigan, 48507.

The Flint YLs are sponsoring the 1970 meeting. Those who have never attended before are in for a wonderful experience. Those who return year after year know that these are three days well worthwhile. So, if you hold that amateur radio license, and are a YL you are eligible to attend. Don't forget those swaps!

Colegas y Amigos

The "People to People" program has a very personal touch between the Mexican and North American amateurs through the annual motorcades to Mexico, as well as meetings held in Southern California attended by representatives from both countries. In the group are 18 YLs, as well as OM-XYL combinations. The gals who are members of Colegas y Amigos are: WB6TZV, Dixie Arnold; WB6DFN, Roberta Baldwin; K6EXQ, Cornelia Hauck; WA6UBU, Esther Gardner; WA6TOH, Evelyn Fischer; WB6ERM, Jan Rogers; K6ELO, Roxanna Griggs; WA6EZI, Helen Miller; WB6OTP, Marian Peak; W6PJU, Mildred Maxon; W6DOY, Harriet Amborn; WB6DQZ, Alice Ginsburg; WA6ISY, Myrtle Cunningham; K6PRN, Edith Smith; K6KDB, Merrien Swanson; K6JZA, Dorothy Chafee; WA6HYU, Mary Ann Eastman; and WA6QJO, Margaret Graham.

The YLs who were with the 1969 Motorcade visited an orphanage in Ensenada, which is one of their projects. Some DXpeditions go halfway around the world, but none has made more friends on a continuing personal basis than this group.

WA7BDD, Joan Gallagher

For Joan, happiness is a Bug between her fingers and a traffic net to meet. She got the OM a short wave receiver for Christmas and they "just happened" to find the amateur frequencies on it. Joan was perfectly content to remain an SWL, but the OM put the pressure on and they both received their tickets in 1965. Joan has never been sorry. Her favorite form of operating is cw and so far as activities go, traffic handling is tops on her list with rag chewing a close second.

WA7BDD was heard on the traffic nets soon after she received her General Class license in the Northwest Slow Speed Net. Two years later she was checking into RN7, and for over a year was the only representative from Idaho. Joan operated a cw rig at the Girl Scout Roundup in 1965, and maintained a 2-meter link with the National Boy Scout Jamboree in 1969, where she handled over 600 pieces of traffic for the BSA. Joan is a member of the ARRL, Y1RL, and is Secretary-Treasurer of the MINOW Net. She holds YLCC, RCC, CP-30, and WAS on 80-meter cw. She has an ORS appointment and has plenty of BPL cards and the Traffic Medallion to prove her activity is anything but casual.

The OM is WA7BDC and they have one daughter who has not yet shown interest in radio. Joan's other hobbies are reading and needlework.

New Harmonics Editors

Harmonics, official publication of YLRL, will have new editors in the year 1970. The GAY-LARCS have volunteered to handle it as a club project, which is something new in the 30-year history of this magazine.



California YLs who were a part of the Colegas y Amigos trip. Front row: Esther, WA6UBU; Mildred, W6PJU; Senora Socorro Plaza de Tico, XE2YX. Back row: Roberta, WB6DFN; Dorothy, WB6OSP.



XE2YX, Senora Socorro Plaza de Tico, with one of the orphans at St. Theresa orphanage during the November, 1969 Colegas y Amigos motorcade visit to Mexico.



WA7BDD, Joan Gallagher.

The Galveston Area gals succeed WA6AOE, Maxine Hanberry, who took over the editorial duties from WA6LWE, when Madge's activity on MARKS became too involved to allow her to continue. Under Maxine's editorship, *Harmonics* has received several awards.

"YL News and Views" extends good wishes to the GAYLARCS in the latest project of this extremely active YL club.

Meet the Club - NYC-YLRL

The oldest of all the YL clubs was organized originally as a Chapter of YLRL in 1941, by W2NAZ (now W6NAZ) as a part of this new organization of women amateur radio operators.

NYC-YLRL meetings are held every other month at the home of one of the members. Luncheon meetings are held each June and January, and there are no meetings during July and August. Any YL visiting the area is welcome to attend the meetings. If there are none scheduled, then she will be invited to attend the NY Radio Club meeting at the George Washington Hotel.

When the Hudson Amateur Radio Council, comprising a number of the clubs in the Metropolitan New York and New Jersey area, hold their bi-annual conventions, NYC-YLRL take charge of YL functions, and maintain a hospitality room for both men and women who attend. During the World's Fair in 1964-1965, members of this club assisted in manning the official station K2US.

1970 officers are Dot Wescott, K2DPN, President; Sallie Lobenthal, W2UXM, Vice-president; Helen Zuparn, Secretary; and Madeline Greenberg, W2EEO, Treasurer. Since the NYC-YLRL does not have a net, there is no certificate.

WB4IKS, Anne Irving

She was born in New York state, is a former model and owner of a major beauty salon, and came into amateur radio because she had to undergo surgery. While hospitalized, Anne met another patient who was a ham. Through her curiosity, Anne learned the code and got her license although she had no station for a while. WB4IKS officially went on the air in 1968.

Anne is best known for the assistance she gives on the air to missionaries, and to people in trouble who need help. She has used her phone-patch equipment to connect parents abroad with their children in the United States, to arrange for welfare of travellers, and to keep relatives in touch with a member of their family who is undergoing surgery. Anne has assisted in plans for a honeymoon; helped a member of a ship's crew who needed hospitalization; as well as keeping servicemen in touch with their homes.

She doesn't operate DX other than her participation in the HALO net, and emergency work, and

WB4IKS, Anne Irving.



enjoys working beginners who are just getting started in the Novice bands.

Anne designs and makes her own clothes, and when she isn't busy on the air, or sewing, her hobby is her home. In October 1969, WB4IKS, was honored by radio station WFUN, in Miami, with their Citizen of the Day award, made in "recognition of outstanding service to the community."

WORLD ABOVE 50 MC.

(Continued from page 73)

220 MHz and Up activity is at its seasonal low this time of year, but WB6NMT reports on 220 EME activity. WB6NMT and W7CNK heard nothing from K2CBA during December tests, probably due to a dish feed problem at K2CBA. Jud is working on this and should have it solved shortly. W7CNK has finished his 160-element collinear array and is correcting matching problems. WB6NMT has debugged his pair of 4CX300s final, solving his drive problems. Louis says WB6TJO has a 100-watt transmitter working, and that WA6JYG and K6ITZ have 220 projects underway.

VE3CWT is on 220 with a 5894 and 9-element Yagi. He reports contacts with W8IDU and W2CNS, and is looking for some 9s. We don't have a 9 listed in the states-worked box. Any candidates? WB2WIK has 100 watts on 220 and a 15-element collinear.

On 432, Al, W0DRL, has been scheduling K4IXC, a 1150-mile Kansas-to-Florida path, and W4FJ, Virginia. During the December Geminids, he heard pings from W4FJ. During a Dec. 22 Ursids schedule W0DRL got pings and a "W4" burst. Ted heard 5 pings in Virginia. The Quads shower was better. Al copied 4 bursts of up to 10 seconds in duration and numerous pings from W4FJ. Results at the Virginia end of the 1000-mile path were not quite as good. W0DRL comments that frequency readout may be the major problem on 432 skeds. Accuracy is of extreme importance, because ms at 432 is short-lived; but I'd bet that before the year is over Al is going to make the first-ever 432 ms contact.

WB2WIK is active on 432 with a 5894. His converter is a Parks 432-3. That converter is in wide use but most have checked out having a 6 to 8 dB noise figure. WB2WIK says W4API and K4SUM have a conversion for the 432-3 that lowers the noise figure to 3 dB. Charlie and Joe, how about passing it along so we may publish it in the column? K2ARO has increased his 432 standing to 10 worked and is building towards 500 watts on the band. W2DWJ, with 16 states worked on 432, says he has worked 160 different stations on the band and wonders if anyone has done better. WA2FGK sports a 4CX250B final and 24-element collinear, good for 13 states.

On 1296, W0ZJY, in Kansas, says he, WA0JYK and W0YMG are active. W0ZJY is experimenting with antennas and converters. W5AJG, Dallas, who also signs W5HN, says K5PUF in Gainesville, Texas, has 20 watts of ssb on 1296. W5LDV, Houston, has a 40-watt 2C39 rig. W5HPT, Bedford, has 35 watts on the band and W5AJG runs 45 watts output. During the summer tropo season, W5AJG says paths up to 200 miles or so are generally solid. Helix and 7-foot dish antennas are favored.

W4HHK has his 2304 MHz kw. working and continues EME tests with W3GKP and tropo scatter schedules with WA4HGN.

How's DX?

CONDUCTED BY ROD NEWKIRK,* WØBRD

How:

Anyone who has the least familiarity with wizened editorial minds knows perfectly well what the subject of this month's intro will be. Dern tootin', an up-dated sample of those questions transmitted in the first ARRL DX Contest some forty years ago (last month's "How's"). Oh, just in case somebody wants to try it that way again in the interest of more meaningful QSOs or something. Might even bring us back closer to our craft. . . .

C-13. How many scratches are on your transceiver?

L-3. Are you insured against loose knobs?

D-31. How high are the front feet on your transceiver?

A-23. Are your chrome strips panel-mounted or breadboard?

G-6. Do you know who scratched your transceiver?

Y-1. How many dB over 89 can your S-meter read?

Q-8. Do your house lights blink when you cough?

M-17. How do you level uneven transceiver feet?

C-22. Do you get good factory service on loose knobs?

F-7. What is the best amount of chrome on a linear?

H-34. Do your neighbors' lights blink when you cough?

X-16. Is your keyer paddle bright red or bright green?

Q-3. Does your mike cord reach the refrigerator?

B-19. Do you ever use spaces with your new keyer?

X-18. How many mikes can you test consecutively?

L-14. Does the family pop your VOX from the kitchen?

Oh, enough on the technical. Most of us are said to be appliance ops anyway, and we wouldn't want to discourage contest participation by being overly scientific. How about something along this line to fit other vital topics of the day?

E-5. Scratches aside, what do you hate most about ham radio?

W-16. Did you have difficulty financing your station?

Z-12. What's the resale value of an unscratched '68 Zupersparker?

A-7. How many clubs and societies have you resigned from?

C-38. Which radio regulation is easiest to ignore?

J-1. How do you chase others off your favorite frequency?

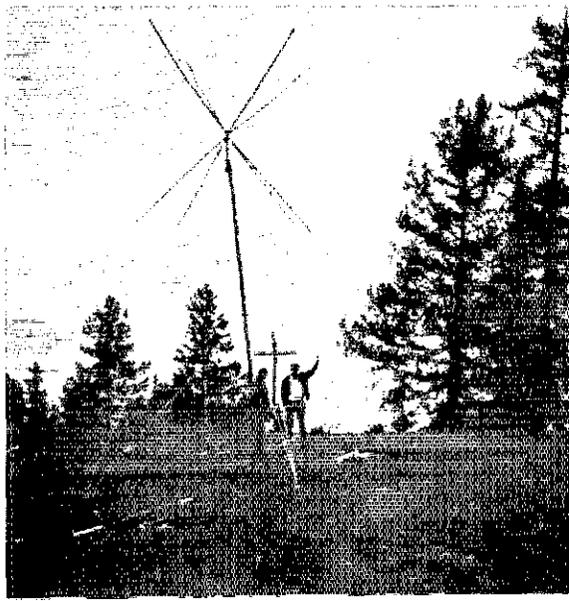
Say, this is a *fun* game. Maybe instead of the League whomping up the questions everybody should rig their own. An analysis of DX Test logs could then well provide enough data for years of research into the state of the art, to say nothing of several volumes of Hints, Kinks and Strays. ARRL Contest Committeemen, QRV?

Who:

"CQ 2 MC DE K8DHT" around 1802 kHz was known to be a reliable tip-off that the bounce was getting long and interesting on 160 cw. The low bands were Tom's DX beat although he caught his share of stuff with the 20-meter crowd as well. We're grieved to relay this notification from friend W9UCW: "On January 7th Tom was electrocuted while working on his rig. K8DHT

*7862-B West Lawrence Ave., Chicago, Ill. 60656.

HBØXFY, DXpeditionary production of Gateway to Europe Radio Club's DL4RM gang, issued some 2600 Liechtenstein QSOs last mid-October. That's DK1BN and DL2GB making a stickcheck above Vaduz valley, logical QTH of the Month. (Photos via DL4ER-WA9HYS)



was a fine fellow, so interested in all aspects of building and operating." Indeed he was, and "How's" loses a frequent contributor to these pages. If anything can be gained by such a tragic loss it may be in this warning: Take every care and caution in the handling of your equipment.

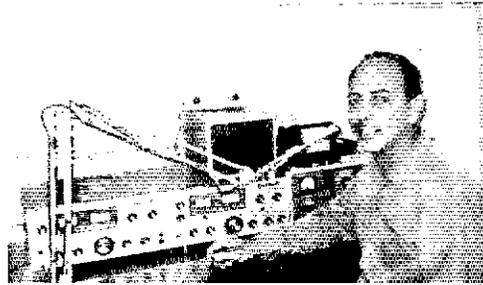
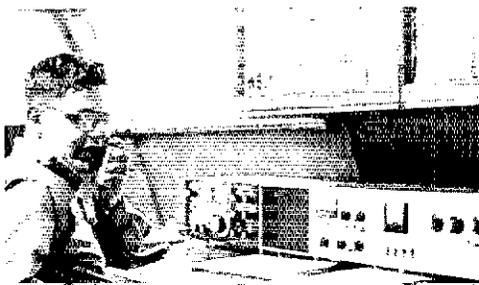
What:

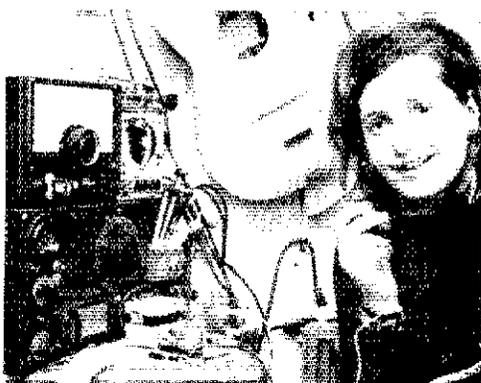
Better unload some more DX *populi* this month before our mill disappears under a paper pile-up. Sounds like solid skip to all points in your "How's" roundtable! ... "I'm DXperimenting with slow-bean TV and RTTY." ... "ILCF. ... "OBS and OVS here." ... "WB3CEH. ... "Very 73 from Paris!" ... "3V8AA-F2QQ. ... "Got a real charge out of Grommebabys' 'Make 88, Not QRX.' ... "LA0AD. ... "There's a close link between the U.S.A. and our city of Plymouth." ... "3GVUC. ... "Good DX on 15!" ... "WN2KEA. ... "Need forms for new 5B-WAS." ... "WB6SDZ. ... "Perhaps my old call J2GIX is remembered at ARRL even though old friends Ws DX and JAs are retired." ... "JH1WIX. ... "OH2YV's last 5B-DXCC haulout was a country on 20 meters." ... "W1CW. ... "Hanging is too good for the lads who messed around on O3MR's frequency." ... "WA2BHJ. ... "ZM1AAT/k knocked me off my chair with an answer to my routine 7037-kHz CQ." ... "W9EY. ... "No new EP licenses have been issued since September, 1968." ... "W5VKJ. ... "Interest in DXpedition of the Month activities has increased considerably since inception of 5B-DXCC." ... "W2GHK. ... "Get 5Bs from Australia but draw blanks on VK0RW." ... "W8KZO. ... "Been scheduling ZLIRD for some thirty years on cw, a-in and now sbs." ... "W9ALL. ... "Keep up the good work, ARRL." ... "W8VYP. ... "Had difficulty obtaining a VFO for my Macquarie station." ... "AX0LD-ZL3KV. ... "Contact me with any questions about RTTY activity in Germany." ... "DJ9XB. ... "I particularly enjoy the photos of DX amateurs in QST." ... "DM2APG. ... "WN3HIF, my XYL, caught 5Z4LY on fifteen." ... "W4YOK. ... "From experience with previous DXpeditions we decided against prearranged schedules." ... "G3UPT-GD6UW. ... "Moving to another house here in Quito revealed what junk we had accumulated in four years at the old QTH." ... "HC1TH-K5ODZ. ... "Visited with neighbor JA7IDBU/W2 after noting his address in your pages." ... "es-YO2BO. ... "Anyone interested in a ZFI DXpedition for July?" ... "WB4IZU. ... "I also work two meters with a homemade half-watt transmitter and 11-element beam." ... "HB9AOE/W4. ... "My 5B-200 goes well with a 55-ft-high 75-meter dipole." ... "WA1JMR. ... "Finally got to the bottom of a mountain of QSL details." ... "W7BE. ... "Good DX on 15 phone here thanks to a new 25-ft-high minibeam and HW-100." ... "WA1JKZ. ... "Long-path Africans roll through on 20 cw." ... "K5MHG/6. ... "9N1MM and RTZTC in rapid succession on 20 sbs; what a pair!" ... "WA4ZZU. ... "Twenty fair, fifteen hot, and ten fantastic." ... "WA1JHO. ... "Lots of fun and interest this season working DX the hard way (160)." ... "W1BB. ... "Been chasing a 3M6MG QSL for five years." ... "W9LNO. ... "Don't really need my linear for plenty of 21-MHz DX." ... "K4TWJ. ... "Things still looking up on 10 cw." ... "WB4FPJ. ... "Not sure which would please me most, delivery of a new QST or my overdue 5B8ZZ QSL." ... "W8YGR. ... "Best DX times here on 80 cw have been close to pre-dawn at the eastern end of the circuit." ... "K6KA. ... "Scads of JAs on 21 and 28 MHz." ... "W1DAL. ... "Good pickings on 10 cw." ... "K3GUL. ... "Have a Rubie (Goldberg type rotor) for my homebrew two-element quad." ... "WA9SQY. ... "Hope this is the first of many a 15-meter report to come." ... "WB2GVE. ... "I'll be watching 'How's' to see if the ZAZ I worked turns out okay." ... "WA6JYJ. ... "After 47 states as a Novice I'm applying for WAS and

WAC as a General." ... "WB4LIL. ... "My new three-element Yagi works out well on 15." ... "WA2FOS. ... "HP1E peaked from the wrong direction on my 80-meter beam." ... "W1SWX. ... "FB8XX, on mornings at 1300-1400 GMT, is tough to catch." ... "K6GSV. ... "My new triband quad's SWR is 1.3:1 or lower across 20 through 10." ... "K6TRF. ... "We of Capitol Hill A.R.C. run a kilowatt to a vertical atop the Old Senate Building."

WA3KSO-W3USS. ... "DXing is limited here by a college thesis due April 1st." ... "WA2YWR. ... "I certify that JA3ALR's August activity at my station was legal." ... "GR9AK. ... "Five-Band DXCC just great!" ... "W1NU. ... "Never heard of 'R8MAR'." ... "K2MGE. ... "Enclosed find the Z53 QTH needed by WN5YMW." ... "K4OCE. ... "I'm former DL4CM, KL7ANR and SV6AB." ... "WFSUC. ... "My previous call was G3BAYN." ... "UA3FE. ... "Suggest you reprint the Jeeves cartoon from October '63 QST." ... "WA2-BCN. ... "Here are photos of one of my QSL boys." ... "W2CTN. ... "Still enjoy the game and keep running into old radio friends." ... "W2GP. ... "Dutch DX Certificate (DDXC) is available for proved communication with 25 Holland amateurs, two FJs and one P2I from this society at P.O. Box 190, Groningen." ... "VRZA. ... "Some very fine DX on 15 meters." ... "WN6JUJ. ... "My 35-ft-high 21-MHz dipole runs north-south." ... "WN2FQF. ... "Location here is 4800 feet a.s.l." ... "Z6JL. ... "Us Navy guys in Scotland look forward to QST each month." ... "GM5A APK AQA. ... "See you again soon with more DX notes." ... "WN2DRS. ... "My dozen crystals help catch 21-MHz DX." ... "WN5-YMW. ... "Fine work, ARRL!" ... "WB4KZZ. ... "First time I ever ran into such a deal, a phone F8." ... "WA4YJJ. ... "Looking for more work as a QSL manager for DX stations." ... "WB8BTU. ... "F8JUB came through with my F88ZZ QSL in only eight days." ... "W4JUK. ... "Carry on there, QM!" ... "W5OPX. ... "He means how you do carry on." ... "WB9CJS. ... "My father, K6UE, was visiting me at the time I got my license." ... "9N1RA. ... "Jimmy received her call October 29th." ... "K6Eo. ... "Hope to give many for 5B-DXCC." ... "contacts to W/Ks on 40 and 80 for 5B-DXCC." ... "XW8CS-W3DBT. ... "Got my Korea ticket thirty days after application upon arrival last July." ... "HL9VV-days after application upon arrival last July." ... "WB9YDI. ... "ARRL has decided on relaxation of certain Worked Republic of India (WRI) award rules." ... "VU2CZ. ... "Mail from Afghanistan seems faster than some local deliveries." ... "WB2BMO. ... "Ten opened up pretty well this season." ... "WA9ZCP. ... "I'll be in the ARRL Test." ... "TA2AE. ... "Working hard on 40 and 80 cw and sideband to help W/Ks with 5B-DXCC." ... "VK6JZ. ... "VK8AV, who recently moved to VK6-land, was probably the most active Northern Territory station." ... "VK8AF-W5ONL. ... "During QSO W4RW reported to me October reception of 28.2-MHz beacon station DL1GUL." ... "DL1FL. ... "After fifteen months as W3DPR I reached 130/107 worked/confirmed; now after fifteen months as WA2LDX I'm 139/103." ... "WB1BX. ... "Heard one of those RY1 stations on ten." ... "WB2HTE. ... "The W221B mentioned in February's pages really is W22LB." ... "W9BRD. ... "Hah, you goofed again." ... "WA9OMM. ... "Should be operating here till '71." ... "G5ANX-WA2MEO. ... "Calling DX with a dipole and 40 watts is good code practice." ... "K4CAX. ... "A brand new Novice beat me to KZ5FBN." ... "WN6VJG. ... "BCNU on all six bands." ... "W1BH-PJ6CW. ... "One crystal and a droopy dipole gets me DX on 15." ... "WN8DSF. ... "Radio Sweden Amateur Radio Club, SK0AC, has about forty members." ... "SM8OY. ... "UB5WJ, an airline communicator, is 36 and has a daughter, 13." ... "K4CFB. ... "Trying a prop-pitched TH6-DXX 140 feet up." ... "W8PEY/1. ... "DJ2TK and I are friends of long standing." ... "WA8NDL. ... "D8Xer W4IA, now retired in Florida, is a fellow member of OOTC." ... "W2CJX. ... "Geographic breakdown of your 'What' listings makes reference much easier." ... "W1BGD/2. ... "I can accept U.S. postage here." ... "Y1XEE-HUIP. ... "Who is EL3C/um?" ... "WA3JZR. ... "Please keep those DX notes rolling." ... "WA3HMK. ... "My 7-MHz inverted

KA7CW, multiplexed by KA7YW (left) with others, and KA2RM kick up quite a voice storm in ARRL DX Tests. KA7CW finished a strong second to KA9MF in the '69 affair, and KA2RM breathed hard on the neck of Japan winner JA1AEA for second solo spot. (Photos via WA1KQM)



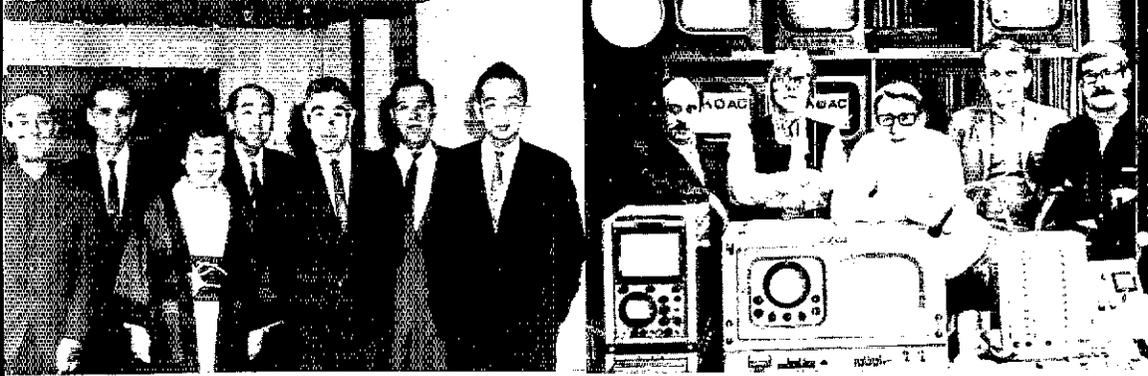


JA7DBG/W2 and Swiss miss HB9AOE/W4 are amateur visitors from overseas who thoroughly enjoy their reciprocal operating privileges. Mikio is an electronics technician in New York, while Susi pursues studies in Alabama.
(Photo via ex-YO2BO)

V is good for a 2:1 SWR on 15 meters. — VE3GHO. . . .
 "WA4s PEN ZNA ZZN and I are Raleigh Amateur Radio Society officers." — K4CLA. . . . "HL9UZ likes 15, or 20 at 1100-1300 GMT." — WA2FRW. . . . "Good friend OD5LX remains active on all bands." — K4TSJ. . . .
 "We try to get on the air as much as possible." — KA2NY. WA9DGM. . . . "Only three QSLs arrived via my local bureau in the last few months." — HL9VL. . . . "Ten IRCs are required for issuance of our WASWA award." — ZS3BS. . . . "Pacific DX Net, 14.265 kHz, began service January 3, 1969." — KH6GLU. . . . "Well known OZ4H celebrated his 61st birthday, working 28-MHz DX." — WA1FHU. . . . "Kept digging at the ARRL *License Manual* to sharpen up for my Advanced." — WA9UEK. . . . "G3RJS/rnm is radioman aboard the *Crossby*, a south seas cruise ship." — G3MKR. . . .
 "Worked Novices in all 50 states with a simple old-style Zepp antenna." — PY2JH. . . . "CP1GF QSL hunters note that my QTH is okay in *Callbooks* of the past 13 years." — W6AFI. . . . "Logging many DX contest QSOs." — YN1MC. . . . "Really enjoyed my stay at VP2AZ's Antigua Beachcomber Hotel." — W3VBM. . . .
 "The north-south 6-meter DX path opens well from February into April." — VP2MJ-VE3EVW. . . . "Couldn't find 4MIA on my countries lists." — W2NFB. . . . "QST lacks anything resembling a propagation chart." — WA1LJJ. . . . "Good day on 15 with CR6LV, CTUIE and ZP1CC back to back." — XE1BN. . . . "Wanted to answer WN5YMW's inquiry on ZS3XQ's QTH but no QTH here for WN5YMW!" — W6QJW. . . . "IS1s FUI and LIO recently visited my shack." — W7SLU. . . .
 "Listening to 15, 20 and 40 on my Blaupunkt with hopes of becoming a W6 soon." — S. Garber. . . .
 "Ten is especially good this season." — KH6EQW. . . .
 "Who's the DK managing LX2CQ's QSLs?" — WA2GXC. . . .
 "For possible use here's a photo of SP5AFL with UA6BV." — K4RON. . . . "You have the same DX station and operator pictured twice in the October '69 issue." — WA3TR/6. . . . "Space Center A.R.S. station WB4ICJ added 14,035 kHz to its list of frequencies on Apollo 12 launch day." — K4DJN. . . . "Can't keep track of that WA9PRE/2 address for 9J2XZ QSLs." — WA2WYS. . . . "Mistakenly used Mexico time instead of GMT in preliminary XF4 announcements." — XE3EB. . . .
 "Very few of my 5B-DXCC QSLs come through direct even when IRCs are sent." — W3TV. . . . "A third of the cards I receive for ZD8RK come from short-wave listeners." — W9VNG. . . . "Have 256/227 countries heard/confirmed on the amateur bands." — J. Morris. . . .
 "QSLs showed from TI2DD and YN18V three days after QSOs." — WB4JXN. . . . "If everyone used GMT correctly for time and date how much simpler things would be for all concerned." — WINJM. . . . "UA8YT remembered and reminded me of our QSO almost exactly one year earlier." — K2QBW. . . . "Amateurs can build overseas friendship between great cities as well as between countries." — JA7DBG/W2. . . . "Missed last July and August QST's while on European vacation." — EI9B. . . .
 "Helped found the Israel Amateur Radio Club as 4X4CZ in the early '50s." — K3KCS. . . . "FCC usually approves special calls for public service activities, not for DXpeditions." — KH6BZF. . . . "WB9RP, formerly of KG4AN and E73USA, has been haunting since he was thirteen and has started plenty of new amateurs on their way." — WA7KEH. . . . "Will be glad to get my Extra and dodge most of the writhing W/K mass on 20." — WA4CZM. . . . "I'm indebted to K3SWD for instruction and encouragement." — WN3MOD. . . . "My first ARRL

DX Contest was a real pleasure." — YN1GLB. . . .
 "I may have worked a phony 3A2, but then again perhaps not!" — W2LX. . . . "My first call, W8NGH, expired in '41." — WN2JNV. . . . "Here are some QSL counts for your info." — W0GNK. . . . "REF members treated me like real DX while I was in Europe." — WB8ABN. . . .
 "Ten still opens almost daily." — W3JZJ/5. . . . "Still wondering about the EQ4CY I worked in '64." — W1DMD. . . .
 "CR8A1 asks if it would not be better to assist amateurs permanently situated overseas rather than the DXpeditionary type." — WB4HJN. . . . "W1YYM's timing with rules for the '70 ARRL DX Contest was perfect." — VK3QV. . . . "FO8BO is club custodian of FO8AA." — W6NTO. . . . "Sent WAS info and rules to FL8HM." — K8UDJ. . . . "Anything you can do to mitigate my QSL holdouts will be greatly appreciated." — WA6LGS. . . . "I'll soon be leaving 5B4ES for Oklahoma and return to the air." — K5LMG. . . . "If only I could have caught Asia on 160 I'd have retired to the west coast in style." — W3DPJ. . . . "A new job and new quad go well with DX." — W3HNK. . . . "Our club's IIDEFL call has not appeared in recent *Callbooks*." — W4NEN. . . . "3V8s AB and AL will use my post office box after my switch Stateside." — 3V8AC-W6JVG. . . .
 "Still looking for another Ranger to replace the one I lost in a September fire." — W2QHH. . . . "Fortunately for the continuance of the s.w.l. hobby many hams do QSL our reports." — L. Waite. . . . "If more DX keeps QSYing to 10 meters I may be DXCC by March." — WA5SOG. . . . "Some of us 160-meter buffs met the late K8DHT on a trip to W8GDQ's last November." — W9UCW. . . . "Building an 813 rig on retirement from the Air Force after 27 years." — W5MOJ. . . . "W4MO, my uncle, keeps after me to get a ham ticket." — J. Heten. . . .
 "Surprised by IT1FTT's answer to my 75-watt CQ at 0200 GMT on 7030 kHz." — WA2HDZ. . . .
 "Planning a DXpedition to Andorra for this month or next." — DL4ER-DL4RM. . . . "I'll be active until April." — XW8CR. . . . "CR6IK hopes to make the ARRL Test on sideband." — W2DKM. . . . "Up to 96/62 after chasing DX for a year on 20 with 180 watts, a ground-plane and HQ-100." — W7YTN. . . . "Now WAS and WAC on attic dipoles." — WB2IWH. . . . "Twenty meters generally best here for DX in midwinter." — VF3-GHL. . . . "Our Worked All Britain (WAB) program is generally supported by the British amateur fraternity." — G3ABG. . . . "Just got my General and hope to become a regular 'How's' reporter." — WA2FLK. . . .
 "I've resumed operation as W4ZCC." — ex-YA1ZC. . . .
 No more space now. More quotes anon and hence.

Getting a workout in the ARRL Test? By-the-book tail-ending is hard to get used to. Remember, you Five-Band DX Century Club aspirants, 5B-1XCC credits are not available through contest log checks at ARRL Hq. Gotta make with the QSLs. Man, with guys on the DX end panting for 5B-WAS, and a mounting multitude of W/KAVEs needing just a handful of lower-band countries to complete their 5B-DXCCs, old 80, 75 and 40 never got such a frenzied long-haul milking! . . . Next month we expect to climb back aboard your "How's" Bandwagon for a swing across 15 phone with Ws 1ARR 1VRE 2LY 3HNC 4YOK 6YRA 8YGR 9BF 9LNO, K4TJW WAS 1FHU 1JHK 1JKZ 2BHU 2FOS 2YWR 6BQW 9SQY, Wbs 2DZZ 2GVE 4KZG 4LIL and 8ABN. Waiting in the wings we have (10 phone) Ws 1DAL 3HNC 4YOK 6YRA 8YGR 9LNO, WAs 1FHU 2BHU 2FOS 4ZZU 6EQW 9SQY, WBs 2DZZ 4KZG; (10 cw) Ws



Generation gap? Hardly in our world of DX. Some of Japan's DX pioneers of the 1920s and '30s are banding together for a fun-filled comeback after long QRT. From left to right: ex-J2HI who awaits his JH1 call, JH1WAH (ex-J2HY), JH1WKS (ex-J2IX), JH1XEO (ex-J2IS), JH1WIX (ex-J2GX), JH1VOE (ex-J2HG) and JH1WDN (ex-J2AY). Old-timers should remember most of them, especially former J2X, still as ever the petite DX-wise YL. In the second considerably younger group we find (l. to r.) SMs 5AWO ØCER 5RN ØDHH and ØOY of RSAC, Radio Sweden's amateur radio club, who hit DX contests hard under the call SKØAC. The TV control layout is that of Radio Sweden, not SKØAC!

1D1TY 3HNK 3ZJZ/5 4YOK 8YGR, Ks 3CUI 5MIG/6, Ws 1FHU 2BHU 2YWR, WBS 2DZZ 4KZG; (20 phone) Ws 3HNK 4YOK 6YRA 8YGR 9LNG, K4FWJ, Ws 1FHU 2BHU 4ZU 6QW, WB4KZG; (20 cw) Ws 1DAL 4YOK 7YTN 8YGR, Ks 5MIG/6 8TRF ØGSV, Ws 1FHU 2BHU 2FOS 2HDZ 2YWR 9SQY, WB4KZG; (40 cw) Ws 4YOK 7YTN 9BY, K8TRF, Ws 1FHU 1KZ 2HDZ 2YWR; (40 phone) W41KZ; (80 cw) W1SWX, W41FHU; (160 cw) W1BB; (15 cw) W5BZK, WAZs BHJ HDZ and WN2KEA. Stick around, sunspots.

Where:

AFRICA — "I handle Canadian QSLs for 9J2RQ," specifies VE3GHL. "Cards for QSOs with the States are taken care of by W2EXS, and stations elsewhere should QSL via G3VFP or direct to Allan." — In L1DXA's *DX Bulletin* W4WH points out that the real TVGATE hasn't tired up since '67. — "CR5SP logs remain a problem," admits DXpedition of the Month proprietor W2GKH. "We are missing records from September 11 to December 21, 1967; also February 25 to April 6, 1968. No logs are on hand for CR5SP activity since June 30, 1968." Stu reminds us that G3ZSM now handles Z1DUBM's QSLs. — Ex-3V8AC (W3VVC) advises that W8ROV will continue to clear his remaining Tunisia confirmations. — 5L3 is a possible variant 5L3 prefix mentioned by DARC's *DX-MB* scoop sheet. — Developments at French outposts are covered in *DX News-Sheet* dispatches: F5QJH manages QSLs for new FB8WV operator Robert, active on cw since late December. F2MO continues as QSL tender for FB8XX whose of Henry was recently relieved by FBAPG and others. F9MS keeps title as QSL agent for FB8YY, also due a new operator, and still awaits some '69 Adelle logs. FB8S does chores for fresh FB8ZZ staffer Georges who made the Amsterdam scene in January.

ASIA — Former YA1ZC writes from Atlanta, "I have many unanswered QSLs and s.w.l. cards which I will take care of in due time." John's W4ZCC address appears in the listings to follow. — Departing XW8CR confirms, "All QSLs for me should be forwarded through W2CTN." — Iran QSL manager WA5VKJ at APO 09205 stresses that EP stations are not licensed for mobile operation, marine or otherwise, so any EP/mm activity is purely self-styled, unofficial and not confirmable through Rick's address. — January AC3PT operation, according to West Coast *DX Bulletin*, came courtesy visitor W1FLS, a music researcher, whose home address is okay for QSLs. — In Long Island DX Association's *DX Bulletin* we note declaration of a 100-percent QSL policy by 9M1ZD, MP4QBK's Qatar QSLing plans call for W/K/V/VO cards via K4MIG with self-addressed stamped envelopes, others via MP4BHH with self-addressed envelopes and International Reply Coupons. — W2MBU states, "I manage HA4FA QSLs as of August 10, 1969, s.w.s.e. only. Logs are slow coming in." — Geoff Watts's *DX News-Sheet* mentions P.O. Box 16321, Hong Kong, as a QSL address for possible DXpeditionary work by WA4MG and VS6 cohorts.

EUROPE — "SVICH logs for all W/K, VE/VO QSOs from February 2 through December 12, 1969, are now on hand," apprises W4BKQ. "QSLs have been sent direct or via bureaus. Anyone who has not received his due card may send his QSL to me with s.w.s.e. for immediate response." — From LeRoy Waite of the ARRL SWL Bureau: "ON4TJ, manager for ON6AF, was ill through

much of 1969 and was unable to do any QSLing until September. Anyone now needing an ON6AF card can send a repeat request direct to Georges or via UBA, IRC's not required." — "Effective this February I am QSL manager for LX1BW," records W2ENK. — Yugoslavia has commemoratively revived its old YF prefix, and Italian brethren celebrate a Rome anniversary with IRØ calls, suffixes unchanged in both cases. — Ex-HA4EA-48A-7PD, now gobbling up multiband DX as WA1FHU, received a fat batch of QSLs from Hungary's bureau for his 1948-'50 activity in the old country. They brought back many a memorable on-the-air moment. For example, remember OE13EG, and IIBCB/FTT when Trieste was a DXCC goody?

HEREABOUTS — Ws 18WX 7YTN, WAs 2FLK 9ZCP, Wbs 2HDZ and 6UDZ nominate and applaud "QSLers of the Month" CT1UA, F1RH, F8NS, F8AP, G3APN, F4MDCG, VK2WD, F1RQ, ZB4BP and ZM1AA/TK, plus QSL aides W3HNK and ZL2AFZ, for unusually fast mailings. Any commendable quackies out your way? — WA5VKP and W2CYX want to help harried DX ops with QSL matters. — From Florida DX Club's *DX Report* we learn that W4BYB holds 6Y5G8 logs dating from December 16, 1967. Earlier records and some QSLs were lost by fire in Kingston. — "Have logs for every QSO made by FG7TD," announces W8ABN. "Jack will ship subscription logs to the every ten days and I have about 300 QSLs to fill out. S.w.s.e. is required from each W.K. s.w.s.e. plus one IRC per non-W.K." — West Coast *DX Bulletin* bears that some-body's been swiping Y810's call, also that Y81RT appears to be fictional. — HTs are disguised VNs celebrating a Nicaraguan to-do, suffixes unaffected. As much of us know, your ARRL *Radio Amateur's Handbook* includes a list of international prefix blocks on file with the International Telecommunications Union. Reference to this will reveal that CV2AA, for instance, is in Uruguay, 3Y3GT would be Kenya, and 4Y4CQ could be almost any old place. — W2GKH says that 10EM incoming cards, after handling, are eventually forwarded to the DX ops or stations concerned. "We still issue QSLs on a straggling basis going back to the first DXpedition of the Month." Gee, that was 'way back in '63 already.

SOUTH AMERICA — "I've answered most due QSLs now," reports HC1TH, busied with changing local QTH. "Still a little behind but catching up fast." — "Recently received '67 contest logs for 4M5A," notes W2HFK. "QSLing has been completed except for stragglers." — "YPRKR, according to F8KLL, has been totally inactive," debunks W1WQC, concerning a recent 75-meter sickie. — Your monthly QTH catalog now, keeping in mind that each item is necessarily neither "official," complete nor accurate. . . .

GT2AO, Box 143, Ponta Delgada, Azores
DL1HH, H. Giron, An der Bahn 5, D-6231 Niederbuchenstadt/Ts, W. Germany
DL4VA, H. Vandegriff, (WA4WME), MatCom LBMO, APO, New York, N. Y., 09052
DUZSAS, Det. 418, APO, San Francisco, Calif., 96298
FB8s WW XX YY ZZ (see text)
FK8HO, Box 637 or Box 28, Noumea, New Caledonia
G3KHK/4X, D. Connolly, % UN7SO Radio, Box 140, Tiberias, Israel
HC1TH, T. Hoke (K5ODZ), Box 583, Quito, Ecuador

HIXEK, W. Keese, Box 1492, Santo Domingo, D. R.
 HT's HDW HTM 1RG 6GAF (see text)
 IDPL, Amateur Radio Club, 6917 Security (Sp., APO, New York, N. Y., 09240
 ITHLO, P.O. Box 20, Messina, Sicily, Italy
 KC6EJ/KG6 (via WA6AUF)
 LU6EJ, CG No. 5, Puerto Madryn, Chub., Argentina
 LX1BW (via W3HUK; see text)
 ON4TJ, G. Thys, 61 Brouhellaan, De Pint 9720, Belgium
 PJs ZHR 9VR (via YERONA)
 SV8WII, FPO, New York, N. Y., 09525
 TI8PE/TF9 (via WA5GFS)
 UA0YP, Radio Club, Kyzyl, Tamu Tava, U.S.S.R.
 ex-YA1ZC, J. Wallace, W4CC, E.E. School, Georgia Tech, Atlanta, Ga., 30309
 YT1BCD (via WA2DWE; see text)
 YV7EM, Box 83, Forlamar, Isla Margarita, Venezuela
 ZMs IAT/k 1BN/a 3FO/c (via ZL2AFZ)
 3V8s AB AL, P.O. Box 323, Tunis, Tunisia
 5U7AR, Box 442, Niamey, Niger (via F6ACT)
 5V4s AH AP EG EW GE (via DL1HH)
 9Q5RH, P.O. Box 7700, Kinshasa, R. C.

AX9LD (via ZL2AFZ) P3J9T (to W1BII)
 CT2AK (via VE7BW(b)) P3J0X (via W3AZD)
 CT2AW (via K9KGV) SV8WI (via WA3HUF)
 EL9C/mm (via DJ7LQ) T19CI (via T2CMEF)
 F0MHP (via WB8ABN) VP2MU (via VE2YU)
 FG7TD (via WB8ABN) VQ8CFB (to VQ8CF)
 GD3PBD (via W2GHH) VQ8CV (to VQ8AD)
 GM5AMS (via K7KPM) WB8CKL/mm (via WB8CEH)
 HM0XFW (via DL2SX) XW8GR (via W2CTN)
 HB4FA (via W2MBU) YN1BW (via DL8DF)
 HPIXCJ (via K1ZMQ) ZC4RS (via C4RS)
 JD1YAA (via JARL) ZF1AN (via W2SUC)
 KP4HI/HIRI (via RCT) ZK1AJ (via KH6GLU)
 KZ5EE (via K1ZMQ) ZSIANT (via ZS2OB)
 LA1H (via W2GHI) 3G1QQ (via W4DQ8)
 MP4QBK (see text) ex-SV8AC (via WR0LF)
 OJ6MR (via OH2NB) 9L2RO (see text)
 ON6AF (via ON4TJ) 9L1RP (via GW3AX)
 ON8CT (via W2GHI)

For these hints we thank WS ISWX 2UKM 4NEN 4YOK 5BZK 6JVG 6LEB 7YTN 8KZO 9IDY 9BY, Ks 4UGL 68SN, WAs 1FHU 2BHI 9ZCP, Wbs 4HPJ 6UDZ, G3UPT, KH6HAM, VE3GHL, Columbus Amateur Radio Association CAAAscop (W8ZCQ), JARCs DX-MB (DL3RK), DX News-Sheet (G. Watts, 62 Bellmore rd., Norwich, Nor. 72 T, England), Far East Auxiliary Radio League (M) News (KAZLL), Florida DX Club DX Report (W4PRO), International Short Wave League Monitor (A. Miller, 62 Wardward in., Selly Oak, Birmingham 20, England), Japan DX Radio Club Bulletin (JA3UD), Long Island DX Association DX Bulletin (W2GKZ), Newark News Radio Club Bulletin (J. Heen, 3822 Marshall ct., Bellwood, Ill. 60104), North Eastern DX Association DX Bulletin (K1HMF), Northern California DX Club DXer (Box 608, Menlo Park, Calif. 94025), Southern California DX Club Bulletin (WA6GLD), UBA's On the Air (ONS 4AD 5VA), Utah DX Association Bulletin (K7DEB), VERON'S DX press (PA4s FX LOU TO VIDY WWP) and West Coast DX Bulletin (WA6AUD). Thanks, indeed!

Whence:

EUROPE — 17K (Poland) invites your participation in its ends-only 1970 SP DX Contest, an 80-fourth-10-meter affair occurring 1500-2400 GMT on the 5th of next month. Transmit the customary RS1001, RS1002, etc., serials to SP (3Z) stations who will respond with RSTs plus two-letter postal (province) indicators such as 46HP, 55WA, etc. For final score multiply your worked bandstations by three, then by the number of different postals accumulated. Multioperator and single-band categories are available. To be eligible for possible certification of performance your log, band-segregated and including the usual signed disclaimer of rules and regs violations plus summary sheet, must be postmarked on or before May 1, 1970, to Contest Manager, PZK, P.O. Box 320, Warsaw 1. Results of the bustling 1969 SP Test show U.S. radiotelegraphers finishing in this order: WA1DJG, Ws 1PZ SVSK, WA8KDI, Ws 4WSH 2CVW, K5KAA, WAs VJN EPG, Ws 4KMS 8IBX, 2 3GN JTT, K8NMG, W9QWM, W42BJL and W2ZPG. Up north VE1AE, VO1H and VE2H won, placed and showed. Other country toppers are DL2CG, DM3TPA, EP2HQ, F2PO, G3ESE, JA1PTO, LA3LC, LU4BCO, LZ1AZ, O65LX, O63AX, OH3MM, OK2BPE, ON8RA, OZ4HW, PA0VB, PY2ACT, SM3EWB, TF3OI, UAs 2PC 3RH, UB5IS, U22OC, UD6AS, UJ8AB, U17CG, U22CT, UQ2IL, UR2QJ, UW9WL, Y06AWR and YU3TCB, all single-op statistics. On the home scene SPs 1KXC 2AVE 3ALJ 4DCS 5ZA 6HEK 7ASZ 8KRZ and 9AL were call area kingpins. . . . VERON'S annual cw/phone Dutch DX test comes off on the 25th-26th of next month, and DARC sings its 1970 RTTY DX Contest on the same week end. We'll brief you further next QNT. In Holland's 1969 PA3C stamp PA3s LOU BRM SNG AAC ABM GRF JR YB TA and LV finished in that sequence on the home front, U.S.A. entries in scoring order:

Ws 3BYX 4BYR 1E2 SV8K-9KXK 4HK 9LKI 8U2K 6IXH 4WSL 6ISQ 6GPH and K8NMG. VO1AW, VE2-1AB and 2IL did Canada's one-two-three. Other leaders by country include CR7Z, DL1XC, EA3KI, F2PO, G3ESE, GMBKLA, HA5UF, HB9QA, IL9KJ, JA3VO, LA1QA, LI1HB, LZ3KCF, OH2MK, OK2XZ, PJ2VD, SM3EWB, SP6AS), TF3OI, UAs 3KAO 9W, UB5KWF, UC2OC, UJ8AB, UL7KAA, UF2PT, UQ2KCE, UR2FT, YU2PYW, ZS6AJS and 9H1BL. . . . "I'm planning several trips to rare locations in Europe and the Mediterranean area," warns DL4VA (WA4WME). "I'd like to hear from U.S. DXers giving their opinions of the five rarest prefixes in descending order, those needed underlined. When plans are completed itineraries will be sent to each responder. No IP prefixes, please." Guess you can start off with Albania, Hugh. . . . Ten or more 681UW stalwarts will put GID6UW back in action on the 17th of this month on 160 through vhf. This annual DX happening by Cambridge U. Wireless Society will head for a hill near Port St. Mary with an FL/PR-500, linear and other gadgetry. . . . Zip s.a.s.e. to G3VUC for info on the Mayflower Award, and to G3ABC for data on WAB (Worked All Britain). . . . OH2BH and associates managed eight or nine kiloQSOs from Market reef as OJ6MR.

ASIA — Lebanese Amateur Radio Association's OD5BZ designates WA2DUG, FT3RHL, HB9AKJ, HK6AAZ and VK2ASZ as continental winners of RAL's October '69 DX test. Other highs per country: CRs 6LX 7IZ, CT1RH, DJ4PT-19LPR, EA4CR, F5FY, G05AGA, GM3PIP, HA5FA, HV3SL, I1HII, K6PCL, LA7HI, LZ1KAA, O65PT, OH2BHU, OK2s KE-QR, ON5MG, OZ4IA, PA0PHK, SM16AJ, Z99ZAL, UA4PZ, UR2OV, YO2AFB, YU4IA and 4U1TU. . . . W4SLK forwards a Washington Post clipping about Miyuki Niwa, Japan's youngest ham, who passed her exam at the age of eight. Not sure of her call (newspapers rarely bother with such unimportant facts) but a photo shows her operating JA24ZY. . . . "HM4FA probably will leave Korea next month," figures W2MBU, Chon's QSL whip. . . . WA1PHU finds ex-OD5FC now behind the key at PY2ECX. . . . Asian addends via aforementioned clubs and groups: Society of Thai Amateur Radio is led by president HS1CB, v.p. HS3AL and sec.-treas. HS3DR. . . . KR6NR suits Army retirement in the midwest, of all places. . . . KA9RC (WA4FLR) aims at a spring or summer Marcus maneuver. . . . W1BPI's Indian Ocean DXpedition offensive may be extended to include AC-Land, offbeat French-affiliated areas and other DX desiderata.

OCEANIA — "My station will consist basically of a Swan 400," writes AX9LD, undertaking a year's assignment on Macquarie island with the Australian National Antarctic Expedition. "One of my main off-duty aims is to foster amateur radio activities from there and to provide opportunity for fellow hams throughout the world to work a reasonably rare DX country. With introduction of WIA's Cook Bicentenary Award I envisage a heavy demand for QSOs." Harold signs ZL3KV when back home and is ex-VG2EG. . . . "During a five-hour cw-phone QSO with KJ6BZ I learned that Johnston Is. is starving for feminine voices," comments W6LFB. No fair with pile-up falsetts, folks. . . . For some snappy DX operating W8KZO recommends a listen to ZM1AAT/DX passing log transcripts to ZL2AFZ. . . . West Coast DX Bulletin hears that Kbs FME and FMF appear around 21,355 kHz at 0030-0130 GMT as 9M8s FME and FMF, also that ZK1AJ pops up on the 14,355-kHz PacNet spot Tuesdays and Fridays at 0600 GMT or so.

HEREABOUTS — "EC7TD looks for Wyoming to complete WAs," discloses WB8ABN, "with a KWM-2 and vertical around 21,280-21,340-kHz sideband at 1400-1400 and 2000-2200 GMT. Jack, a Catholic priest, expects to be on Guadeloupe indefinitely." . . . WA2HDZ comes through with a prediction for the superoperators as requested: "I think ham radio will become more automated but a growing group of hams will shy away from such frills and go to simple equipment as more challenging." . . . XEs 1J 1KS and 3EB rattled off a couple of XFs kilocontacts on 10 through 80 at year's end. . . . K5QHS would like to get something going on Bajo Nuevo, Serrana bank or what have you. Grab ya? . . . LU1DAB dabbles with balloon-supported skyhooks on lower 5B-DXCC frequencies. . . . Arkansas hunters will find WA5SOG uncallable on 10. . . . WB4IZU and colleagues mull over July ZF1 DXpeditionary possibilities. . . . 5B-DXCC enthusiast WA1PHU chuckles, "Came out of an 80-meter 5L2BE pile-up with RST 339. Wonder how the others were doing!" Lact is among the increasing number of DX diggers who now need but a handful of 3.5-MHz QSLs to clinch the feat and deluge W1CW & Co. with heavy stacks of 500s. By the way, the nationwide 1TV rasp lousing up the low edge of 80 is a DX-limiting factor for many 5B-DXCC hunters, especially those in metropolitan regions. That's a 223rd harmonic — from receivers yet. How many amateur transmitters could get away with such engineering or lack thereof?

Q57

Operating News

GEORGE HART, WINJM
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, W1KQM

Public Service: WILLIAM O. REICHERT, WA0HHH

The OBS Program. The Official Bulletin Station appointment goes back a long way. In the May, 1923, issue of *QST*, the first announcement of this appointment appeared. They were called "Official ARRL Amateur Broadcasting Stations" then, later became "Official Broadcasting Stations" and still later, as FCC put a ban on amateur "broadcasting," the name was changed to Official Bulletin Stations.

The idea then, as now, was to supply a certain group of appointees, who would agree to transmit it on a regular schedule, with a weekly "broadcast" of news of interest to all amateurs. For many years, the OBS schedules were announced each month in the "Operating Department" of *QST*. In 1928, when the League's first headquarters station (1MK) was established in Hartford, it transmitted these same bulletins and became the leading OBS. WIAW took over this role in 1937 and today the "Official Bulletins" are copied from WIAW more than all the 400-odd OBS appointees put together.

Little change has been made in the OBS program in the past several decades. Little change, that is except for one thing. The program has become more and more a mail program and less and less an on-the-air program as it was intended to be. Many OBS appointees do not transmit the bulletins at all — or if they do, they don't report their schedules to the SCM and through him to headquarters as required. Meanwhile, the demand for additions to the mailing list for the weekly Official Bulletins (usually mailed on postcards) has increased. First a few "complimentaries" were added, then affiliated clubs were added, then various amateur bulletin

editors and many others at their request. Today, the Official Bulletin is mailed to about 2200, or about four times the number of OBS appointees. At five cents a throw 52 times a year, this mounts up to a lot of lettuce, considering it is information anyone can get quicker just by taking the trouble to copy it from WIAW, who puts it on the air within hours after it is released. The more enterprising OBSs could also do so by copying WIAW and then repeating, instead of waiting for their mail copies to arrive. Clubs could detail one of their members to copy WIAW or a relaying OBS the night of or the night before the meeting.

We are amateur communicators, or supposed to be. When you come right down to it, why is it necessary to have a mailing at all? Give us three good reasons why it should not be discontinued; OBS should be required to copy WIAW and repeat the bulletins, others to get the information from listening on the air, as the program was originally intended. Hw?

Why Doesn't WIAW Listen First? This is a question we are being asked with increasing frequency. It is a point of common courtesy among amateur operators (not to mention a connection with the "wilful or malicious interference" clause of the regulations) to listen first before transmitting on any frequency, to determine whether or not the frequency is in use. Even if nothing is heard, it is considered good practice to inquire, in case someone is listening to a signal you cannot hear. But, the complaints complain, here comes WIAW barging onto the frequency with its bull-

OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

March	April	May
5 Qualifying Run, W6OWP 7-8 DX Competition phone, p. 82 Dec.	4-5 Florida QSO Party, p. 118 New Mexico QSO Party, p. 114 SP DX Contest, p. 81	7 Qualifying Run, W6OWP 9 Frequency Measuring Test 12 Qualifying Run, WIAW 16-17 Michigan QSO Party
13 Qualifying Run, WIAW 14-15 Virginia QSO Party, p. 112 Wyoming QSO Party, p. 116	8 Qualifying Run, W6OWP 11 Qualifying Run, WIAW 11-12 CD Party, cw* 18-19 CD Party, phone 25-26 Arizona QSO Party WAE RPTV DX Test PACC Contest	June 13-14 VHF QSO Party 27-28 Field Day
21-22 DX Competition cw, p. 82 Dec.	* League officials and appointees, only.	
23 W1EIA High Speed Code Test, p. 85		
24 Morning Qualifying Run, WIAW		
28-Apr. 19 IARC DX Contest phone, p. 78 Jan.		

Note: Possible W6OWP Qualifying Run "alternate" (same schedule) is W6ZRL.

DXCC Notes

Announcement is hereby made of the addition to the ARRL Countries List of *Market*. Market is an island located exactly on the boundary line between Finland and Sweden and directly opposite the Åland Islands. Separate country status for Market is in accordance with Point 3 of the criteria (see page 88, February 1969 QST). Operation has taken place from Market under the call sign OJ0MR.

Confirmations for contacts with Market may be submitted for DXCC credits starting March 1, 1970. Confirmations submitted before March 1, 1970, will be returned without credit.

ARRL CODE PROFICIENCY PROGRAM

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 qualify 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 endorse-

ment stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6WP (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 March 13. (In converting, 0230 GMT March 13 becomes 2130 EST March 12.)

W1AW will transmit a qualifying run on all listed cw frequencies at 1400 GMT March 24. (In converting, 1400 GMT Mar. 24 becomes 0900 EST/0600 PST Mar. 24.)

W6WP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7120 kHz, 0500 GMT March 5. (In converting, 0500 GMT March 5 becomes 2100 PST March 4.)

Code Practice

W1AW transmits daily code practice according to the following schedule. 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.)



DX CENTURY CLUB AWARDS



From December 1, 1969 through December 31, 1969, DXCC certificates based on contacts with 110-or-more countries have been issued by the ARRL Headquarters to the amateurs listed below.

New Members

DJ1CG . . . 250 K1FP . . . 198 K1SHU . . . 154 W4ZDW6 . . . 146 WA8QJY . . . 135 K4PCU . . . 128 PY2DHY . . . 126 W60HZ . . . 126 W60UL . . . 123	9Y4DS . . . 113 8E1CG . . . 110 9W0FH . . . 110 G3JFC . . . 109 JA1RYV . . . 109 OK2OI . . . 108 JA1PJ . . . 107 WA4JMQ . . . 107 PG7TF . . . 106	JA2BVS . . . 106 Y18GJ . . . 106 T48PA . . . 105 DL14Z . . . 105 W3FDU . . . 105 W4HD . . . 105 W45QNY . . . 105 W46BKN . . . 105 OH3KN . . . 104	JA8HRC . . . 103 PA8PTK . . . 103 W46GNA . . . 103 W6BW1W . . . 103 W9GAQ . . . 103 OK1TK . . . 102 K9EKR . . . 102 VE3BWL . . . 102 K3ZYNV34 . . . 102 OK2BEC . . . 102	W3GSL . . . 102 W4CFW . . . 102 W4BQNA . . . 102 E5JC . . . 101 K4EN . . . 101 K9EKR . . . 101 W61UL . . . 101 W4BZL . . . 101 W43XY . . . 101	DM7AF . . . 100 E48BY . . . 100 FTDN . . . 101 K3ARM . . . 100 K9ENC . . . 100 K9UXV . . . 100 W4BNI . . . 100 W4BAM . . . 100 W49VU . . . 100
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Radiotelephone

DJ1CG . . . 219 JA1AG . . . 215 G6LK . . . 207 G4HK . . . 153 K2SHU . . . 151 K6PTL . . . 149 W4ZDW6 . . . 135	EA7QE . . . 130 YV1PP . . . 127 PY2RE . . . 118 K4DSN . . . 113 PY2DHY . . . 113 PY2DH . . . 112	LA7AJ . . . 110 GM3HMU . . . 109 R6TOV . . . 109 W3VHC . . . 107 G3LWH . . . 106 K6GMW . . . 106	WA9QZE . . . 106 W2LYR . . . 105 W60LZ . . . 105 W4GHRJ . . . 105 W2TQC . . . 104 VE1SH . . . 103	W6BW1W . . . 103 W6RUC . . . 102 VE2A4Y . . . 101 W1YD . . . 100 W42BJ . . . 100 W42SB . . . 100	W62VQC . . . 100 W45FRN . . . 100 W68EF . . . 100 W7CFD . . . 100 W43BK . . . 100 W49IRH . . . 100
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Endorsements

Endorsements issued for confirmations credited from December 1, 1969 through December 31, 1969 are listed below. Endorsement listings from the 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

335 W2HTI	W100S 300 W1WQC	ZL1AJU 270 K1OZR K4ADU W3ALB W3HTO W4BRE W6CAW	250 K2DDK W4SHUP W6GAK	LA1H SM7TQ W2AH W79PT 240 CR7BC VR2DK W43LK YU2NEG 220 K4RTA	OH2QQ W1AA W3CRE W40BN W44DZU W5LZV 200 DL3CM DL9TJ Y8KU K4TTA K6NM K8TVO	W84KZG W5ZVU W6GC W9TPA 160 DJ1QT DK1HP K2AHQ K2BMT K4DSN K6AJ	K6DJ0 OH6NH VE2DCW VE3PN W3SS W4UHI W6EIP W81PA W49TBA 140 DL4QP	W6IBZ 120 K1ULX K3PZU K6IR K6ZMZ W4CQW W3UT W4JNZ W44WT W48CXU W9GBG
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Radiotelephone

305 F2MO W58BY	290 W4PJG W6RUF	W0LFR 250 UYRK W4BRE 240 K1OZR 220 K4RTA	VE7ABD W3HTO W4SHUP W43LK 6W8DY 200 DJ3CN	G4JW URC Y63WQ 180 K4RKP K4TTA W46BJ W7CRT W6RIV	ZS1DC 160 DL3VX UJ2AB K14XU K2DDK W2EV W3SS W4JHN	W7ELU 140 UBER K7AXF Y67NH W3CRE W43GTX W5CIV	W6PAN W49NJB 120 E5XA K6IR SM5AWD W4AV W4GTG
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Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EST / SnTTh 6:30 P.M. PST / Sat	0230 MWF/Sn
"	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 TThSat
"	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 list by sending in sleep with WIAW (but not over the air), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

- Date Subject of practice text from January QST.
- Mar. 11: *It Seems to Us*, p. 9
 Mar. 19: *Etched-Circuit Boards*, p. 11
 Mar. 25: *A Coaxial Band Checker*, p. 30
 Mar. 31: *Technical Correspondence*, p. 42
- Date Subject of practice text from *Understanding Amateur Radio*, First Edition
- Apr. 3: *Making a Joint*, p. 124
 Apr. 8: *Taking Care of Tools*, p. 126

HIGH SPEED CODE TEST (Mar. 23, 1970)

The twenty-third running of the semi-annual Connecticut Wireless Assn. high speed code test will take place on March 23, 1970, with call-up beginning at 0115 GMT. Anyone who wishes to have a try at qualifying for a certificate at speeds exceeding 35 w.p.m. is invited to copy.

Five five-minute transmissions are made, one each at 10, 45, 50, 55 and 60 w.p.m. Six volunteer stations will be transmitting on nine frequencies, all using the same master tape. Here is the chronology of the transmission:

0115 GMT: Call-up begins. This is for the purpose of locating the best signal by those who wish to copy. See below for frequencies.

0130 GMT: Important instructions begin. All who intend participating should copy these carefully. The transmission of instructions will last approximately 15 minutes.

0150 GMT: 40 w.p.m. starts. You qualify if you copy one minute *consecutively solid* of the five minute transmission. Speed is *nominal*; that is, it may not be exactly on the nose at 40.000 w.p.m.

0200, 0210, 0220, 0230 GMT: Transmissions at 45, 50, 55 and 60 w.p.m. respectively, beginning on the second. All six stations synchronize their starts, all use copy of same tape. Copiers are not penalized for transmission errors.

0235 GMT: Sign-off.

The following stations will be transmitting on the above schedule at the times indicated:

Call	Location	Frequencies (approx.)
W1EIA	Newington, Conn.	3637/7120 (simultaneous)
WB1GTS	Arlington, Va.	3525/7025 (simultaneous)
W5QMJ	Enid, Okla.	3665
K6DYX	Monterey, Calif.	3690
W6EOT	Lakeside, Calif.	3640/7115 (simultaneous)
WBFA	Englewood, Colo.	3653

Sound interesting? Believe it or not, about 30 have qualified at 60 w.p.m. You can too, if you work up to it. Practice over W1EIA every Monday, 0130 GMT, 3637/7120.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for December Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	908	4197	3784	391	9280
K6BPL	5189	1653	1423	230	8595
W4GXE	310	1677	1012	1410	4409
W7BA	7	897	549	52	1805
K9ONK	168	785	779	35	1767
W4ZBAN	9	879	862	2	1752
K6FEY	1	863	862	0	1725
W3VR	16	692	604	63	1375
K1BCS	1090	159	55	71	1369
K5BNH	7	701	639	12	1359
W4ZFRZ	290	578	476	8	1347
W1TCN	29	695	581	27	1332
W6RSY	52	587	492	97	1228
W0YQ	599	291	278	13	1150
W3JML	74	567	439	7	1065
W7DZX	8	541	490	3	1046
W9JBC	73	498	412	34	1017
W6VNO	22	485	495	3	1005
W81PH	8	480	412	63	963
W4VZZ	15	464	441	6	926
W4SETX	43	319	427	20	926
W4WZF	13	454	420	19	905
K9FZX	7	450	446	1	904
W4ASC	24	442	399	10	875
W6BOT	4	589	393	0	786
W1PEX	36	395	320	30	781
K3IAT	25	392	300	60	770
K3NSN	140	319	301	10	760
W0JMJ	6	366	366	0	732
W2OE	150	319	225	11	705
W6MLF	185	257	257	5	704
W4SQQ	35	291	283	13	622
W4ZFM	63	269	214	51	597
W4HFX	192	246	129	25	592
W1BJG	16	392	251	22	581
K5LNE	61	280	239	11	591
W9CKY	10	292	283	6	591
W6BBO	11	283	283	8	585
K2NHL	23	288	204	66	581
K4MVC	9	309	285	4	580
W4SPL	34	289	258	7	578
W4ZFS	14	294	248	34	578
W4JTM	47	268	243	16	574
K7RQZ	57	270	252	14	573
W4EYX	55	262	204	50	571
K3BAE	17	282	260	10	569
W3BR	14	291	238	27	568
W6LRU	10	292	235	24	558
K2KDJ	132	212	174	30	548
W7KZ	15	263	252	8	538
W4YYS	17	261	220	35	533
K9AYQ	104	162	231	24	521
W2MFA	14	278	212	2	506
W4TQB	37	246	211	12	506
W4CAL	33	245	196	31	503

late Reports:
 W4PPP (Nov.) 412 1634 850 784 3680
 K9ONK (Nov.) 172 767 734 39 1712

More-Than-One Operator Station

W4JLR	236	172	155	17	580
BPL for 100 or more <i>originations-plus deliveries</i>					
W4GRC	400	W3TQ	141	W7CKX	109
W43HV	261	W84HY	139	W4ZPN	107
W2TRK	248	W43HT	138	W4BJH	107
W4YXA	213	W49QQ	133	W4ZDR	103
W4XT	206	W7EM	130	W43MK	103
W4BYZ	191	W4HAZ	129	W9EQ	103
W4BAM	184	K21BC	128	W4JKE	103
W4ES	177	W8B9	127	W4GTE	102
W3TN	176	W44TL	121	W41HL	101
K4ZJ	174	W86ZC	116	K9SD	101
W1HPI	171	K16BZF	116	W4BEE	100
W6BHG	184	W42FI	114		
W4DIL	163	W43MI	111	late Reports:	
W4BNI	146	W3E7T	109	W43HE	110
W4VAs	145			W4DIL	102

More-Than-One Operator Station

K1NQG/1 316 K2DEL 1361 K2OQJ 118
 BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listing: W45PF, W4GXE, W4XT, W4EAM, W4VAs
 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 origination 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.

HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30, on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U. S. 5, the Wilbur Cross Highway. (For WIAW visiting hours, see the schedule on the next page).

WIAW SCHEDULE, MARCH 1970

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 March 27, in observance of Good Friday.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000							
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
1300	←-----CODE PRACTICE ¹ (5-25 wpm MWF), (35-15 wpm TTh)-----→						
1800-1900		21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	
1900-2000		14.280	7.255	14.280	7.255	14.280	
2000-2100		14.280	21/28 ⁵	14.095	21/28 ⁵	7.080	
2130-2230		14.100	14.280	14.100	14.280	14.100	
2230-2330		7.255	21/28 ⁵	21.1 ⁶	21/28 ⁵	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 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ WIAW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff, Wis QIS WPR. * Times-days in GMT. Operating frequencies are approximate.



Meet WN8ZCC, fifth Novice to acquire DXCC. Gary's 117 credits (all 21 MHz) checked out in fine fashion last October 20. This neat control points includes a Viking Challenger and HQ129X. The radiator in use is a Telrex TC99D up 50 feet.

In Emergency . . .

Monitor your local emergency net frequency.

Make contact with your local EC or RO.

Take immediate steps to follow any pre-arranged plans.

Stay off the air unless or until you are sure you can be of assistance.

In widespread emergencies, monitor WIAW for latest bulletins and news.

Strays

Plan to include the Single Sideband Show in your activities during the IREX convention this year? It's being held again in 1970 on Tuesday, March 24, from noon to 9:00 p.m. in the Penn Top Room, Statler-Hilton Hotel, Seventh Ave. at 33rd St. in N.Y.C.

Now that AO-5 has been launched, here is a list of pertinent information which has appeared in *QST*:

- "Australis-Oscar arrives in U.S." *QST*, July, 1967 p. 58.
- Soifer, "Antipodal Reception of Oscar Signals" *QST*, November, 1968, p. 32.
- Klein and Tynan, "AMSAT, the Radio Amateur Satellite Corporation" *QST*, June 1969, p. 54.
- Belair and Howard, "Australis-Oscar, Its Design, Construction and Operation" *QST*, July 1969, p. 58.
- Dunkerley, "Australis-Oscar 5 and You!" *QST*, August 1969, p. 69.
- Belair and Howard, "Obtaining Data From Australis-Oscar 5" *QST*, August 1969, p. 70.
- "Australis-Oscar 5 Progress Report" *QST*, September, 1969, p. 47.
- Danielson and Glick, "Australis-Oscar 5, Where It's At" *QST*, October, 1969, p. 51.
- "Australis-Oscar 5 at WA1IOX" *QST*, November, 1969, p. 61.
- King, "Proposed Experiments With Australis-Oscar 5" *QST*, December 1969, p. 55.
- Glick and Dunkerley "Australis-Oscar 5, When to Listen" *QST*, January, 1970, p. 50.

•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. Renewals: W3BDP as OVS; WA3DUM and W3DEO as OP8s; K3MPZ and K3HR as OBSs; W3TRC and W3HK8 as ORSs; W3EJU as OO and WA3DYG as New Castle EC. WA3KZQ passed the General Class exam. WA3KFR has worked thirty-five countries. WA3LE passed the Advanced Class exam and has acquired a new HW-100. W3GTZ also has a new HW-100. W3DEO had a visit from his son during the holidays. WA3HWC made another hospital visit. We all wish him a quick recovery. K3KAF passed the Advanced Class exam. K3RBU is experiencing rig problems on v.h.f. W3YL lost most of his antenna farm during the high winds. If you don't recognize that new fist on the end of W3EEB it will still be Cedrick with a new electronic keyer. K3NYG received the "Outstanding Amateur of the Year Award" from the KCARC. Net reports: D6PN, QNI 44, QTC 1, KCEPN, QNI 33. Traffic: W3EEB 75, W3DKX 40, WA3GSM 15, W3TRC 12, WA3GAY 11, WA3DUM 9, K3NVY 6, K3NYG 3.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3CC. RMs: W3EML, W3MPX. PAMs: K3PSO, WA3GLI. V.H.F. PAM: W3FGQ. OO reports were received from K3HNP, K3RDT, W3KEK, WA3EEC; OBS reports from W3CBH, WA3FMI, WA3AFI, K3RDM; OVS reports from WA3IOB, WA3JWL, W3ZRR, K3VAX, WA3IAZ, WN3LYC, WA3JZB, WA3BJQ, K3WEU, W3CCL, WA3EML, WA3EEC. HPIers: W3CUL, W3YR, W3EML, K3NSN, W3MPX, WA3EEC, WA3IIV, WA3MLQ, WA3FMI, WA3HBT.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	Daily 8:45 P.M.	352	431	W3MPX
FTTN	3610	Daily 8:00 P.M.	297	216	W3MPX
FPN	3960	Mon.-Fri. 5:30 P.M. (Nov.)	492	58R	K3LJY
			659	674	K3PSO*
			804	489	WA3GLI
			363	62	WA3GLI
EPAEP/FTN	3917	Daily 8:00 P.M. Snow Emerg.			W3EGQ
VHF (6)	50.64	Mon.-Fri. 7:00 P.M.			W3EGQ
VHF (2)	145.35	Mon.-Fri. 8:00 P.M.			W3EGQ
ENTN	3726	Daily 7:30 P.M.			WA3IUV

*We have a new PAM for the FPN, K3PSO, K3SLG is busy at school so Ed agreed to pick up the job. Well done to K3SLG and good luck to K3PSO. The EPAEP/FTN did a swell job of operating during the recent snow emergency in E.Pa. and surrounding areas. K3KXAF, WA3INW and WA3IFQ, in conjunction with Fina B'riith, set up a Christmas station at the Abington Memorial Hospital and sent 55 messages for the patients. The messages were sent to WA3HIT, W3FGQ and WA3KCE for delivery or relay. W3EML lost his 40-meter antenna but has a spare! K3NSN now has some of the handicapped helping him teach other handicapped! W3MPX fixed his horn band receiver for MARS with a file! K3MVO now is retired but will stay active for a while. PSHR was claimed this month by W3EML, WA3JZB, WA3FMI, WA3EEC, WA3LAK, K3OIO, W3MPX, WA3JKR has new 8- and 2-meter converters. K3WEU has hunched two new hams, WN3NUA and WN3NTH. WA3ATQ reports the P.V.L. Net is doing real fine. WA3BSV graduated from P.S.U. and has been appointed 2nd Lt. USAAR. WA3JWL lost his v.h.f. antennas in the recent high winds. W3BNR spent two weeks in Florida. WN3LYC passed the Tech. Class exam and is awaiting its arrival to use his new

G50 rig. Traffic: (Dec.) W3CUL 9280, W3YR 1520, W3EML 1083, K3NSN 760, W3MPX 592, WA3IIV 373, K3MVO 267, WA3EEC 254, WA3IWR 234, WA3LAK 228, WA3MKQ 188, WA3JKB 182, WA3HBT 171, WA3GLI 159, K3WEU 146, WA3JZB 143, WA3FMI 135, WA3ATQ 120, K3FIE 118, WA3MIX 109, WA3KTK 106, K3OIO 102, WA3GUK 94, WA3AFI 85, WA3BSV 75, W3HK 64, WA3IOB 51, WA3JWL 51, WA3LYC 41, W3NNL 39, WA3IYF 32, W3VAP 29, W3BNR 26, K3PSO 23, WA3LMO 20, W3ATZ 18, W3VA 18, W3CBH 15, K3KRO 15, W3HFR 14, WN3LYC 13, K3KTH 12, W3KRX 11, WA3JRY 10, W3ADE 9, K3FOR 9, W3FPC 9, WA3GAP 8, WA3CKA 6, W3OY 6, W3CL 5, WA3IAZ 3, WA3BJQ 2, W3OML 2, W3EU 1, WA3HGX 1, W3KEK 1, K3RDM 1, W3ZRR 1. (Nov.) WA3HBT 134, WA3GUK 58, WA3JZB 38, W3KEK 1, K3RDM 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Alunholland, K3LFD—SEC: W3LDD.

Net	Freq.	Time	Days	Secs.	QTC	QNI	Mgr.
MDD	3643	0000Z	Daily	31	319	10.8	K3JYZ, RM
MDDS	3643	0130Z	Daily	28	47	1.0	W3CG/HM
MDCTN	3920	2300Z	STPS				W3CKN/PAM
MBPN	3920	2300Z	MWFF	22	80	—	K3LAG
M'GMTN	145.206	0200Z	T-5	21	19	9.6	W3LPW

#Plus Sat. and Sun. at 1800Z.

PSHR claimants (Dec.): W3TN, W3EZF, WA3Y8, WA3HW, K3LFD. Appointments: W3EZF as ORS. Endorsements: W3JZY as OPS and PAM. K3JYZ as RA1, WA3GXN as OPS, WA3HTQ as ORS, K3QDC as ORS, W3DPW as EC, WA3DWF as EC. It's a "4-bell" BPL picture this month with W3TN, WA3Y8, WA3JR and W3EZF all ringing the gong. K3TEZ:3 has pulled the big switch at his Frederick QTH until he returns from Uncle Sam's military encampment. School and homework have cut into the traffic totals of trafficman WA3GUL. W3GN got a 50-w.p.m. certificate from the Connecticut Wireless Association "for Christ-mas." Boy, that's "ear-pounding brass" or upside-down BPL, or something! W3CDO received a Certificate of Merit from ARRL. WA3LWT is the proud operator of a new HW-100. WA3EOP advises that M3CN has gone QRT. He also announces the birth in Washington County of the Itelico V.H.F. Amateur Radio Society (club station WA3NUL) dedicated to v.h.f. contesting and QRP Tying on 436 Mc. New officers of the Antioch Radio Assn. are: WA3UCG, pres.; WA3JPO, vice-pres.; WA3MXG, secy.-treas.; WA3EOP, int. mgr. WA3FED, chief of the County Hunting Tribe in MDC, got his USA-CA award from W3GT for 2000 counties confirmed and is looking for more on 8 meters with a TR-106 and a 31' beam on the roof. Retiree W3MSN has kept busy inside tidying the shack and outside sawing wood. W3JPP has a YAesu FT7x400 on the air and a tri-band beam on the way up. W3MYB's Dec. report sounded so much like "zippo do da zippo th a" that we thought maybe he got a new rig for Christmas, but he says it's just because 1969 things were going his way. Traffic: WA3JLR 580, WA3Y8 553, W3TN 434, W3EZF 382, K3LFD 136, W3CBG 117, K3GZK 94, W3ECP 92, WA3HTQ 63, WA3LWT 60, W3ATQ 45, K3JYZ 44, WA3HW 42, K3LFN 41, W3ZNW 28, WA3EOP 26, W3EOP 10, K3TEZ:3 9, WA3PCK 8, K3QDC 8, WA3LJK 7.

SOUTHERN NEW JERSEY—SCM, Charles E. Travers, W2YPZ—SEC: W2LVW. RMs: WA2KIP, WA2BLV. PAMs: WA2UVR, W2ZL. The Southern New Jersey section was well represented in the Oct. CD Party by W2OHR and W2PH, the former with 16800-100-32-7 and the latter with K8JLF, with a score of 7700-48-28-1. It must be mentioned that K8JLF also carries a full university schedule at Princeton. In the phone column, W2ZQ, the club station for the D.V.R.A. is listed with K3CPE as chief operator and the following accomplishments—47,430-186-51-11; W3ZAPX 24,180-121-39-7; W2SPX 875-25-7-1. W2BVA was active in the Jan. V.H.F. Contest. A recent OO appointee is W2BFB. OBS K2ARY is acknowledged for having

made four Bulletin presentations during the month of Dec. These bulletins are important to the fraternity and it is hoped that ORSS will find the time to make an increased number of presentations in the coming months. The Gloucester County Radio Club announces the election of the following officers for the year 1970: WB2WAK, pres.; W2EBF, vice-pres.; WA2IOY, rec. sec.; WA2AFZ, corr. sec.; WB2JZX, treas.; WB2PVI, WB2WKV, WA2VEE, WB2EJE, directors. SEC W2LVW advises that K2PQD, of Woodbury, has been appointed EC for Gloucester Co., replacing K2SOL. Many thanks, George, for your help in the past and hope that you can find some time to spend with us. Charlie's assistant is WB2EJE, a very active and capable ham. Traffic: WB2VEJ 125, WB2DRG 117, K2RXB 100, W2ORS 92, W2YPZ 64, W2PU 63, W2BLM 45, W2DNF 35, WB2SFX 16, W2ZI 12, WA2BY 9, W2U 9, WB2WHB 2, WB2APX 1.

WESTERN NEW YORK—SCM, Richard M. Pitz-ruse, K2KTK—Ass't. SCM: Rudy A. Ehrhardt, W2PVI, SEC: W2RUF, PAMs: WB2RHJ, WA2CAL, RMs: W2MTA, W2FR, W2RUF, K2KTR. The section net listing appears in the Feb. column. Congratulations to WB2RHJ and WA2CAL, the new PAMs for our section. Sorry to report the passing of WA2FKB, the XYL of WA2URX and mother of WA2EJR. New officers of the Kodak Office Recreation Club are K2DHA, pres.; WA2TDF, 1st vice-pres.; WB2PPT, 2nd vice-pres.; K2CBD, secy.-treas.; WB2EDT, trustee. Gobs of Rochester area hams participated in the Annual Pennython. They drove over 2000 miles and collected 140,456 pennies for hospitalized children's toys for Christmas. W2KX daily puts on 8 miles on his exercise bike. K2CZN checked into the W.N.Y. Emergency Net all 54 sessions of 1969. WA2WMT gave an enlightening talk to RAWNY concerning 75- and 80-meter DXing. Germlins having gotten into the Jan. column (my fault) I hereby move W2MSM back to Rome (he having never left) and move W2IPM to the new QTH in Rochester. Sorry about that. WB2FHS is struggling with the 2-meter fm rig trying to get it back on the air. W2CPT attended the SAROC Convention, where ECARS and WCARS exchanged ideas. K2GXT is back on the air at RIT, NY. I received 652 messages with 844 check-ins at Dec. WA2MDF, on Lyon Mountain, is looking for a 2-meter net in his area between 145 and 147 Mc. The Garbage Collectors has been on daily since 1953 without an NCS and now meet on 3600 kc. WB2FPG returns to v.w. with a new electronic lever. W2RUT moans about his new job as a security guard—night shift. The RAGS has a smash-bang hamfest coming up in April. Dates and what have you next month. Meanwhile keep the RARA affair in mind. It's May 16. ARPSOC Honor Roll: W2MTA, W2PVI, W2RUF, W2FR, W2QC, K2KTR, K2KTK and WA2CAL. RPLers: W2OE, W2MTA, W2FR and WA2CAL. Traffic: W2OF 705, W2RF 567, W2MTA 506, WA2CAL 308, W2QC 389, WA2REX 259, K2KTR 222, W2RUF 214, K2AKR 202, W2FBE 120, W2VND 116, WB2MID 108, WA2ICU 82, W2HYM 81, WA2DHS 73, K2KTK 71, WB2ILL 67, K2RYH 65, W2MSM 59, WB2RHJ 57, WB2ZDK 47, W2RQF 41, W2TIR 33, W2PVI 32, W2PVI 24, W2DRU 17, W2APZ 15, WA2AWK 14, WA2AIV 13, WB2VEE 13, W2CFP 8, WB2FHS 8, K2OFV 8, W2PNW 8, W2AFB 4, K2DNN 4, WA2GLA 4, W2EMW 2. Total traffic 4791; Last year 4782.

WESTERN PENNSYLVANIA—Acting SCM, George H. Stoneburner, WA3AKH—SEC: WBKPL, PAMs: W3WFR, K3ZNP, RMs: WA3AKH, W3KUN, W3LOS, W3NFM. Traffic nets: K3SSN, 2330 GMT; WPA, 0000 GMT 3585 kc.; WPP, 0300Z 3935 kc. Froothills Radio Club announces new officers are K3SHU, pres.; W3VCD, vice-pres.; K3QKP, secy.-treas.; W3GKXO, act. mgr. W3UVD reports that he will send code practice on 2 meters Mon. and Thurs. nights beginning at 1935 EST. Congratulations to the Amateur Radio Assn. of Erie on being featured in a front-page article which appeared in the *Erie Sunday Times News*. W3SN is busy with code and theory classes at the Erie YMCA. WA3EUF has qualified for his RPL medalion. K3ZNP made RPL with 107 originations plus deliveries. Appointments: WA3JRN as OPS, W3ZUH from OO CL IV to OO CL I. Endorsement: WA3IAL as ORS. K3SOH is convalescing at home after a brief stay in Pittsburgh Hospital. His son, K3PYS/WA3ZUE, now is mgr. of I.N. WA3EXX and WA3HSE are new traffic-handlers on the c.w. section nets. WA3LPU, W3KUN, WA3AKH and K3ZNP have qualified for the PSRR. See Nov. 1969 QST for details on this listing. K3VYO presides as Master of Ceremonies on 29.0 Mc. daily as Pittsburgh area mobiles fight traffic on their respective ways to places of employment. The Community College of Beaver County will organize an amateur radio club

under the leadership of WA3NQE, instructor of electronics. Congratulations to WA3JJP on passing the General Class exam, W3KXO, who attends Moody Bible Institute, and W3NURK, Carnegie Mellon U. students, were home for the holidays. My first reminder: Check the expiration date of your ticket.

Net	Secs.	QNT	QTC
WPA	31	308	208
WPP	26	141	69
K3SSN	23	167	37

Traffic: (Dec.) WA3IPU 578, K3ZNP 404, W3KUN 175, WA3AKH 151, WA3JBN 69, K3HCT 63, W3LOS 52, W3GJY 34, K3SLN 14, K3NMB 14, W3IDO 11, W3VA 11, WA3EXX 9, W3UHN 4, W3KXO 1. (Nov.) W2KAT/3 44, WA3BLE 4.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Motzger, W0PRN—SEC: W9RYU, RM: WA9ZUE, PAMs: WA9CCP and WA9PDI (v.h.f.), Cook County EC: W9HFG. Net reports:

Net	Freq.	Times	Days	Tfc.
1EN	3940 kc.	1400Z	Sun.	18
LLN	3760 kc.	0000Z	Daily	211
NCPN	3915 kc.	1300Z	Mon.-Sat.	259
NCPN	3915 kc.	1800Z	Mon.-Sat.	
HL, PON	3915 kc.	2245Z	Mon.-Fri.	1199
HL, PON	3915 kc.	1830Z	Mon.-Fri.	
HL, PON	145.5 Mc.	0200Z	M.W.F.	45
HL, PON	50.2R Mc.	0200Z	Mon.	13
Gr. Lakes Emergency.	3932 kc.	0230Z	Daily	114

W9HRY reports traffic for the Ninth Regional Net with a outfit of 492. W9ZTK's new QTH is Mendota and he is employed by CONCO Engineering in its electronics division. W9GKR, of Normal, Ill., is spearheading a new QST Guarantee Club. Contact him if interested. K9SZT spoke on MARS at the last York Radio Club meeting. New officers of the Starved Rock Radio Club are W9ZEN, W9PNY and W9QLZ. The club's annual Hamfest has been announced for Sun., June 7 at the regular 4H club grounds. WA9ZLN spent a few days in the hospital with a surge of bronchial pneumonia. W9QXR is bringing in the cure ones with a T-175 linear on 6 meters. W9PYD is building a 8B-101. The Big Thunder Amateur Radio Club held its Annual Dinner Meeting Jan. 10 at Belvidere. Ill. W9ZXP and WA9VWE are the officers of the newly-organized Count High School Amateur Radio Club. WA9ZYG has an 11-element antenna on 2 meters. The new officers of the Rockford Amateur Radio Assn. are W9PL, WA9PXO, WA9VJO, W9NCHU and K9SAN. K9QMX has a new 60-ft. tower, a CL-33 and an L4B to work DX. Graduates of the Woodale ARC are W9BRYA, W9B9NY, W9B9XZ, W9N9HH and W9N9CK. The new officers of the club include W9SK, K9QNA, W9B9YA, WA9YNE, W9N9HH and W9B9XZ. W9B9XX is a new ORS. K9KNW plans to DXpedition to Coos Islands. K9TMN is now W9MTH in Minnesota. New Novices heard are W9N9Z8 and W9N9CX1; new Generals are W9YQJ and WA9Y8U; new Advance Class licenses are WA9ZYG, W9NWK, W9B9CUC, W9B9JC and W9B9DP. The Whenton Hamfest was held Feb. 15. K9EWR, K9VVT, and K9DQU are now fully operational on 29.6 Mc. sideband fm. and invite other stations to check in. New members of the Palestine ARC, W9AUR and W9B9WC, are issuing QSLs from Pioneer City on 40-meter c.w. K9AVQ is the only RPL recipient this month. Traffic: (Dec.) K9AVQ 521, WA9WNN 440, W9NXC 327, WA9NZF 161, WA9RTS 152, W9JXV 147, W9LQ 94, W9HCT 82, WA9RFB 80, W9LQ 54, K9BAS 40, K9NBU 35, W9PRN 30, W9HCT 35, W9HFG 24, K9TXJ 32, K9H8K 19, WA9LHU 13, W9RY 7, W9PHJ 7, K9JQU/WB9AT 5, WB9AJB 4, W9LTF 3. (Nov.) K9TXJ 10.

INDIANA—SCM, William C. Johnson, W9BTQ—Ass't. SCM: Mrs. M. Roberta Kroulik, K9IVG, SEC: W9BUQ.

Net	Freq.	Time	Dec. Tfc.	Mar.
1EN	3910	1330Z	Daily 2300Z M-F	215 K9LVT
ISN	3910	0000Z	Daily 2130Z M-S	700 K9CRS
			2300Z S-S	
QIN	3656	0100Z	Daily	158 WA9FDQ
Ind. PON	3910	1245Z	Sun.	94 WA9YKA
Ind. PON V.H.F.	50.7	0200Z	M-Thurs.	285 W9AAMB
Hoosier V.H.F.				94 W9PMT

To all Indiana v.h.f. stations, report your traffic to

W9PMT, Robert E. Witte, 1225 Wall Street, Fort Wayne, Ind. 46804. W9HRY has a new harmonic. K9WPE is being transferred to Durham, N.C. WA9JHC put on ATY for the CCARC. WA9EAO passed the Extra Class exam. Tri-State Amateur Radio Society officers are: WA9CDP, pres.; WA9QCF, vice-pres.; K9LAI, treas.; WA9ZZJ, secy.; W9GGW, WA9HGA, W9VZX, W9LVL, K9STX and WA9BPP, directors; WA9VYR, publicity; W9NZC, advertising; WA9JZX, meeting hall; WA9QDZ, hamfest. Indianapolis Radio Club's officers are: W9JVF, pres.; W9FLA, vice-pres.; W9SIN, secy.; W9AI, treas.; W9RS and W9CKB, directors; W9POF, chief operator. K9SNQ recently retired from the U.S. Postal Service. Allen County Amateur Radio Technical Society's new officers are: K9LSB, pres.; WA9QKD, vice-pres.; W9QAJ, secy.; treas.: K9UBF and WA9PIV, activity; WA9QKD and K9LSB, publicity. K9LSB reports that they have their new repeater antenna on the WANE-TV tower. WA9SBR has a code and theory class at the Merrillville Elementary School. Indianapolis Red Cross ARC's new officers are: W9POF, pres.; WA9VBG, vice-pres.; WA9VVS, secy.; WA9FZS, trustee; K9OXA, chief operator. W9AAB, IPON v.h.f. mgr., has an s.s.b. net on 50.4 Mc. QIN Honor Roll: WA9KAG 26, K9VHY 20, W9QWP 23, W9BDP 22, K9HYV 18. *Amateur radio exists because of the service it renders.* K9L certifies went to W9IYO, W9BQ, K9FZX, K9IVG, WA9YXA, W9AAB, W9EQO and WA9QOQ for Dec. traffic. Dec. PSNR: W9HRY 48, W9PMT 27, WA9AB 22, WA9YX 22, W9HUI 17, Nov. PSNR: W9PMT 27, Traffic: /Dec.: W9JYO 1150, W9BQ 1017, K9FZX 904, K9IVG 508, WA9YXA 336, W9AAB 285, W9EQO 251, WA9QOQ 250, W9HRY 240, WA9JH 190, W9FVH 164, K9HYV 148, W9ICU 138, K9YBM 124, WA9VZM 116, W9UEM 107, WA9OXH 95, W9BUQ 81, WA9GJZ 78, WA9WMT 68, K9CRS 64, K9CHY 58, K9VHY 52, WA9WA 51, W9YX 42, K9EY 40, WA9AD 39, WA9UMI 35, K9JQY 29, W9SNQ 25, WA9HG 21, W9DZC 20, W9IG 18, W9CMT 16, K9RWQ 16, WA9XF 15, WA9CHY 15, K9ILK 14, WA9VBG 14, W9PMT 11, WA9WSK 11, K9LZN 7, WA9QRO 7, K9WGN 7, W9CUC 5, K9PIJ 5, WA9BV 3, (Nov.) K9HYV 70, WA9BVL 1.

WISCONSIN—SCM, S. M. Pokorny, W9NRP—SEC: W9NGT. PABs: WA9ZT, WA9ZK, WA9OAY, WA9QKP, WA9QNT. RAIs: K9KSA, WA9TXN.

Nets	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1245Z	Mon.-Sat.	368	203	WA9OAY
BEN	3985 kc.	1800Z	Daily			WA9RKP
WI-PON	3925 kc.	1801Z	Mon.-Fri.	482	213	W9VCN
WSBN	3985 kc.	2300Z	Daily	1461	276	WA9QNI
WTN	3682 kc.	0115Z	Daily	414	187	WA9TXN
WSSN	3780 kc.	0030Z	TTSat.	72	15	K9KSA
WRN	3620 kc.	0130Z	Sun./RTTY 24	3		K9GSC
SW6RN	50.4 Mc.	0300Z	Mon.-Sat.	151		WA9EZF
SW2RN	145.35 Mc.	0230Z	Daily	164	12	WA9QZK
WI-RACES	3993.5 kc.	1400Z	Sun.	55		W9NRK/RO

WA9OAY has been appointed PAM for BWN. Net certificates went to WA9QVT and WA9YSD (WIN); W9AAB (HVN); W9AJ, W9BAH, WA9YSD (WSBN); WA9GYF, WA9EDZ, WA9YSD (WSSN). K9UTQ is a new OO and OBS; W9QMT a new OPS and OBS. W9DM and WA9HCZ are ready to follow Oscar-5 when it takes off. K9PQT now is KH6HDJ. The WNA Picnic will be held July 12 at Baraboo, Wis. K9L certifies for Dec. traffic went to W9CXY and W9GSI. Many thanks for a job well done to K9GSC, who retired after eight years as Wisconsin SCM. Traffic: W9CXY 591, W9EAL 410, K9CTM 332, W9DND 219, WA9QK 200, WA9RAK 152, WA9QNI 102, WA9KLR 101, K9FTH 98, K9KSA 68, K9UTQ 62, W9KRO 55, WA9TXN 47, K9THY 42, W9SRU 41, W9RTP 39, W9HFW 38, K9JPS 31, W9NRP 24, W9BCH 23, WA9PKA 21, WA9OAY 14, W9DXV 13, WA9ZTY 12, W9RQM 11, WA9HFB 8, W9ZRD 6, WA9SAB 3, K9GSC 2.

DAKOTA DIVISION

MINNESOTA—SCM, Larry J. Shima, W9PAN—SEC: WA9MZV. PAMs: K9GYO, WA9MMV, WA9OEB, WA9HRM, V.H.F. PAM: WA9DWM. RMs: WA9RRA, WA9IAW, K9JYJ (EC Jackson County) passed away in Dec. W9YHE recently passed the Extra Class test. Under the leadership of WA9MZV, the AREC program has grown to over 65 ECs. Net activities have increased significantly through the efforts of WA9IAW, WA9RRA, WA9OEB, WA9HRM and K9GYO. Statistically the following results have been obtained.

Station Reports	Traffic	Net QNI	Net QTC
1969	693	37,115	36,749
1968	440	18,778	22,243

Growth in 1970 can only continue with the increased participation by more Minnesota amateurs in the various section activities. The anticipated spring floods will necessitate the river reading program of last year. Contact WA9MZV if you can assist in this program. Check in on one of the Section nets as often as possible and get involved with traffic handling. We have a continuing need for active OOs. The PAMs and RMs have a continuing need for NCSs as backup and for regular spots. The only requirement is interest in doing a good job as NCS. The SCM needs information regularly as to individual station activities (new rig, DXCC total, etc.) for this column. Reports must be received by the 5th of the month. Part of the SCM's job is to maintain section membership contact on a personal basis. In 1969 I attended 22 meetings all over the state. In planning my 1970 schedule I would appreciate advance notice on special meetings which you would like me to attend. I want to thank all Minnesota amateurs for the tremendous support given during my first year in office. Traffic: (Dec.) WA9WEZ 315, WA9VAS 305, W9ZHN 233, WA9IAW 226, K9MVF 124, WA9EJ 122, WA9EPX 118, WA9TLY 114, WA9RRA 104, K9ZRD 90, WA9VYV 83, WA9RKY 60, W9PAN 52, W9FIT 48, WA9VTZ 45, W9HEN 44, WA9VLS 44, WA9GRX 43, WA9URV 42, W9BUC 40, WA9VDG 40, K9FLT 30, WA9HRM 30, WA9WDX 36, WA9SDR 33, WA9VHU 33, WA9DOT 32, WA9VFN 32, W9GB 31, WA9MMV 31, WA9RKF 30, WA9ZND 30, W9FHH 29, WA9VPK 23, WA9QIT 27, K9GYO 26, W9KRN 26, K9SRK 23, WA9UW 22, W9EQO 21, WA9VHX 21, WA9VQX 19, W9AAU 17, WA9VU 17, WA9WB 16, W9OYH 16, WA9EBZ 15, WA9LPR 15, WA9IAD 14, W9BUI 13, W9SZJ 11, W9VJP 10, WA9OQH 10, W9ATO 9, K9ITA 9, W9KLG 9, W9MBD 7, WA9CJU 6, WA9UTQ 6, W9NZC 6, K9IKU 5, K9CNC 4, W9KUI 4, WA9INE 4, K9ZWG 4, W9TSJ 3, K9ZBT 2, W9PDK 1, WA9LAC 1, W9OYV 1 (Nov.) WA9THI 119, W9ZHN 109, WA9VH 31, WA9SDR 22, WA9VPK 13, WA9OEF 2, WA9UTQ 2.

NORTH DAKOTA—SCM, Harold L. Sheets, W9DM—SEC: WA9AYL, OBS: K9SPH. PAM: W9CAQ. RM: WA9RSR, OO: W9BF, WA9MSJ spent the holidays with his parents in Cavalier. W9DM and family spent Christmas with his son and family at Minot AFB. K9TTP is getting ready to go West for the duration of the cold weather. W9DND received a new TR-4 for Christmas. WA9AIN has four Novices and a Conditional in the making at Rubey. W9DM and WA9AYL have twenty-five Novices coming up for exams as the result of the classes held in the adult programs. Incidentally, if you have any radio gear suitable for this group contact WA9AIN, W9DM or WA9AYL. K9RSA has an NCX-5 and WA9OQG, who is attending U.N.D., has an HW-12. The Sioux Amateur Radio Club at U.N.D. has new quarters in the Student Union and has moved Drake and Heath gear to equip the station with high and low power for operation by all classes of license. A new TH8DXX will grace the roof of the student center. WA9HUD continues to lead in traffic totals with W9NMV and K9SPH up there too. The c.w. net is picking up. WA9RSR could use a few more. W9WWI spent the holidays in Tucson and worked mobile on 20 meters mostly. WA9HUD tied with WA9WEZ for honors on TEN for Dec. WA9RSR also checks into that net.

Goose River	S	1969	4	58	W9CDO
160m Net		ke.	sess.	check-ins	
		2100	3640	19	Tfc. WA9RSR
N.D. CW Net	CST M-F	ke.	sess.	QNI	54 Tfc. WA9MND,
		0730	3995	31	608
YL WX Net	CST M-M ke.	sess.	check-ins	WA9GRX, W9NMV	
		0900	3996.5	12	321
N.D.P.O.N.	CST Sun, ke.	sess.	check-ins	52 Tfc. WA9HUD	
		1730 Sat.			
		CST Sun,			
		1730	3996.5	47	1087
N.D. RACES	CST M-F	ke.	sess.	check-ins	104 Tfc. K9SPH
		1830 M-F			

Traffic: WA9HUD 296, W9NMV 67, K9SPH 64, WA9GRX 42, WA9SBJ 31, WA9AYL 27, WA9RSR 26, W9GFE 20, W9DM 18, WA9MND 16, WA9TBR 15, WA9UKD 14, WA9JPT 6, K9RSA 4.

SOUTH DAKOTA—SCM, Ed Gray, WA9CPX—W9IT has contacted many states with his low-power rig and shows what can be done with just a few watts and good antenna. WA9CKH, WA9CPX, K9TXW

and WQFT are some of the fellows found on 160 meters some evenings. WOKXZ is seriously considering participating in some RTTY contests. WAQYAK and WAQCPX are constructing watt meters recently described in QST. WAOLYO is nearing DXCC. WQPRZ is becoming more active working DX. WAQUEN has started a Pennington County ARCC Net which is held every Sun. at 1500 GMT. Silent Key: WNOZHF. Net reports: Morning WX Net, 455 QNI-NJO Net, 533 QNI and 49 QTC; Early Evening Net, 791 QNI and 71 QTC; Late Evening Net, 1814 QNI and 68 QTC. The ARCC Net is active every Sun. at 1830 GMT. on 3955 and C.W. SDN is on 3845 at 0100Z. Traffic: WQZWL 0 350, W3ONSA 216, W3HOL 104, W3OPNH 104, W3OPTF 61, W3ORIQ 50, W3WIG 49, W3WUEN 46, K0MZN 39, W3ONSA 30, W3OLLG 27, W3DJO 19, W3OLYO 13, W3OBAIG 4.

DELTA DIVISION

ARKANSAS—SCM, Robert L. Schaefer, WA5HS—SEC: W5PBZ. PAM: WA5KJT. RM: W5NND. Congratulations to W5SAS, who passed the Extra Class exam. K5SCE has a new 5-kw. generator. My wife, Missy, is now WN5AES. WA5KJK is home from Scotland. The group at W5YM is busy moving its repeater site to Robinson Mountain and getting ready for Oscar 5. Net reports for Dec:

Net	Freq.	Time	Tx	QNI	Min.	Member
OZK	3790	0100Z	81			WA5TIS
RN	3995	0600Z	33	509	585	WA5KJT
APN	3937	1200Z	19	379	1366	W5VFW
PN	3925	2130Z	105			WA5TJB
EC Net	3995	0600Z Sun.				W5PZ
DX Info	3860	0045Z Mon.				WA5EFL

Traffic: W5NND 212, WA5TIS 77, WA5KJT 34, WA5TJB 16, K5EDH 14.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PAM—SEC: W5OB. RM: K5ANS, V.H.F. PAMs: W5UQR, WA5DXA. Again we call your attention to the GNOARC project: Ham Radio Doubletons. Contact WA5CZF if interested. Incidentally, the club is conducting radio classes one night per week. W5MBC is 1970 net mgr. for LAN and requests that anyone interested in traffic-handling report into 3815 at 0630 or 0400Z any evening of the week. W5CRZ has installed two antennas at Toledo Bend Lake, the hottest bass fishing in the country. W5EA reports a new group of old-timers meets daily around 7030 for bull sessions. K5ABA won the Annual Powell Memorial Trophy for his outstanding work on LAN during 1969. Our new Delta Division Director, W4VHN, states he will visit each section during the coming year and would like to hear from each of you with ideas or thoughts concerning ham radio. W5SKW, outgoing secy. of the ARC of Southwest Louisiana, has submitted a year's accomplishments of the club doings and activities for 1969. The report includes newspaper and other publicity obtained during the year. Reports are slim this month. If you need report cards let me know. Again I remind you I will not run again for SCM and you club members should nominate some of the good men available. My term ends in June. Watch QST for the announcement. Traffic: W5AH 464, W5CEZ 73, WA5WBZ 64, K5ANS 56, W5MBC 35.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—SEC: WA5JWD. RM: W5JDF. WA5SK1 is operating in the North End, WN5ALG, of West Point, is our newest Novice. W5BW has trouble with his big tin bar still is active on 2 meters. WA5SUE reports that the 2-meter repeater at Keesler is now working and covering the Gulf Coast. WA5UPG Hancock County, WA5GOH Adams County and WA5SUE Harrison County are recent EC appointees. Check your certificate dates and see if your appointments need endorsement. WA5KPS's petition for special auto tag rates for amateurs willing to install mobile rigs for emergency use should come up in this session of the Legislature. W3CTD/5 is doing a fine job on RN5. MSBN and CGCHN. His ORS appointment is being processed. The MSBN's winter picnic is to be in McComb in late Feb. or early March. WA5PZI is now Advanced Class. WA5WJR is now a General instead of Tech. We all wish K5FMY a speedy recovery. Check into our nets:

MSBN	3990 kc.	0015 GMT	Daily
CGSBN	3925 kc.	0030 GMT	Daily
CGCHN	3935 kc.	0100 GMT	Daily

Traffic: W3CTD/5 113, WA5JWD 11, WA5KEY 9, WA5-SEG 2.

TENNESSEE—SCM, Harry A. Phillips, K4HCT—SEC: W4WJH, PAMs: W4PFP, K4MQI, WA4EWW, RM: K4AMO.

Net	Freq.	Days	Time	Secs.	QNI	QTC	Mgr.
TSSB	3980	Tue.-Sun.	0030Z	27	1511	141	K4MQI
7PN	3980	M-Sat.	1345	31	1357	50	W4PFP
		Sun.	1400				
EPFN	3980	M-F	1440	23	810	44	WA4EWW
TPON	3980	Mon.	0030				K4RTA
TTN	3270	Daily	2200	31	240	57	
TN	3935	Daily	0100	31	203	68	K4AMC
ETVHF	145.2	F 5 T	0000	9	66		WB4I08
ETVHF	50.1	MWF	0000	13	207		WB4I08
ETPMN	29.8	W & F	0230	8	96		WA4YON

It seems to me that amateurs are not given credit enough for the little-known services that they provide both on local and national level. The ARRL also is overlooked when it comes to giving credit for contests, FD, NET, WIAW programs etc. W4TZR suggests that 3.880 be established as a place for the Tech using to meet in the advanced portion of the band. ORS WB4JFT should have a new 4-band divide up by now. EC WA4LRA is now Extra Class. Bartlett High School has organized an Amateur Radio Club. Traffic: WA4EZZ 225, K4AT 211, WA4JTY 200, WB4JFT 185, W40GG 161, WA4GLS 26, WB4JTC 23, WB4DJY 21, WB4ERK 20, WA4ZBC 20, WB4H88 18, WB4H11 17, K4PUZ 17, WA4CGK 16, K4AMC 15, W4PFP 15, WB4FCF 13, WA4YEM 13, WA4ZNX 13, WB4G88 12, W4LBD 11, WA4YON 11, W44UCF 10, W40ET 8, W4VJ 8, WB4IMS 7, WA4EWW 4.

GREAT LAKES DIVISION

KENTUCKY—SCM, George Wilson, W4OYT—SEC: W4VYS. Appointed: WB4EOR as ORS. Endorsed: W4JGMA, W44PMT, WA4AVV, WA4AGH, WB4I0B, WA4QZ, WA4WVA as ECs; WB4HTN as EC and OPS; WA4GHQ as EC, OPS, OVS and PAM; WA4FAF as OPS, BPL; W4BAZ, WA4VZZ, WB4HFF.

Net	Freq.	EST	QNI	QTC	Mgr.
KRN	3960	0630	381*	41*	W4BEJ
MRPN	3980	0830	575*	251*	K4PRC
KTN	3960	1000	890	395*	W443GH
KYN	3600	2000/2200	367	519	W4BZ
FCATN	50.7	2100 TW FSS	199*	435*	W40TP
Central Ky.	50.3	2100 M, Th.	13*	8*	W4GHQ

Kentuckiana RC's job at the Hobby Show should be a model for the nation. A big boost to ill W4JHT from W4INK, W4NDY, W4MXD, WA4TTC, W4HRC, W4VYI and W4HNI put him in regular touch with his son W4KYV. WA4FMY and W4VY were featured in the Owensboro paper for their ATV activity in the 20s. W4RHZ seems to have solved the "impossible" audio/stereo development, and also edited a tape on the K16 traffic load immediately after 12/7/41. This tape was featured on one of the local BC stations. W4HSE helped VP28Y replace supplies for a burned-out hospital. Traffic: (Dec.) W4VZZ 928, W44DYI 446, WB4KP6 320, W4RAZ 239, WA4LEX 176, WB4HFF 149, WA4AGH 136, WB4EOR 116, WA4WWT 108, K4MAN 107, W4OYT 106, WA4GHQ 94, WB4HQW 89, WB4LFF 77, WB4OPN 72, K4TFT 64, WB4KER 60, K4UNW 60, W40TF 58, K4HOE 46, W4CHD 45, K4UNM 42, W44DO 40, WB4I0B 37, WB4HUS 36, WA44XD 36, W44UK 33, W48ZB 28, WA4URR 28, WB4FLA 27, K44XV 25, WB4DOM 25, W44YS 24, WB4EQY 23, K4VDO 22, K44NF 21, WB4FDK 20, WB4GCV 16, W4K1P 12, W44K1P 11, W44KAF 9, W44GMA 9, WB4PTN 7, W44RF 7, WB4LZ 7, K4FXN 7, W44OMH 4, K4VCB 2, (Nov.) WB4HUS 89, WB4HQW 54, (Oct.) WB4HQW 27. Traffic: 4231* Reports 54*.

MICHIGAN—SCM, Joseph L. Poutek, K8HKM—Asst. SCMs: Rodner C. Phillips, W4RLWK; Howard A. Walker, W81TO. SEC: W8MPD. RMs: W81TO, W8PTN, K8KMQ. PAM: K8GOU, V.H.F. PAMs: W8CVQ, K8VEM. Appointments: W8CUP, W8FPC as ORS; W8AGQ as OPS, W8HFD as ORS, K8IGQ, W8VRB as EC's. Silent Keys: K8VPY, K4WA.

Net	Freq.	Time	Days	QNI	QTC	Secs.	Mgr.
QMN	3663	2300	Daily	1176	694	92	-----
WSSB	3935	0000	Daily	905	200	31	K8WRJ
UPEN	3920	2230	Daily	359	27	26	W8RLIC
PON-Day	3950	1600	Daily	764	780	31	K8IANE
GLETN	3932	0230	Daily	417	128	31	K8H1L
PON-LW	3615	0000	M-Sat.	169	32	25	V83DFD
M8MTN	50.4	0000	M-Sat.	248	38	26	W8RLRC
B4/MEN	3930	2230	M-Fri.	1080	131	27	K8LJS

Newly-elected officers of the Brass Pounders ARC are W8FWQ, pres.; K8UPK, secy.; K8KJL, vice-pres.; W8JQO, prog. chmn. Gentleman Albert Allen, K4WA, who was editor of the Ham Radio column in the *Detroit News* since 1934 became a Silent Key and will be missed by many. W8MMJT had his LW-20 stolen from his vehicle. W8MAIG is retired and neighbors with W8KWO retired, at Lake George. The QMN Late Net was heard in KH6 with good signals. W8DTEZ should be ex-107WV now and back in Michigan. W8DT worked CEBAE, Christmas Island, during Christmas. W8FWA has been cutting it up with the DX stations. The Grand Rapids ARA is running code and theory classes conducted by W8HKP. The GLARA also is considering moving its repeater to increase its coverage—DXing, huh? The Southeastern Michigan ARA is planning a swap and shop Apr. 12. The Central Michigan ARC has new QSL cards for members. Traffic: W8WZF 908, K8LNE 591, K8ZJL 496, W8JTC 449, K8KMQ 330, W8MGM 213, W8NOH 198, W8SSQ 189, W8RZE 168, W8IZ 137, W8HTL 165, W8LXY 151, W8LXJ 143, W8BDDT 181, W8HRU 108, W8PJM 96, W8SSQ 82, W8MO 77, W8ZF 69, K8ETU 62, W8LUC 61, W8ONZ 57, K8GOU 52, W8RTN 45, W8SYR 40, W8AZPII 40, W8FNW 38, W8KANR 37, W8FN 35, W8MPD 35, W8WVY 19, W8SQH 18, K8NLY/8 14, W8TBP 13, W8FEB 10, W8FWQ 10, W8ZJM 10, W8AGQ 9, W8ARQB 8, K8MEG 8, K8CKD 7, W8SS 2, Total 5355.

OHIO—SCM, Richard A. Egbert, W8ETH—SEC; W8OUU, RM; W8IMI, PAM; K8URK, V.H.F. PAM; W8ADU, Dec. net reports:

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
OSSBN	2384	1383	66	3972.5	1530 & 2345Z	K8URK
BN	423	492	62	3580	0000 & 0300Z	W8IMI
06MtrN	492	114	56	50.61	0000Z	W8ADU
				50.16	0200Z	
OSN	281	118	31	3580	2325Z	W8AVU
Apricot	248	585	31	51.0	0000Z	K8ONA

BPL certificates for Dec. go to W8UPH and W8ETX. A total of 43 BPL cards were issued during 1969. The total traffic handlings for all four of our section nets for the year was nearly 22,000. OSSBN Mgr. K8URK sent a detailed report of net statistics which shows traffic handlings up almost 4000 over 1968 for a total of over 15,000. This is a good time to congratulate all of our section net managers and net participants for their excellent performance. The Marion, Massillon and Inter-city Radio Clubs set up stations in public places to handle holiday message traffic. Net certificates for OSSBN participation were earned by W8LAG, K8ONY and W8TKM. Canton ARA's new officers are: W8PZG, pres.; W8TUY, vice-pres.; W8SRV, secy.; treas. K8DHT W8SCL, K8USV, W8ZRY and W8OG joined the Silent Keys. W8GRT reports that the Williams Co. Sheriff's Dept. sent a patrol car to deliver two military Christmas messages on Christmas Day. W8RBO is now located in Grand Rapids, Mich. K8BPX recommends working the Novice bands. He says you can be "first Ohio" in three out of ten QSOs. W8GNI was NCS 95 times on OSSBN during 1969, and was master of ceremonies over 2533 QNI and 1504 QTCs. Dayton ARA examined 21 members of its fall code and theory class for the Novice Class license. The Newark ARA Club's new officers are W8EOG, pres.; W8AWCW, vice-pres.; W8QXD, secy.; W8ZES, treas. 160-meter enthusiast W8GDQ tells of working HR9, DL9, HR2, VE4 and G3 on that band. SEC W8OUU's year-end report shows that we have 875 AREC members in our section. A total of 139 AREC drills was conducted during Dec. There are 28 AREC nets active, all of which conduct liaison with NTS. These numbers are all significantly larger than the totals for 1968. EC W8ERD is now mobilizing at a kw. level. The Buckeye Net Bulletin reports that BN's QNI total for the year is up 7 percent, and QTC's better by 8 percent over 1968. 06MtrN Mgr. W8ADU shows a total of 44 "regulators" on his net roster. Veteran DXer W8ZCQ lists for us the Ohio members of the DXCC Honor Roll as follows: W8AJJ, W8RF, W8BGU, W8CUT, W8DE, W8DM, W8EYZ, W8GZ, W8HGW, K8URK, W8JN, W8KIA, W8KTT, W8MPW, W8QJH, K8RTW, W8WZ, W8YCP, W8ZCQ. Dec. appointments were: W8SSP as OO, W8IMI and W8ZNC as OBSS. Those submitting data for PSNR listings are reminded that we require a breakdown of activities as shown in Nov. 1969 QST. I visited the Marion ARC during Dec. and enjoyed the hospitality of this fine and active club. A long-overdue visit also was made to ARRL Hq. for some lengthy and rewarding confab with "Boss" WINJM and other members of the Hq. staff. Traffic: (Dec.) W8UPH 963, W8KTX 926, W8AKW 246, W8AVU 222, W8OCU 225, W8ZTY 224, W8VND 218, W8IMI 210, W8ACXY 186, W8ADWL 169, W8BALU 159, W8SUS 157, W8ETW 156, W8PMJ 153.

W8SDSV 145, W8GVC 131, W8CFT 130, W8WAK 123, W8QZK 120, W8OCG 118, K8URK 116, K8ONA 112, W8ADU 109, W8VTL 107, W8JD 102, W8SSD 100, W8BHZ 98, W8EPU 94, W8YH 89, W8VY 86, W8VYQ 80, W8TYF 79, W8ULF 78, W8JF 75, W8BCKT 71, W8UX 61, W8JK 60, W8ANQ 60, W8FGD 59, W8AYUB 37, W8SPK 56, W8BAKU 55, W8GNT, 54, W8ADU 53, W8DAK 49, W8MOC 49, K8QYR 49, W8NAL 45, W8MHG 44, W8UDG 44, W8BAJC 43, W8BU 42, K8LGA 39, W8SSP 37, W8YHN 36, W8ZNC 35, W8BLH 34, W8ERD 33, K8BYR 31, W8ACOB 30, W8CFT 29, W8LZE 29, K8LXA 25, K8PBE 25, K8ONV 22, W8AWH 22, W8YLV 22, W8BPP 21, W8CUT 21, W8OFK 21, W8KPN 19, W8OP 18, W8FQW 16, W8TKM 16, W8PSX 15, W8GOE 15, W8LQ 15, W8RWW 15, K8CKY 14, K8ZBL 14, W8ACV 12, K8DHL 12, W8XAI 11, W8BDN 9, W8JEH 9, W8QX 9, W8UPU 9, W8RYP 8, W8WEG 8, W8ZYT 8, W8BAGD 7, W8ARW 7, K8EKG 7, W8HLE 7, W8GHI 7, W8LAM 7, K8LFE 7, W8HCH 6, W8MGC 6, W8HZN 5, W8CFJ 5, W8EBS 5, W8IO 5, W8ISW 5, W8PCT 5, W8ARU 5, K8WZ 5, W8BCH 4, W8RQC 4, K8EHL 4, W8AIC 4, W8WJR 3, W8ZUK 3, K8BPX 2, W8DYF 2, W8RHT 2, W8ZGC 2, W8NSCW 1, (Nov.) W8OCG 75, K8LXA 44, W8YHN 29, W8FQW 26.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SUN—Asst. SCM/RM; Ruth E. Rice, W2YVS, SEC; W2KGC, PAM; W8ZJB, V.H.F. PAM; W8ZYU, Section nets: NYS nightly on 3075 at 2300Z; ESS 3500 nightly at 2300Z; NYSPT&N nightly on 3925 at 2300Z. On the club circuit for Dec.: VK1ZAR was speaker at the Communications Club of New Rochelle Dinner along with Director W2TUC, who installed new officers and directors. The K2BYC Memorial Award went to K2QDF. The Westchester ARA Annual Dinner was held with W2MOI as chairman. Look for WARA's Technical Net on 23,690 Wed. at 1930 local time. Problem-solving is a specialty. The Albany ARA election meeting was held Dec. 12. New officers are W2TDE, pres.; K2BUK, vice-pres.; W2ICZ, secy.; W8ZJB, treas.; W2WSY, director for a 3-year term. The Schenectady Club board W2PY and his XYL speak on their last summer's visit to Finland. The SARA has 12 "family" groups of licensees. Can any other club match 'em? W2KGC reports starting the year with the following active EC's in the area: Westchester W2JWL, Dutchess W2HZZ, Rockland K2CNO, Albany W2BAH, Ulster W2WGE, Schenectady W2URP, Orange K2AXI, Greene W2WGE. We still are looking for County EC's in Columbia, Rensselaer and Putnam. Volunteers, contact the SCM or SEC. We want to fill the roster for R.N.Y. as soon as possible. Reminder to appointment holders: Send your certificates to W2YVS for renewal processing. Individual station activities: K2QBW received a PS award from ARRL, a BCRTA certificate from RSGB and a new mike from S. Claus. K2UTY (W8RGD) has a new kw amplifier and a new beam helping him to run up the DX total and hold his position in CD Parties. W2EFTU expects to be active again soon. EC W2JWL reports the Westchester County AIRPSC Net on 3925 kc. Wed. at 8:00 P.M. local time welcomes liaison from other nets and other areas. As of column closing, the New Rochelle club has 60+ students registered for the new Novice course, to be followed by a General-Advanced-Extra theory course in the spring. W8ZJB was waiting at press time for his new Advanced Class ticket, and is net mgr. for NYSPT&N for this year. W8ZNVJ is finishing a tape unit for c.w. via the RTTY TR unit. K2RRZ has gone to Hawaii for a short trip. Those making the Public Service Honor Roll for Dec. include W2FBI, W2YVS and W2VYT. Traffic: (Dec.) W2FBI 235, W2EAF 226, W2YVS 73, W2ANV 53, W2HGB 47, W2THE 37, W2URP 35, W8ZJB 33, K2SUN 27, W2GQW 22, K2UYK 20, W2VLS 18, K2HNW 16, (Nov.) K2DTP/W8RGD 2.

NEW YORK CITY AND LONG ISLAND—SCM, Fred J. Brunjes, K2DGH—SEC; K2OVN, PAM; W2EW.

NLI*	3630 kc.	1919/2300 Nightly	K2IAT RM
NLI/VHF*	145.8 Mc.	1930 MTWTF	W8ZHQ PAM
NLI Phone*	3032 kc.	1600 Daily	W2WVA PAM
Clear House	3925 kc.	1100 Daily	W2AGPT Mgr.
Mic Farad	3925 kc.	1100 Daily	K2HRC Mgr.
East US	3683 kc.	0001 Nightly	K2URC Mgr.
All Sec.	3925 kc.	1300 Sun.	K2AS Mgr.
NYSPTEN	3925 kc.	1800 Daily	K2SPO Mgr.

*Section nets. All times above are local. As you read this column, my term as your SCM has been running for two months. My thanks to Blaine Johnson, K2EDB, for a smooth transition of office. I will do

my best to run this section in a smooth and successful manner, with your cooperation. I hope you will let me know from time to time what you are doing, so I may pass it along via this column to others. Well down to business, New Club officers: Suffolk County RC—WA2-FJQ, Order of Boiled Dogs—W2GGE, Kings County Handicappers—WB2JJK, Rockaway ARC—W2VHA, LIAI-ARC—K2CQM, W2PF reports the QCWA Net shifts to 4,232 kc, at 11:00 EST, Sun., 3332 kc, at 9:00 P.M. EST. Queens RC WB2IPQ is looking for members on 2-6-10 meters Mon, at 2000 EST on 145.82, 30.52, 29.5 a.m., 146.8 Lm. WA2LJS reports a new bird proof tower. WB2RZF is now Extra Class, congrats. K2LCK says transmitter hints are being held again. Contact him for details. Suffolk County RC and LIAIARC are coordinating the F.M. repeater 34-76 on L.I. WA2BBS really is making them up those days via 6 meters. The Flatbush RC station is getting ready for business. W2MBH received a DXCC 180 endorsement. WB2TBP is the new pres. of the Shyversant HS RC. WA2Y8Y and WA2YQI have acquired 1st class radiotelephone commercial tickets. Comments on making the BPL to WA2HMO, K2VAT, K2JRG and, would you believe, W2FUK, the first one ever! Traffic: K2UAT 777, WA2HMO 597, K2JRG 420, W2FUK 250, WB2IPQ 45, K2AAs 39, WB2RZF 22, W2PF 20, K2DGI 14, WA2LJS 6, WA2QJU 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoros, W2ZZ SEC; K2KDO, Gals: WA2TAF and WB2RKK, PAMs: W2PEV, K2KDO, WA2KZF and WA2TBS.

ARRPS Section Net Schedules

Net	Freq.	Time	Days	Sess.	QNI	Tls.	Mgr.
NJTTN	382A kc.	7:30 P.M.	MWF	13	25	1	WA2TAF
NJN	3695 kc.	7:30 P.M.	Dy	37	485	572	WA2BLV
NJN	3695 kc.	10:00 P.M.	Dy	31	211	115	WA2BLV
NJSN	3740 kc.	8:00 P.M.	Dy	19	64	73	WB2FEH
NJEPN	3950 kc.	6:00 P.M.	M-Sat.	31	887	540	W2PEV
NJPN	3950 kc.	6:00 P.M.	Sun.	4	108	63	WA2TBS
NJAN	50,325 kc.	8:00 P.M.	M-F	23	276	71	WA2KZF
PVETN	145,710 kc.	7:30 P.M.	Dy	36	324	378	K2KDO
RTTN	146,700 kc.	9:00 P.M.	Dy	31	181	108	WA2TBS

New appointments: WA2UJ as EC for Bayonne and vicinity, WB2RUM as EC for Clifton and vicinity, WA2TAF as OPS, WA2DRH as OPS, Endorsements: WA2IGQ as EC for Rahway and vicinity, WA2ASM as EC for Plainfield and vicinity, W2JFH as G.O., WB2WNZ as OPS. New officers of the Fairview ARC are WA2EGR, pres.; WA2DLG, vice-pres.; WN2MEL, secy.; W2TIV, treas., WA2DNB, WB2FH, WB2DRG, WA2HEL and WA2CGM visited WIAW during the Christmas vacation. W2CVV is back from a winter cruise to VP7-Gand. WA2BCT passed the Extra Class exam. Both WB2RKK and WA2DNB were back in the nets during the Christmas break. WA2ATO won first place in the recent N.Y. QSO Party. WA2JED received his Extra Class license. WB2LWH received his WAC and WAB and has 57 worked towards his DXCC. WA2ECO is waiting for the last 3 QSTs to arrive for his WAB. WB2YPO added the NCX-3 for s.s.b. WN2KVR and WN2LCT are a new father-and-son team in Ramsey. W2EWZ was promoted to Colonel in the U.S. Army Reserve. WA2JOC is trying out his new keyer. WA2ERF has his new SR-200 working. WA2HEF, now is using the RAH and T4X. The West Jersey RC holds code practice sessions on 146.8 every Mon, at 8 P.M. WA2RUX lost his long wire during a recent ice storm. WN2KXW is on with the DXCC and 8X-1H. WN2KJD now is on 15. WA2EIV is planning a homebrew transmitter. WA2HEF, passed the Advanced Class exam. Traffic: (Dec.) WA2BAN 1752, WA2PHZ 1347, K2KDO 548, K2DEL 468, WB2FEH 457, WA2DRH 250, W142W11 161, W142U12 146, K2CQJ 144, WA2BHI 150, WA2TRS 119, WA2HSJ 106, WA2DQE 80, WA2ETX 67, WB2RKK 58, WA2RCT 56, WA2TAF 51, W2PEV 51, W142VNZ 19, K2DQT 43, W2EWZ 41, W2PEV 40, WA2NJB 39, WA2CPC 52, W2CVH 30, WA2GQC 28, W2ZZ 27, WA2FV 25, WN2BVH 18, WN2JHT 16, K2MFX 15, W2DRY 8, K2ZPF 5, W2TFM 2, WA2EU 1. (Nov.) WA2BHI 36, W2CVV 26, WB2-VPO 21, WB2BXX 20, W2DRY 9, (Oct.) WB2YPO 105, WA2BCT 14. (Sept.) WA2BCT 85.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, K0MHX—SEC; K0LYB, PAM: W0PZO, RM: W0LGG, ORS: W0LXC, W0JQA, W0LR, W0AINT. New appointees: W0GPIU as OPS and K0ITZL Scott Co., W0UCE Poweshock Co., W0ATVE Linn Co., W0VVRJ Clay Co. as ECs. W0UCE hosted a gathering of approximately 15 hams to form a new club in the Grinnell area. W0KR made WAS four times last year but still needs two confirmations. K0ISA returned from several weeks training at Ft. Gordon, Ga. W0APUI is majoring in forestry

at I.S.U. WB0AFJ is a new club station at St. Ansgar High School with W0DSP as trustee. New licenses are WN0AEZ and WN0AGA. Roosevelt High ARC wishes to thank all who made its 9 District QSO Party a great success. Over 122 logs were received from more than 30 sections. 1970 officers of the 160-Alder Net are W0SR0, pres.; W0BTR, vice-pres.; K0TJY, secy.-treas.; W0GGS, act. mgr. North Iowa ARC's 1970 officers are W0ONYU, pres.; W0KRE, vice-pres.; K0YVV, secy.-treas.; W0QZJ, act. mgr. Several Iowa stations are participating in the afternoon informal Dead-End Net on 3880 at 1500Z. Happy Wearing of the Green.

Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3670	M-Sat	1830	1650	339	W0PZO
PLCN	1580	Daily	0630	226	117	K0AZJ
Iowa 160	1815	Daily	0100	825	18	K0TDO

Traffic: (Dec.) W0LON 1332, W0UPX 238, W0UCE 178, W0YKI 173, W0LGG 115, W0VZH 95, W0AUX 88, W0DQJ 82, K0AZJ 69, W0KB 58, W0PZO 58, K0JGI 41, W0QZJ, 30, W0JLZ 29, W0APOS 26, W0VVR 25, K0TDO 17, W0VVBG 15, W0AMT 13, W0WR 12, W0AIAW 10, W0DMX 10, K0KLD 10, W0MLO 7, W0RIZ 4, K0ISA 2. (Nov.) W0UCE 111, W0LGG 94, K0LKH 3.

KANSAS—SCM, Robert M. Summers, K0BXF—SEC; K0EAB, RM: K0MRL, PAM: K0JME, V.H.F. PAM: W0GCCV. Congratulations to W0PYP and W0PPI on the arrival of their first harmonic Dec. 15. Recent stations: Ar Capital Tech-Ni-Cat Wichita—W0GCT, pres.; K0DYH, vice-pres.; W0SPE, secy.; W0MRL, WA0GV, W0GCCV, board members. Johnson County Radio Amateur Club—K0HAI, pres.; WN0UCI, secy.; W0ZJY, vice-pres.; W0HAI, treas. Wichita Amateur Radio Club—W0GFER, pres.; W0GUTT, vice-pres.; W0APZO, secy.; W0QPY, treas.; K0WOP, pub. dir. Jayhawk Amateur Radio Club, Kansas City—W0PBR, pres.; W0PKN, vice-pres.; W0AIVR, secy.; K0CZT, treas.; W0HPS and W0GWS, board members. W0PR at Hiawatha, helped provide a 2-meter voice circuit from the air port at Hiawatha to the Natl. Guard Armory during the Homecoming Program for Hiawatha's Natl. Guardsmen. W0KDE and W0JOG have both left the state for new residences. Ray to Warrsburg, Mo., and Vern to Silver Dollar City, Mo. Kansas Sub-band Net report for Nov.: QNI 298, QTC 100, 25 sessions. KPN reports QNI 203, QTC 18, 18 sessions. (The Tri-State ARC elected K0LJL, pres.; K0PZT, vice-pres.; W0FXU, secy.; W0TE, treas. AREF activity in Zones 1, 7 and 15 still are on a good plane with each zone listing QNI results of 50-plus for the month. PSNR: W0H 38, K0MRL 43 and K0BXF 27. KSNB reports QNI 1076, QTC 199, 33 sessions. KPN reports QNI 194/29/15; KPN 1409/770/25; QK8 505/25/62. This net still is in need of representatives for several of our larger cities. KWN reports for Dec. QNI 180, QTC 16, 1080 totals is as follows (QNI/QTC): KSNB 8006/2070; KPN 2957/408; KPN 13410/8016; KSN 4436/2325; KWN 8446/609. Traffic: (Dec.) W0INH 449, W0H 250, W0LLC 165, K0MRL 133, W0MA 124, W0UTT 113, K0JMF 110, W0WYN 107, W0OQO 88, K0BXF 86, W0ATZK 67, K0LPE 55, W0GCG 40, W0GWH 36, W0CHJ 28, W0GIX 22, W0ASHG 18, K0UVH 17, K0GZP 15, W0VCY 13, W0LYC 10, W0OZP 9, W0UCZ 9, W0PBR 4, W0JOG 3, K0RFD 2. (Nov.) W0H 327, K0MRL 137, W0MA 110, K0JMF 79, W0ATZK 37.

MISSOURI—SCM, Robert J. Fowler, W0RV—SEC; W0HUL, New appointments: W0VYN as OPS and ORS; W0QZU as ORS. MWN certificates go to W0VLD and W0VJN. With deep regret I report that K0FSL of Brookfield and W0LZG of Kirksville are Silent Keys. Net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MRN	3905	2300Z	M-W-F	14	211	9	W0BTL
MON	3585	0100Z	Daily	51	131	117	K0AEM
MOSSB	3983	2400Z	M-Sat.	27	1281	148	W0BTO
MNN	7063	1900Z	M-Sat.				W0UO
MOFON	3633	2300Z	M-Sat.	27	250		W0PAA
SMN	3585	2200Z	Sun.				W0UO
MWN	3585	0345Z	Daily	31	180	187	W0RRV
MOCD/CW	3531.5	1400Z	Alt. Sun.	3	17	15	K0RPH
PHD	50-45	0130Z	Th. (GMT)	5	144	8	W0AKUI

Those wishing to start a slow-speed Novice net should write to Harry L. Moore, WN0ZLP, Route 9, Box 437, Springfield 65804. Those interested in participating in the Missouri Tennerge Traffic Net should contact Dale Dermott, WA0YRY, 103 West 4th St., Lamar 64759. Missouri amateurs were surprised to learn that the General (Continued on page 95)

EIMAC's new family of outstanding power tetrodes offers 13 impressive features:-



- (1) High linearity. 3d order products — 40 dB or better.
- (2) Low input capacitance. Typically, 45 pF.
- (3) Over 600 watts measured output at 865 MHz.
- (4) Very high gain-bandwidth product. Over 125 MHz.
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- (6) Low drive. Typically 40 volts for class AB-1 service. Easily driven at 150 MHz with 5 watt solid state device.
- (7) Plate dissipation up to 800 watts. Both air and liquid cooling available.
- (8) Coaxial base adapter available.
- (9) Shock-resistant design for rugged service.
- (10) 20 kW pulse output at 430 MHz.
- (11) Very low cathode lead inductance.
- (12) 5-pin base adapted for heat-sink cooling.
- (13) High grid and screen dissipation ratings.

The unique 4CX600 family is an exciting result of EIMAC's CAD (computer-aided-design) program for ceramic/metal tetrodes. Closely controlled parameters permit intermodulation distortion limits to be included as a defining tube characteristic, establishing new criteria of performance.

EIMAC's advanced segmented cathode and electron focussing combine with an unusually high figure of merit in this family, providing you with tubes useful in widely diversified services: linear amplification, high reliability aircraft-to-ground communication, wideband

distributed amplifier service in airborne ECM gear, and r-f pulse application.

Another example of EIMAC's ability to provide tomorrow's tube today! Here are the numbers to prove it:

TUBE TYPE	FIL. VOLTS	RATED TO: (MHz)	BASE	COOLING	MAX. RATINGS		TYPICAL POWER OUTPUT (150 MHz)	USEFUL FOR:
					Plate Volts	Plate Amperes		
4CX600B	6.0	890	5-PIN SPEC.	Air	3000	0.6	740W	WIDEBAND AMPLIFIER SERVICE
4CX600F	26.5							
4CW800B	6.0	890	5-PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800F	26.5							
4CX600J 8809	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE

More? Our Application Engineering Department's ability to design tube into circuit means less engineering time for you. For all-around capability, talk to EIMAC. For circuit and application information on these new power tetrodes, write to EIMAC for our new, free application bulletin #14, *Using the 4CX600 Family Tetrodes*. Or contact your nearest Varian/Eimac Electron Tube and Device Group Office. They are located in:

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John Morgan near Auckland, New Zealand, has had three QSOs with Kjell Rasmusson near Lund, Sweden, via 2 meter moonbounce. Both John and Kjell use EIMAC radial beam power tetrodes in their transmitters.



tubes, and the fact you don't need acres of land and unlimited resources to experiment with moon-bounce techniques.

John points out that he has only a quarter-acre suburban homesite, a homemade rig, wife-and-son engineers and

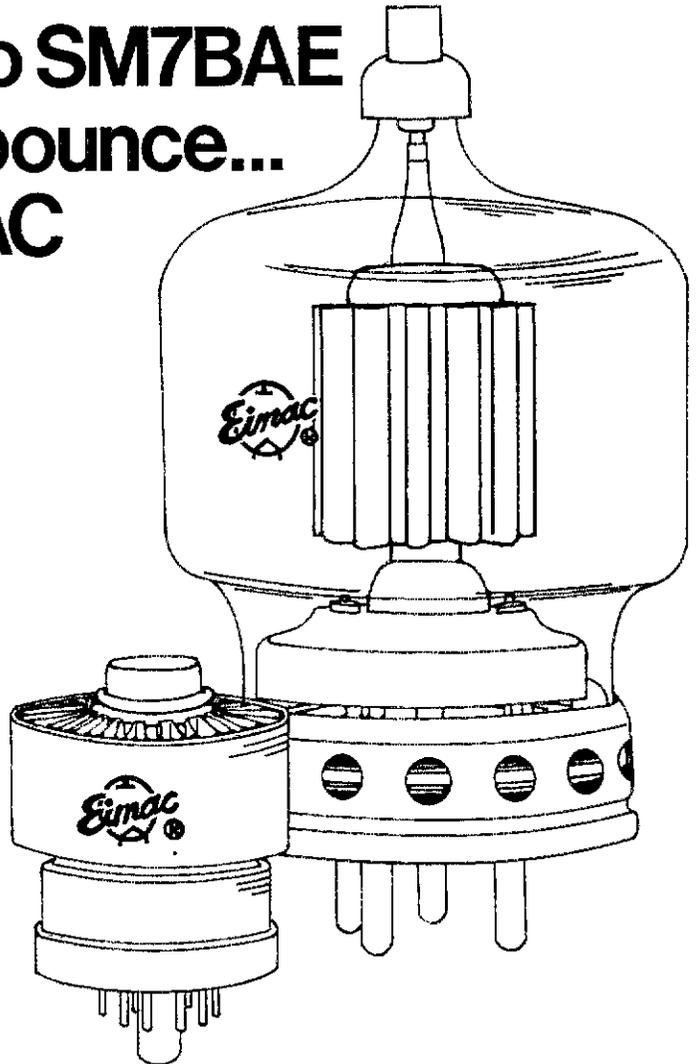
ZL1AZR gets a measured 550 watts output with 80 watts drive at 1 kW input. He uses two EIMAC 4-400A tetrodes, cathode driven, with grid and screen grounded. His antenna has 8 bays of 6 over 6 slot-fed Yagis spaced one wavelength. SM7BAE uses two EIMAC 4CX250R ceramic tetrodes, grid driven, with 1000 watts input. His antenna is an array of sixteen ten-element Yagis. Both amateurs have proven the ruggedness and dependability of EIMAC

dozens of curious neighbors. Next step is to QSO Kiell on 144 MHz RTTY.

Put up your 2 meter antenna and listen to these record-breaking schedules. Make it a three-way QSO with EIMAC tubes! And for more information on EIMAC tubes at VHF write Amateur Service Dept., EIMAC Division of Varian, San Carlos, California 94070.



ZL1AZR to SM7BAE by moonbounce... with EIMAC tubes



Assembly, unknown to practically everyone, had eliminated call-letter license plates in the last session. Congratulations to WA0KPF, who was recently married; to K0QNU, who was married on Dec. 20; to WA0YBB, who passed the General and Advanced Class tests in one session; to W0HTL, WA0QIA and K0RWL on perfect QNI on MoPan in Dec.; and to K0ORB on honorary membership in the Society of the South Pole. Traffic and PSHR (:): (Dec.) K00NK 1767, K0AEM 589, WA0RVR 480, K0EOD 208, WA0HTN 191, W0BY 149 (32), W0JKE 142, WA0VRI 101, K0RPH 77, WA0VJN 76, W0QUD 65, WA0TXP 52, W0BUL 43 (64), W0RTO 31, WA0TAA 25, K0ORB 22, WA0QIA 19, WA0WFN 18, WA0WQA 18, WA0FMD 13, WA0KUH 12, WA0YR 11, K0WTZ 10, W0GEB 4. (Nov.) K0NK 1712, WA0WQA 1.

NEBRASKA—SCM, V. A. Cashon, K00AL—SEC: K00DE, WA0SOP has organized the Early Bird Storm Net (RHSN) which meets the first Mon. of each month and on days of inclement weather at 0830 CST on 3982. Norm would appreciate support. K00DE reports 318 AREC members at the year end. If you are not an AREC member and wish to join, see your EC or write K00DE, W0CT, ex-W0EUT, plans retirement from FAA and his return to Nebraska sometime in 1970. Congratulations to the following new officers: Hastings ARC—K0FJT, pres.; K0MRH, vice-pres.; W0LJO, secy.-treas. Pine Ridge ARC—WA0PIF, pres.; WA0FCV, vice-pres.; K00DE, secy.-treas. Dec. net reports:

Net	Freq.	GMT	Days	QNI	QTC	Mgr.
NSN I	3982	0030	Daily	1352	127	WA0LOY
NSN II	3982	0130	Daily	947	55	WA0LOY
Nehr 160	1995	0130	Daily	751	14	WA0CBI
NEB II	3590	0400	Daily	59	26	WA0HWR
EBSN	3982	1230	1st Mon.	17	0	WA0SOP
NMN	3982	1330	Daily	1120	65	WA0JUF
WNN	3950	1400	M-Sat.	612	51	W0NIK
AREC	3982	1430	Sun.	172	2	W0IRZ
CHN	3982	1830	Daily	1116	154	WA0GHZ
DBN	3982	2200	Daily	300	35	W0FBY

Traffic: W0LOD 258, WA0IBH 75, K0JTW 88, WA0SOP 66, WA0JH 65, K0RRI 46, W0AGR 33, WA0FGY 33, W0GEQ 32, WA0TTM 29, WA0GRW 28, W0VEA 24, WA0GHZ 21, WA0BOK 20, W0PQB 18, K00DE 18, WA0KTD 17, W0NIK 15, K00AL 14, WA0UPK 14, WA0PCC 12, W0RJA 9, WA0JUF 8, W0RAM 8, WA0VJ 8, WA0QEI 6, WA0GAT 4, W0PFA 4, W0SWG 4, K0UDW 4, K0BYR 3, WA0EEI 3, W0EWF 3, WA0LOY 3, WA0MHW 3, W0YFR 3, WA0BL 2, WA0NYM 2, W0RPB 2, W0SQA 2, WA0VML 2, W0BFN 1, K0SFA 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNassor, W1GVT—SEC: W1IHR, RM: W1HSN, PAM: K1YGS, V.H.F. PAM: K1SXF, Dec. report:

Net	Freq.	Days	Time	Seas.	QNI	QTC
CN	3640	Daily	1845	31	366	400
CPN	3965	M-S 1800 Sun.	1000	31	416	125
VHF 2	148.98	M-S	2200	22	80	16
YHF 6	50.6	M-S	2100	23	175	8

High QNI: CN—W1GPH, W1HOL and W1JZC. CPN—W1LLB 31, K1YGS and W1GVT 29, W1DQJ 27, K1SXF 26, W1HOL, W1KMR and W1YBH 21, K1DGG 19, W1AFX 18, SEC W1IHR is very busy with the Conn. EC program. All ECs have been contacted and your help will be appreciated. New ECs are being appointed where needed and available. Be sure there is an active EC in your area. Contact W1IHR for information. *Nutmeg Net News* de W1HSN again is well done and filled with important information. *The CARA Newsletter* and the *Murphy Message* also are always very informative. All appointees: Check the Jan. CD Bulletin and be sure to return Poll Sheet! Sincere thanks to Murphy's Marauders for a wonderful evening at its Annual Christmas Party Banquet. All DX/Contest operators should be members! The Navy MARS 2-meter repeater is on the air 24 hours every day! The Conn. Amateur Repeater Organization hopes to have the new repeater station operating soon. Contact W1LLB (via CPN) for information on the c.w. practice station project. Ragglers: The Farmers Net is on 1840 kc. Sat. from 7 to 9 P.M. Notes: K1TKS now is W3NUH. W1AFX is getting a full RATT station. W1NFG haw has an HW-12A mobile. Congratulations to: W1LWD on Advanced Class; W1HOL on Dec. BPL also on being an award winner of the Russian CQM Contest! The New Public Service Honor Roll listing is available to all—see Jan. QST for

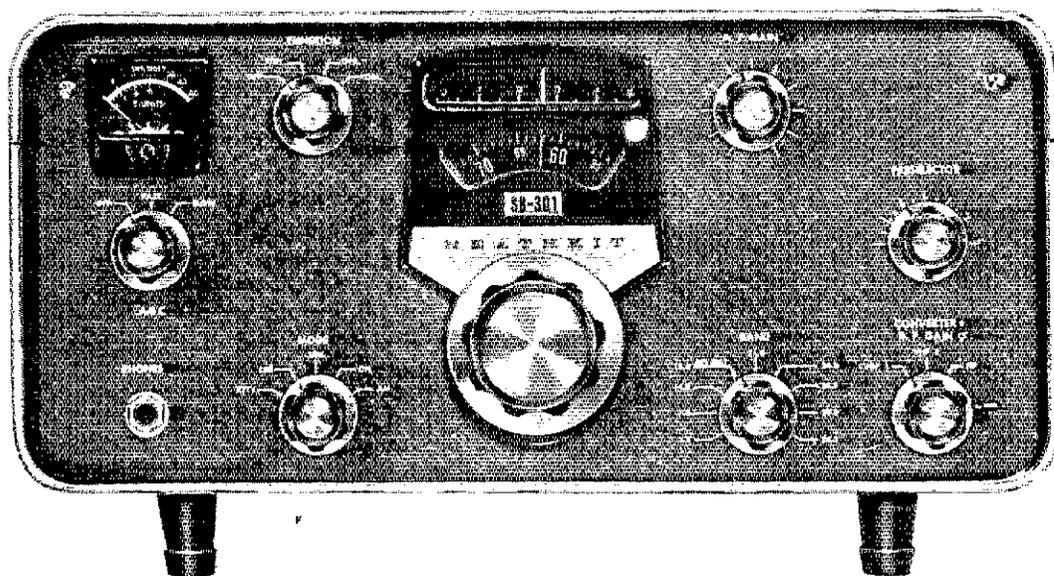
details. Traffic: (Dec.) W1EFW 496, W1HOL 408, W1HSN 203, W1EJ 157, W1JZC 117, W1BNP 166, W1KLO 102, W1GPH 66, K1EJR 59, W1OBR 49, W1GVT 42, W1LLB 40, W1GFW 39, W1AW 37, K1SXF 35, K1YGS 27, W1MPV 24, W1IHR 22, W1JGA 22, W1JJSU/1 20, W1JGF 18, W1BDI 17, W1CCH 17, W1BNB 16, W1CTT 12, K1EIC 12, W1AGWS 12, W1AIK 11, W1QV 8, W1YRH 8, K1TKS 6, W1ALMO 5, W1DQJ 4, W1AFX 4, W1CWE/1 2. (Nov.) W1JMO 21, W1GFW 4.

EASTERN MASSACHUSETTS—SCM, Frank I. Baker, Jr., W1ALP—W1AGC, our SEC, received reports from W1LAW, K1DZG, W1AS DXI, IRY. Sorry to have to report these Silent Keys: W1ZR who was 95 years old, W1BLA, W1MJ, W1NKTW is on 40 and 80 c.w. W1NF has a new frequency marker. The South Shore Club had a Christmas Party, New Y1s: W1NS MGK, MER, MFP, MEZ, W1MGC, W1LAW passed the Extra Class exam. K1UMP had his hand hurt when the crank-up tower came down on it. K0CIX is living in So. Boston. W1AKY has his Extra Class license, also W1DJC, who has 4 new Novices at his school. New officers of the New England Chapter of the IOTA: W1DFS, chairman; W1KJ, vice-chairman; W1ALT, secy.-treas. W1KQJ moved to Weymouth. W1EHT reports that the NEEPN had 4 sessions, 96 QNIs, 6 traffic. EBN had 50 sessions, 285 QNIs 232 traffic. K1NFV is the new RO for Melrose. W1KJR reports that the Barnyard Net had 475 QNIs, 27 traffic. The Whitman RC has 3 towers up at the club house. The T9 RC met at W1TJP's QTH. W1MGP reports the Partners Net meets on Sat. P.M. from 7 to 9. K1UW has a new HA460 for B. New officers of the So. Eastern Mass. ARC: W1ACRA, pres.; W1ATI, vice-pres.; K1VJP, secy.; W1ADHM, treas.; W1AFNM, K1TVY, directors; K1KCK, trustee. K1VJP did a nice job on the Christmas Party. W1DOM and W1JKJ an new OBSS. The Capeway RC elected W1ZST, group mgr.; W1ANB, asst. group mgr.; K1MAK, secy.; K1IIP, treas.; K1HGT, certificate chairman. W1UOH has a new trapped vertical antenna. W1AIGL now is General Class. New officers of the Waltham RC are K1MOM, pres.; K1EMU, vice-pres.; W1LQU, secy.; W1DDN, treas.; W1JCT, director. W1IHL is permanent N.C. of the P.O. Net on Sun. W1IFF is alternate. W1IFE worked W4-Land on 6. K1MOM is on 6 RTTY. W1NF says a lot of bootleggers are on the air. W1DFL worked into W3-Land on Meteor Scatter. Appointees endorsed: W1S BB, IAU, MNK, YYZ, K1WVA as ECs; W1S EDJ, IAU, OFK as OVSs; W1LAW as OBS; W1BB as OO; W1PEX as OHS; K1CLM as OPS. W1PEX, W1OJM and W1EYY made the BPL. The Needham Sr. HSARC is turning out a lot of new Novices. W1JKJ is on ECTTN at 2200 on 7290. The ECARS is now on 3921 kc. YV1ACI visited W1FHF. K1WVW is in Army MARS. W1DAL has a 140 sticker for DXCC. W1BHY has a Swan 500C and a Hustler antenna mobile. E12MN had 24 sessions, 160 QNIs, 290 traffic. The 6 Meter Cross Band Net had 22 sessions, 84 QNIs, 4 traffic. W1IMW is becoming interested in nets and traffic. The Quannapowitt RA had Mr. From speak on "Microwave Communications for the Amateur." W1S CUY and OFK are back on 2. The Framingham RC holds regular meetings. W1MIG has his General. Active in the greater New Bedford area drill: W1S LE, UID, DIY, W1AS HNS, ESY, DHM, K1S DIY, BJP, Y1AW. Public Service Honor Roll: W1LWJ for Nov. and Dec.; also K1ESG, W1AIRY, W1S RUF and H6J for Dec. Traffic: (Dec.) W1PEX 781, W1OJM 738, W1EYY 571, W1AFAD 267, W1QYV 188, W1EMG 166, K1ESG 162, W1AHL 154, W1AIRY 142, W1ARC 118, W1UX 113, K1ZRE/1 96, W1AITE 94, W1BUT 84, W1AHL 83, W1KJ 75, W1JGJ 73, W1AJY 70, W1CTR 58, K1RBP 58, W1DOM 56, W1AGG 55, W1FHU 39, K1LCO 26, W1EJN 16, K1WVW 11, K1CLM 9, W1ADPX 5, W1MNK 5, K1OKE 5, W1LIX 4, W1DAL 2, W1AFNM 1. (Nov.) W1BHV 2.

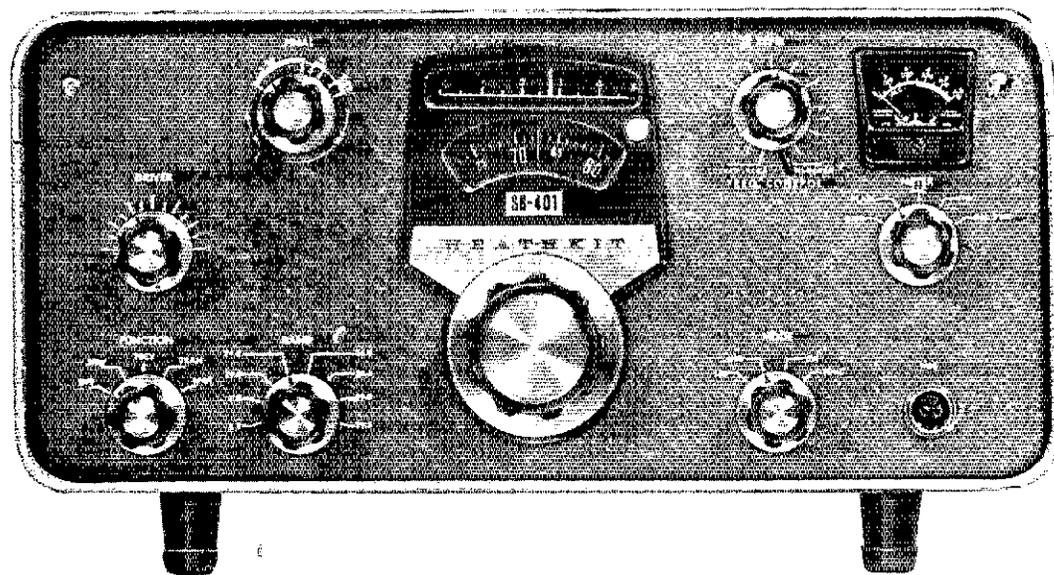
MAINE—SCM, Peter E. Sterling, K1TEV—SEC: K1CLE, PAM: W1FLG, RM: W1BJG, W1N1G has moved to his new QTH in Westbrook. RTTY activity in the Portland area has picked up quite a bit. The following are now active on 2 meter RTTY: W1WAS, W1GKI, W1LJK, K1TEV, W1PLB, K1PCI, K1OVR, W1KLO is on the air with a new SR-150. I am still looking for news for this column. New hams in the State of Maine are W1AMDR, W1M6Y, W1N1MG, W1N1MZ, W1N1MC, W1N1MD, W1M1CT, W1MED, W1N1MEI, W1M1EA, W1M1EM. Welcome to the fraternity. W1JFX is a new OBS. The Me.-N.H.-Vt. Net is on 3685 at 2330Z. The Sea Gull Net meets on 3940 Mon. through Sat. at 1700. Interested in an appointment? If so, drop your SCM a line. W1KVV is on with a new SR-160. Any-

(Continued on page 100)

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SB-301 PARTIAL SPECIFICATIONS — Frequency range (megahertz): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 15.0 to 15.3, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megahertz. **Frequency stability:** Less than 100 Hz per hour after 20 min. warmup under normal ambient conditions. Less than 100 Hz for $\pm 10\%$ line voltage variation. **Visual dial accuracy:** Within 200 Hz on all bands. **Electric dial accuracy:** Within 400 Hz on all bands after calibration at nearest 100 kHz point. **Backlash:** No more than 50 Hz. **Sensitivity:** Less than 0.3 microvolt for 10 db signal-plus-noise to noise ratio for SSB operation. **Modes of operation:** Switch selected; LSB, USB, CW, AM, RTTY. **Selectivity:** RTTY: 2.1 kHz at 6 db down, 5.0 kHz at 60 db down (crystal filter supplied). SSB: 2.1 kHz at 6 db down, 5.0 kHz at 60 db down (crystal filter supplied). AM: 3.75 kHz at 6 db down, 10 kHz at 60 db down (crystal filter available as accessory). CW: 400 Hz at 6 db down, 2.0 kHz at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response:** SSB: 350 to 2450 Hz nominal at 6 db. AM: 200 to 3500 Hz nominal at 6 db. CW: 800 to 1200 Hz nominal at 6 db. **Audio output impedance:** Unbalanced nominal 8 ohm speaker and high impedance headphone. **Audio output power:** $\frac{1}{2}$ watt with less than 8% distortion. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at mute socket. **Crystal calibrator:** 100 kHz crystal. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120/240 V AC, 50/60 Hz, 50 watts. **Dimensions:** 14 $\frac{1}{2}$ " W x 6 $\frac{1}{2}$ " H x 13 $\frac{3}{8}$ " D.

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break-in CW keying • Meter checks grid current, final plate current, ALC maximum modulation, final plate voltage and relative power, all at the flick of a switch.

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SB-401 SPECIFICATIONS — Emission: SSB (upper or lower sideband) and CW. **Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm — less than 2:1 SWR. **Frequency range:** (MHz) 3.5 — 4.0; 7.0 — 7.5; 14.0 — 14.5; 21.0 — 21.5; 28.0 — 28.5; 28.5 — 29.0; 29.0 — 29.5; 29.5 — 30.0. **Frequency stability:** Less than 100 Hz per hr. after 20 min. warmup. **Carrier suppression:** 55 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kHz. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 Hz. **ALC characteristics:** 10 db or greater @ 0.2 ma final grid current. **Noise level:** 40 db below rated carrier. **Visual dial accuracy:** Within 200 Hz (all bands). **Electrical dial accuracy:** Within 400 Hz after calibration of nearest 100 kHz point (all bands). **Backlash:** Less than 50 Hz. **Oscillator feedthrough or mixer products:** 55 db below rated output (except 3910 kHz crossover which is 45 db). **Harmonic radiation:** 35 db below rated output. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 350-2450 Hz ± 3 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120/240 V AC, 50/60 Hz. **Dimensions:** 14 $\frac{1}{2}$ " W x 6 $\frac{1}{2}$ " H x 13 $\frac{3}{8}$ " D.



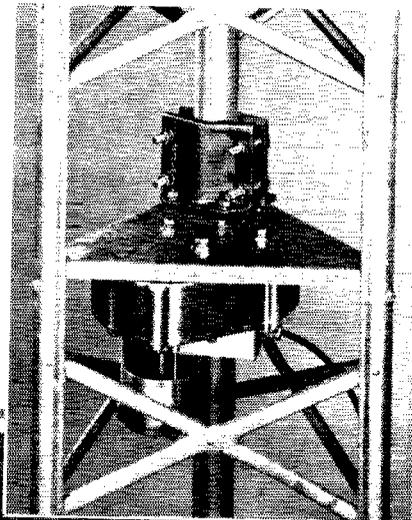
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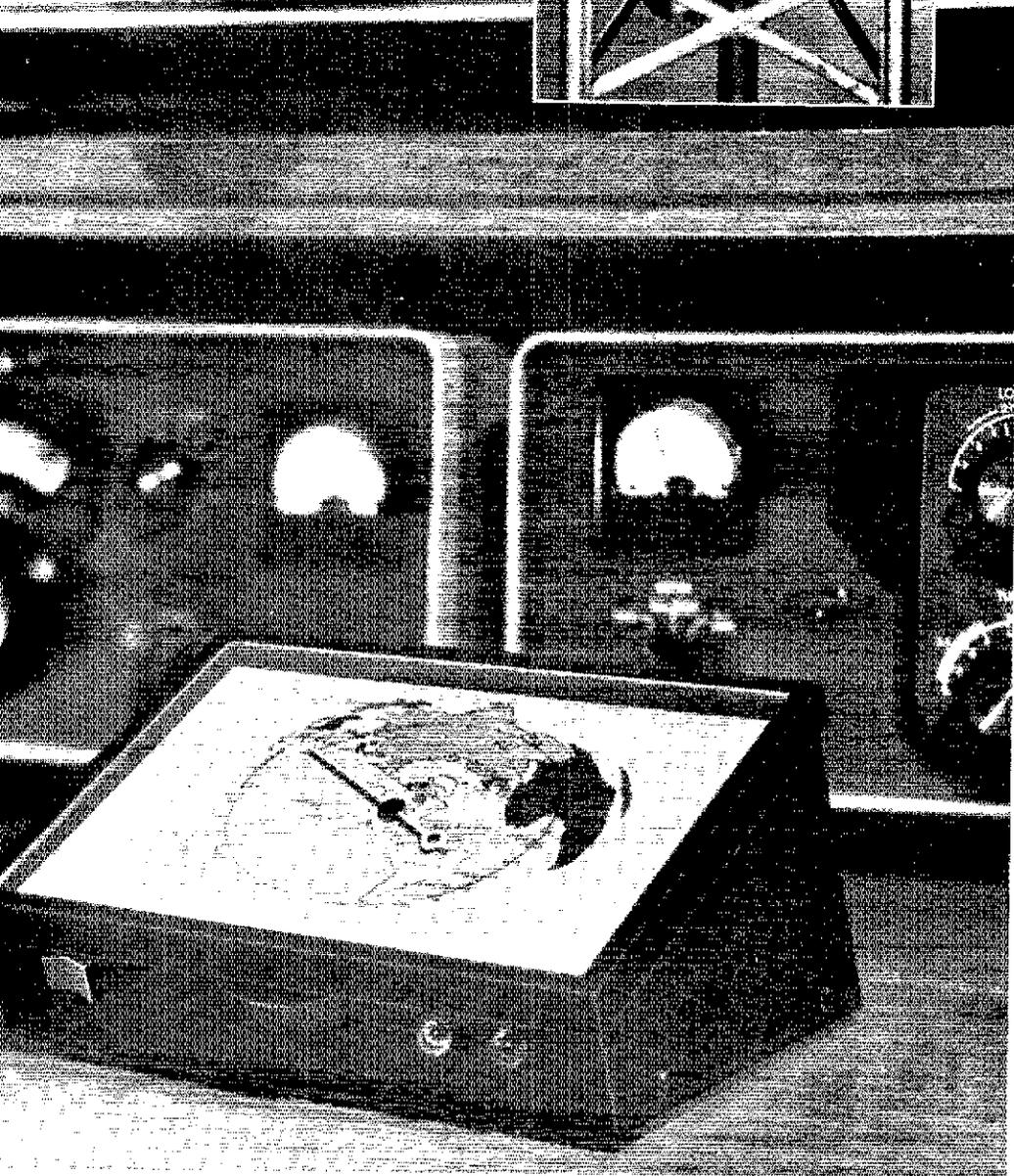
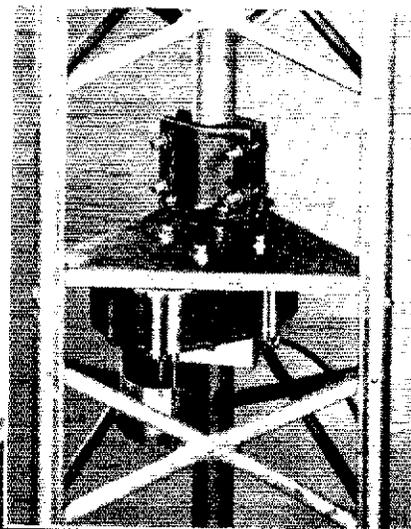
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one interested in starting a Novice net? If so, please get in touch with me. Attendance at the PAWA meetings has picked up sharply with the showing of weekly Buck Rogers serials. Traffic: (Dec.) WHJG 391, WAIFCM 121, WAIFLG 66, WAJFX 48, KIWQI 46, KIPMK 26, W10TQ 16. (Nov.) WAIFCM 34, W1ISO 10.

NEW HAMPSHIRE—SCM, Donald Morgan, KIQBS—SEC: KIRSC, RM: KIBCS, PAM: KIAPO. We welcome the following: WAIMEK (T), WAIMFF (T), WNIMPT, WNIMCW. It's nice to note that half of these are young ladies. The GSEN report for this month shows 698 check-ins and 198 traffic. The MNV Net reports 31 sessions, 284 QNT and 414 traffic. Two new appointees are KIBCS as EC and W1BUT as OD. W1JB had two certificates endorsed, UD and QPS. W1SWX who was hospitalized in Dec. is reported up and around again. Members of the Manchester Radio Club, W1HPM, were most successful with their Christmas endeavor "Holiday Radiogram." They displayed and operated from a store window in downtown Manchester. They had 6-and 20-meter s.s.h. and 80 c.w. set up. Reports of this were most gratifying. If your club has news, let's have it. The Farmers Net, on 1840 kc., meets on Sat. P.M. 7 to 9. This net went off the air Dec. 7, 1941, and was reactivated in 1968. Check in and remember 25 watts maximum power. Late report for MNV (Nov.) 28 sessions, QNT 156, traffic 123. Traffic: KIBCS 176, WAJTM 574, W1HPM 175, KIPQV 146, WAILEY 25, KIQES 21.

RHODE ISLAND—SCM, John E. Johnson, KIAAV—SEC: KILIL, PAM: WITXL, RM: WIRTV, V.H.F. PAM: K1TPK. Elected officers in the W1AQ Club of Rumford for 1970 were: WAJYE, pres.; WAHUR, vice-pres.; W1DK, trans.; K1UKC, secr.; with the following committees: Building KIAAV and WIWAC; Field Day KIAAG and KIAQA; Membership K1KYI and K1LH; Library W1FNH; QSL WAHIM and WAICQ; Publicity WAICVF; Activities K1HAM; Technical W1FNH. The W1OP Club of Providence reports that the clubhouse now has made repairs to the heating system through the efforts of W1KKE, WNIGLD. The club will hold an auction to raise funds for building a repeater. K1LPL and K1NKR are both in the Air Force and stationed at Ft. Meade, Md. New Novices in the club are WN1LAD, WN1LGD and WN1MFL. The K1NQG Club of Cranston held its Annual Ham Radio Exhibit at the Midland Mall and sent over 200 messages from the display. The display included exhibits of antique equipment from the N.E. Antique Wireless Museum, a Novice station, Advanced station and a display of the club's QSL Cards. Traffic: K1NQG/1 318, W1YKQ 182, W1TXE 165, K1QFD 82, W1BJV 54, K1YVQ 40, WB2HPW/1 36, K1TPK 17, K1VPK 16, WAICNF 9, WAJST 9, WAIEEJ 5, W1FLN 2.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Days	Time	QNT	QTC	N. Mgr.
Gr. Mt.	3932	M-S	2330Z	270	23	WA1EQO
Vt. Fone	3955	Sun.	1400Z	87	...	WA1EDI
MNV	3685	M-F	2330Z	224	414	W1BAG
VTCD	3950 1/2	Sun.	1500Z	26	10	W1AD
VTPO	3949	Sun.	2300	73	23	K1BQB
VTSS	3909	M-S	2330Z	606	79	WA1HSG
		Sun.	1330Z			

Welcome to new Novices WN1MCX (Waterbury Center) and WN1MDR (E. St. Johnsbury). Congrats to W1WTE (Barre) on passing the Extra Class exam. We regret that WA2ZLT is a Silent Key. Thanks to all stations who kept the CD RACES Nets going during the State snow emergency. There's still time to get in the Vt. QSO Party, 6 P.M. EST Sat. Feb. 28 to 10 P.M. EST Sun. Mar. 1. Give it a whirl. Traffic: K1BQB 21, WA1GKS 106, W1FRT 71, K1MPN 38, WA1JGK 12, K1YGI 6, W1FS 2.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BYR—C.W. RM: W1DVW. Under the direction of WA1DVE, a ham station was set up in the Union Federal Bank in Pittsfield during Christmas week. Operators were WA1ERR, WA1HX, WA1HSO, WA1KVL, WA1GQ, W1NBT and WA1CPD. WA1DNB has been promoted from EC of Belchertown to EC of Hampshire County. W1GJG is working for WAS. W1UPH is active in 3 phone nets. W1ZPB assembled a Heath decade capacitance box and built an audio frequency counter for RTTY. W1ALL has a new SB-301. Tie-up with any emergency communications outfit other than ARRL does not prevent any amateur from signing up with the Amateur Radio Emergency Corps (at least as a "limited" member). It makes no

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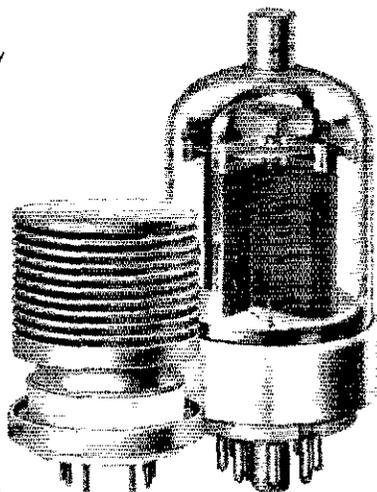
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difference where you operate. WIIRC is busy on three informal s.s.b. acts. WNIAMP is a new ham in Turners Falls. WA1JCT, of Williamstown, is starting up an s.s.b. net to operate Mon. through Fri. on 3915 kc. at 5:30 P.M. CW RM W1DVW reports that WAIN had 156 QNLs during Dec. and handled 166 messages. Five top highs in attendance were WIBVR, W1ZPB, K1IJV, W1HH and W1DVW. The Valley Amateur Radio Club held a combined meeting and Christmas party at the Cavalier Restaurant in Chicopee. Its April meeting will be at Civil Defense Area Hq. in Belchertown. W1CEB, of ARRL Hq., was the Dec. speaker at the Hampden County Radio Assn. It is with regret that we report the passing of Alvin Hook, W1DNT. Also, our sympathy to W1EUA for his recent loss. Hampshire County EC W1ANDB is a real go-getter. He has a fine article in *Zero Beat* (HCRA bulletin) giving reasons why hams should join the Amateur Radio Emergency Corps. Traffic: W1ZPB 232, W1HH 180, WIBVR 87, W1DVW 71, K1IJV 42, W1CEJ 29, K1WZY 24, W1UPH 16, W1P00 6, W1STR 2.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, K17AEQ—Add to those Alaskan hams who lost their antennas during the recent wind storms, K17DCF/1DEJ and K17GFT/GFU. K17PNI, I understand, has things really worked out. Elaine puts up the antennas while Bob works the rig. Tanana seems to be the town with the greatest ham population per capita in Alaska. K17PPM has been running classes over there, and to date there are eight hams licensed and at least six more coming up. For a village of 400, that's not bad. Kay, by the way, is presently Advanced Class and working for that of Extra. K17CSR got a moose and some birds on a recent hunting trip. K17FJW is the new secy. of the YLRL. 160-meter activity is increasing in the Fairbanks area. Add K17GHT to the list. K17AEQ/AZJ are currently transmitting near 1802 as a usual thing, and listening from top to bottom. The best we have heard to date is KH8LJ, but he no hear us. To date have not heard even a peep from the East Coast. We'll keep plugging. Traffic: K17CAH 178.

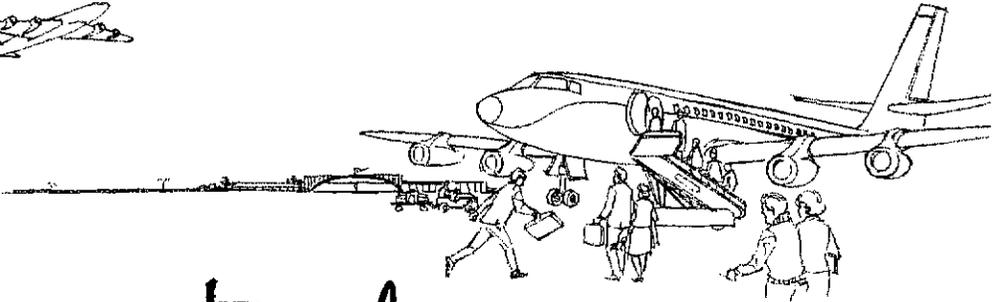
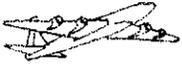
IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes each day at 0200 GMT on 3935 kc. The Idaho RACES Net meets week days at 1516 GMT on 3891 kc. New FARM Net NCSs are K7CSL, WA7GSM, K7KBX, K7HLR, WA7ZJ, K7ORA and W7JHM. Four-color Idaho QSL cards are available free from the Department of Commerce and Development, Idaho State House, Boise, Idaho 83707. WA7EUV reports that Lewiston area amateurs are meeting on 3940 kc. WA7MMG and his son, W7NTOM, are new hams in Coeur d'Alene. W7FTN has installed a patch, K1NBH/7 has built a new home 30 miles east of Coeur d'Alene. The house is at the 3000-ft. level, and being an avid v.h.f. fan John is making plans for some large 6- and 2-meter vact beams. WA7LJL received an OBS appointment. FARM Net report: 24 sessions, 695 check-ins, 101 traffic handled. Traffic: W7GHT 275, K7KBX 206, WA7BDD 105, K7CSL 8, W7ZNN 7.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. Nets:

Montana Traffic Net	3910 kc.	0000 GMT	M-F
Montana Section Net	3950 kc.	1700 GMT	Sun.
Montana PON	3850 kc.	0245 GMT	Daily

Endorsements: W7LBK as OO/ORS/EC; K78VR as EC. A new call in Bozeman is WN7NUM. W7HGG has been appointed assistant vice-pres. of the First National Bank of Bozeman. WN7LXM is a new call in the Great Falls area. W7LEQ is getting back on the air after being off for ten years. WA7LIQ was married in Feb. K7CCZ is putting a BC-610 on a s.s.b. W7MKB is putting a new 4-1000 amplifier on the air. 1970 officers of the Yellowstone Radio Club are WA7FCG, pres.; K7VCA, vice-pres.; WA7KKN, secy.-treas. W7LC is on with an SR-400. WA7KKN has a new FTDX-400. Traffic: WA7ZR 73, K7EGJ 41, W7LBK 28, WN7LXM 2.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—SEC: W7HLE. RM: W7ZFH. PAM: K7RQZ. Dec. net reports: WA7BKV reports for the BSN, noon sessions 31, traffic 110, contacts 92, check-ins 492. K7GIG reports for the OSN, sessions 28, check-ins 95, traffic 48. K7YTA reports for the Salem 2-Meter Net, sessions 30, traffic 16, check-ins 291. WA7FTN reports 468 phone patches to S.E. Asia. K7ZQU is the new manager of the BSN for evening sessions. Our thanks to K7FFG for a job well done. W7AJN sends in a nice report. WA7GCE sends in 1969 activities for the EARS Club of Eugene. The EARS practice net is held Mon. through Thurs. on 3743 kc. at 9 P.M. local time. Send a card to



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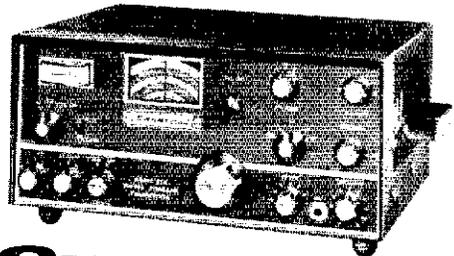
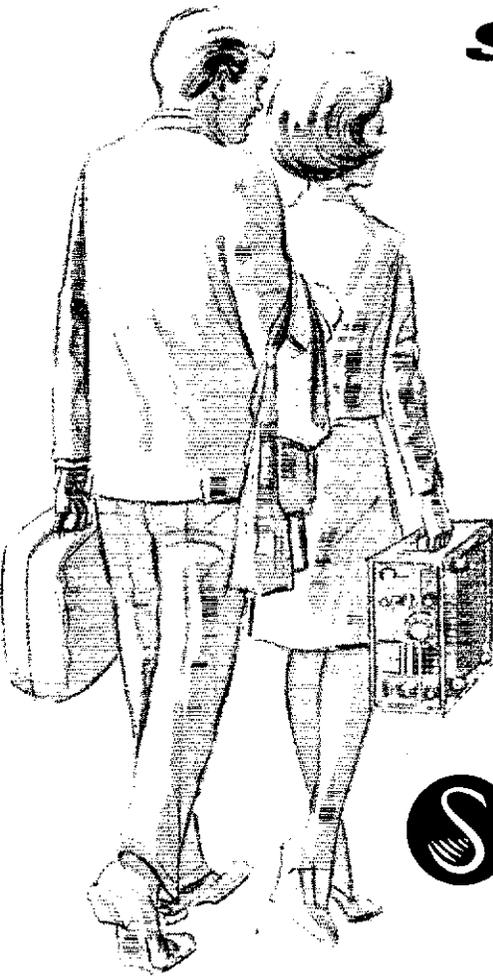
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WAZGCE to get on the roll. Awards are issued for code proficiency on this net. W7LT renewed as QRS. WAZGFP reports lots of 8-meter openings. Traffic: (Dec.) WAZIFM 578, K7RQG 573, WAZHKY 408, WAZKDU 187, WAZICX 166, K7QFG 112, K7NTS 111, WAZTKU 92, WZBZ 91, K7OUF 87, W7BNS 82, K7WWR 26, W7DEFM 24, WAZKRH 20, W7BFX 15, W7MLJ 14, WAZJAU 13, WAZJMD 13, K7USZ 13, W7HLE 9, W7LT 7, W7CPK 5. (Nov.) W7CPK 26.

WASHINGTON—SCM, Harry W. Lewis, W7JWJ—(Until early winter W7BQ attended computer school in Spokane. VE7BZA took a vacation this winter by hitch-hiking through Washington and Oregon. He dropped in to see WAZJFX, of Kelso, among others. W7FQE, of Vancouver, Wash., is looking for 2-meter c.w. signals down at the very low end of the band. W7ZIW is busy getting the new harmonic used to the rig and is now back on the air a little more often. W7KZ and W7F1 lend their support as QNB stations whenever needed. W8N net mgr. W7AXT is lining up new stations. The Radio Club of Tacoma and the BEARS Club of Boeing entered the SS Contest as an inter-club contest with a trophy being held by the winner. The aggregate claimed score of the Tacoma Club was 529,807, far ahead of Boeing with 208,446. WAZBSQ is the BEARS pres. WAZACQ and K7ANP are active in teaching a radio class for the BEARS. W7JWJ is teaching a General theory course at the North Seattle Community College. The BEARS search and rescue operation group was active this winter with WAZJBM, WAZMJX, WAZACQ, W7RJW, W7CJL, WAZGNC, WAZTKD, WAZURD and WAZGYD participating, reports W7RJW. The Spokane Dial Twisters has shifted its net frequency slightly to avoid QRM. Look for it Sun, nights on 3915 kc. Another enjoyable hamfest will be held this winter at the Quay Motel in Vancouver. The Atlington Hamfest is coming up in April. The Radio Club of Tacoma again is sponsoring the Washington State Hamfest along with the WARTS Net as co-sponsor and is looking for other clubs and nets to assist in making it another big one. W7LJW, of old Cracker Barrel Net, is planning an unusual type of hamfest for members of the net. They will fly to Koloa Kauai, Hawaii, to the hotel of KH6BAS, who is planning a big Luau for Cracker Barrel members, wives and friends. Traffic: W7BA 1805, W7DZX 1046, W7KZ 538, WAZKOB 506, W7PI 423, WAZHKR 383, WAZAT 316, WAZLMO 165, WAZFNB 148, K7CTP 105, WAZLOI 92, W7NWK 92, W7JFY 88, WAZPS 69, WAZ16X 49, WAZEDQ 45, WAZDZT 41, W7BQ 40, W7BUN 36, W7JWJ 34, K7TCY 34, W7TEU 28, WAZACQ 27, W7PQE 25, WAZTA 22, K7SUX 22, WAZDXI 21, W7USO 18, WAZLEP 14, WAZBBJ 11, K7OKC 11, K7WTG 11, WAZHSJ 10, K7YFJ 9, WAZBDB 8, W7UWT 8, WAZGYB 7, WAZMEO 6.

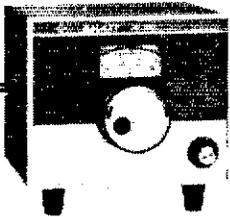
PACIFIC DIVISION

EAST BAY—SCM, Paul J. Parker, WB6DHH—New CCRC officers are WB6ZE, pres.; WA6JKY, vice-pres.; WA6DJI, secy.; K6MKQ, treas. A special note to all those who get their QSL cards through the 6th Area QSL Bureau. It is now QSL Bureau, c/o N.C. DX Club, P.O. Box 11, Los Altos, Calif. All new envelopes should be sent to them. Send only legal size S.A.S.E., please. Have you thought about Field Day yet? Don't forget the combined Pacific/Southwestern Division Convention to be held in Fresno at the Hacienda Motel May 15-17. Make your reservations now. There seems to be some confusion still about call letter plates for hams. The hams are being charged the enormous rate of \$20.00. Believe it or not, we better start sending some QRM up to Sacramento or we might lose this privilege altogether. WA6JUD, JLO and JLF all plan to be in the Annual 23rd VHF S.S. Listen for the new Oscar on 29,450 and 144,050 Mc. There seems to be a big question in everyone's mind about the Greater Bay Area Hamfest. Is it dead or alive and what is it going to be like this year? There is a continual offering of new prospective hams for radio club populations printed monthly in the CCRC circle. Clubs looking for people should look into this comprehensive monthly list. K6RZR joined the Silent Keys after a long illness. W6GIP is working 21-Mc. skeds with VR2EK. WR6AMB is working on antennas for small spaces and has a ground rod buying machine that really seems to work. WB6BNR has a new HW-100. K6UWR is moving to Richmond. K6DMI reports that he is able to work a little Asian DX down on the bottom end of 40 meters at 6-7 A.M. WA6DIL is getting a new station and is moving. K6LRN reports being active in the recent SS but forgot to send in his logs. W6IPW reports that the family Christmas scene cuts into the traffic routine. W6CBF is back from the Orient. WB6NMT/6 is a real v.h.f. enthusiast. Traffic: (Dec.) WA6DIL 476, W6IPW 242, W6VZX 13, K6DMI 6, W6ZF 5. (Nov.) WA6DIL 393, K6LRN 4.



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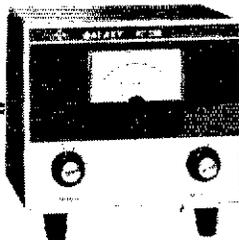
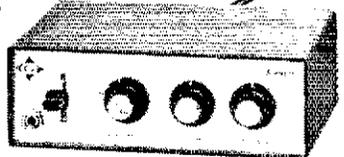


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Nets	Freq. (Mc.)	Times (GMT)	Days
Friendly Net	7.290	2030Z	M-F
Roy Scout Ham Radio Net	21.360	1800Z	Sat.
Pacific Interisland Net	14.330	0830Z	M-W-F
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2,3,4th Tues
Pacific Typhoon Net	14.265	During Typhoon Alerts.	
Confusion Net (Phone Patches)	21.400	0130Z	All
Gecko Net (KG6 Islands)	14.315	1000Z	Thurs.
Pacific DX Net	14.265	0600Z	Thurs.
Marine Corps Net	21.380	1900Z	All

It is with deep regret that we record the passing to Silent Keys of W6GNY/KH6HU, former SCM and friend. KH6GHC/9 reports he's signing W9CSP, KH6-DBE is Advanced Class, KH6CBQ is back home vacationing from the U. of Colo. KH6AD has been active on 3.5-Mc. e.w. KH6FF is on with a new 8/Line. KH6AG/-C21 writes that he had a nice visit with C21JW and his NYL Betty. KOQZP now is signing KH6HDH. Ex-KH6W-D, reports that he's still studying at the U. of Ala. in Birmingham. Ex-KW6EJ now is signing KC6EJ on Ponape. Ex-KH6FIF now is signing W7GKF at the U. of Montana. Dec. visitors at KH6GQW's included VS6BF from Hong Kong and KR6NR and family. Jim is now signing W9JZK in Chicago. KH6CHB has left us for W8-Land. The Honolulu DX Club meeting took place at the home of KH6GQW Dec. 3. KR6NR was the special guest. Those present were shown the ARRL film, "The Ham's Wide World" also there were tapes of the Kure Island DX-pedition, humorous records, slides of Kure Is. and a surprise presentation of the ARRL DX Test 1969 *Oceania Winner*, both phone and e.w., to KH6GPQ. Both operators from the Kure Is. operation, K5LTH/KH6HDB and KH6GKV, were present to narrate their slides. Keep those Form is coming. Traffic: KH6BZF 16, KH6LP 58, KH6GQW 29, KH6-GRG 15, KH6NO/KH6 10, KH6BAS 4, WTUZH/KG6 1, KH6AD 1, KH6GHC/9 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7BPU. The National Office of Ancient Accepted Order Mystic Shrine (AAONMS) would like all members who are amateurs to notify their recorder of their ham call. The ARRL color movie was shown four times on TV and one school showing in the Las Vegas area with K7LBQ making a video copy for additional classroom showings. W6RAY/7 is no longer mobile from Jackass Flatts, Nev.—too cold for the burr. The W7DDB 2-meter f.m. repeater has been replaced by the W7AKE 2-meter f.m. repeater, providing better coverage from Mt. Charleston. Some very constructive criticism was received regarding Nevada's First QSO Party. K7IC8 is back in Nevada and active on 40 meters. W7CSB is settled in his new QTH running a new rig, K7ICW. K7ZOK and W7DSP report considerable activity on 6 meters. W7RBV is reported on the sick list. W7VYC is an expert on HAIR. W7YDX reports increased activity in the Ely and Elko areas.

SACRAMENTO VALLEY—SCM, John F. Minke, III, W6KYA—ECs: K6RHV, W6SMU, W6TQJ. RMs: W6LNZ, W6VDA/6. We can assume the increase in activity since the beginning of the year is due to the new 5-band VAS. Check in on 3930 or 3943 late at night and you may pick up many states. W6VUZ has been busy working on a 10-watt home-brew rig for 40 and 80 meters from a construction article in the Feb. '66 issue of QST. Speaking of old issues of QST, ever browse through those back issues? Going back to July, 1946, when W6MGC was SCM and the Philippines was a section of the Pacific Division, the Sacramento Amateur Radio Club claimed a membership of 151! That is about four times the membership of today. In those days the club met at the South Side Park Club House. Also in that issue was a letter from an amateur who griped about the "Z" as the first letter in the suffix of his call. It seemed that others thought him to be a boot-legger. Who would ever dream of the day when "WA" and "WB" would be issued, not to mention a "K" for Continental U.S. WB6TCX, of the Nevada County ARC, upgraded himself to General Class. The League's PR Film, "Ham's Wide World," was shown on KCRA Channel 3 in Dec. The club station at Chico State College, K6SKD, has been reactivated and plans both e.w. and a.s.h. activity 80 through 10 meters. Traffic: W6LNZ 74, K6YZU 52, W6VUZ 5.

Solid-state Building Blocks

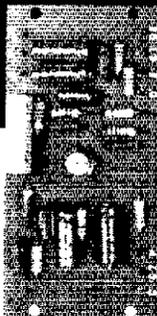
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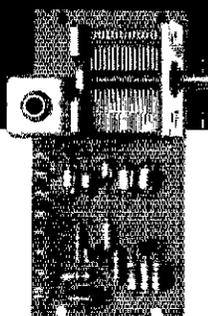
MR1, set of four modules, with instructions \$29.95



MX1—Synchrodyne detector-converter uses dual gate MOSFET for high sensitivity, low noise and effective reduction of overload. Selectivity 2KHz. 2" X 4" circuit board. Power +12 VDC @ 3 ma.



AA1—Integrated circuit audio amplifier has 100 db gain. Response shaped 200-2500 Hz. Output impedance 1000 ohms. Drives high impedance headphones. 2" X 4" circuit board. Power +12 VDC @ 9 ma.

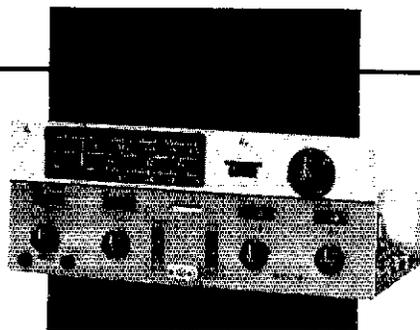


VO1—40-80 meter oscillator-buffer. Drift less than 100 Hz. Output 2 volts R.M.S. Low impedance. Designed for use with MX1 or TX1. 2" X 4" circuit board. Power +12 VDC @ 15 ma.



TX1—Crystal oscillator and power amplifier. Tapped toroidal coils cover 80-40-20 and 15 meters. Final amplifier power input 2 watts. 2" X 4" circuit board. Power +12 VDC @ 250 ma.

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PM1 \$49.95
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AC1—Convenience kit for MR1 modules. Contains amplifier current meter, power switch, antenna switch, knobs and connectors. \$7.95

AC3—15 meter converter. Converts 21 MHz band to 3.5 MHz. Free running injection oscillator. Dual gate MOSFET. 12 VDC @ 8 ma. \$8.95

AC4—Low power SWR meter. Usable from 1/2 watt to 250 watts. \$14.95

AC5—Low power antenna tuner. Matches random length twin lead or open wire line fed antennas. 10 watts maximum. \$8.95

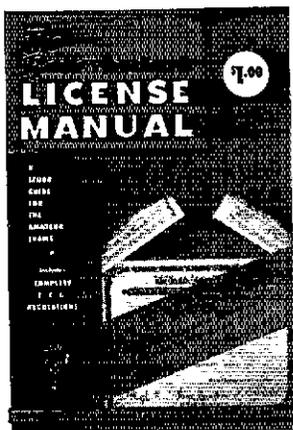
AC6—Extend MR1 module group to 20 meter transceive operation with side-tone for all bands. Built-in side-tone volume and frequency adjustable. 12 VDC @ 5 ma. \$7.95

KR3—Solid state keyer module. Integrated circuit. Complete with speed pot (6-60 wpm) and keying reed relay. 2" X 4" circuit board, use with AC2 monitor. 6 VDC @ 100 ma. \$17.95

AC2—Keying monitor. Also ideal code practice oscillator drives speaker or phones. 6 VDC @ 50 ma. Use with Model KR3 Keyer. \$5.95

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SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC; W6WLV. The rains around the first of the year brought minor flooding but there was no need to activate the emergency communications which functioned in past emergencies in Humboldt and Sonoma Counties. WB6GYI has returned from service in the Navy and again is active in the Humboldt Amateur Radio Club, being elected secy.-treas. K6ZWB has the Sonoma County AKEC holding drills on 28.6 Mc, the 1st and 3rd Mon. at 8 P.M. local time. Check-ins are invited. W6-BWV continues to handle traffic and participate in the emergency nets through his time is limited. W6FAX is a second San Francisco outlet in the Northern California Net. W6EJAJ is working on some solid-state transmitters, K6SRM is working on his Extra Class license during the breaks from his law studies. WA6BYZ finished up with BPL for Dec., making a full 12-month BPL for Joe in 1969. W6WIA also had a solid record in 1969 with an SEC report every month of the year. W6ENA, W6BUB and W6RQ were active in the Telephone Pioneers QSO Party. W6KVQ continues to work on his antenna systems at his Navarro QTH and is expanding his activity to the higher frequencies. K6CWS in Sebastopol, became a Silent Key in Dec. after a long illness. The Tamaipais Radio Club held its installation dinner in Jan. with a good turnout. My appreciation is expressed to the faithful reporters who have cooperated so well in past years. Traffic: WA6BYZ 457, W6WLV 185, W6KVQ 142, W6RWV 36, WA6AUD 18, WB6GYI 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—It's time to make reservations to attend the Pacific-Southwestern Division Convention, to be held here in Fresno, May 15, 1970. Send your inquiries to FARC, P.O. Box 783, Fresno. The Central Calif. Single-Sideband Assn. and the Tulare County Radio Club held their annual Christmas Party in Visalia, with 57 in attendance. The Madera Amateur Radio Club held its Christmas Party and had 25 in attendance. W6WWT is on 2-meter f.m. K6ZNI has a Swan 250. W6CUX is a new ham. K6CZL is now at ARRL Hq. W6BJRL is taking flying lessons. W6VSI is now located back in Fresno. W6BGVQ is working with decoders. WA6PRU is on 2-meter f.m. W6BWM1 is on 2-meter f.m. W6STW is working on a 80-ft. tower. WA6DPD is active on 2 and 6 meters. W6JUK has a Thunderbolt 6 & 2 amplifier. W6BJQD is ex-WA6FFJ. W6GUZ is active on 75 s.s.b. The Madera Amateur Radio Club meets the first Tue. of every month in the Court House. The Fresno Radio Club meets the 2nd Fri. of every month in the PGF Building. The Bakersfield Club meets the 3rd Wed. in the Navy station building. Traffic: WA8SCE 173, K6KOL 135, WA6JDB 32.

SANTA CLARA VALLEY—SCM, Albert Guetano, W6VZT—SEC; W6VZE, RM: WA6LEA, W6AUG has been keeping skids with K6PFMM and running phone patches to his XYL. The boys at W6YX, the Stanford University Radio Club, have been doing some work on phasing 2 forty beams. WA6OXE has a Model 28 RTTY in operation on 2 meters. Ed also just completed a 432-Mc. receiver and transmitter for repeater work on that band. W6ZRL has completed the assembly of an HW-17 which works fine. WA6GTF has been checking in to NCN and I believe he is getting the traffic bug. What a roundtable WA6LEP had with a Z86, another Z86, a K4, a W2 and a W3. If you fellows want to approve your e.g., remember that W6ZRL and W6PMK both are sending code practice on 3590 kc. every night of the week. W6ZRL is from 7:30 to 8:00 PST Tue. through Thurs. while W6PMK is Mon. and Fri. and after 8:00 on the rest of the week nights. W6VZT has put a 2-meter monopole with ground plane up and is now back on 2 meters after many years. It sure was nice to hear all the traffic on the nets for the month of Dec. and to observe how well the nets handled it. The Salinas Valley Radio Club starts its monthly meeting with code practice for fifteen minutes. Sounds like a good idea. Traffic: WA6OXE 4409, W6RSY 1228, WA6LEA 364, K6DYX 216, WA6GTE 152, W6AUC 101, W6NW 93, W6VZT 54, W6BYB 15, W6BPT 14, W6ZRL 5.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Calvin M. Dempsey, WA4UQC—Asst. SCM: James O. Pullman, W4VTR. SEC: W4EYN. RM: W4RRE. PAM: W4AJT. V.H.E. PAM: W4HJZ. New officers of the Rowan Amateur Radio Society are: K4GHR, pres.; K4PXU, vice-pres.; K4YYJ, secy.-treas. The Interstate Teenage Net meets every Fri. at 0130 GMT on 3574 kc. K4CIA is working hard for 5B DXCC. He also has a new 85-ft. pole.

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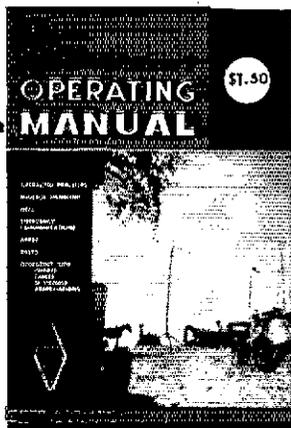
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Newington, Connecticut 06111

WB4ORT soon will be on 8-meter sideband. WB4MLL said he enjoyed the Tennessee QSO Party on 80 and 40 (ex. WB4LL) confirmed three new countries. He is planning to build a 40-meter wire beam. W4OFF is now on 2 meters. WB4JIT, WB4GKL and WB4DTR passed the Advanced Class exam. The N.C. Fone net started Dec. 1, 1969. It meets on 3865 kc. at 0130Z daily. W4KFC gave a fine talk to the Raleigh Amateur Radio Society and they had a real good attendance. WA4VNV got his Extra.

Net	Freq.	Time	Days	QTC	Mgr.
N.C. S.S.B.	3838	0030Z	Daily	33	WA4KWC
NCN (I)	3573	0900Z	Daily	95	W4IRE

Traffic: (Dec.) WB4ICP 144, W4BYN 220, W0AVS/4 120, W4IRE 102, WB4HGT 88, WB4M14 75, WA4GMC 60, E4VBG 58, K5TGA/4 58, E4MC 44, WB4ILO 39, WB4HGS 27, WB4PL 20, WA4VNV 19, WA4AKN 18, K4JTN 18, WB4BGL 12, W4WVZ 10, WA4KWC 7, W4UCQ 6, W4WLD 4. (Nov.) W4IRE 121, WA4VNV 24, WB4ILO 21, WB4BGL 17.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC, WA4ECL, PAM, W4VFO, RM, W4MOVY. The merger of the SCN and NCN took place in Jan.

Carolina Net	3573 kc.	Daily	2345Z/0300Z	Dec. Tfr. 38
SCNSB	1815 kc.	Daily		Dec. Tfr. 106
SCPN	3930 kc.	0830 and 1530 EST	Sun., 12 Noon Daily,	

W4JA was back in the hospital in Dec. but recovered with two weeks at Hilton Head. From Spartanburg, W4NTO reports high schoolers WB4KPN and WB4NNY now hold Advanced Class licenses; WB4LMS has been sporting a large food since Christmas; K4JDX is about to test-hop his homebrew plane and promises to be back on the air soon. W4VHH worked W4URK in Minnesota on a motor scatter for his 35th state on 2 meters. K4BSS and W4PED qualified for the new Public Service Honor Roll announced in Jan. QST. Many more of you can be eligible. Check the details. The news reports get fewer each month. Get those club secretaries busy or send in some news yourself. Traffic: K4BSS 120, W4NTO 45, W4PED 32, K4JCU 18, W4JA 1.

VIRGINIA—SCM, Robert J. Slagle, K4GR—Asst. SCM, Albert E. Martin, Jr., W4THV, SEC, WA4PBG, Asst. SEC, WB4CVY, PAM, W4OKN, RMs, WA4EUT, K4MLC, W4SHJ. Noticed in the *Hartford Times* under the dateline Dec. 2, 1919, that a few days before ARRL President Marvin managed to signal Chicago from Hartford and was heard! Pleased to announce that W4THV has consented to hack me up as Asst. SCM. W4DM schedules his 10d on 40 and is converting to an electronic keyer. K4LEF is trying to get the entire rig reassembled. W4TIF/3 has a frequency counter that checks us down to one cycle and made Class 1 OO as a result. W4SQQ came through solidly for BPL this month. Also there were impressive totals from WB4EJK and K4KDJ considering the same operator at both. SEC WA4PBG organized Virginia for the 89C. W4ZM worked hard as Santa Claus. W4YZC reports good DXing with a vertical. Our Director, W4KFC, while operating P4OCV was instrumental in getting a special drug from Washington to Caylon for a critically ill patient; he visited the Raleigh ARS and the Triangle RC. W4JUI now has 1330 counties!

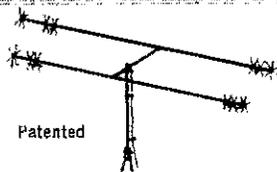
V8BN	3935	6 and 10 p.m. EST	Daily
VFN	3847	7:30 p.m. EST	Daily
VSN	3860	6:30 p.m. EST	Daily
VN	3860	7:00 p.m. EST	Daily

Traffic: (Dec.) W4SQQ 622, WB4EJK 331, W4NLC 249, K4RNP 243, WB4CVY 236, WB4GTS 160, W4TQ 158, W4RHA 130, K4KDJ 120, WA4M14 90, W7WST/4 84, W4TIF/3 68, WA4JTF 59, WB4DRB 57, WB4FDT 50, K4PQI 45, W4ZM 43, K4GR 41, WA4PBG 40, K4MLC 32, W4QBE 29, W4SHJ 29, W4ZYT 29, WB4IRA 23, WB4LQV 21, W4YZC 17, W4EJK 15, K4JM 11, WA4WQ 10, W4THV 9, K4VCY 9, WA4NIG 8, K4SDS 8, WA4TFZ 8, W4KX 7, WA4TK 6, W4KFC 5, W4JUI 3. (Nov.) W4DM 34, K4MLC 30, WB4GTS 18, K4RTQ 3, W4OP 2, K4LEF 1. (Oct.) WB4GTS 22.

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VIRGINIA QSO PARTY

March 14-16, 1970

All amateurs are invited to participate in the Virginia QSO Party, sponsored by the Roanoke Valley Amateur Radio Club. Virginia stations are urged to work as many out-of-state stations as possible. All contacts will be made during the 32-hour period from 1800 GMT Saturday March 14 to 0200 GMT Monday March 16. There are no power or time limits. The same station may be worked once on each different band. The general call is CQ VA. Virginia amateurs residing in independent cities will use a neighboring county in contest exchange and will use that county throughout the contest. (Maximum counties—96.) Phone and cw will be considered separate contests, requiring separate logs. Virginia stations send QSO number, RS(T) and county. Out-of-state stations send number, RS(T) and state, province or country. Virginia stations score one point for each complete contact, including those with other Virginia stations. Multiply the number of QSO points by the number of states, provinces, countries and Virginia counties worked. (Do not count Virginia as a state or Canada as a country.) Out-of-state stations likewise count one point for each complete contact with a Virginia station. Multiply the number of QSO points by the number of different Virginia counties worked. Suggested frequencies: cw 3560 7060 14060 21060 28060, phone 3930 7235 14240/14340 21310/21400. Highest scoring stations in each state, province and country will receive a certificate. Virginia stations will compete for 1st-5th place certificates. Logs showing dates, times, stations contacted, bands, mode, location and final score must be received no later than April 30, 1970. Send logs plus an addressed 4 x 9 1/2" envelope to: Roanoke Valley Amateur Radio Club, 110 Union Street, Salem, Virginia 24153, attention Van A. Wimmer, WA4BIX.

WEST VIRGINIA—SCM, Donald P. Morris, W8JM—SEC, W8EY, RM, W8BBBG, PAMs, W8IYD, K8CHW, Phone Net Mgr., W8AQQE. New officers of the Opequon Radio Society of Martinsburg are K8KML, pres.; W8DQF, vice-pres.; K8QYG, sec.; pres.; W8YHE, net. mgr. W8NDY reports that W8WJK, W8HZA, W8LFW, K8TPE, W8WEJ and W8ZGX were active during the recent state hoods. W8BBBG is the first to qualify for the Public Service Honor Roll (PSHR). Buchanan ARC members attended the Elkins ARC Dinner Meeting. W8TYP reports the Kanawha Valley ARRL Net is on at 0900 GMT on 28.740. The WYN Phone Net reports 31 sessions, 514 stations and 140 messages. The C.W. Net reports 13 sessions, 280 stations and 118 messages. W8EY, besides SEC work, is active in frequency-measuring. W8MIS and K8QYG are DXing on 160. W8C'PK keeps in touch with home from Florida by skeds with her son, W8NWN. W8NTV is on a long trip to the West Coast by trailer, operating 75 and 20. Please keep me posted on your 5-band WAS work; also report your results for PSHR listings. The West Virginia ARRL Convention will be held July 4 and 5, Jackson's Mill, with K8BCE as chairman. W8DPC reports 50 tin-filled years in amateur radio. W8ALX is active again after an illness. Traffic: W8RRBG 145, W8APOS 174, W8HZA 62, W8NDY 52, W8ZZY 24, W8CKX 19, W8RQB 18, W8WCK 15, W8WIX 14, W8YSR 14, K8HJD 12, W8LFW 12, W8AKR 9, W8BAV 7, W8DUV 7, W8SFE 7, W8JM 7, W8WEJ 7, W8ZNT 7, W8AQQE 6, W8UNP 5, W8EFP 3, W8TYP 3, W8BAFJ 2, K8MND 2, W8KNG 1, W8QEC 1, K8QKW 1, K8QYG 1, K8RXW 1, W8TGF 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Catteroll, W6SN—Act. SCM, Neal Morris, K0TFV, SEC, W6HTQ, RM, W6LRN, PAM, W6CKW, W6OWP will be looking after the amateurs' interests at the State Legislature again this year. W6GHL, one of the Extra Class, also Class 1 CD, KC K0FTQ and a lot of very fine amateurs helped the CAP this month. Welcome back.

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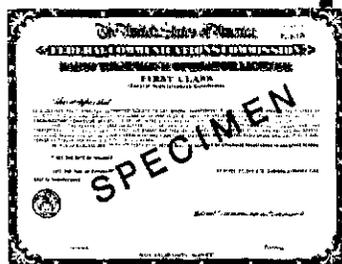
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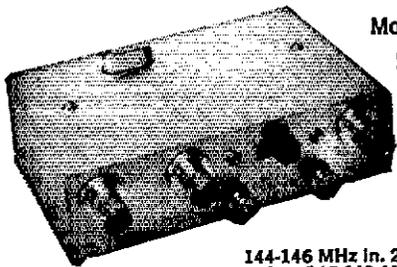
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KØSPR. New OPS: WAØSUD. WØWYX reports lots of snow on Squaw Mtn. keeps the snow plow with mobile busy. Colorado has a new repeater on Lee Hill north of Boulder, WØJA. W4APR reports some 8-meter openings, as does WØWYX. The Denver Radio Club will have a new Colorado Ham Directory. Why not 160 meters? Several of us will be on 160 soon. Will try for a section net if enough amateurs are interested. CGN is back in business with a total QNI 173. QTC 107 with a time of 820 minutes for 28 sessions. The Hi-Noon Net reports total QNI 890. QTC 184, time 1058, 21 sessions. Columbine had 938 QNI and QTC of 155 with time of 1554 for a reported 24 sessions. The Rocky Mountain Division Convention will be held at Estes Park June 12-14. The Denver Radio Club has the details. Write Rich High, WØHEP, chairman at 740 Galena St., Aurora, 80010. Traffic: (Dec.) WØWYX 228, WAØMNL 217, KØJSP 120, WØLRN 75, WAØSUD 72, WØKFK 60, KØECR 36, KØTIV 28, WØSIN 24, KØSPR 24, KØMNG 21, WØBWJ 17, WAØLVM 12, KØFLQ 11, WAØPGM 11, WØUAT 7, (Nov.) WAØMNL 104, WØKFK 12.

NEW MEXICO—SCM, James R. Prine, W5NUI—Plans for the New Mexico QSO Party have been finalized for the week end of Apr. 4-5. Details of rules in this issue. Contact as many stations as possible and send logs to K5MAT. WA5UJY is doing an excellent job as this year's NMN net manager and reports NMN Dec. traffic 72 with QNI of 178. K5QIN, W5AROW, W5PNY and W5OJM are active with ham TV. Are there others? W5ALR mobilized in Durango, Colo. and worked W5PNY in Los Alamos via the W5PDO 3-meter f.m. repeater. WA5LHC has a new HT-18 antenna providing a good account on the Road Runner Net. Now is a good time to start the paper work for summer reciprocity operation if you plan to visit abroad. Traffic: K5MAT 289, W2ZVW/5 207, WA5UJY 88, W5DMG 58, W5ATWA 44, K5ISJ 28, W5IKR 21, W4TFBV/6 20, WA5JNC 19, WA5UNA 18, WA5JXU 12, W5GPZ 9, WA5BLI 8, WA5OHI 7, W5PNY 6, W5NTG 3.

NEW MEXICO QSO PARTY

April 4-5

The 1970 New Mexico QSO Party sponsored by W5PDO, the Los Alamos Amateur Radio Club, will take place from 2200 GMT April 4 to 0100 GMT April 5, from 0300 to 0600 and 1800 to 2200 GMT April 5, 1970. Suggested frequencies: cw 3565 7065 14065 21065 28065; phone 3900 7250 14275 21350 and 28850. Check the high end of 160. Exchange serial number, RS(T) and county for New Mexico stations, state or country for others. Stations may be contacted once on each band and mode. Score 1 point per QSO on 40, 20 and 15; 2 points on 80 and 10; 3 points on 160. Multiplier is the sum of states plus countries for New Mexicans (KH6, KL7 and U.S.A. do not count as countries), and the total number of New Mexico counties (maximum of 32) for others. New Mexico stations may work other New Mexico stations for a multiplier only. A certificate will be awarded to the top New Mexico scorers and to the highest scoring station in each state and country, provided that a minimum of 5 contacts are made. Full log data, including exchanges, should be sent to Bill Wageman, K5MAT, 35 San Juan, Los Alamos, New Mexico 87544, no later than May 1, 1970. Duplicate check sheets are required from all stations with more than 25 QSOs. Include an addressed stamped envelope for a copy of the results.

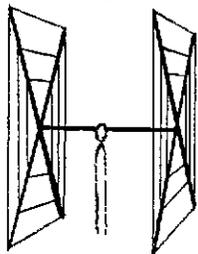
UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCK. ODs: K9LBO/7, K7ZJ8. ORNs: W7EM, K7RAJ, K7HLR, W7OCK. QVBS: W7RQT, W7IAW. KØZIO is trying to obtain call-letter license plates from each state. When you change plates this year and would like to send your old set to him I'll give you his QTH. W7OCK and W7EM again made BPL the hard way—100 or more originations plus deliveries. W7OCK also made the PSRR again with 81 points. 2-meter f.m. is really going strong in Northern Utah. Forty "new" units are now in the hands of would be f.m.ers. W7RQT worked Iowa and others recently on 2 meters. K7RAJ has been manning W7OHR at B.Y.U. and running phone patches for

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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' x 1 1/4" 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' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" 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	\$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

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

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; 7/8" 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 E1 20	\$19	4 E1 10	\$18
3 E1 20	25*	7 E1 10	32*
4 E1 20	32*	4 E1 6	18
2 E1 15	15	8 E1 6	28*
3 E1 15	19	12 E1 2	25*
4 E1 15	25*		
5 E1 15	28*		

*20' boom

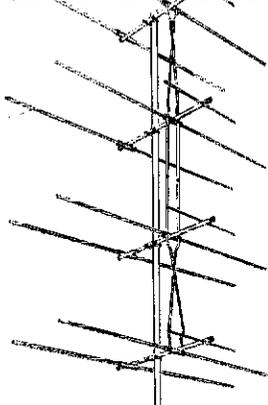
ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVB, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGG, 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

DX-ARRAY



NEW
20 ELEMENT
ANTENNAS
FOR
144-220-432
mhz

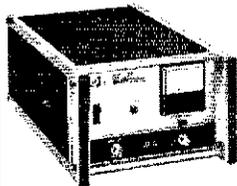
The new Cush Craft DX-Arrays combine the best yagi and colinear features into the World's most advanced amateur communication antennas.

DX-120	2 meter	20 element	\$29.50
DX-220	1½ meter	20 element	22.50
DX-420	¾ meter	20 element	17.50

40 & 80 element Stacking Kits also available. See your distributor or write for free literature.

Cush Craft 621 HAYWARD STREET
 MANCHESTER, N. H. 03103

80 MHZ WIDEBAND RF POWER AMPLIFIER



MODEL RF-805

- 10 Watts Output into 50Ω
- 0.1 Volts In — 22.5 Volts Out
- .05 MHz to 80 MHz Broadband
- Low Distortion
- Solid State
- Flat 47 db Gain

The RF-805 is a solid state amplifier, broadband from .05 to 80 megahertz, which produces ten watts with —30 db harmonic and intermodulation distortion. Lower distortion is available at lower output levels. Gain is 47 db minimum, constant within 1 db, so that full output is developed with less than 0.1 volt at the 50 ohm input. Accurate output metering and overload protection is provided.

The RF-805 will raise the power of most manual and swept tuned signal generators and thus extend the usefulness and versatility of available signal generators. Receiver testing, wattmeter calibration, antenna testing, RFI testing, attenuator measurements, and filter and component testing will be aided with the use of this equipment.



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people in the Pacific Islands. OBS appointments are available. If you are interested and are willing to keep regular on-the-air skeds to transmit Official Bulletins, contact the SCM, Traffic: W7OXC 304, W7EM 263, K7SOT 42, K7QWH 10, K7CLO 8.

WYOMING—SCM, Wayne M. Moore, W7CQI—SEC: K7NQX. RM: K7KBA. PAMs: W7TZK, K7SLM. ORRs: K7RLM, K7NQX, W7SDA, K7TAQ, W7ZFA. Nets: Pony Express, Sun, at 0800 on 3920, YO, daily at 1830 on 3610; Jackalope, Mon, through Sat, at 1215 on 7230; WX Net, Mon, through Sat, at 0630 on 3920; PO Net, 1900 Mon, through Fri, on 3950. K7UUF has a new rig. Got some new Novices on in Casper as a result of the recent classes. New officers of the Casper Club: W7IVK, pres.; W7CLF, secy.; W7BFV, act. mgr.; W7VDZ, trustee; W7CQL treas. W0NBA, ex-W7WYX tied the marital knot in Jan. K7QJW has started a code and theory class in Wheatland. The boys in Laramie have their repeater working very well on 4 meters now. They have tough tone control for operation. If you would like to show the ARRL film "Hams Wide World" to scout groups, schools, etc., drop me a line. Traffic: K7TTH 239, W7GMT 138, W7TZK 61, W7SDA 60, W7BDI 53, W7YWW 29, K7SLM 23, K7TXZ 26, K7VWA 34, W7VJI 21, W7ELA 14, K7QJW 8, W7AUV 6, K7WRS 3, K7JED 2.

WYOMING QSO PARTY

March 14-15, 1970

All amateurs are invited to participate in the first Wyoming QSO Party, sponsored by the Sky-Wy and Casper Amateur Radio Clubs. The contest starts 1700 GMT March 14 and ends 2400 GMT March 15. Each station may be worked twice on each band, once by phone and once by cw. Complete exchanges consist of QSO number, reports and Wyoming county (or ARRL section/country for non-Wyoming stations). Each completed exchange counts one point. Non-Wyoming stations will try to work as many Wyoming stations as possible. Wyoming stations are not permitted to work stations in their own state for point credit. Suggested frequencies: 3560 3920 7060 7260 14060 14280 21060 21410 28066 28660 kHz. In scoring, non-Wyoming stations multiply total points by the number of Wyoming counties worked. Wyoming stations multiply total points by number of ARRL sections/countries worked. Certificates will go to the highest scoring phone and cw stations in Wyoming and the highest scoring station in each ARRL section/country (total phone and cw). Multioperator stations are not eligible. Logs showing usual information in GMT should be mailed to the Sky-Wy Radio Club, Box 164, Cheyenne, Wyoming 82001. Send a copy of your log, not the original, since the entry will not be returned. To be eligible, logs must be postmarked no later than May 1, 1970.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. RM: W4IFU. PAM: W4ERC. Public Service Awards were presented by the Mobile Civil Defense Office to the following Mobile ARC members for their outstanding work done during and after Hurricane Camille in Aug.: WB4LNM, K4MIF, W4EX, WB4NNX, WR4KDA, W44MNU, W44NRJ, W4EMAK, W44AN and W4EXE. An award also was presented to the Mobile Club by the Red Cross there. The Mobile Club has an emergency communications travel trailer ready for use and operates a net on 3715 at 2300Z on Sun. for Novices and a net on 3925 at 0200Z every Thurs. W4HDO is the new mgr. of AENM and invites everyone to check in. K4WHW continues as mgr. of AENL. WB4LAL is now an ORS. WB4NNX has his General Class license. Attendance on AEND still is good but no new calls have been heard lately. WB4EKJ says everyone is welcome to QRS and QNT. The Tennessee Net AENT traffic count was 42, AENB 121, AENI 10, AEND 133, AENR 4. WB4LAL was high individual traffic handler. Sorry to hear about W45OMY being in the hospital. W44NPL has a new KVM-2 and is building a (you guessed it) 4-1000 linear. Don is EC of Jackson County. Our appreciation goes to everyone who

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participated in the NET in Jan. Traffic: WB4LAL 196, W4HEU 150, WB4MH 122, WB4FKJ 110, K4AOZ 48, WB4LHH 42, WB4KDI 30, W44VEK 39, W44LQ 38, WB4AH 36, W44VO 34, WN4NJG 33, WB4NCT 25, W4WLCG 23, W44SM 23, K4W1W 20, W44BLX 17, WB4LNL 15, K4KJD 14, WB4K8V 12, W4DGH 10, WN4PEI 8.

EASTERN FLORIDA—SCM, John F. Porter, W4KGT
—SEC: W4YLT. Ass: SEC: W49NK. RMs: K4EHY (e.w.), W4RWM (RETY), PAM 75: W40GN, PAM 40: W4NDR, PAM V H F: W44BMC. (This resume of how the E. Fla. section will be run during my term of office is for newcomers and out-of-state transplants. The local "Old Timers" know from past experience how I operate. Our section is not a one-man operation. The reason we have stayed near the top is because of a lot of hard work by dedicated hams who give unselfishly of their time. It takes the combined efforts of all to maintain this high standard. The SEC and respective RMs will handle all emergency planning and operations. The SEC will recommend appointments of RMs. The RMs will recommend QRS appointments, the PAMs all OPS appointments. Recommendations from any or all of the above will be solicited for other official appointments. Section Net Managers will recommend those stations eligible to receive Section Net certificates. The final decision on all appointments will rest with me. Traffic is the life blood of our section nets. Therefore all reports other than those written should be sent

FLORIDA QSO PARTY

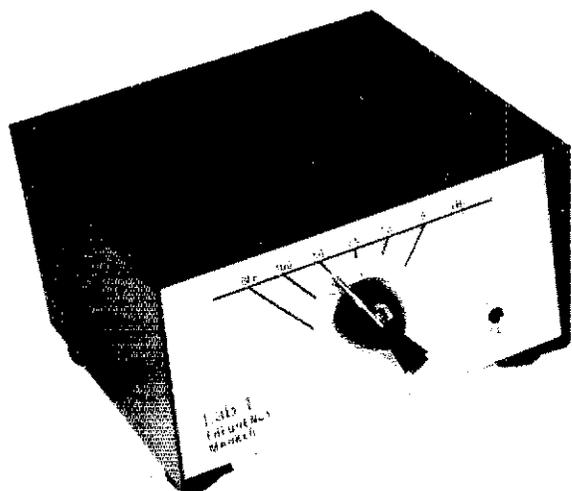
April 4-5, 1970

Florida Skip, the all-Florida amateur radio publication, is happy to announce the sixth annual Florida QSO Party. All amateurs are invited to participate. Florida amateurs are urged to work as many out-of-state stations as possible, as well as those within the state. This year, provisions have been made establishing a portable category, to encourage field day-type operation from rare Florida counties.

Contest periods are Saturday 1500-2000, Sunday 0000-0500 and 1400-2359. All times in GMT. Suggested frequencies: cw 1807 3570 7070 14070 21070 28070, phone 1817 3870 7270 14270 21370 2857. No power restriction or time limit. Stations may be contacted once on each cw band and once on each phone band. Cw and phone are separate scoring and are *not* to be summed for any award. Multipliers count only once. Florida stations score one point per QSO times the number of states, provinces and countries. (DC counts as Maryland.) Other Florida stations may be worked but only for contact points. NOT for a multiplier. The maximum multiplier is 70 (49 states, 10 provinces, and 11 DX). No more than 11 DX countries will count towards the multiplier. Multioperator stations: single transmitter per mode, minimum of 50 QSOs. *Florida portables*: Stations operated in other than their home county, and not at a location presently licensed to a station in the amateur service. Single or multioperator, single transmitter per mode. Non-Florida stations score 1 point per QSO times the number of Florida counties (67 maximum). Minimum 5 QSOs. Trophies will be awarded to stations in the following categories: *Florida stations* to the high single cw or phone, high multiop, cw or phone, high portable cw or phone; *non-Florida trophies* to high single cw or phone. Certificates will be awarded as follows: *Florida* high single cw and phone each county, high multiop, cw and phone each county, high portable cw or phone each county, high Novice; *non-Florida* high single cw and phone each state, province and country and high Novice each call area. Logs must be postmarked no later than May 30, 1970 and mailed to: *Florida Skip* Contest Chairman, Box 501, Miami Springs, Florida 33166. A summary sheet with your name, call, address, claimed score, category, station location and the customary declaration **MUST** be included. All scores will be published in a summer issue of *Florida Skip*. Participants desiring a copy should include a 6¢ stamp with entry. Decisions of the Contest Committee are final.

TBL1

FREQUENCY MARKER



- **SELF-CONTAINED UNIT**
- **BATTERY OPERATED** (3 1.5V Flashlight Cells)
- **NO EXTERNAL WIRING**
- **COMPACT:** 2 1/2" x 4 1/2" x 4 1/2"
- **HANDSOMELY STYLED** (2-tone Equipment Grey)
- **FRONT PANEL ADJUSTMENT TO ZERO BEAT WWV**
- **COMPLETE WIRED & TESTED** (WITH MONEY BACK GUARANTEE)

The TBL1 will replace the 100 KHz calibrator built into most receivers. Using your 100 KHz XTAL this unit will provide sharp accurate markers with readouts at 100, 50, 25, 10 and 5 KHz. Keeps your receiver calibrated at all times. Locate sub-band MARS frequencies and band edges.

PRICE, less Crystals*
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\$29.95

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FREQUENCY MARKER IDENTICAL TO ABOVE, LESS CABINET AND SWITCH

SPECIFICATIONS: Glass Epoxy Board, Adjustment to zero beat with WWV. Uses 100 KHz crystal (not supplied).

3 to 4 VDC

Compact—1.75 x 3.75 inches.
Install anywhere!

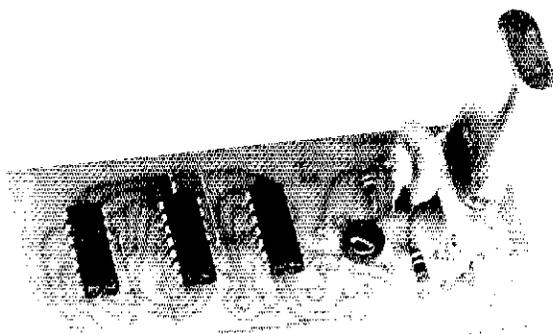
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Complete easy-to-assemble kit

Prices Prepaid USA 50

\$19.95

Wired & Tested



(*) 100 KHz crystal for any of above for \$3.25.
Switch for Kit Models, \$1.00

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SPECIAL from Stafford Electronics Inc.,
computer cards loaded with goodies!

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Card Mounting Rack Holds 24 4x6 cards		\$4.00

HOT BUY !! 24 assorted units from list above with rack with over 30 transistor resistors, capacitors, diodes, trim pots and connectors. \$50.00

CARD EDGE CONNECTOR. 15 pin double sided and gold plated 0.156 inch spacing \$5 for \$4.50

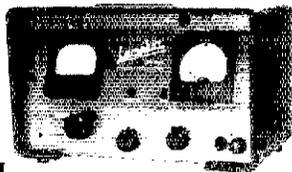
The above circuit cards are of the highest quality. Some have gold plated fingers. All have eyelets at component location. Boards can be stripped and rewired with ease. All cards are shipped with mating connectors. Schematics are available.

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Indicates instantaneous PEAK deviation of voice or tone modulation, on fast-attack, slow-decay, analog meter.

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Continuous tuning, 25 to 500 Mc.

Meets FCC requirements for all mobile-radio services.

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via radiogram. This will assist the various nets in their traffic count. All reports should reach me before the 25th of the month. I urge each of you to contact your section official and take an active part in our section activities. We welcome to our section W4IA from Virginia. Congratulations to W4LE for a fine job on the Fla. Traffic Handlers Routing Guide. Thanks to K9FMA and W8RZY4 for the fine Q1 reports. Six PSBR reports were received this month. WA4SCK and WB4HJV made the BPL. Our thanks to everyone who took part in the Jan. SET. Let's all plan for a bigger one next time. Traffic: WA4SCK 875, W4FPC 528, WA4FGH 261, WB4AW 183, WB4HJV 177, K4GJ 153, W4FP 151, WB4HJV 148, W4SDR 127, WA4HD 118, W4BHW 116, WB4ER 103, W4DQ 92, W8RZY4 72, W4NGR 71, K4DAX 70, W4SMK 64, K4HS 60, W4BRC 60, WA4EJA 56, WA4HDH 52, WB4GHD 48, W4ZAK 48, WB4FLW 42, WA4BGW 34, W4TJM 29, K4LPS 27, W4BNE 23, K4SJJ 21, W4TA 17, W4KGT 17, WA4EYU 16, K4OKR 16, W4HT 12, WB4HNL 9, W4LEP 9, W4LK 9, W4LE 7, WB4HTJ 4.

GEORGIA—SCM. Howard L. Schreiber, W4RZL—SEC: WA4WQ, RM: W4FDN, PAM: K4HQ. W4LR, WA4OR reports a short 6-meter opening Dec. 19 to the W5 area and a good opening Dec. 22, also to the W5 area; and on the 23rd Mass., Va., Conn., Penna. and Ohio. An open invitation is extended to all stations to check into the Dixie 6-Meter SSB. Net on 50.115 Mc. at 2100 EST 50m. and Wed. GSX reports 62 sessions with 464 Q1 and 353 messages handled. The Ga. SSB. Net reports 827 Q1 for 176 messages and 36 photo catches. W4UQ added QJOMR, HTHSM and YTBUD for new prizes. W4LHR now is copying ARRL Bulletins on RTTY. Phil also built a 9-transistor 2-meter receiver. W4GXZ says WA4CAY uses word abbreviations like "POTUS." Same to you, Joe. W4BGH added 2-meter fm. to his HW-17. W4BGK has a Clegg 220r. K4HQ lost his stand in a windstorm. K4PK wonders how Santa got that 500c down the chimney. WA4LLI reports a traffic total of 2 and a Navy MARS total of 65. How about dividing your time Steve? We need St. Simons. Traffic: W4RAV 319, W4NSO 220, WA4CZY 150, K4BAI 125, W4FDN 102, W4CZV 77, W4DDY 74, W4PIM 74, W4AOL 23, WB4DMO 23, K4HQI 14, W4RZL 12, K4PK 4, WA4LD 2.

WESTERN FLORIDA—SCM. Frank M. Butler, Jr., W4RKH—SEC: W4KB, PAM: W4MQQ, RM-RTTY: W4WEB Nets:

Net	Freq.	Time	Days	Sess.	Q1	QTY
WFBN	3957 kc.	2300Z	Daily	31	548	77
QFN	3651 kc.	0000/0800Z	Daily	59	558	333
NW Fla FM	146.94 Mc.	0830Z	Daily			

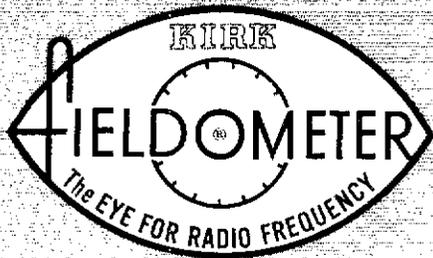
Pensacola: The first showing of the new ARRL film, "Ham's Wide World," was on Ch. 2 here. The NAB Club, W4NHF, was motivated by K7ZCK with all new equipment. It is located in Hungar 708, W4RKL Gulf Breeze, assisted in the rescue of a stranded ship off the coast of Nicaragua. The FARA held an FB Christmas Party. Fort Walton: New Novices include WN4s PAU, PBA, P6F, and PFV. The just is W4RKH's jr. operator. The W4KLF repeater is back on the air after a shut-down to permit repainting the water-tank transmitter site. WB4NHI is a new ORS; he put up 80-meter tilted dipole and 4RTV vertical. K4YLM is active again from Laurel Hill. Chupley: W4SRR, WA4TTC and W4KB assisted in the search for two lost children, Mariana; WA4LA is back on the air after many years, on 146.94 Mc. Wovahitehka: W4CGA lost his 2-meter antennas to high winds. Port St. Joe: W4WEB got a new Cygnit 270 mobile/portable rig. Quincy: WN4OYM just got his Novice ticket. Tula-hassee: K4RDI moved here from Lakeland. WB4XXX was appointed OPS and QYS. Traffic: (Joe) WB4DYM 52, WB4LQ 41, W4WEB 26, WB4EQI 24, W4FDJ 19, W4KB 19, W4RKH 13, WB4NHI 6, W4VE 4, (Nov.) W8RY/W4 80, WA4BBN/4 45.

SOUTHWESTERN DIVISION

ARIZONA—SCM. Gary M. Hamman, W7CAF—SEC: K7GPZ, RM: K7NELL, PAM: W7UXZ. The Amateur Radio Council of Arizona, Box 6002, Phoenix 85005, elected the following officers: W4TLP, chairman; K7GHS, vice-chairman; W7GX, secy.; VE3BCR/W7, treas. The Old Pueblo Radio Club of Tucson elected the following to office at its Annual Dinner meeting: K7KNP, pres.; K7BCW, vice-pres.; WNTXW, secy.-treas.; W7GCSN, comptroller. A public service the Old Pueblo Club is performing is running phone patches for the Tucson Boys' Chorus while it is on concert tour from Jan. to Apr. The Arizona ARC

KIRK SIGNAL DETECTORS

The R. F. Super Snoopers



KIRK Fieldometers Are Electronic Measuring Devices for radio frequency fields and RF energy with wide spectrum frequency coverage of 1 KHz to 1000 MHz. They are not frequency sensitive nor polarized. Usual batteries and plug-in coils are not required.

All KIRK Fieldometers are equipped with sub-miniature silicon microwave diodes, selected, paired & tested to cover frequency range spe-

cified. Housings, handles & covers are injection molded from high impact styrene.

KIRK Fieldometers Are Offered In Three Distinctive Models with meter indicators and a hand probe multimeter adapter model for use with most standard volt-ohm multimeters. Metered models are offered in two types: A Standard Model incorporating a 0-100 Microampere Meter, or an Ultra-Sensitive Model containing 0-20 Microampere Movement.



MODELS MC & MC-20 SIGNAL SENTRY for Mobile • Marine • Aircraft

Case: $3\frac{1}{2}$ "H x $2\frac{3}{4}$ "W x $1\frac{1}{2}$ "D.

Ideal For Tuning antennas and transmitting equipment for maximum performance. Also serves as a signal sentry for two-way radio in mobile, marine and aircraft, providing a visual reference of power output of each transmission. Equipped with capacity wand and silicon microwave diodes plus a U-shape mounting bracket for pivoted case.

Standard Mod. MC, 0-100 Microamp Meter..... \$29.95
Ultra-Sensitive Mod. MC-20, 0-20 Microamp Meter. \$39.95

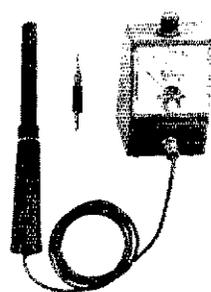
HAND UNIT MODELS HCE & HCE-20

Case $3\frac{1}{2}$ "H
 $2\frac{3}{4}$ "W
 $1\frac{1}{2}$ "D



A Versatile, Portable, Hand Unit for field use in measuring radio frequency, field strength and energy. Contains a capacity wand with silicon microwave diodes, microampere meter & sensitivity control with scale on $4\frac{1}{2}$ " handle end.

Standard Mod. HCE, 0-100 Microamp Meter..... \$34.95
Ultra-Sensitive Mod. HCE-20, 0-20 Microamp Meter. \$49.95



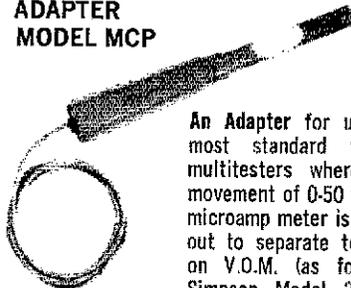
LABORATORY MODELS LCE & LCE-20

Identical To Model HCE except Microamp Meter and sensitivity control are mounted in a portable, slanted front meter case; $3\frac{7}{8}$ "H x $2\frac{7}{8}$ "W x $2\frac{3}{4}$ "D. Hand probe is equipped with capacity wand containing silicon microwave diodes and a 3-ft. cord

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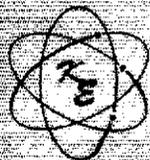
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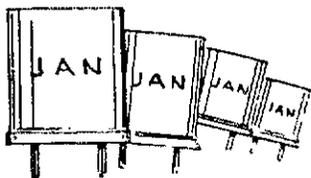


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elected the following officers for 1970: K7WUG, pres.; W7WSV, vice-pres.; W7GX, secy.; WA1KKE, treas.; K7CEH, act. mgr. The Ariz. Repeater Assn. had several ties in its election and the run-off results will be available next month. A new net, the Arizona Emergency Traffic Net meets daily on 3992 kc, at 1800 MST in the winter and 2100 NST in the summer. K7HIS has been appointed EC and is managing the net. The Ariz. Post Office Net has added sessions Mon. through Fri. at 1800 NST on 3915 kc, Net manager is K7WJF. K7IRV recently was appointed an OO. Congratulations to K7NHL on making the BPL. The Copperstate Net handled 253 messages in Dec. PSHR: K7NHL 51, WA7EQC 27, W7UXZ 22, W7CAF 19, Traffic: K7NHL 581, WA7FD 128, W7GEP 110, W7OTU 45, K7WUG 26, W7JMJ 23, WA7EQC 22, WA7SP 21, W7FQJ 20, W7UXZ 20, W7LLO 17, W7CAF 16, W7DQS 6, W7PKM 6, W7GPT 4, K7EXT 2.

LOS ANGELES—SCM, Harvey D. J. Heland, WA6KZI—Asst. SCM: Donald R. Etheredge, K6UMV. SEC: WA6QZY. New officers of the W6IN Society are WA6LLI, pres.; WB6NBT, vice-pres.; WB6IJD, secy. New officers of the Atrn. Int'l-Rocketdyne Club are WA6IGU, pres.; WA6QAM, vice-pres.; WB6BJG, treas.; W6ZZN, secy. The Rocketdyne group lost its 70-ft. tower during the Dec. winds, as did several other local amateurs. Eight members of the Antelope Valley ARC code/theory classes took the Novice Class exam. WB6OEZ is sending code practice for Palisades RC members on the air prior to meetings. WN6BJP has a DX60B and a GR54 to a long wire on 40 meters. K6ASK has moved to a new home in La Verne. WA6JHD passed the Advanced Class exam. K6NA is rebuilding his HV power supply. WB6VZI is kept busy with school and arranging programs for the West Valley ARC. WB6ABP is back on the air after replacing bad capacitors. WA6AM advises his 5-band c.w./phone mobile is available for emergency communications. WB6RBO spent the holidays out of town. WN6TIM reports a W6N effort of 30/20. WA6EJJ is busy with school, the Metro Net and a bit of 10-meter DX. Power line noise is cutting into the activities of W6TVC, K6VNX and WA6KZI. W6JET installed coax switches to expedite power and antenna changes. WN6LSB now has an 8X-101 and is interested in a possible Novice net. WB6MCW won the Nov. homebrew contest at the Inglewood RC and is presently working on an ATV camera. W6ORS is going mobile soon with an SB34/Porsche. W6YTB is building a Heath HW-100 and is looking forward to net operating. K6KUIQ is a new OO/OV8 appointee. W6TBT is now on ATV. WA6KXT has a new 14AVQ. WA6KZB is running phone patches to WA6HWB/HC2. W6FP now works at KHJ-TV. WB6QZY has his General. K6KIP now is on s.s.b. W6DQX and WA6ABP advise that SCN now meets at 8 p.m. on 3800 kc. *The Palisades RC Bulletin* reprinted an FCC Bulletin on RFI to Audio Devices in which the Commission explains in layman's language that such RFI is cured by servicing the audio device. Copies of the *Bulletin* may be obtained from FCC Field Offices. The East San Gabriel Valley AREC, working closely with the Red Cross Disaster Committee, was on standby alert during the wind-driven fire near Glendora in Dec. L.A. County RACES, in conjunction with CBers, provided Ross Parade communications. County RACES should relocate in the central jail until new quarters are constructed across the street from the current 1316 N. Eastern L.A. address. Your SCM, WA6KZI, soon will publish another section club list, so he wants current meeting information and mailing addresses for all clubs in L.A. County. Please help him out. Traffic/PS: (Dec.) W6AM 9/0, WB6BRO 595/3, W6BFG 195/3, K6CDW 35/0, K6CLL 46/0, W6DQX 10/0, WA6JZR 2/0, WA6FJJ 38/0, W6FJT 27/25, W6BGLL 7/6, W6IHN 329/0, W6IVC 10/8, W6JET 0/11, W6KKG 8/17, W6KXI 28/0, WA6KZI 0/4, W6MLF 704/3, W6OEO 36/10, W6PAV 3/0, W6QAE 213/0, W6RCV 0/6, W6SSZ 1/0, W6SYP 12/0, W6USY 8/0, W6WDS 4/3, W6WIT 6/10, W6ZVC 207/3. (Nov.) WA6ABP 27/14, WA6VIK 67/9, W6ZLP 160/31.

ORANGE—SCM, Jerry L. VerDuft, WA6ROF—Asst. SCM: Richard W. Kirbeck, K6CID. SEC: WB6CQR. RMs: W6LCP, W6BNX, PAM: WB6RYM. 1970 officers of the Victor Valley ARC are WHJT, pres.; WB6WMC, vice-pres.; W6JPX, secy.-treas.; K6QCZ, act. The club station is K6QWR. W6TTR is trustee and KBV3304 is CB coordinator. New officers of the Orange County ARC are WB6UDC, pres.; WR6CQR, vice-pres.; WA6HC, secy.; W6BNX, treas.; WA6FIT, act.; WB6TBU, pub. rel.; WB6UBW, membership; W6NGO, TVI; W6LCP and WA6ROF, at large; WB6NRK, teen-age rep. OO WA6JZZ reports that

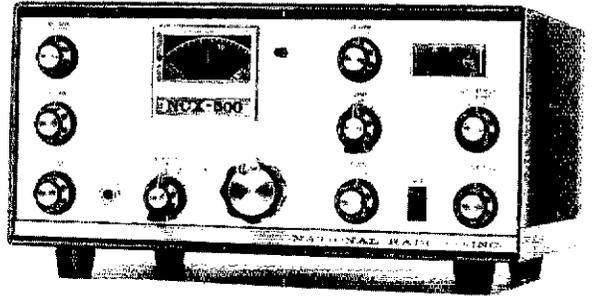
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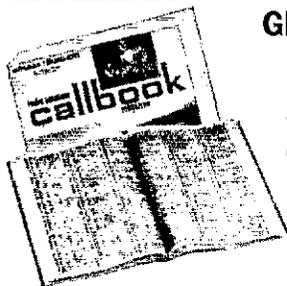
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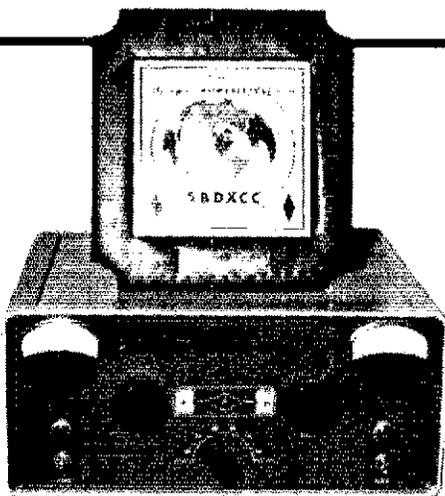
UV9IA is moving to 3.5 and 7-Mc. e.w. because of poor 14-Mc. conditions. He is operating at 0200-0400 GMT most nights. OVS WA6FIT is working on an 824R final for 2 meters and experimenting with "J" antennas. Ron also is the new NCS for the 10:30 A.M. 2-meter AREC Net. Sun. on 145.53 Mc. OPS W6BUK displayed his old-time tubes at a local hobby show. Both the SRC and SCM were recent guest speakers at the Newport ARS. WA6ROF passed the Extra Class exam and Santa Claus blessed him with a 32N-3 transmitter. Welcome to our new PAM, WB6RVM, who will work towards better liaison between phone traffic nets, AREC and NTS. The Southern California Net (SCN) now meets at 0230Z daily on 3600 kc. SCN Mgr. W6LCP reports 31 sessions, 60 stations, QNTI 483 and total traffic 749. Our past SCM, W6DEY, and his NYI, W6PJU, have been unanimously elected as life members of Orange County ARC by the board of directors. Please send your reports and news to the SCM by the 15th of the month. I am interested in hearing from you. The SRC and SCM will visit any club in the section extending an invitation. If you don't invite us we may show up anyway. Support your club and section AREC and NTS nets. Traffic: (Dec.) W6LCP 219, WA6POQ 184, W6VRJ 115, W6BNX 114, W6BZEC 1, W6GB 14, W6BUK 3, (Nov.) W6BUK 9, W6BZEC 2.

SAN DIEGO—SCM, Richard E. Loffler, WA6COE—Asst. SCM: Art Smith, W6INI. The 11cc. membership drive to enroll more amateurs in the S.D. AREC program of preparedness paid off with 27 new members signing. AREC membership forms are available at Western Radio and through the SCM. Register now! Section clubs: W6ODR was elected pres. of ARC El Cajon. W6SOK still is pres. of the No. Shores ARC. K6STS heads the SOBARS. The S.D. County Council will elect officers soon. The Palomar Club meets in Vista now. K6HAV wants No. County operators to come up on 3920 evenings at about 2100 and he will tell you about the Palomar ARC. Section news: W6JUT and W6BLK are now back on the well list. The 2-meter ARPSC group worked communications for the S.D. Marathon in the rain in Jan. W6NDAR passed the General Class exam. W6DLN hosted WA6COE W6INI and WA6KHN for AREC at the Imp. Valley meeting. W6PJG passed to General, while K6ESN, WA6EAG, WA6ZGT and WBNEJ passed to Advanced Class. Congratulations to W6KKA, elected Ham of the Year at the El Cajon ARC. W6MAG is now on 20 after returning from W3-Land. 75 ARPSC members provided communications for the dunbuggy race at Cerroillo Wells in Jan. WA6KHN reports FB results with an SR-2000 and Outboard v.f.o. W6ASOK and K6QXN are new ECs. W6SQZ is Asst. EC for Central District and handling the 2-meter group. W6QP is on RTTY from Vista. W6SEZ works with the AREC Novice Net. Traffic: K6BPI 3395, W6VNO 1005, W6EOT 786, W6LRU 554, W6BCF 377, W6YKF 55, WA6KZN 12, K6ZMS/6 5, WA6COE 3, PSHR: W6EOT, W6VNO.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKA—SEC: K6GV, RM: W6UJ. K6AAK has only about 10 more months before he retires and is putting up antennas in preparation. Bill is a favorite speaker at the local clubs telling the troops how it was in the spark days. WA6DEI has ordered an SR-401 transmitter to drive the four-element homebrew beam that he is putting up to replace the three-element antenna that blew down. W6HR, a ham for almost 50 years, maintains a skeed with his brother, K2JV. W6UJ reports that DX was good for him on 10 e.w. last month, and we may see his name on the honor roll. W6RKN is back on the air with a Swan 240 after a lapse of 10 years. W6ORW has put up his second eight-element (two) on 2 meters, and still is working on the 80-40 inverted "V" antenna. W6ORW and his ham wife teach those young people in the Simi area who are interested in becoming hams. W6EEXX received from Santa (the GM) a new phone patch and s.w.r. bridge. Traffic: WA6DEI 370, W6ORW 20, W6EEXX 15, W6UJ 4.

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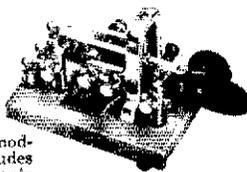
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W1LR—Asst. SCM: Gene Pool, W4KFO, SEC: W5JSM, PAM: W3ROO, RM: W4QGG, Asst. SEC: ETex/PAM V.H.P.: W4SKHE. Continuing last month EC cancellations we have K4RBC, K4MZW, W5YDI, W5IPM, W5KZA, W5JSL, W5RSX, W5MJN, W5ANK, K5ULC, W5FWA, W5TUF, W5TUW, W4IAR, W5OCH, W4VYP, W5RDG, K4DOM, W4SGNT, W5FKT, W5CVL, W5GBS, W4KNA, W3BTH, W5VVA, W5HYO, W5LPH, W5WBY, W5LWW, W5AIB, K5RSK and K5OIZ. W4SKIV/KHE wishes more people worked 2-meter a.m. than I'm. W4SNKY and W4VIR are working on 432-Mc. transceivers per Handbook. A critique of Brownfield shows Lubbock in first place with 23 licensed hamus plus many CBers. W5GWF's QTH changes from Sherman to Waco. Gaines also was appointed EC McClellenn County. W5QU is Fort Worth's new ORS. OO W5ARY, Arlington, hemorrhaged about the USNR *Coscatol* and was evacuated to Miami via helicopter. His son, daughter and XYL are K4POW, K5LCQ and W4SAIT. K4MOT is a new ORS. PSIR report forms are available from the SCM. The Irving ARC held a Christmas Party Dec. 17. The club meets on 50.5 Mc. each Thurs. at 8 P.M. Say, did you guys read the Director's letter about the Puerto Rico Radio Club RM1349, special frequencies for KP4. See Feb. QST for Board actions. Others of interest include RM-388, 969, 1016, 1087, 1116, 1209, 1306, 1346, 1363, 1364, 1429, 1454, 1455, 1456, 1477, 1478, 1479, 1512, 1516, 1520, 1521, 1522. If you don't know what's going on then here is your chance. Remember, there is always someone who never gets the word. The Arlington Spook Patrol brought out some 15 people. W5RG now is on s.s.b. Some 10 stations in No. Texas used "B" power level for the contest. W5KDX volunteered to give code tests to a Novice in the Cleburne area. Bill of the Tarrant County Emergency Net, says we can hear QRM on all bands if we get up early enough and work low. OO W5MRG visited the SCM for an on-call QSG and says there's nothing like PB contacts. PSIR is working out fine. W4E2A above the Arctic Circle, expressed a desire to join the League appointment program. The Garland Club held a Christmas Dinner Meeting. W5JA wants to get into ARRL work. Traffic: (Dec.) K5BNH 1350, W5JSM 172, W5QGG 94, W4SKIV 45, K5BDC 29, W5JA 26, W5LR 21, W5PRN 14, W4SDQP 13, W5ARY 9. (Nov.) W4SPFF 3850, W5QGG 74.

OKLAHOMA—SCM, Cecil C. Cash, W5PMT—Asst. SCM: W.L. Smoky Stover, K5OGV, SEC: W4SPSN, RM: W5QMT, PAMs: W5MFX, KATEY, W4JGU and K5ZCI, W5FWW is home from the hospital and has up a new wire for 40 meters. K5AYD wired out his car on Dec. 25th. He and his wife still are in the hospital at this writing but their condition is not serious. The recent ice storm got many antennas but W4YRO didn't let that stop him. He was right back on his next NCS appointment using his mobile yelp. He has his dipole back up now at shoulder height but puts out a signal at tree-top level. W4ZVI has a new "home brew" 2-meter amplifier. Thanks to Senator Goldwater for his stand and notification to the headquarters (here in my section) of the belly-aching bunch of Technicians and Conditionals who are afraid to appear before an FCC examiner. Personally I am with Senator Goldwater in favor of incentive licensing. I can remember 1953 when we lost something. We are just now, in part, getting it back. New officers of the Oklahoma City ACARC are W5HXL, pres.; W5FP, vice-pres.; W4DV, asst. to pres.; W5KE, Secy.-treas. Congrats to Novices WN5AKT, WN5AKU and WN5AME; also to new Advanced Class K5LX and W4LUCX. Net schedules:

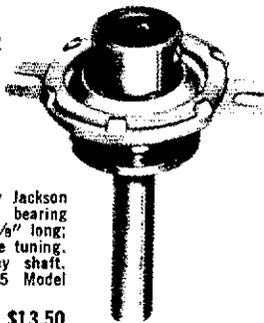
Net	Freq.	Time (Z)	Net	Freq.	Time (Z)
OPEN	3915	1400 Sun.	OLZ	3682.5	0100 T-Sun.
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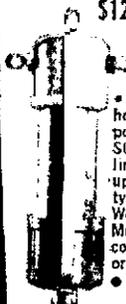
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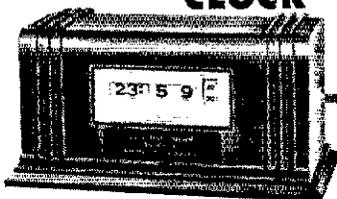
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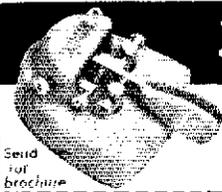
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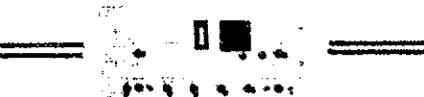
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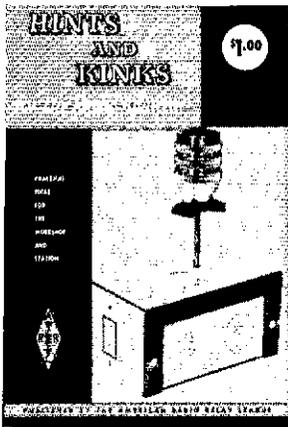
SOUTHERN TEXAS—SCM, G.D. Jerry Sears, W5AIR—SEC: K5QQG, PAM: W5KLV, RM: W5EZY. Our SEC, K5QQG, has gone back on the job after having a stunt-out with a couple of hijackers three months ago. Yep he winged them both and caught one himself. *Houston ARC News* is back in print and reports the V.H.L. Amateur RM Society held its bi-annual meeting at the club Feb. 22. All interested persons are invited. K5FRT, last heard from in Puerto Rico, now is at A. & I. College in Kingsville. He reports CNSPV now is WA0MEI/5 in Kingsville, EC K5EFIL in Texas City, and OPS K5WYN, Galveston, use 2 meters to pass their traffic. EC W5KR's *Off Resonance* bulletin for the Texas Southwest Amateur Radio Club, Inc., reports a Memorial "Lon G. Hill Library" has been set up at the Harlingen Library in memory of WA5ISH, who has entered the Hall of Silent Keys. WA5DSG and XYI, Ginger have moved from the Valley to the Fort Worth area. The El Paso ARC's (W5ES) *Bulletin* reports W5AAJ, ex WB9AAX, is a new member. W5HYG and his XYI are back from a Christmas trip to Ohio and kept in touch with El Paso via amateur radio. Reports for Dec. were few. Come on, fellows, let's hear from you about your activities. Traffic report for Dec. was way down. The Public Service Honor Roll reports for Nov. were K5H2R, W5EZY, W5QJA and W7WAI/5. For the month of Dec. they are W5QJA, W5EZY, K5ROZ and WA5WTF. Nice going, fellows. Keep the reports coming. Traffic: WA5FJN 223, W5EZY 198, W5QJA 104, K5ROZ 81, W5ABQ 45, W5BHO 44, W5TFW 31, WA5QKE 12, K5WYN 8, W5AC 3, W5KLV 1.

CANADIAN DIVISION

ALBERTA—SCM, Don Sutherland, VE6FK—SEC: VE6AFR, PAM: VE6ADS, V.H.F. PAM: VE6AWY, ECs: VE6SS, VE6APQ, VE6APR, VE6XC, ORS: VE6ATG, OPSs: VE6ATH, VE6TG, OVRs: VE6MX, VE6HE, OOs: VE6HM, VE6MJ, VE6TY, ORN: VE6SH. It is with deep regret that I report the passing of VE6MP. Congratulations to VE6AVV on his appointment as V.H.F. PAM for the Calgary area. I am pleased to welcome VE6MF back to Alberta. VE6MJ has completed his integrated circuit frequency standard. Both he and VE6HM did well in the FMT. VE6HR has completed the installation of his 80-ft. tower and also received the approval of the Edmonton Development Board for the installation. VE6TY is on c.w. only (is this new?) while completing his 8B-101. The APSN is averaging 58 QNTs per session. Many phone calls and informal contacts are handled, but written message traffic still is very light. We still require some c.w. operators to give us liaison with the NTS. The Western Polar Net comes in very clearly these days on 3760 at 0300Z. Watch for its QSO Party and other NWT Centennial Celebrations. Traffic: VE6FK 23, VE6XC 13, VE6MJ 10, VE6SS 7, VE6ALA 2, VE6HL 2, VE6FS 2, VE6YW 2, VE6ASZ 1, VE6JK 1, VE6NU 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—We hope you all will make 1970 a banner year for amateur radio activity. The North and West Club, via VE7OF, reports ten potential new amateurs for 1970 from its cude and theory class. VE7BQA has an HW-12 and 2-meter mobile. It's nice to have *Beaver Valley Chicks* again. The club has taken on a couple of children with muscular dystrophy, and hopes to advance them into the knowledge of amateur and a ticket. VE7APR is reported to be in the hospital. VE7BIO has the tower and 20-meter beam installed now. Chilliwack has received the call VE7ELK for its repeater station. VE7FW has just returned from a VIF trip to Japan and Bang-Kok. He worked VE7W/HIS1 and visited VKs and ZIs. The Chilliwack ARC theory/code class has four adults and last year added four new amateurs to the ranks and one this year. Vancouver Club's Dinner at the Fraser Arms and the QCW Dinner at the Blue Boy brought out many old-timers. The Victoria SWC was tops in the B.C. section with its high FD score. It's only 1970 now but what are we amateurs going to do for British Columbia's birthday in 1971. VE7RG 40/80 has an inverted dipole up 65 feet. Traffic: VE7APR 70, VE7BQA 61, VE7BIO 57, VE7AC 43, VE7BA 39, VE7AXH 25, VE7GQ 23.

MANITOBA—SCM, Keith Witney, VE4EI—VE4FQ reports a good month for MTN and planned a change of net frequency to 3660 Feb. 1. Congrats to VE4RO on



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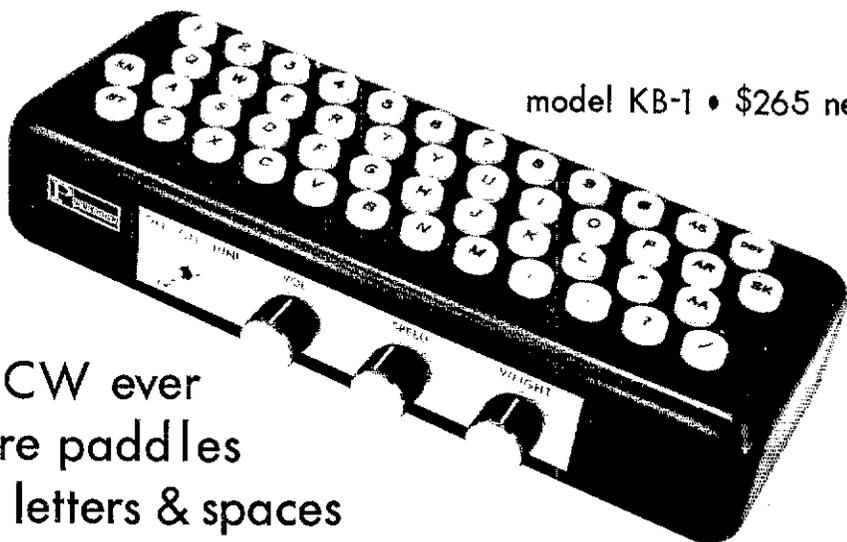
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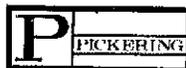
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becoming ORS, VE4NS and VE4NE can clear VE8 traffic if need be. For those interested in nets and traffic the new MTN bulletin is a must. Write VE4PQ for copies. VE4QL is starting a club for v.h.f. experimenters. The Winnipeg Repeater Society has confirmed the use of the Richardson site. The Manitoba Centennial Awards Contest has been causing much excitement on the bands. Contact J.N. Knowles, VE3JK, Box 365, Carmen, for information. The ARRL Newsletter is of interest to all section amateurs and may be obtained from Box 475, Winnipeg. Traffic: VE4PQ 102, VE4RO 59, VE4KE 56, VE4YC 25, VE4RL 16, VE4NE 13, VE4QI 9, VE4JA 8, VE4EF 7, VE4XN 5, VE4IW 2, VE4JK 2.

MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HL. Appointment is open for Asst. SCM in Newfoundland/Labrador. Main duties are to provide items for the station activities report and assist in organizational matters. VE1AMR and VE1RO are eligible for PSNR listing. VE1ADD recently underwent surgery. VE1WZ lost his quad antenna in a recent storm. VE1PPV now is operating as JJ2PV. VE2AM was a recent visitor to VE1-Land. VE1SI has been appointed secy. of the NBARA. The NBARA is now conducting organizational and technical discussions on the Sun Morning Net. VE1AMR was active in preparing for Jan. SET activities in the Moncton area.

ONTARIO—SCM, Roy A. White, VE3BUX. Traffic: VE3CI 189, VE3EBH 109, VE3DPO 94, VE3DRG 80, VE3RZB 70, VE3DV 70, VE3EWD 53, VE3EAM 51, VE3EHL 35, VE3CWT 33, VE3FRE 31, VE3GMQ 31, VE3NO 31, VE3CLB 30, VE3FXI 22, VE3GHO 14, VE3ANJ 13, VE3EBC 10, VE3VD 10, VE3WW 9, VE3RUC 7.

QUEBEC—SCM, J.W. Ivey, VE2OJ—SEC: VE2ALE, RM: VE2DR. We will be looking for the results of the 1970 SET to see how VE2 activity stacked up. At this writing (end of Dec.) there is very little activity showing in that direction. It would be wise for ECs to have at least one local simulated test during the year. During the illness of VE2AGI, the repeater VE2AT was outed for by VE2DAH. By the time this report reaches you it should be obvious that nominations should be made for your next SCM. My term expires in June.

With much regret we report that VE2KW became a Silent Key Dec. 25. Don was one of the section's earliest s.s.b. stations. The 2-meter rig is all ears for Oscar 5, from reports. More stations will be listening to this satellite than previously. Felicitations à VE2AUJ et son excellent pour leur excellent travail au sein du Radio-Club de Québec. Roméo, ex-VE2WP, opère maintenant avec ses nouvelles lettres d'appel: VE2RG, VE2RPT est actif sur le 40 mètres en c.w. Il y a aussi le réseau du Petit train du matin avec VE2AB et VE2AA en tête; ce réseau opère à la fréquence 3750 kc., tous les matins à 8 heures. Traffic: VE2DR 132, VE2RIU 59, VE2BXY 35, VE2CP 34, VE2OJ 16, VE2FC 9, VE2ALE 2.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—SEC: VE5CU, PAM: VE5HZ, OOs: VE5HQ and VE5KE, ORS: VE5HQ, OVSs: VE5CU and VE5US, OPS: VE5US, ORSs: VE5GH, and VE5SC, RM: VE5GL, ECs: VE5DO, VE5RJ, VE5BO, VE5NX and VE5H. The big talk now is concerning the coming hamfest in Regina July 3, 4 and 5. There still are copies of the book, *From Spark to Space* left. Got your copy from the Saskatoon Amateur Radio Club. Don't forget to participate in the awards that are going around. Saskatoon has the Wheat Belt Award, the four boys at Esk, Sask., are sponsoring the Esk Award, our friends to the east are celebrating their Centennial with the Manitoba Centennial Award. There will be a Saskatchewan QSO Party in the spring. Details will be given in this column. The Saskatchewan Amateur Radio League will be making a special effort this year to hold picnics and get-togethers in various areas throughout the summer. VE5SN, of Saskatchewan, one of our most active hams in Saskatchewan, is confined to a wheelchair, having been a polio victim for some years. Art is now fully equipped with 2 meters and is able and willing to play an active part in public service and emergency communications. A new feature from Saskatchewan is the Swap Net which will be held after the regular phone net each Tue. night. In charge of this operation are VE5HZ and VE5TA. Items of interest for this column will be welcomed by the SCM. Traffic: VE5GL 59, VE5SC 35, VE5SN 12, VE5KI 8, VE5BO 7, VE5H 7, VE5IK 6, VE5KZ 5, VE5EO 4, VE5IX 4, VE5NL 4, VE5LK 3, VE5NX 3, VE5OJ 3, VE5EH 2, VE5FA 2, VE5VO 2, VE5MX 1, VE5YR 1.



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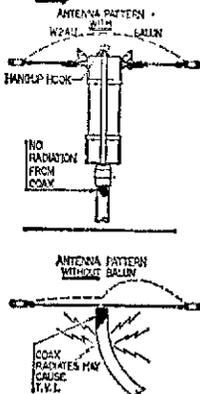
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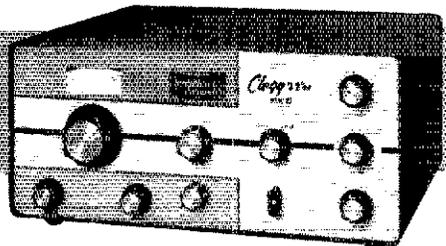


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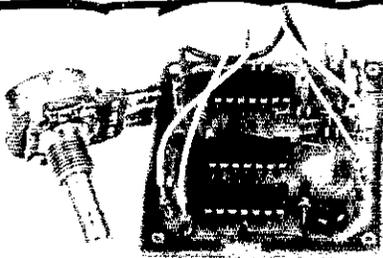


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NOW! USE YOUR TAPE RECORDER TO LEARN CODE!

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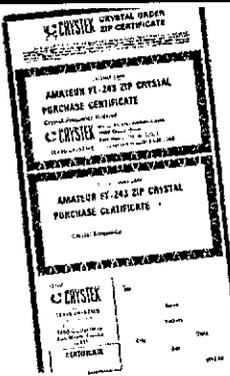
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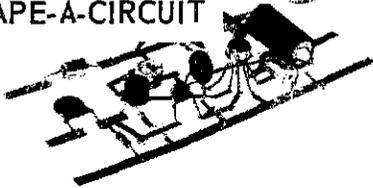
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Kit includes: Pre-assembled base, form, and plate cap; pre-tested 1 KV diodes, heat sinks, indicator glow lamps, resistors, capacitors, and complete instructions.

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(3) The Ham-Ad rate is 50¢ 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.

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(8) No advertiser may check more than one ad in one issue, one advertisement for 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.

ROCHESTER, N.Y. is again Hamfest, VHF meet and flea market headquarters for largest event in northeast, May 16, 1970. Write WNY Hamfest, Box 1388, Rochester, N.Y. 14603.

AUCTION TIME. The N.Y. Radio Club cordially invites all hams and SWLS to its 15th annual auction Sunday afternoon, Mar. 15th 2 P.M. Free parking. Bring items to sell and money to spend. Families are welcome. The George Washington Hotel at 23rd St. and Lexington Ave. NYC. G. Kiener, Pres. NYRC.

WINTER BLUES? Cheer up! You have the ARRL Hudson Division Convention to look forward to! Exhibits, Lectures, Contests, Golfests, New York City sightseeing, Fun, October 17-18. Hilton Motor Inn, Tarrytown, N.Y. Hudson Amateur Radio Council, Box 58, Central Islip, LI, N.Y. 11722 has the happy news.

QCWA—Quarter Century Wireless Association is a 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, N.Y. 10543.

INVITATION to attend West Allis Radio Amateur Club meetings on the first and fourth Tuesdays of every month, McKinley Fieldhouse, 1000 So. 72nd St., at 8 PM, West Allis, Wisconsin. Lynn Tamblin, WA9KRE.

DAYTON Hamvention April 25, 1970. Sponsored by Dayton Amateur Radio Association for the 19th Year. Technical Sessions, Exhibits and hidden transmitter hunt. An interesting program for XYLS. For information watch ads or write to Dayton Hamvention, Dept. O, Box 44, Dayton, OH 45401.

FIFTH Annual Ham Auction and Flea Market sponsored by Penn Wireless Radio Club will be held on March 8, 1970, at Fairless Hills Community Center, Fairless Hills, Penna. Open tables from 10 AM till 5 PM. Auction from 2 PM till 5 PM. Table space \$1.00. A 2-meter FM transmitter demonstration will be held. Tag in free. 89.20 Mc., 50.4 Mc., 146.34 FM. Held indoors rain or shine. For further information, write WAYHBT, Bob Almeida, Box 111, Cornwells Heights, PA 19020.

RAGS Hamfest Syracuse, New York April 11, 1970 at Sons Mountain. WA2AWK, P.O. Box 88, Liverpool, New York 13088.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news, business size SASE to K2AFY, Box 74, Massapequa Park, N.Y., L.I. 11762.

CHICAGO Suburban Radio Association Annual Hamboze on March 22nd at East Avenue and 55th St., Countryside, (La Grange), Ill. Flea market and prizes. For further information contact William Thomas, W9KWA, 4017 Vernon Ave., Brookfield, IL 60513 Tel. a.c. (312) HD3-0451.

AUCTIONFEST. Broward R.L. Saturday, March 14. Chaminate High School, 500 North 51st Ave, Hollywood, Florida. Doors open 8 a.m. Fred Schmidt, W4NYF, Chairman, P.O. Box 8873, Ft. Lauderdale, FLA 33310.

INDIANA'S Most progressive Hamfest Sunday May 24, rain or shine. Sponsored by Wabash Co. Amateur Radio Club. \$1 donation for admission. For information, write to Bob Miting, 700 Centennial St., Wabash, IN 46992.

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QSLs "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 10¢. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

QSLs Free samples, attractive designs. Fast return. W7HZ, Press, Box 2387, Eugene, Oregon 97402.

QSLs—SWLS. Samples 25 cents. Maigo Press, Box 375, M.O., Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P. O. Box 5237, Trenton, N.J. 08638. Samples 10¢.

10¢ Brings tree samples, Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

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QSLs by K1FF: \$2.00 for 100. Others at reasonable prices. Samples 25¢ (deductible), K1FF QSLs, Box 33, Melrose, Mass. 02177.

QSL, SWL cards that are different. Quality Card Stock Samples, 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

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RUBBER Stamps, 3-line address, \$1.50. J. P. Maguire Company, 448 Court Avenue, Revere, Massachusetts 02151.

QSLs. finest XYLS. OM's samples 10¢. W2DJH Press Warrenburg, N.Y. 12885.

QSLs. Neat, Quick, 10¢. Filmercrafters, Box 304, Martin's Ferry, Ohio 43935.

QSLs-SWLS. Hundred, \$7.00. Samples dime. Willow Press, 223 N. Ulariks Dr., Battle Creek, Michigan 49017.

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QSL. Second to none. Sameday service. Samples airmailed, 25¢. Rav. K7HLR, Box 331, Clearfield, UT 84015.

ORIGINAL EX-IN double holders display 20 cards each in plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free samples to Dealers or Clubs, Tepabco, John KANMT, Box 1981, Gallatin, Tenn. 37066.

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PICTURE QSL cards of your shack, etc. from your photograph 500, \$12.00, 1000, \$15.25. Also unusual non-picture designs. Generous sample pack, 25¢. Half pound of samples 50¢. Baum's, 4154 Fifth St., Philadelphia, Penna. 19140.

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NEW! QSLs professionally designed. Every card original. Free samples. Printing color thru by WFLX QSL Design, 20 Britton St., Pittsfield, Massachusetts 01201.

3-LINE Engraved badges, any color, \$1.25. Special rates to clubs. Fallert's Engravings, 121 N. C. St., Hamilton OH 45013.

NEW OSL Catalog Hundreds of cuts, stock and ink samples, nine report forms plus ten sample QSLs 25¢. Cornelson's Quality QSLs, 321 Warren St., North Babylon, NY 11704.

CANADIANS: Sell unused 814 tubes, incomplete OSA-COs run, 1957-1961; ARB receiver AC converted, Hammond 762 plate transformer. VB7CT, 3636 West 17th Ave., Vancouver 8, BC, Canada.

CANADIANS: Eico 753 xcvr, SSB xmt, plus a.c. p/s, 200 watts 20.40, 80 meters, c.w. and fone; solid-state VFO. Total cost, \$250. Your pay shipping. I. Lightbody, VE3FEO, 12 Goding Ave., Brampton, Ont. P., Canada Tel: 459-4171.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass caps & bridging resistors, 10/\$3.95, 100/\$30. Postpaid USA. Dealers inquiries invited. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga N.Y. 14225.

DAH-DITTER Kever. Integrated circuit electronic Kever. Fully self-completing on both Ditt and Dah with automatic spacing. Build-in A.C. pwr. supply, recd relay output, with side-tone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6833 Sunnybrook, N.E., Atlanta, Georgia 30238.

AUCTION: March 22, 1970, at Lambs Auction House, 1600 N. Oak, Champaign, Illinois. Sponsored by Twin City Amateur Radio Club. Details, Contact K9OZL, Milt Forsberg, 807 W. Charles St., Champaign, IL 61820.

NEW Jersey's largest Ham Auction!! Friday April 3rd, 1970. Presented by the Key Clickers of Shirling, Central School, Shirling, N.J. Restroomless, talk-in stations. Bring your gear. Two auctioneers. All evening. Buy in French from Penna and NY. Make plans to attend! 7:00 PM. Call W2DLT, Van't Slot. Watch for further details.

ANIQUE Wireless Association, 1970 Historical Radio Conference Ford Science Museum, Dearborn, Michigan. Week-end August 8 and 9th. Write W2QY for information.

WANT Early issues of Radio News, Science & Invention Electrical Experimenter, Radiocrat, Modern Electronics, Popular Radio, Radio Broadcast, Wireless Age, 1923-25 Callbooks, For Historical Library, Wayne Nelson, W4AA, Concord NC 28025.

DUMMY loads 1 k.w. all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, NJ 07016.

JUNE 7, 1970—Save this date for the Starved Rock Radio Club Hamfest. Same place as last year. Details on request after April 1, 1970. Write: SRRC/W9MKS, G. E. Keith, Sec'y, Treas., RFD#1, Box 171, Oglesby, IL 61348.

CHECK your first 2-way radio contact. If it was 40 or more years ago, you are eligible for membership in the most exclusive club in all of Amateur Radio, The Old, Old Timers Club. Write for membership application and details. Bert E. Gamble, W5ZC, Executive Secretary, 402 Beck Building, Shreveport, La. 71101.

WANTED: Military and commercial laboratory test equipment. Electronics, Box 13, Binghamton, N.Y. 13902.

SOUTHERN California Amateur Network, Scan 14.325 MHz Monday through Friday 0400 GMT. Join us. K6YCM.

WELCOME To Maritime. Mobile service net, 14313 KHz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry RDC USS Corry. PD817 FPO N.Y., N.Y. 10950.

TOROIDs, 88 mh uncased, \$5/\$2.50. Postpaid Humphrey, W46FKN, Box 34, Dixon, Calif.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2510 for the gear u want at the prices u want to pay.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, N.Y. 10007.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-24 and Radio Amateur Callbooks 1928-1934? ARKL, 225 Main St., Newington, Conn. 06111.

TELETYPE Wanted: Models 28, 32, 33, 35, Receivers R-390A, R-388, CASH, or transmitters for amateur equipment. Alltronic, Howard Co., Box 19, Boston, Mass. 02101. Tel: a.c. 617-742-0048.

SPIDERS For boomless quads, Heliarc welded aluminum, AF's Antenna Accessories; 1339 South Washington St., Kennewick, Washington 99336.

R389, R390, R390A, S114, 75A4, 7553A, NC101X, HR050TI, HR060TI, SP600, KWM-1, KWM-2, 62S1, 312B5, HA-2, and others. List for SASE. W2ADD.

SFL, trade or buy Call Books, Handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood City, California 94062.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also \$25,000.00 inventory used gear. Request list. Chuck, W8IGC, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

GREENE—Center of dipole insulator with or without balun. Free flyer. O. Watson Greene, Box 423, Wakefield, R.I. 02880. See December QST, p. 150.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. Normandy 8-8262.

FOR Sale: NCX-3, HP-13, 75 and 20 meter bumper mount. Hustler, Sun tach, Motorola mic, Vespa scooter (trade?). E. P. Rolek, 1166 Ridge Road East, Rochester, NY 14621.

TRANSFORMERS rewound. Jess W4CLJ, 411 Gunby, Orlando, Fla. 32801.

QST's Wanted: December 1915 to December 1916, 1913. IRE proceedings. Any unreasonable price! Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNL, Barry Electronics, 512 Broadway, N.Y., 10012. Tel: (212) 925-7000.

WANTED: Tubes and all aircraft and ground radios. UOI like 17L, 51X, 61BT or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Seacomer, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mby toroids five for \$2.50 postpaid. Elliott Buchanan & Assoc. Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

WORLD QSL Bureau. See ad page 131.

COUNTER, 100kc, Berkeley, emut, model 7150BDK, excellent condition, \$200. Safety belts for climbing, new nylon body belt. J15, John Link, 1081 Aron St., Cocoa, Fla. 32922.

TOROID Coils 88 mh uncased postpaid, 5/\$2.00. La Von Zachry, P. O. Box 845, Apple Valley, Calif. 92307.

GOVERNMENT Surplus Electronics Bargain Catalog. 96 pictured pages. Send 25¢, Meduna, Nahant, Mass. 01908.

NOVICE Crystals: 40-15M \$1.33, 80M \$1.85. Free flyer. Nat Stinnette, Electronics, Umatilla, Fla. 32784.

SELL swap and buy ancient radio set and parts magazines. Lavery, 118 N. Wycomb, Lansdowne, Penna. 19050.

DX Awards Log. 150-page book lists contacts for over 100 major world-wide awards. Individual logs for each award for record of contacts and confirmations. Required over two years to prepare. \$3.95 (\$4.95 foreign). McMaon Co., 1055 So. Oak Knoll, Pasadena, Ca. 91106.

TELETYPE Parts. Fast service. Machines to M.35. Boy, too. S.a.s.e. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310.

TOROIDs, uncased 88 or 44 mh, 5 for \$1.50 ppd. M. Weinschenker, Box 353, Irwin, PA 15642.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 6608 Edsall Road, Alexandria, Virginia 22312.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash and freight. Ritco Electronics, Box 156-Q567, Annadale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes, Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

HAM'S Spanish-English manual \$3.00 Ppd., Gabriel, K4BZY, 1329 N. E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914. WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

WANTED: HP-524A freq. converter and any plug-in accessory for HP-524B or Northeastern Engrg. Inc. 14-20C counters. Need 10-18 oven and assembly for 14-20C counter, prefer working one, and manual for 14-20C. Pepos S. Dounson, 914 W. Mistletree Ave., San Antonio TX 78201. Tel: a.c. (512)-735-5554.

RTTY Pictures for sale. Vol 1 \$1.00. Vol 2, \$2.00. Audio and perforated tapes available. W9DGV, 2210-30th St., Rock Island, IL 61201.

HR0-500, LF-10 wanted. Hans Horn, 527 N. Massachusetts Ave., Atlantic City, NJ 08401.

WANTED: B&W T-R switch, model 381-B; 4:1 tuning knob for 75A4, P&H VFO-matic model 80-10, Jennings vac. var. UCS-500 7 K.V. WBMEE, Jim Joyce, 286 Ridgewood Blvd. No., Westwood, NJ 07675.

CLEARANCE: Mint condx NCX-5; unwired DX-100; unused 10 mobile rts. unused kilowatt d.c. supply components; much much more. No homebrew. List 10¢. No stamps, pls. Ex-WBZKVK, P.O. Box 4552, Wilmington, Ca. 90744.

DISCOUNT! Up to 15% on new equipment. Full warranty, factory-sealed cartons. We service what we sell. Rent s.a.s.e. for a deal from the best in the West. L. A. Amateur Radio Sales, 2414 Crenshaw, Torrance, Calif. 90503.

WE Buy electron tubes, diodes, transistors, integrated circuit semiconductors and resistors. Astral Electronics, 15¢ Miller St., Elizabeth, NJ 07207. Tel: a.c. (201)-354-3141.

FOR Sgle: Collins 755-3, 325-3 and power supply, in g.c. condx. Total price: \$875.00. KOMST, Keith P. Schmidt, Box 138, Eldridge, IA 52748. Tel: a.c. (319)-283-4149.

COLLINS 75A-4 3 k.c. filters. In perfect condx. \$390. John Morin, 4145 Sonnet Ave., Oscoda, MI 48750.

SATELLITE Amateur Radio Equipment Co. New and Used Ham Gear. Repair service. Ham antennas—supplies. 426 Boston Post Road, Waterford, CT 06385. Tel: a.c. (203)-443-8841.

SELL: Heath SB-301/SB-401, \$500. Polyeonmm 6, \$125.00. Sx rcr 325. Must sell. W3INW. Tel: a.c. (215)-333-0448.

SALE: Complete Novice station; Drake 2-C, 2-NT, 2-AC, 2 CS, 8 months old and in mint condition. Original packing boxes, cables, Hallicrafters HA-5 VFO. All for \$300. W. V. Wilson, W45YQV, Box 997, Batesville, Ar. 72501.

COLLINS KWM-1, 2275; 516F-1, a.c. supply, \$50. Monitors dio, M-160 polieband FM, 12V receiver, \$100. Offers con sidered. Norman Fertel, 1200 Van Nest Ave., Bronx, NY 10461.

HRO-60 National revr, xtal calibrator and 14 coils to cover 60 kHz to 30 MHz and 50 to 54 MHz including 15M coil and 2 sets of R, C, and D coils so that one set can be left in 20, 40, and 75M bandspread position. \$250. Heath TX-1 Apache smtr. and SB-10 sideband adapter, \$100. Central Electronics FA revr phasing s.s.b. adaptor, 485 HF, \$15. Panoramio 2T, 200, 45 W Panadaptor, \$15. No shipping; package deal, \$325. Above prices or best offer. Paul Kiesling, W1SWC, 101 Union St., East Watpole, MA 02032.

CADILLACS: 1928 coupe, 1931 V-16 sedan, 1938 limousine and 1940 sedan for sale. Johnson Kilowatt, low-pass filter, deck, Dow antenna relay, \$450; Hallcrafters SX-62A, \$95; HC-794, \$90; new model B (CE) slicer, \$25; VHF-152A, \$22; General Radio 916A R.F. bridge and Model 19 teletype also. May trade for other cars or s.b. gear. Roy, W0TWZ/6, 641 E. Carson, Long Beach, CA 90807. Tel: a.c. (213)-424-2060.

WANTED To correspond with persons employed in radio, TV, ed-TV, CATV to seek advice concerning employment opportunities and prerequisites. Southeast preferred but not limited thereto. Write or cassette to Vandegrift, Matcomismo, APO, NY 09052.

COLLINS 7553C, mint condx, 500 cycle and 6 Kc. filter, 9 extra xtals. Less than 1 year old. Ser. No. 13548, \$650. L. D. Acton, WN9YJTM, RR 2, Box 234, Indianapolis, IN 46231. Tel: a.c. (317)-839-4124.

SELL HT-37, \$150; Johnson Thunderbolt 2 KW linear, \$200 or best offers. No shipping. W2TXV, Glen Head, LI NY 11545. Tel: a.c. (516)-676-4477.

FOR Sale: Collins R-390A, \$950; KWM-2, PM-2, \$625; R-4A (Drake updated 12/69), \$315. James Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

HEATHKIT HW-32A 20M transcvr, \$95; Eico 752 12 VDC supply, \$40. Both in A-1 condx. No trades. F.o.b. K6CH, 1204 N. Alamo St., Anaheim, CA 92801. Tel: a.c. (714)-774-3710.

TRI-EX Towers, Hy-Gain, National, CDE, Millen. Write for discount prices. Miller Brothers, Box 48, Harmony, PA 19037.

SELL: 250-21-3 Johnson Matchbox. Like new condx. Ship in original cartons. Built-in meter, \$74. WASSFM, 304 Tansy St., Berger, TX 79007.

SELL: HA-350 receiver w/spkr, \$80. Money back guarantee. Beavers, 36 Berkshire, Little Rock, AR 72204.

HQ-170A, \$200; HT-37, \$220; SX-130, \$120. All in like-new condx. May make offer. Ask about 2 and 6-meter converters, phone patch and mike. W4GFKL, Bob Easmlinger, 11388 Campus, Loma Linda, CA 92354.

USED Amateur Radio course wanted. Tape recordings preferred. State Price. Evan Goodstein, 9925 60 Ave., Corona, LI, NY 11368.

SELL: 20 Meter beam 204BA and TR-44 rotator. Both used only two months, \$150. Wilbur Roddey, Rte 2, Box 191, Rock Hill, SC 29730.

SELL: Hammarlund HQ-170 matching speaker above average condition, \$200. Viking Ranner, like new, \$100. W4JYX, 2214 Janlyn Rd., Jeffersontown, KY 40299.

DRAKE L4XB-R 4B, AC4, MS4, 6 extra xtals, used three months, like new \$725. John Dilworth, W9FAA. Tel: a.c. (608)-725-5407. Cassville, WI 53806.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info, contact Al Marcy, W4JD, Sec'y., 461 Third Ave., Eau Gallie, FLA 32937.

HQ-180C. Like new condx, \$220. Tel: a.c. (615)-262-0620. Paul Vandell, 2813 Portland Drive, Nashville, TN 37206.

FOR Sale: Power supply, 200 VAC primary. Dual output voltages either 2000 and 300 or 2500 and 375 VDC at 750 and 100 mA respectively. Solid state. Remote controlled. \$30. You pay shipping. Tom Cann, 1555 Black Rd., Joliet, IL 60435.

"DON and Bob" guaranteed goodies: Monarch FSI-5 dual power-SWR bridge, measures forward, reflected simultaneously, 2 Kw, \$19.95; Monarch Pocket VOM, 10,000 HM/V, \$4.95; mode Motorola TRF-1, 2 SA/1000 PIV, 396; C-E 3A/600V, 336 ea. (10/92.95; 1A/1200V, 496; 3SA/600V, 32.25; 15A/300V, \$1.50; Raytheon 61Q6, \$3.50; Eimac 4X25DB bulbs \$6.00 ea. Cetron 572B/T1601, \$15.95; transformer, dual 115V, pri. Sec. 30V/4A; 15V/3A; 90V/.05A \$5.95 ea. Rotron squirrelcage blower 3380 CFM, \$5.95; Collins 75A-4, \$350.00; KWS-1, \$650.00; Johnson Invader 2000, \$399.00; OSTs 1940-1949, 1950-1959, 1960-1969, \$25.00 each. COs 1946-1966; \$25.00. Write for quotes new, used gear. Write for surplus list. Prices f.o.b. Houston, GECC, BankAmericard, Mastercharge, Madison Electronics, 1508 McKinney, Houston, TX 77002. Tel: a.c. (713)-274-2668.

MUST Sell: Heath SB-300 revr, \$180, 14AVO vertical, \$22; both in excellent condx, instructions, I will ship. Mike Cole, WA9ZSL, 8006 S. Stewart, Freeport, IL 61032.

HQ140XA, \$90; DX-35, \$35.00; VF-1, \$10; all one-owner items. HT-18, \$25.00 (VFO) and 3 watt FM smtr. First check or m.o. takes one or all. Bob, W9KPO, 317 N. Brooks, Madison, WI 53715.

COLLINS 754A ser. No. 2036, 2 filters, \$350 30L-1, \$335. Swan 450, and 117XC, p.a., \$275.00; all mint condx. M. H. Klapp, 23 Gladwish Rd., Delmar, NY 12054. Tel: a.c. (518)-439-9511.

RECEIVING and Industrial tubes, transistors, all brands. Biggest discounts. Technicians, hobbyists, Experimenters. Request free giant catalog and save. Zalytron, 469 Jericho Tpk, Mineola, LI, NY 11501.

HEATH HW-16 with speaker, key, 4 xtals, \$100. Lafayette HF-45B converted to 10 meters with 1 xtal, mike, \$60. Hy-Gain 18-V 80 meter vertical with 50 ft. RG58/U S15. All in exlnt condx. Alan Lauter, 190-178 69th Ave., Flushing, LI NY 11365. Tel: a.c. (212)-454-6107.

FM-MOTOROLA T-51, 12 volt, 60 watt, with accessories, set for 52.525 MHz, \$97.00. Lafayette HA-600, 15-30 MHz, Brand new, \$75.00. Drake SX-4A, like new, \$195.00. Ken, K8YYC, Rte #1, Box 216, Downing, MI 49050.

SWAP or sell for Collins equipment. Brand new Hosselblad 300C with registration cards on following equipment. 50mm Zeiss Distagon, 80mm Zeiss Planar, 150mm Zeiss Sonnar, 250 mm Zeiss Sonnar. Includes eye level prism finder, lens shade, custom lifetime Halliburton aluminum 106-FX case. Want KWM-2-A, with the following mint condx equipment: 30L-1, 312B-5, 316F-2, MP-1, 351D-2. William J. Garrett, 1114 Ossington Ave., Flint MI 48507. Phone days: a.c. (313)-766-2234, and Nights: a.c. (313)-233-6449.

DRAKE 2C, 2CQ, exlnt condx, \$225.00; DX-60B, VF-1, \$70. Package deal \$275.00, or first best offer. WA0SZO, John, 423 Blair, Sullivan, MO 63880.

THERMISTER Mounts (two), HP-477B, average power 10 MHz to 10 GHz, never used, first best offer over half price. K4WTK/5, Ant. 101, 4151 S.W. Loop, Ft. Worth, TX 76132. Tel: a.c. (817)-292-7671.

SELL: HA-10 amplifier. Modified for full 2000 P.E.P. input SSB, 1000 c.w. Internal antenna relay. Perfect, \$125.00. F.o.b. W2HXD, P.O. Box 157, Westbury, LI, NY 11590.

HC-221-M, calibration book and extal. C.w. only. Exlnt condx. First best offer over \$40. W3ZSJW, 11 Crescent Dr., Old Bethpage, LI, NY 11804.

SELL: HQ-10 Monitor Scope and HQ-12 Hamscan. First best offer, no trades, Marvin Fein, W2AH, 151 Rock Creek Lane, Scarsdale, NY 10583.

HEATH HW-32 w/HP-23 ac supply, Turner 350-C mike, calibrator, HD-15 phone patch. All with coats, cables, manuals, in exlnt condx, \$150.00. Ron, W2RQOE, 152 Davis Ave., White Plains, NY 10605. Tel: a.c. (914)-946-1839.

COLLINS 32S-1, \$325; 30L-1 linear, \$325.00. Exlnt condx. Both \$600 or will trade for 32S-3, Galaxy G-1000 d.c. p.a. \$75.00. W3CEX, Glen Burnie, MD 21061. Tel: a.c. (301)-761-7119.

DX-60, \$35; TR-10R, \$85.00; V-44 VFO, \$10.00, WA9BYR, 627 Bounce Ave., Barrington, IL 60010.

GALAXY 2000 amplifier. New set tubes, never been turned on. \$300. A. R. Estes, Jr., 816 Jadewood, Dallas, TX 75232.

SHIP'S Radio operator, experienced. All documents in order. I am seeking employment. Call NY (516)-732-1929, E. H. Halkitis, 511 Hawkins Rd., Selden, LI, NY 11784.

HALLICRAFTERS SX-110, \$80.00; Heath DX-60B, \$60.00; Lafayette HA-460, Saturn Halo, matching transformer, \$110.00. Penny Reimo, WA3IGT, 5-122 November Drive, Camp Hill, PA 17011. Tel: a.c. (717)-737-1401.

SELL: Eldico SSB-100F, SSB/AM/CW exciter, 100 W P.E.P., all amateur frequencies 3.5-30 MHz, complete with built-in scope monitor, one of best ever built, \$150.00. Also Heath GC-1 three-in. scope, \$30.00, and Eldico FTFP-1 phone patch with built-in compression amplifier, \$15.00. Ed Piller, W4KCP, 80 Birchwood Park Drive, Syosset, LI, NY 11791. Tel: a.c. (516)-938-5926.

FOR Sale: Collins KWM-2, 75A-4, 75A-3, 2-element 40-meter beam with Ham-Motor, 2-element cubical quad with rotor. All items ready to operate, plus my TV business and share a 6 room Cape Cod winterized home, all located in this Aardvark Mt. summer and winter resort area. Only someone who can take over and service black & white and color TV, apply please. Package deal only. Owner will take first mortgage at 6%. W2TN, Fred Liddle, Box 434, Old Forge, NY 13420.

WANTED: Sweep generator, WA5GGB, 302 Texas NE, Albuquerque, NM 87108.

SELL: Heath Tower, \$25; Terratt TR-20/50 with home-made power supply, \$25. F.o.b. Bryan, Ohio. Delmer Carlin, W8Y1J, RFD #2, Bryan, OH 43056.

SELL: Heath HR-10B revr w/spkr and xtal cal., \$65.00. Johnson Ranger smtr, \$75. Both in vry gud condx. Ed Fitt, WA9VGR, RR #2, Box 104, Vinton, IA 52349.

HEATH Apache and SB-10 SSB adaptor, complete with all cables, manuals and Dow-Key relay; \$120.00. Would prefer package deal, but will consider separate sales. Tom Mann, W8TWR, Room 40-1, Roseman Hall, West Virginia University, Morgantown, W VA 26506.

TOROLDS! Lowest price anywhere, 40/\$10 postpaid, 88 or 44 mhz. Center tapped (5/\$2.00). FRXD-10 typing reperfocator with TD on same base, \$25. Suitcase Mite page printer, \$160, 11/16" fresh reperfocator tape \$35/box/10 or \$10/box/40. Resizable paper Electro-sensitive (2 x 18.2) 250 sheet roll, \$3. Hammarlund HQ-160 receiver \$150. Hallcrafters SX-10-A receiver \$150. Excess C-D Gonset Communicator IV \$135. Measurements Model 80 Signal generator \$125. Stamp for list. Van, W2DLT, 302Z Passaic Ave., Stirling, NJ 07980.

SALE: Heath HW-100, HP-23 power supply, HD-10 keyer, DPZ Vacationer Antenna all for \$750.00. No shipping. Sry W2DYS, Farone, 586 Palisade Ave., Teaneck, NJ 07666.

SELLING: Eico 723 transmitter, in fine condition, factory-wired; \$45.00. Steve Sacks, 2 Rockover Rd., Mendham, NJ 07945.

RG-8/U coax low-loss foam Amphenol 10¢ per foot, K200 RG-8/U 20¢ a foot; PE-259-50239, 408 each, 15/\$5.00, F.o.b. Monte Southward, R #1E, Upper Sandusky, OH 43851.

SELL: HW-22A (40m. transceiver) \$80 and its 6 or 12 VDC power supply, \$54. Excellent operating condx. Call me between 7:25 and 21:30 your time; a.c. (805)-736-3762. F.o.b. WA6PGA.

FOR Sale: Ham and engineering book collection. Send for list. Knight dual speed tape recorder, KIAPA, 3 Sunny Acres, Brattleboro, VT 05301.

FOR Sale: RM E-6900, \$140.00, NCX-D and NCX-3, \$225. W5DNL, Tel: a.c. (215)-933-3150.

KWS-1, 75A-4, TA-33, CDR rotors and 50 ft. mast, tubes, manuals, \$1,000 cash. Bill Hudnall, WA8SMW/2, NEA Div. ECOM, Ft. Monmouth, NJ 07703. Tel: a.c. (201)-532-6511.
SELL: HW-16, 500; Lafayette HA-500 receiver, \$100.00; SB-101 factory transmitter, \$350.00, SB-610 monitor scope, \$75.00; 3-1000 5-band kilowatt homebrew linear, \$399.00. Must sell, permanently disabled. Bill Manahan, WA3STL, 8300 Ingersoll Rd., Alexandria, VA 22319.

SRE-34, w/cal, VOX, and mic, \$265.00; Gonset III, 6m., \$99.00; Clegg gear, \$139.00; Ameco TX-62 w/VFO, \$129.00; Apache, \$50.00; Johnson 6N2 xmt, \$100.00. All in excite condx, prices firm. David Mackey, 11 Gallopinghill Road, Elizabeth, NJ 07208. Tel: a.c. (201)-353-8109.

FOR Sale: Swan 500 transmitter, Swan 117 XC power supply. Model TR-44 CDR rotor, Turner 454C SSB Ceramic mike. Make offer. Courtland Dodds, W0VPTJ, Seneca, KNS 66538.

TELETYPE equipment: Reconditioned and rebuilt: Model #14 typing reperforators, Model # strip printers, Model #14 transmitting distributors, Model #13 page printers, Model #19 sets complete. All units 60 speed with sync. motors and communications type and keytops. Write for complete details: C. H. Plummer, Cherrybrook Drive, RD #5, Princeton, NJ 08540. Tel: a.c. (609)-466-3597.

WANTED: 2 meter FM equipment. John Petrek, W8BNO, 424 Lewis Seifert Rd., Hubbard, OH 44425.

WANTED: HA-10 L.F.M.F. tuner for Hallcrafters SX-117 receiver, K6SLA, 627 Crescent Lane, Vista, CA 92083.

MANUALS: R-390/URR, R-390A/URR, USM-26, OS-8C/11, \$6.50 each. Many more. List 20¢. S. Consalvo, 4905 Roanne Drive, Washington, DC 20021.

FOR Sale or trade: DX-100 updated to 100B per factory mods \$80; Heath Sixer, including mobile supply and Saturn Six antenna, \$35.00. CF10B with BC458 VFO, \$65.00. HQ-170C revr, \$165.00, individually or for gud SSB transceiver. All except revr for good med. pwr. SSB transmitter. G. N. Huett, W6LJK, 429 S. Valley St., Anaheim, CA 92804.

SWAN 350 with 117-XC power supply, speaker and TH-3JR beam, \$350.00; Drake W-4 wattmeter, \$20.00. WISWV3, 239 Essex St., Weymouth, MA 02188. Tel: a.c. (617)-337-6815.

EXPERIMENTING in Facsimile? Leading manufacturer of 18" facsimile weather chart recorders is in process of converting existing network for automated weather chart transmission. Conversion will make available a number of used 18" weather map recorders ideally suited for use by anyone experimenting with facsimile weather chart recorders in operating condition. They include recording head, all electronics including automatic start, phase and stop circuits. Recordors can be used to monitor radio weather chart broadcasts, accept press wire photo transmission or transmissions from orbiting weather satellites. R. Boire, Surplus Food, Sales, Aiden Elec & Impulse Recording Equip Co., Inc., Washington St., Westboro, MA 01581. Tel: a.c. (617)-366-9851.

4X-1000A brand new sealed plastic bag, \$100; Variac 0-120V, 10 amp., \$15; new used Rotron fans, \$3.00 or swap. WA2RLQ, 101 a.c. (716)-544-5083.

SALE From the estate of WROG: Receivers, transmitters, RTV gear, test equipment, meters, vacuum variable, other good parts. S.A.E. for complete list. James Bennett, 2731 Cottonwood Dr., Springfield OH 45504.

WANTED: Good c.w. transmitter. Tom Dornback, 19 W 167 21st Place, Lombard, IL 60148. Tel: a.c. (312)-627-6856.

COLLEGE Expenses! Sell Drake R474 combo, gud condx. with 800-m and W7WV crystals and MS-4. No p.s. \$495.00. H. E. Bernis, 2201 S. 14th St., Springfield, IL 62703.

WANTED: Mechanical filter. Collins 2.1 kHz. W5LGD, Ruffer, 4013 Cleveland Place, Metairie, LA 70003.

NATIONAL NC-190 all-band receiver for sale, with crystal calibrator and matching speaker, in perf. condx. WB2RRS, 909 Midway, Woodmore, IL, NY 11598.

SHACK Clearance: NC-155 receiver, gud condx. \$90; Even 374 Signal Generator, 57 gud, \$50; Turner, no mod., \$12.00. Will ship free. Thomas Nast, 14 Burling Ave., White Plains, NY 10605.

ESTATE sale: Collins 7583-C, \$25.3; 3 in factory sealed unopened cartons, \$1360. Estate of W7OCL. Write 308 N. Lucasi-Spokane, Washington 99206.

FOR Sale: Kennedy 38 ft. dish with accessories, in excite condx. Ideal for moonbounce. Contact Paul Hoffman, W1ETU, 169 Millham St., Marlboro, MA 01752.

SELL: Heath SB-200, excellent, in mint condx. \$185.00. Also, wanted: 2 meter transceiver with accessories. Send details and price to Robert Simon, 1694 Linden Pl., No. Merrick, LI, NY 11566.

SELL: HW-12, H.B.A.C. 885, K. Morris, 109 Fifth St., Scotia, NY 12302.

COLLINS KWM-2 with noise blanker, like new, mobile mount and d.c. supply, mike, 1/3rd off amateur net. WACAM, 2324 Soindriff Road, Virginia Beach, VA 23451. Tel: a.c. (703)-464-2211.

WANTED: HP-13 d.c. supply, HW-12, mobile speaker; or SR-34. W0ATFD, 53 Oklahoma Ave., S.W., Cedar Rapids, IA 52404.

WANTED: 1000-T tube triode (Eimac). Urgent! It's an old tube type for my 20M Hn. VE7VA, 1770 Regan Ave., New Westminster, B.C., Canada.

SWAN 350 (late) with 117XC power supply, spare finals, A-1 condx, original packing and manuals. Used little, never mobile. \$295.00 plus shipping. WB7YRU, Al Povol, 3538 Center-view Ave., Wantash, LI, NY 11793.

WANTED: 5837 Klystron. W0BT, 2801 Wright Ave., North Platte, NEB 69101.

COMPLETE Station: SX-100, R-46A, Scout 680A, Johnson VFO w/p.s., mercury relay break-in, Heath keyer, Vibronyx paddle, all manuals. \$195.00. Jordan, K4QPL/9, 7619 Det'an. Ct. Apt. 53, Elkhart, IN 46514.

SELL: Heath DX-60B 80-10 meter transmitter. Never used, and in perf. condx. Must sell: \$75.00. Postpaid. Mike Wilke, W6BAQL, 3607 Cambridge Road, Montgomery, AL 36111.

R.I.P. A-M days. Desperately need SB-10 or similar SSB adaptor or low cost 5-band exciter. Gary Bourgois, WB2EOH, 837 N. Pine, Ishpeming, MI 49849.

SELL/Trade: Collins R-388; Hallcrafters Tornado SR-500; Johnson Matchbox 275w with SWR meter; Eico 710 GDO, all with manuals. Wanted: 517-4, top condition. Joseph E. Gaudet, K1CLM, 61 Adele Ave., Haverhill, MA 01830.

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SELL: Complete station: Swan 500 with Swan 400 a.c. supply, mic, coax, connectors, 4BT antenna, Johnson LP filter (new), Blitz Bug (new), manuals, mint condition: \$425.00. Ship at your expense. Michael Eckart, KFD 1, Boozey Creek Road, Blountville, TN 37617.

FOR Sale: Drake TAX, R4B, MS-4, AC-4, 4 extra crystals. New late '69, little used, all perfect, \$860. W0RJK, P.O. Box 466, Creston, IA 50801.

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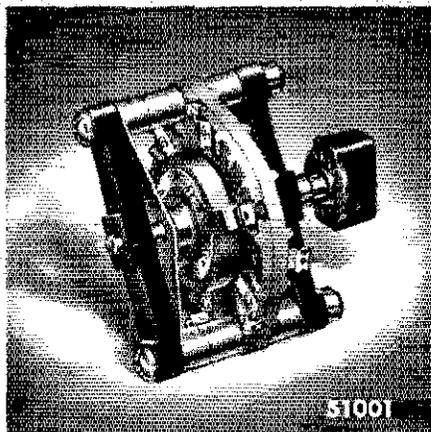
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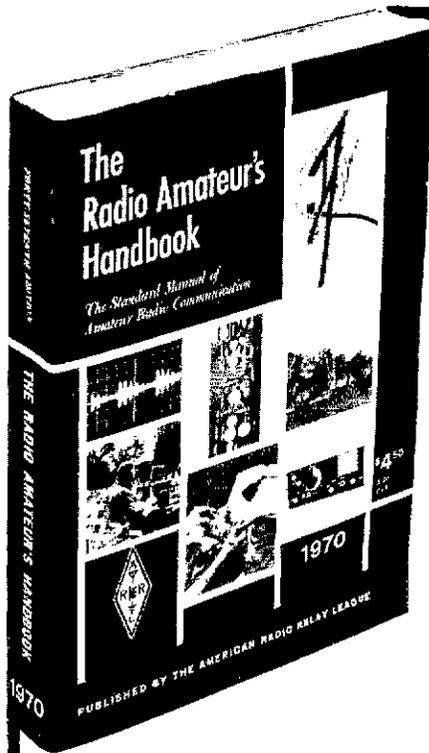
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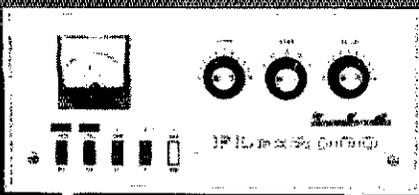
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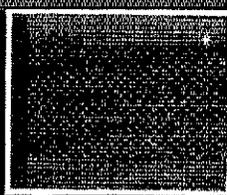
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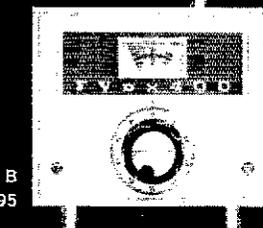


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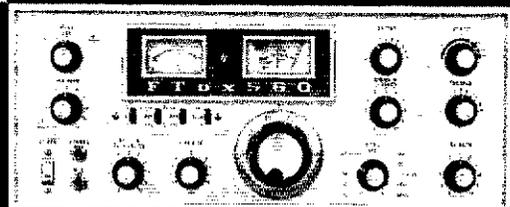
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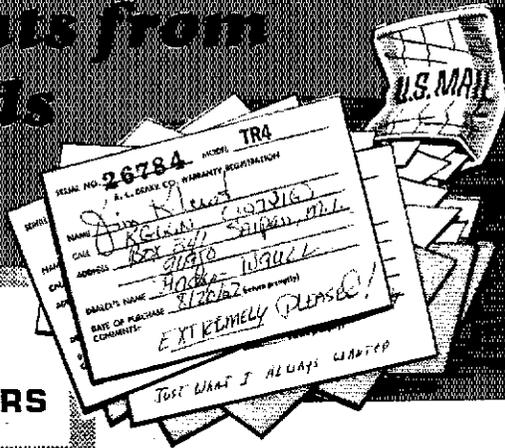
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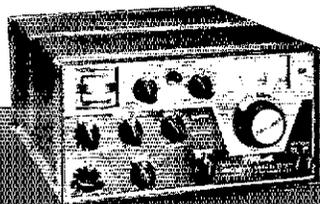
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