April 1971
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amateur radio

OFFICIAL JOURNAL OF THE ARRL

At last—Drake quality in a
VHF FM Transceiver

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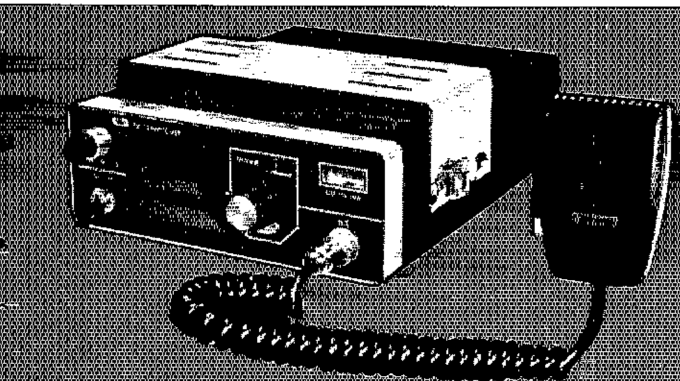

The best of the Japanese, the VHF FM Transceiver Model ML-2
is built for and distributed and backed by the R. L. Drake Co.

- Exceptional receiver
- Backed by R. L. Drake
- Complete package for . . .

$329.95

Includes transceiver, [illegible] channels [illegible] mobile mount, micro- phone, [illegible] cable, Hustler antenna [illegible] AC-DC power supply.

SPECIFICATIONS

General

Frequency Coverage	144-148 MHz
Number of Channels	12 Channels, 3 supplied Channel 1 Receive 146.94 MHz Transmit 146.34 MHz Channel 2 Simplex 146.94 MHz Channel 3 Receive 146.74 MHz Transmit 146.34 MHz
Modulation	Frequency Modulation
Transmitter Control	Push-to-Talk
Power Drain	AC: Receive 6 Watts Transmit 50 Watts DC: Receive 0.5 Amps Transmit 4 Amps
Power Source (Built-in)	AC: 117 Volts 50-60 Hz DC: 13.5 Volts ± 10%.
Dimensions	7⅞" W x 2¾" H x 10¼" D.
Weight	8¼ lbs.
Standard Accessories	Dynamic Microphone, Hustler Antenna, Antenna Connector Plug, AC/DC Cord, Speaker Plug.

Transmitter—transistorized with 6360 output tube

RF Output Power	Greater than 10 Watts
Frequency Deviation	Adjustable to 15 kHz maximum
Frequency Stability	±.001% or less
Spurious Radiation	Greater than —80 dB below Carrier
Output impedance	50 ohms

Receiver — completely transistorized

Receiver Circuit	Crystal-controlled Double Conversion Superheterodyne
Intermediate Frequencies	1st 10.7 MHz, 2nd 455 kHz
Input Impedance	50 to 75 Ohms
Sensitivity	0.5 µV or less for 20 dB quieting. 1 µV or less (30 dB S+N/N ratio at 10 kHz deviation with 1 kHz modulation)
Spurious Sensitivity	Greater than —60 dB.
Audio Output	0.5 Watt with 10% or less distortion.

Accessory Antenna, Model [illegible] — Hustler [illegible] dB gain quick-mount with coax — [illegible]

[illegible]

R. L. DRAKE COMPANY
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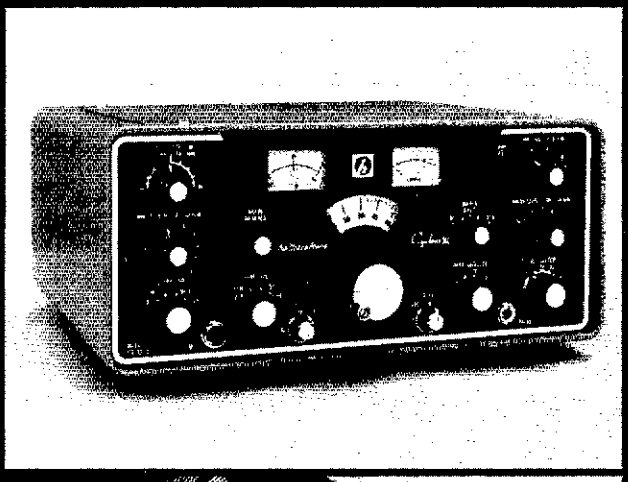

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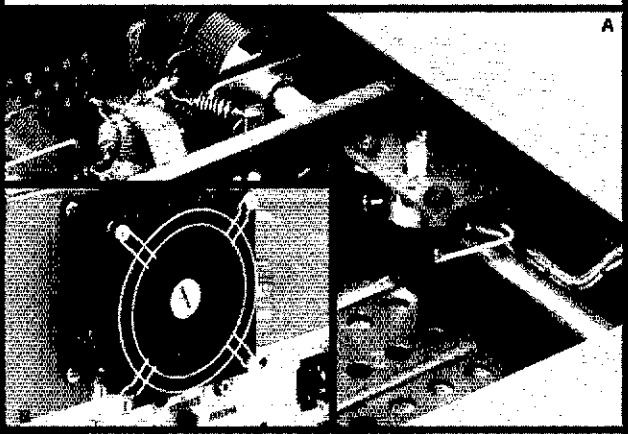

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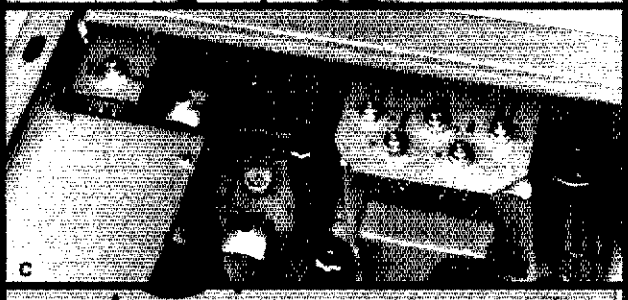

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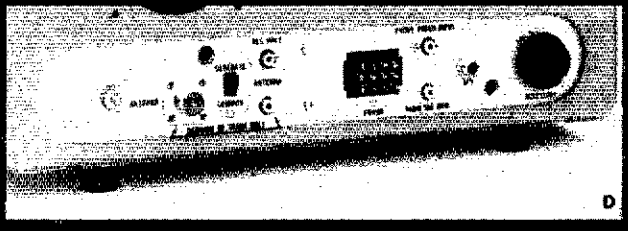

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A. Increased SSB input and output power with Hallicrafters' engineered exclusive Power Amplifier tube balancing adjustment. It provides matching and peaking of tube gain for continuous, maximum power output.

B. Improved reliability through optional HA-60 heavy duty, high efficiency cooling fan (6.4 CFM rated) for Power Amplifier. Permits continuous duty operation in either SSB or CW modes at high power levels with greater reliability.

C. Easily accessible internal adjustment panels include AGC attack, Carrier balance. (3) VOX controls, S-Meter adjust and CW side tone volume for interface with various types of microphones, tube aging and general performance adjustments.

D. Rear panel input/output terminals and connectors for phone patch, accessories, power supply, antenna plus provision for common or separate receiving and transmit antennas, or linear amplifier operation.

Of course, the new Hallicrafters SR-400A also has semi break-in CW, RIT, AALC, VOX, USB/LSB, < 1 KHz readout, noise blanker plus many more exclusive features.

Ask for it at your local Hallicrafters' distributor.

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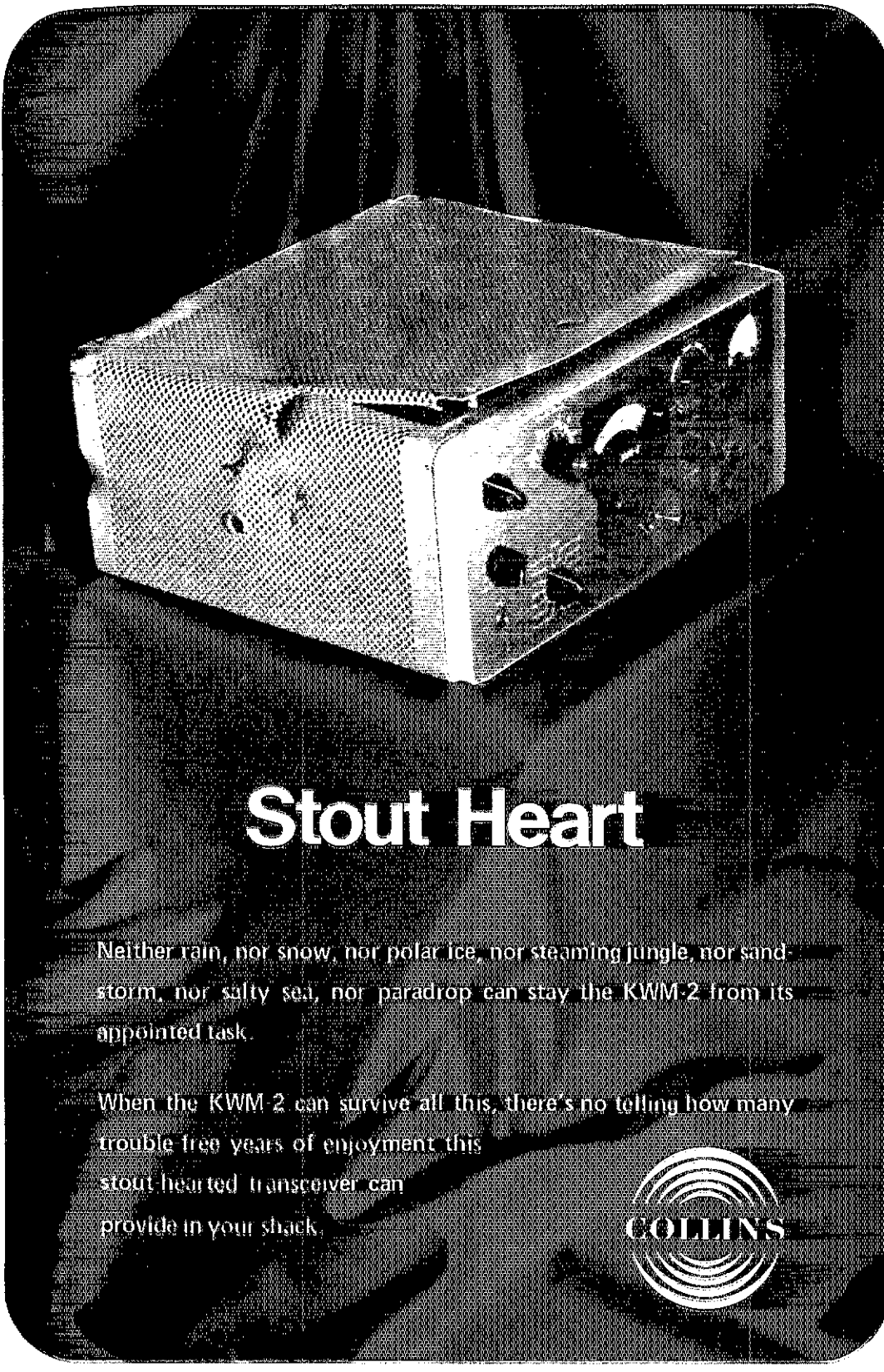
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OUR COVER

Dave Porter, K2BPP, stands at the South Pole! See the story on page 87.

QST

APRIL 1971

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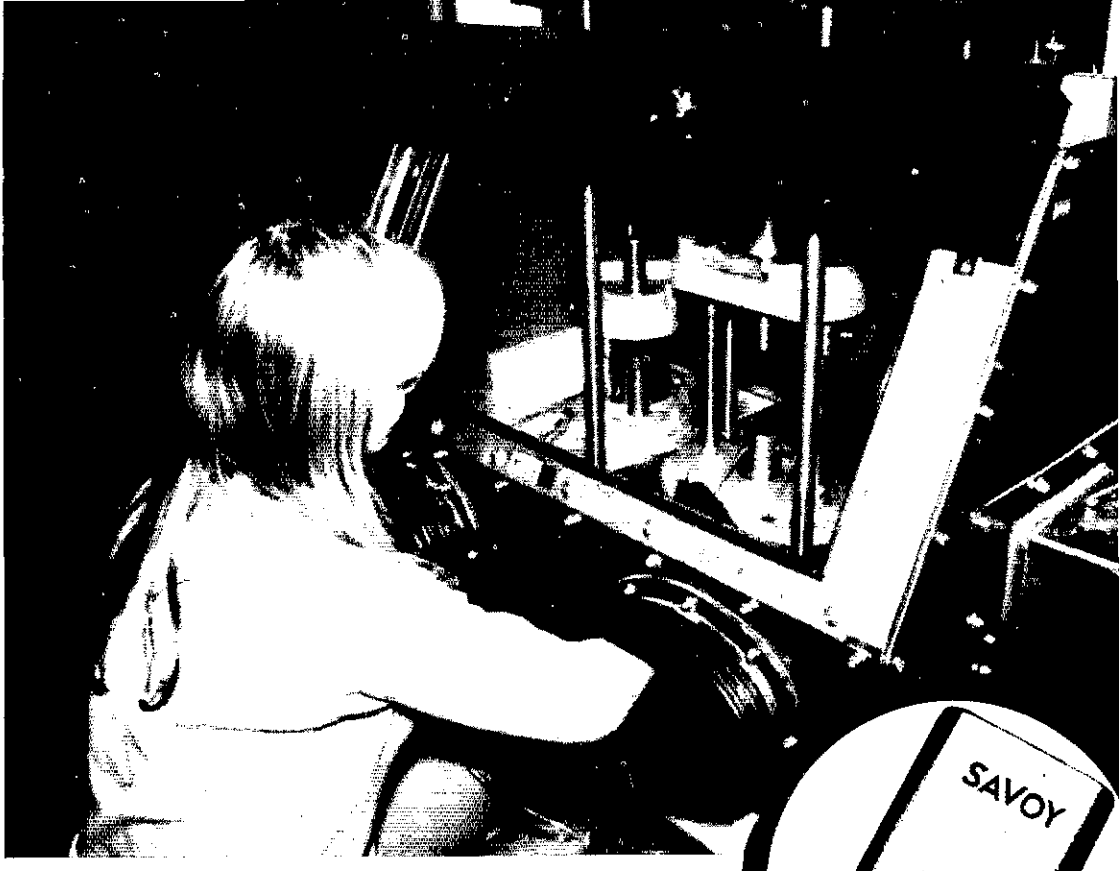

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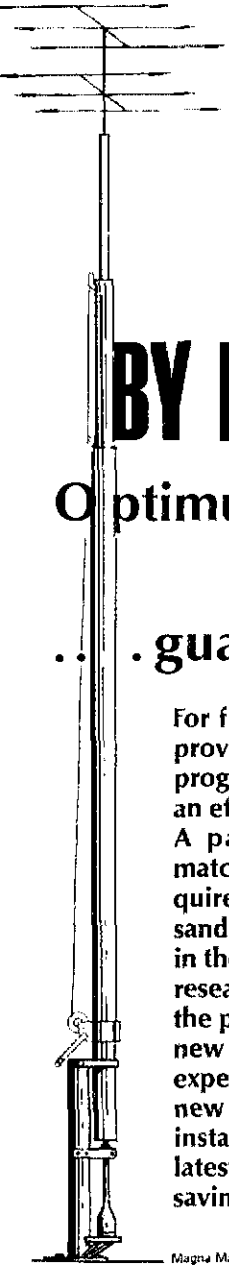

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100 ft. 4 Cond. rotor cable
Complete with one of the following antennas:

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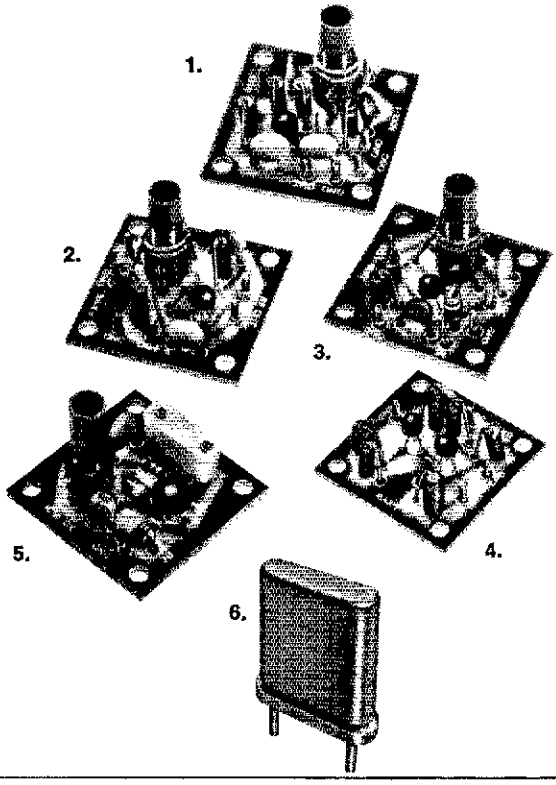

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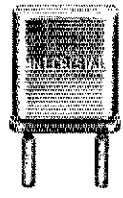

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"It Seems to Us..."

LARGER VOICE BANDS?

LATE IN FEBRUARY the Federal Communications Commission issued a Notice of Proposed Rule Making, Docket 19162, serving notice of intention to expand those portions of the 80- through 10-meter amateur bands which are available for voice emission. The action was in response to some 15 petitions[1] filed by individual amateurs and groups over the past year or so. Additional space is proposed for Extra and Advanced as well as General/Conditional licensees.

Our phone lines naturally have been busy since the FCC announcement. The question asked most often is, "What is the League's position?" We cannot answer. As yet there *is* no position. The ARRL view will be determined by the Board of Directors at its meeting early in May, based on the evaluation and comments of members and affiliated clubs.

At the moment of writing this in early March, we have only the substantive highlights; the actual text is not expected to be released by the Commission for several days. But because of the importance of getting the official word out to all interested parties, we have determined to hold the press for this issue long enough to include the document, even if it means late mailing. You will therefore find it elsewhere in this issue. We commend it to your careful study. We shall also make a special mailing to affiliated clubs.

In Board consideration of this basic subject a year ago, discussions showed considerable difference of opinion among members in various parts of the country. The conclusion, tho by no means unanimously supported: there was not sufficient crystallization of positive amateur views to justify affirmative action in such a controversial area. Since that time, a number of directors have been gathering additional information through surveys, bulletins, club meetings, correspondence.

The arguments for and against phone expansion have been voiced time and again. They are persuasive on both sides. They now need to be weighed carefully as applied to the specific FCC proposals. There is ample time for rational evaluation prior to the May 7 meeting of the ARRL Board of Directors, and even more leeway until the deadline (June 1) for filing comments directly with FCC.[2]

[1] Fourteen seeking expansion; one proposing reduction!

[2] An "original and fourteen copies" is the desired procedure but not actually required in the case of amateur matters. Identify your paper as Docket 19162.

Without taking firm sides on the question of expansion, we must express a feeling that the sub-band structure is becoming more and more a complicated maze of small ghettos – ten kHz for this, 25 for that, and so on. The trends are about as far from the original League concept of incentive licensing as can be imagined.

A recap of that 1963 ARRL action might be in order: There was no proposal for restricted cw bands for Extra – in fact, none seeking *any* special privileges for Extra Class (which rather puts the lie to charges that ARRL was after private subbands for the use of the engineering elite!). There was no hodgepodge of chopped-up band segments, no split bands of any kind. The proposal was, first, to reinstate the Advanced Class license.[3] Then, after a couple of years of a grace period for adjustment, it was to be the class of license required for voice operation on the 20-meter band. Additional voice bands – those at 40, 15, 75 – would have been added in yearly increments. Thus there could have been an annual evaluation of the effectiveness of the plan and a chance to halt in midstream if desired.

The 75-meter band was last on the list, simply because it carries the heavy load of nets and general public service communications. It was considered quite possible that this final stage of implementation might never be reached. Which is something to keep in mind in the present appraisal; it seems to us there is some merit to leaving the voice band edge on 75 exactly where it is, but dropping the license restrictions completely so that Generals and Conditionals might freely participate in public service activities as they did so well in years gone by. If this seems a reneging on the incentive principle, it is no more guilty than the Commission's own proposal, which hardly promotes incentives by adding as much extra space to Generals as it does to higher classes. All of which prompts us to the observation that the 1963 ARRL proposal was a pretty good one after all.

But that's spilt milk now. We have a new setup placed before us. Let's all give it plenty of thought, plus adequate exposure through rational discussion, and then express views both to ARRL directors and the Commission itself. QST

[3] This is the only phase of the League concept adopted by FCC exactly as proposed, and then only after quite a battle.

League Lines . . .

As this column reported earlier, the intention of at least some members of the Electronics Industries Association to take over 146-148 MHz for CB never got off the ground. But very real indeed is another attempt to invade amateur bands. EIA has now formally proposed to FCC that 220-222 MHz (not 222-224 as you may have read elsewhere) be taken from amateurs and diverted to a new "Class E" Citizens Radio service, 25 watts of voice fm only, $3 license fee. ARRL is filing strong opposition!

Field Day rules for 1971 will change as a result of Contest Advisory Committee recommendations: signal report added to the exchange; entrants in Class A and B must use emergency power; check sheets for each band, a summary, and necessary proof for bonuses will constitute the entry -- log sheets no longer required unless specifically requested!

A list of those TV set manufacturers and importers who supply high-pass filters at no charge in order to clear up TVI problems is now available from Hq.; an s.a.s.e. will help us give you prompt service on a request. This list will also be included in the League's TVI kit, which is available to individuals and clubs who need guidance in both the technical and public relations aspects of solving problems of TVI.

Heartwarming indeed is the result of a Midwest Division poll question whether members would endorse a $1 rise in League dues -- 3 to 1 said yes, by all means if needed. The question really is not whether, but when -- this year, next, or the one after that? Let your own director have your views.

Some of the fancier new automobiles (like the Eldorado) have electronically-controlled braking systems for the rear wheels. We're told experiments show a 5-watt CB rig doesn't have enough rf to cause trouble, but a higher-powered transmitter such as we hams use could cause braking difficulties which might be fatal in an emergency.

We understand a NY ham with a new Saab is having a bit of difficulty with its electronically-controlled fuel injection system. Every time he presses the switch to his mobile, the engine quits. But this happens only on 20 meters, not on other bands! Who knows but that some day the military will preempt 14 MHz for electronic space artillery?!

Lots of important reading in this issue -- FCC's phone expansion proposals, page 82; 160-meter west coast changes, part of a king-sized "Haps" section, page 76; W3MR's backgrounder on ITU rules, page 70; and for those of particular organizational bent, the ARRL advisory committee structure for 1971, page 68.

President Richard Nixon has transmitted to Congress an extensive report covering U.S. space activities for 1970 ($1.25 from Superintendent of Documents). Prominently mentioned at several points is the January launch of Australis-Oscar, with a summary of its experimental results.

With personnel retirements in the Amateur & Citizens Radio Division, sad to say, it is our guess many months will pass before FCC takes final action in the matter of repeater rules.

VE3ADO has resigned from the VHF Repeater Advisory Committee because of pressure of other activities; Leon Giannakeff, VE3BUI, is appointed to fill that vacancy.

"Radio Today," the CB-SWL-Novice hobby radio effort of 73 Magazine to attract newcomers, has folded; subscriptions are being filled out with issues of "S-9," published by the CQ magazine people.

A Transmatch for Field Day

BY DOUGLAS A. BLAKESLEE,* W1KLK

ON FIELD DAY, and during other portable operations, makeshift antennas are often used. Available trees or other supports frequently turn out to be too close together or too far apart for a simple dipole. Even when suitable supports can be found, the antenna may end up so close to the ground that its feed impedance is quite different from that of the free-space value. Therefore, a Transmatch is useful for providing a proper match to the transmitter.

To help the transmitter "get along" with random-impedance antennas, the author has always taken along a piece of coil stock, a transmitting-type capacitor, plus a few clip leads, and used them together as an L network to match any troublesome antenna to the portable transmitter. This kind of haywire can lead to trouble: One year an unsuspecting operator came into the Field-Day tent and sat on the L network (which had been clipped together on a chair next to the operating table). Before another June came around, it was resolved to have a properly-built Transmatch made up with some extra features for operating convenience, such as an SWR bridge, and instant antenna switching.

*Assistant Technical Editor, *QST*.

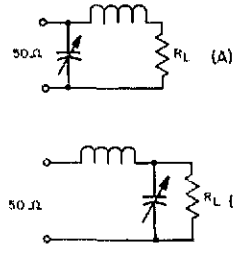
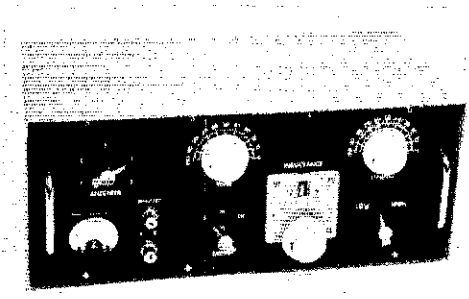


Fig. 1 — L networks for matching impedances (A) below and (B) above 50 ohms.

Having trouble matching those random-wire antennas during portable operation? Or, perhaps one of the home-station antennas isn't sufficiently broad in response to permit its use across an entire band? Whatever the problem, here is an easy-to-build Transmatch that will permit any antenna feed line, balanced or unbalanced, to be matched to that 50- or 75-ohm unbalanced transmitter output.



The meter and counter dial used are military surplus items. A Johnson 116-209-1 or Millen 10031 dial may be substituted. The handles were added to make the unit easier to carry.

Circuit Details

The military services have a nifty little antenna matcher, the Collins 180U-2, that is used to match 50-ohm-only transmitters to a wide range of impedances. This design was used as a basis for the unit shown in the photographs. The circuit is an L network which can work into impedances above or below 50 ohms. The basic arrangement shown in Fig. 1A can be used to match impedances that are less than 50 ohms, and Fig. 1B shows the circuit for matching loads of more than 50 ohms. A separate output, taken through a 500-pF series capacitor, can be used in situations where the L network alone doesn't provide sufficient range. The series capacitor may be left out, if desired, with only a slight loss in total range. Of course, no Transmatch will handle all of the possible impedance combinations, but this unit has a very wide range and easily matches end-fed random-length and long wires, plus coax-fed antennas and those that use balanced feed.

The schematic diagram of the unit is shown in Fig. 2. A rotary inductor is used to provide continuously-variable adjustment of the circuit inductance. A tapped coil is not recommended, as the value of inductance required for the best match is often quite critical — sometimes a fraction of one turn. The 500-pF TUNING capacitor doesn't provide enough total capacitance for low-frequency, low-impedance matching. Supplementary capacitance, 500 pF at a time, may be switched in with S2, as needed. The fixed transmitting-type capacitors, C3 to C12, are required to handle quite a bit of rf current. At low power levels, a single 500-pF unit can be used in place of the five 100-pF capacitors. At the kilowatt level, however, the rf current may "pop" a single capacitor.

A Monimatch-type SWR indicator is included to aid in adjustment of the Transmatch. This unit was described in a recent issue of *QST*.[1] A

[1] McCoy, "An Etched-Circuit Monimatch For Checking Your Antenna," *QST*, October, 1969.

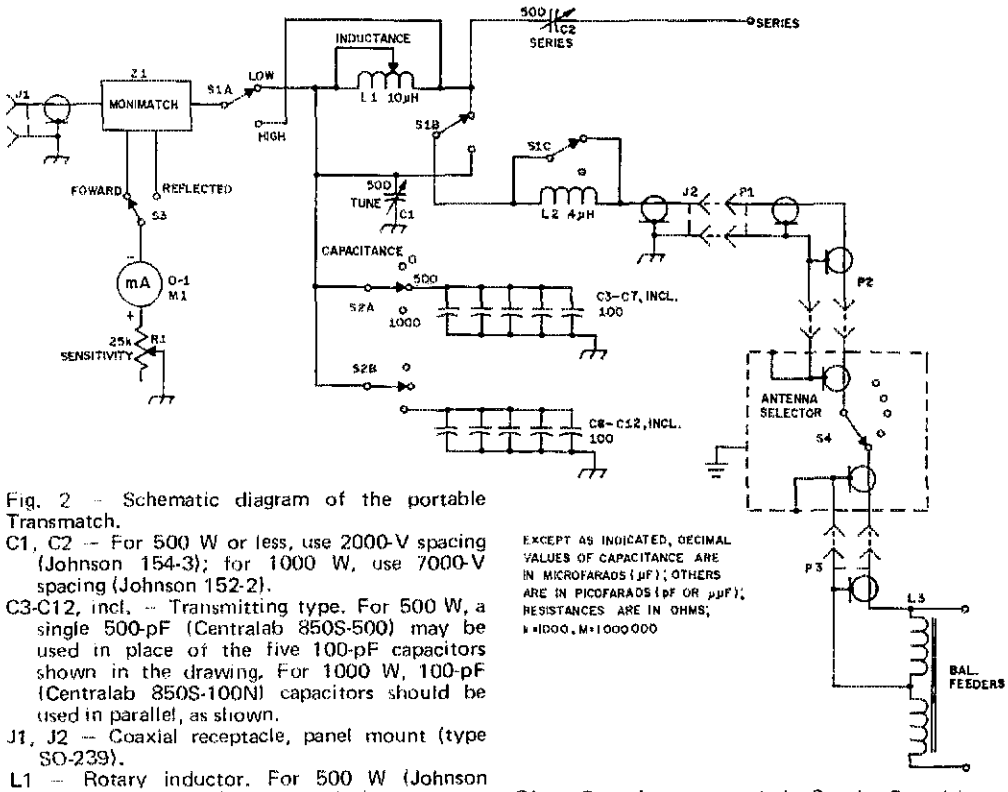


Fig. 2 — Schematic diagram of the portable Transmatch.

C1, C2 — For 500 W or less, use 2000-V spacing (Johnson 154-3); for 1000 W, use 7000-V spacing (Johnson 152-2).

C3-C12, incl. — Transmitting type. For 500 W, a single 500-pF (Centralab 850S-500) may be used in place of the five 100-pF capacitors shown in the drawing. For 1000 W, 100-pF (Centralab 850S-100N) capacitors should be used in parallel, as shown.

J1, J2 — Coaxial receptacle, panel mount (type SO-239).

L1 — Rotary inductor. For 500 W (Johnson 229-201), 1000 W (Johnson 226-3).

L2 — 4 turns, No. 12 copper wire, 1-inch dia., 1 1/2 inches long.

L3 — 10 turns of No. 14 enam. wire, bifilar-wound on Amidon KW Balun Kit core (Available from Amidon Associates, 12033 Otsego Street, North Hollywood, CA).

M1 — 0 to 1 mA dc.

P1-P3, incl. — Coaxial plug (type PL-259).

R1 — Linear-taper composition control.

S1 — Ceramic rotary switch, 3 pole, 2 positions used, 1 or 2 sections (For 500 W, Centralab JV-9003; 1000 W, Communications Products Model 86, available from Radio Switch Corp., Marlboro, NJ).

S2 — Ceramic rotary switch, 2 poles, 1 section, 3 positions used (Centralab JV-9033).

S3 — Phenolic rotary switch, 1 pole, 1 section, 2 positions used (Centralab PA1001).

Z1 — Etched-Circuit Monimatch (see text).

commercially-made coax switch is used to select antennas. However, a suitable homemade switch can be produced from the instructions in an earlier issue of *QST*.[2]

The author's unit was built from junk-box components. The ratings of the parts chosen will determine the maximum power level that can be safely used. Part values are given in Fig. 2 for medium- and high-power operation. The limiting factors are the voltage ratings of the switches and variable capacitors, plus the current that can be handled by the fixed-value capacitors and the rotary inductor. Transmatches use only a few parts, but the components required are often expensive; a shopping tour of the surplus shops can save a lot of money, especially if you are building a kilowatt model.[3]

A Transmatch does not have to be TVI-shielded, so any sort of commercially-made or home-constructed cabinet will do. Two U-shaped pieces of sheet aluminum with appropriate bracing (Reynolds L stock) are used in this model. The cabinet is made strong enough to withstand the rigors of portable operation. Component placement is not critical, although rf leads should be as short as possible. Rf currents can be quite high, so heavy conductors or straps should be used for interconnections.

Using the Transmatch

Almost any random length of wire can be used as an antenna. If the length chosen turns out to be beyond the range of the Transmatch, adding or cutting 5 or 10 feet off the wire will bring the impedance into a range that can be matched. The most common mistake made with random-length antennas is that a suitable earth ground isn't used. The effectiveness of end-fed wires is directly related to the quality of the ground. To this end, a ground-connection post is included on the rear deck of the Transmatch.

Coax-fed antennas present a similar problem. Here the Transmatch is acting as a "line flattener."

2 Gimmicks and Gadgets, "A Coaxial Switch With All Unused Contacts Shorted To Ground," *QST*, March, 1970.

3 Barry Electronics, 312 Broadway, New York, NY, and Fair Radio Sales, Lima, Ohio, have transmitting-type capacitors and rotary inductors available at attractive prices.

Interior view. Input and output connections are made with RG-8A/U. Other wiring is done with No. 12 wire or copper strap. The series tuning capacitor must be insulated from ground. Ceramic couplings are used on the tuning capacitor and rotary inductor shafts — the plastic types do not provide sufficient voltage insulation. The two ceramic pillars on the outside of the rear deck are connection points for balanced feed lines.

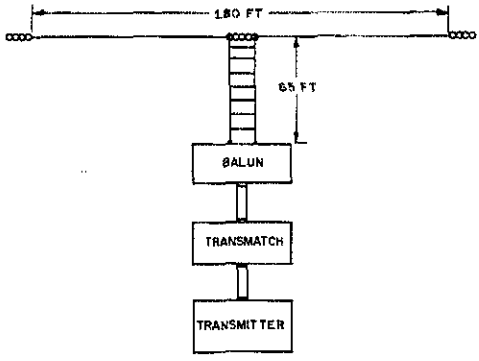


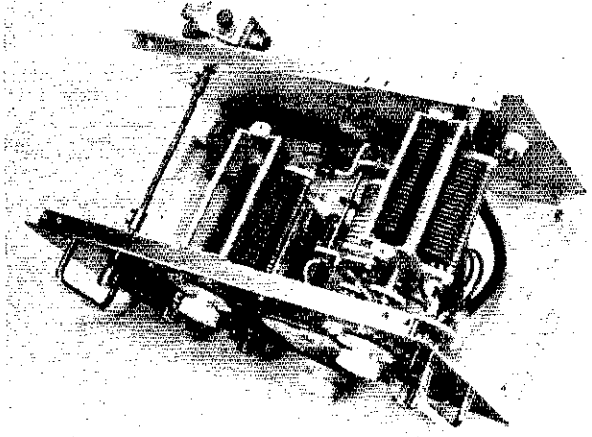
Fig. 3 — A 4-to-1 balun, used with an open-wire-fed Zepp and the portable Transmatch, provides a system that can be used on the 80- to 10-meter bands. The feed line is 300-ohm TV-type open wire.

Again, not every line can be matched, but most can. When a coaxial feed line is terminated in an impedance that is other than that of the coax, the impedance looking into the transmitter end of the coax will depend on the length of the line. Thus, if you end up with a combination that just won't work, adding or subtracting a few feet from the feed line should provide an impedance that can be matched.

Remember that the Transmatch is not changing anything at the antenna. It is only matching the impedance at the end of the feed line to something close to the output impedance of your transmitter, allowing the rig to deliver maximum power. The efficiency of the antenna isn't altered. If you have a poor antenna, having a low SWR on the connecting cable to the Transmatch isn't going to improve the antenna. Of course you may work out better, because you are getting more power to the antenna through improved transmitter loading.

Some examples of the results obtained give an idea of how useful this Transmatch can be. It allows a dipole cut for the center of the 80-meter band to be used at either the high or low ends. A 20-meter beam was used on 15 meters during a contest when no other antenna was available. It wasn't acting as a beam, of course, as it had lobes in all directions. But, many contest QSOs were made. A 30-foot end-fed wire, attached to the side of the house, was used to work California and Europe (from Connecticut) on 40 meters.

Accessories for the Transmatch consist of the 4:1 balun transformer described in the text, and a coaxial-to-single-wire adapter made from a Johnson 111-100 binding post mounted in a PL-259 connector.



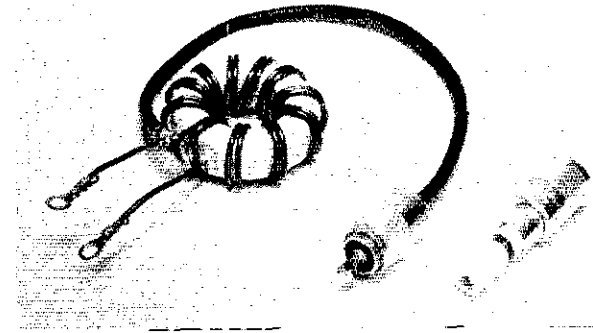
One question often asked is, "How about using my 80-meter dipole on 40 meters, or vice versa?" This is a tough one, but using a cut-and-try approach on both antenna and feed line will usually lead you to a combination that will work.

With a 4-to-1 or 1-to-1 balun this Transmatch, or any L network, can be made to feed balanced lines. The ARRL *Handbook* baluns[4] were built and tried for this purpose. The results were excellent up to a power level of 500 watts. To prevent voltage breakdown to the core, it was necessary to wrap the toroid with several layers of Scotch No. 27 glass tape before winding the transformer. The balun was bolted between two pieces of epoxy board and attached to the rear deck of the Transmatch. If desired, the *Handbook* method of mounting — in a Minibox — will do as well. Operation with the balun was tried by feeding an extended double Zepp, as shown in Fig. 3. A good match was obtained on the 80- through 10-meter bands using a 4-to-1 balun.

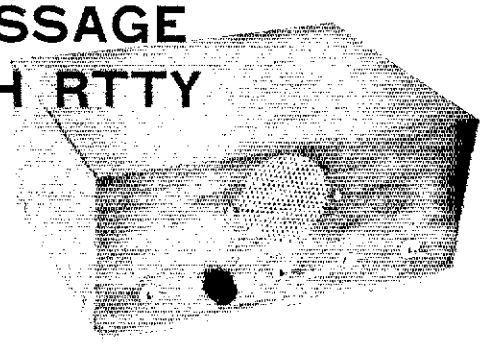
Building a balun for the kilowatt power level presented some practical problems. It was difficult to get sufficient insulation between the windings and the core. Also, cores large enough to handle the power, at high-impedance levels, and without saturation, are costly. So, the use of the *Handbook* baluns is only recommended for rigs with dc power inputs below 500 watts.

This portable Transmatch is about as close to a universal coupler as can be realized in a simple unit. Working into coax-fed and random-length antennas, plus those using balanced feedlines, it will provide a match for almost any antenna system you may plan when operating in the field. QST

4 *The Radio Amateur's Handbook*, 46th and 47th Editions, Chapter 13.



THE DIGITAL MESSAGE GENERATOR WITH RTTY



BY JERRY HALL,* K1PLP

SOME MONTHS ago an article in *QST* described a completely solid-state message generator for sending Morse code.[1] Not described in that article but available with one minor circuit change is the capability to send RTTY as well as cw messages. The modification requires just one resistor change. With no other alterations to the instrument, RTTY messages up to 36 characters in length may be sent. Oft-repeated RTTY transmission sequences can be set up, or by integrating the message generator with other station equipment, automatic RTTY identification is available. The advantage over the use of perforated tape transmissions is that one does not have to hunt for the correct tape, or for its leading end. With the message generator after initial turn-on, the message will *always* start at its beginning.

The RTTY Code

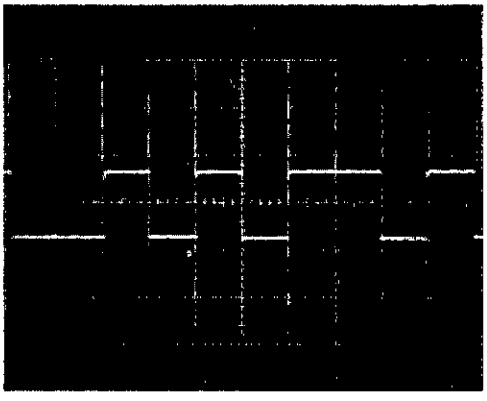
In the teleprinter code used in amateur RTTY[2] work, every character contains seven pulses.[3] The first pulse of each character is always a space, to synchronize or start operation of receiving printers, while the last pulse is always a mark, to stop operation at the end of the character. The remaining five pulses are the coding pulses and may be arranged in any of 32 possible combinations of marks and spaces. This code is frequently called a five-unit start-stop code.

For 60-wpm operation, the start pulse and the coding pulses are each 22 ms in duration. The stop pulse, at full machine speed, is 31 ms long. Some machines in use on the amateur bands send a stop pulse which is only 22 ms in duration at full speed and 65-wpm operation results. The two types of machines are fully compatible with each other as the length of the stop pulse beyond 22 ms is not too important for most work. (Indeed, with manual typing at a keyboard, the stop pulse for each character may be in the order of seconds in duration.)

To adapt the message generator to RTTY use, its clock frequency must be increased to provide clock pulses at 22-ms intervals (45.45 Hz). (A Morse code message from the generator at this clock speed would be sent at the rate of approximately 55 wpm.) See Fig. 2 of the earlier article. Changing R1 from 33,000 to 30,000 ohms will place the clock frequency in the right "ball park" when R2, the adjustable speed control, is set for maximum speed. However, for an accurate clock speed, the new value for R1 should be determined through the use of an oscilloscope having a calibrated time base, or with a frequency counter. Or if one preferred instead, R1, R2, and R3 could be switched out of the clock circuit for RTTY operation, to be replaced by a 50,000-ohm control which is used as the RTTY-speed calibration adjustment.

The RTTY Message

The generator can be programmed to send a message containing as many as 254 Morse code "bits." Because the teleprinter code is more compatible with digital logic than Morse code, this number can be extended to 256 bits when planning RTTY messages. A bit is equivalent to a 22-ms teleprinter pulse. To form an RTTY message with the generator, all start pulses, coding pulses, and stop pulses must be programmed in the order in which they would normally be transmitted from the keyboard or a tape. With seven pulses required for each RTTY character, one can see that 36 characters will nicely fit in the frame which limits the size of the message. With programming done in this manner, the message would be electrically



The keying waveform developed from the R-Y matrix of Fig. 2. This oscillogram shows the signal which is present at the base of Q4, the relay-driver transistor. At this point in the circuit, mark is high and space is low. Each circle division represents 22 milliseconds of sweep time; message bits 1 through 10 of Fig. 1 are shown here.

*Assistant Technical Editor, *QST*.

[1] "A Digital Morse Code Message Generator," *QST*, June, 1970.

[2] The complete teleprinter letter code is given in any recent edition of *The Radio Amateur's Handbook* in the "Specialized Communications Systems" chapter.

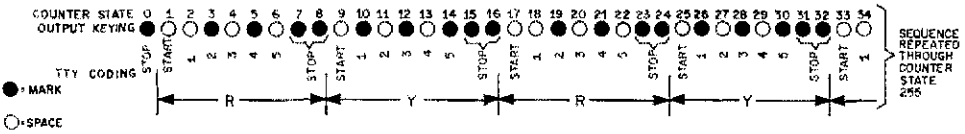


Fig. 1 — The message layout for programming an RTTY message consisting of 16 RY pairs. The diode matrix must be built to produce a high output for each teleprinter space pulse. For this message, such pulses occur at counter states 1, 2, 4, 6, 9, 11, 13, and at these numbers plus any integral multiple of 16, up through counter state 253.

equivalent to that from a 65-wpm machine, containing 22-ms stop pulses.

Piling 7-unit characters end-on-end to form the program complicates the designing of the message matrix somewhat, though. The reason is that the bit numbers which require decoding occur somewhat at random in terms of the binary-counter output states — 2, 4, 8, 16, and so on. Although these complications are not serious, laying the RTTY message out with 8-unit characters instead of 7 simplifies the design for the matrix and generally requires fewer matrix diodes. For 8-unit characters, two consecutive bits from the message generator are used to form each stop pulse. This results in a 44-ms-duration stop pulse (with a slightly slower equivalent teleprinter speed — 57 wpm), and does reduce the maximum number of characters in the message to 32. But in return, consider the following message: two carriage returns, a line feed and a letters shift, followed by as many RY pairs as the message can contain. With 7-unit characters, 299 diodes and 42 resistors are required in the message matrix. With 8-unit characters and two less RY pairs, only 64 diodes and 12 resistors are required. An impressive difference, isn't it? This difference may not be quite as significant with messages which contain other than repetitive RTTY characters, but is still substantial. For example, consider this message: a character space followed by DE KIPLP WETHERSFIELD CT K, ending with a carriage return and two line feeds. With 7-unit characters, 343 diodes and 50 resistors are required, while 203 diodes and 32 resistors will do the job with 8-unit characters. Only if it is absolutely necessary to squeeze those last four characters into the message would one normally be justified in using 7-unit characters.

The Message Matrix

When the message generator is being used for Morse code operation, the keying relay contacts are ordinarily held closed continuously by the keyer circuit. The message matrix is designed and built to intersperse spaces at the proper times to form dots and dashes, making the desired code. For an RTTY message, the continuously-closed relay contacts correspond to a mark, and it is necessary only to build the matrix to intersperse teleprinter spaces at the proper times. One important thing though: when the message generator is "at test," the entire binary counter is cleared to zero. This means that in designing the matrix, the message must be laid out so the zero state of the counter is a mark. Otherwise, the printer will "run open" at the conclusion of the message. To avoid this problem, the start pulse of the first RTTY character should occur at the counter state of 1. (If 32 characters are contained in the complete message, the fifth selector pulse of the last character will occur at the counter state of 254; 255 is used as a mark to form the beginning of the stop pulse for that character. As the counter is cleared to zero, the mark condition will remain unchanged at the keying output.)

Suppose, for an example, that we wished to form a message consisting of 16 RY pairs, or a total of 32 characters. The message code is first laid out as shown in Fig. 1. From here, design of the matrix is performed in the same manner as for a Morse-code message.[3] Fig. 2 shows the schematic diagram for the completed design.

(Continued on page 21)

[3]The design of message matrices was not described in the earlier *QST* article, but full details are given in a "designer's package" of information, available postpaid by sending $1 or equivalent currency to ARRL Hq. The instruction booklet, recently revised, presents a Karnaugh map developed especially for use in designing message matrices for this generator. The map permits a graphical solution of the design problem to be reached. A working copy of the map, instructions, sample problems, and circuit-board templates with parts layout are included.

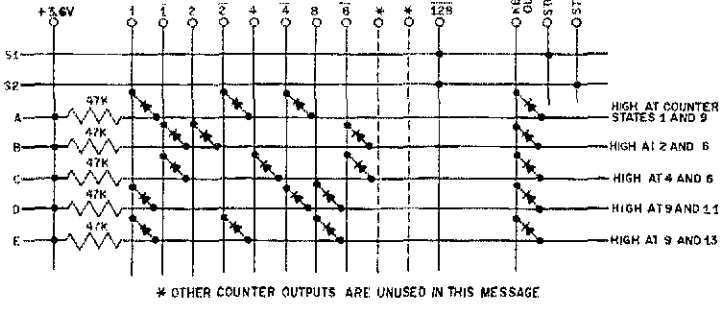


Fig. 2 — Schematic diagram of the matrix to form 16 RY pairs in an RTTY message. By connecting the "stop" lines directly to the counter's $\overline{128}$ output, the message is made to end as the counter transition from 255 to 0 occurs.

DIGITAL FILTERS

BY L. V. GIBBS,* ZL2AVF

IN ELECTRONICS, it is sometimes necessary to discriminate between signals of differing frequency. The most common method of doing this is to use an *LC* circuit of reasonably high *Q*. At audio frequencies, it becomes difficult to obtain a high-*Q* circuit because of coil resistance. Several different approaches have been tried to overcome this problem. For example, many *RC* filters have been developed, thus doing away with the usual inductance. Regeneration has also been applied to these circuits to increase the *Q*. A typical example of this is the "Selectoject" described in the ARRL *Handbook*.

Another less-publicized approach has been the use of digital filters. Although these devices are not new, there are not many articles on this subject. Those articles that are available tend to be brief outlines of the circuit capabilities, or mathematical analyses that are difficult to follow. This is rather unfortunate, because digital filters have some interesting and useful characteristics.

What Is a Digital Filter?

Basically, a digital filter is an *RC*-active device that produces the frequency response of an *LC* circuit of very high *Q*. Furthermore, the center frequency of the response curve may be controlled at will with the aid of a signal generator. Because no regeneration is used the filter cannot become unstable, as is possible with a regenerative circuit. Unfortunately a digital filter has one undesirable characteristic: it distorts the input waveform. However, when used in circuits that need to detect only the presence of a signal, such as in RTTY converters, this characteristic is of no importance.

Theory of Operation

Consider what would happen to a sine wave if it were divided into an equal number of segments and the voltage in each segment averaged. The resulting waveform would appear as a stepped sine wave, as shown in Fig. 1. As can be seen, the more segments into which the sine wave is divided, the closer the resultant waveform resembles the original signal.

Now consider the circuit of Fig. 2. If a dc voltage is applied to this network, the capacitor will eventually charge up to the dc value. In a digital filter a sine wave, instead of dc, is applied across this network. Since the average value of a sine wave is zero, the capacitor will aquire no charge. However, if a different capacitor is allocated to each segment of the sine wave in Fig. 1, then each capacitor will be able to charge to the average value of that particular segment, thus producing the stepped waveform shown. Drawn theoretically, the circuit would appear as that shown in Fig. 3, with the switch, S1, synchronized to the input frequency and C_n equalling the number of segments.

With the switching of S1 synchronized to the input frequency, the same average voltage is presented to each capacitor for each successive time interval that it is connected to the input signal. If, however, the input and switching frequencies differ, the average value of signal voltage applied to each capacitor will vary for each successive time interval. The rate at which this average voltage varies is equal to the difference between the two frequencies. Since the charging rate of each capacitor is limited by the time constant of the *RC* circuit, the capacitors do not accummulate much charge when the difference frequency is large. Consequently, the output voltage falls symmetrically towards zero on either side of the filter's switching or center frequency.

Determining the Frequency Response

An analysis of the circuit shown in Fig. 2 shows it to be a simple low-pass filter whose output is equal to:

$$(1) \qquad V_{out} = \frac{V_{in}}{\sqrt{1 + \frac{R^2}{X_c^2}}}$$

where X_c is the reactance of the capacitor at the applied frequency. This network bears a close resemblance to the circuit shown in Fig. 3, especially if the switch is stationary.

At this point it should be remembered that the output of the filter is a function of the frequency difference between the switch and the input signal, and the time constant of the *RC* circuit. As such, it might be thought that the output of the filter will follow a curve plotted from equation (1), with the applied frequency being equal to the above "difference frequency." If this was so, the output of the filter would be 3 dB down when X_c equals

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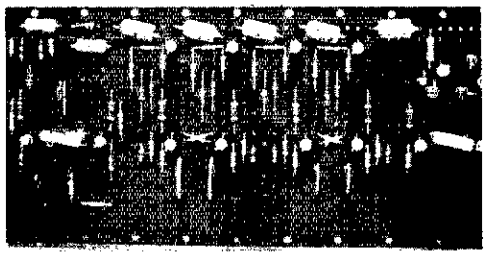


The digital filter constructed on perforated phenolic board. The physical layout is similar to the layout used in the schematic diagram.

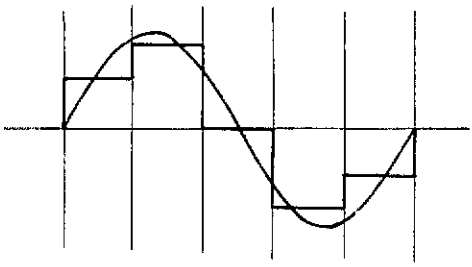


Fig. 1 — Averaging the voltage in each segment of a sine wave. Note that the average voltage of the center segment is zero.

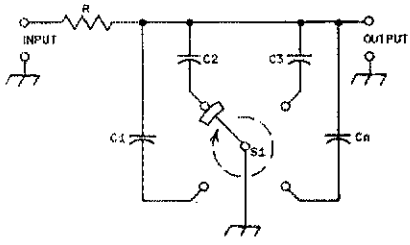


Fig. 3 — Circuit of a basic digital filter.

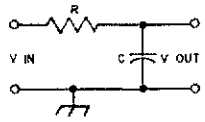


Fig. 2 — Circuit of a simple low-pass filter.

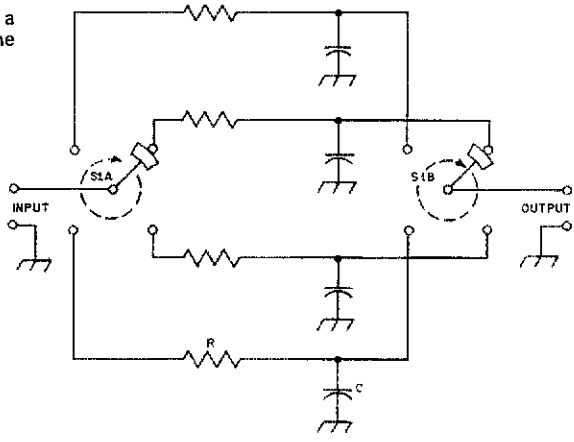


Fig. 4 — Series-switched digital filter. All RC sections are the same.

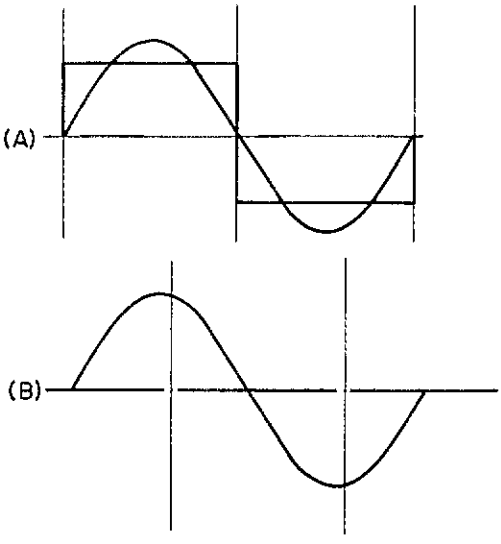


Fig. 5 — Averaging of voltages with only two capacitors when the signal and switching frequencies are the same. Shown at A is the output when the signal and switching frequencies are in phase. At B the output average voltage is shown as zero, resulting from a 90-degree phase difference between the signal and switching frequencies.

R at this difference frequency. In practice, the commutating action of the switch multiplies all values of capacitance by a factor equal to the number of segments into which the input signal has been divided. Thus the output voltage of the filter becomes:

$$(2)\quad V_{out} = \frac{V_{in}}{\sqrt{1 + \frac{(NR)^2}{X_c^2}}}$$

where N equals the number of capacitors or segments, and X_c equals the reactance of the capacitor at the difference frequency. This means that the 3-dB-down point now occurs at a frequency given by this formula:

$$(3)\quad 3\text{-}dB\ point = \frac{F}{N}$$

where F equals the difference frequency when X_c equals R. Thus, the half-bandwidth of the filter is N times narrower than the single-section low-pass filter shown in Fig. 2.

The multiplying action of the switch may be understood if we assume that the switch behaves like a rectifier connected across each capacitor shown in Fig. 3. The output of a rectifier is directly proportional to the fraction of each input

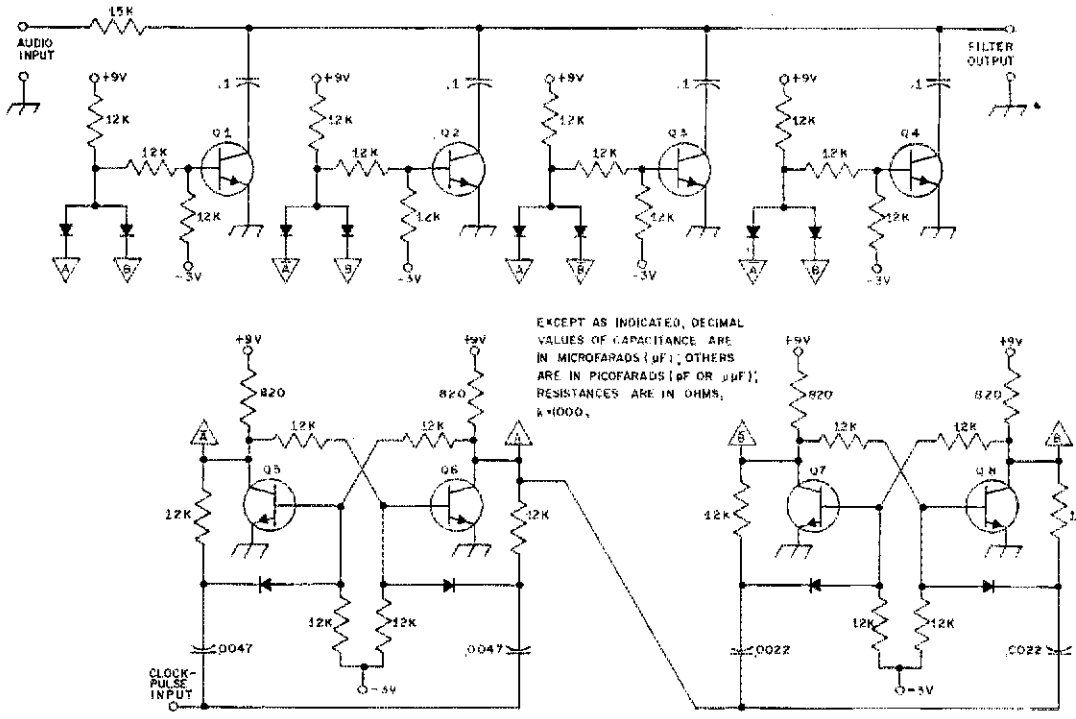


Fig. 6 — A practical digital filter suitable for frequencies in the range of 2000 to 3000 Hz. All transistors are type 2N706 or equivalent; all diodes are type 1N914 or equivalent.

cycle for which it operates. Since the switch connects each capacitor for only a fraction of the time, the output voltage of each segment is correspondingly reduced.

Miscellaneous Points

So far, the description has been limited to a shunt-switched system. With this system, it can be seen from equations (1) and (2) that the slope of the response curve is fixed at approximately 6 dB per octave roll-off. A more versatile system is that shown in Fig. 4. Here we have a series-switched filter whose slope may be controlled by replacing the single-section networks shown, with networks of more elaborate design. Both types of filter have the same characteristics when identical networks are used. From a practical aspect, the shunt-switched filter has fewer parts and is satisfactory for most purposes.

Something not immediately obvious is that the filter will respond to all harmonics of the commutating frequency, except the Nth harmonic and multiples of the Nth harmonic (where N equals the number of capacitors used). Depending on the use of the filter, this may or may not be an

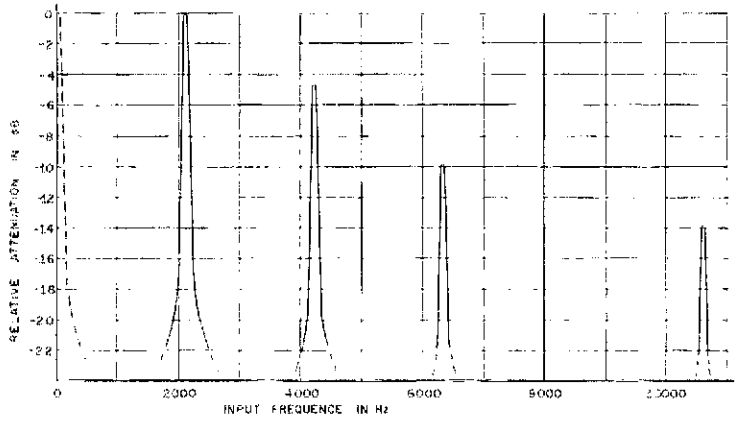


Fig. 7 — Measured frequency response of digital filter shown in Fig. 6. Response was taken with a filter center-frequency of 2125 Hz. Note the cancellation of the Nth harmonic (where N = 4, the number of switching sections).

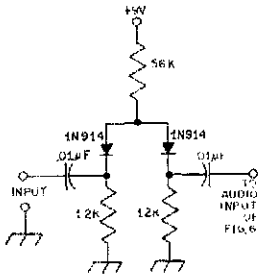


Fig. 8 — Clipper circuit for use with the filter of Fig. 6.

advantage. In practice, suitable filtering will eliminate unwanted frequencies before they reach the filter.

From Fig. 5 it can be seen that if the input signal is divided into two segments the output is zero, when there is a 90-degree phase difference between the input and the commutating frequencies. This is because the average voltage of each segment is zero volts. For this reason, a digital filter must use three or more capacitors.

Designing a Digital Filter

Before it is possible to design a digital filter, two things must be known. These are the desired bandwidth at the 3-dB-down points, and the number of segments into which the input signal is to be divided.

Let us design a digital filter suitable for passing a 50-baud RTTY signal. A simple rule-of-thumb enables us to determine the minimum bandwidth:

(4) *Keying speed (bauds) = Bandwidth (Hz) at 3-dB points*

From this formula, it can be seen that the required bandwidth is 50 Hz for a 50-baud signal. After determining the bandwidth of the filter, the next step is to decide on the number of switching segments to be used. As already mentioned, the number of segments must be three or more. Assume that we are to duplicate the arrangement shown in Fig. 3. This circuit may be electronically synthesized by replacing the mechanical switch contacts shown with transistors that are sequentially turned on and off. The scanning voltages necessary to perform this switching action are obtained from a scale-of-four counter, with diode decoding to detect the four separate counting states. Such a circuit is shown in Fig. 6. Here we see transistors Q1, Q2, Q3, and Q4 replacing the mechanical switch contacts shown in Fig. 3.

Equation (3) defines the half-bandwidth of the digital filter. That is, it defines the distance the 3-dB point is from the center frequency of the filter. Multiplying the above result by two, we obtain the bandwidth between the 3-dB-down points. Hence:

$$(5) \qquad 3\text{-}dB\ Bandwidth = \frac{2F}{N}\ Hz$$

where F equals the difference frequency when X_C equals R in Fig. 3 and N equals the number of switch segments.

In Fig. 3, R may be almost any value. However, in order to calculate the value of X_C, it is necessary to know the frequency at which X_C equals R. This may be obtained by substituting all known values in equation (5) and rearranging:

$$(6) \qquad Difference\ freq.\ F = \frac{Bandwidth \times N}{2}$$

$$= \frac{50 \times 4}{2} = 100\ Hz$$

By using a reactance-frequency nomograph, it can be seen that the reactance of a 0.1-μF capacitor at 100 Hz equals 15,000 ohms.

The circuit of Fig. 6 was constructed using the values calculated. The test results of this filter are shown in Figs. 7 and 8. As can be seen, the filter response is exactly as calculated.

It should be noted at this stage that the clock-pulse frequency is N times the desired filter frequency because of the counter's divide by N action.

Summary of Design Procedure

1) Determine the bandwidth from equation (4).
2) Decide on the number of switch segments.
3) Determine the difference frequency at which X_C equals R from equation (6).
4) Choose suitable values of C and R with the aid of a reactance-frequency nomograph, such that X_C equals R at the above difference frequency F.

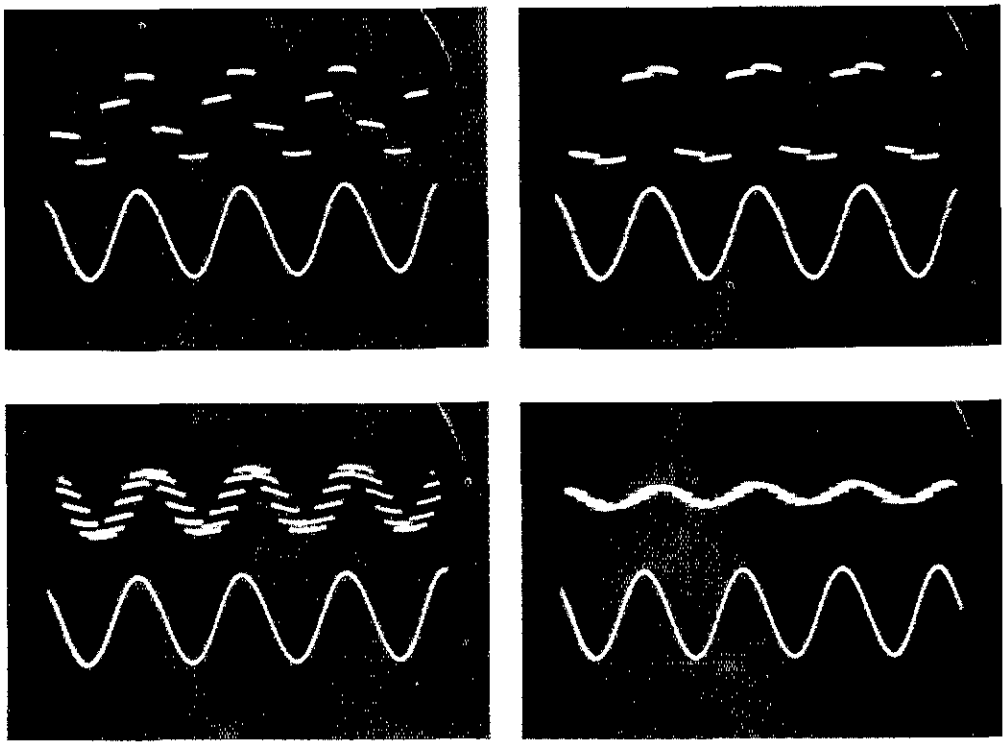
Practical Aspects

When the input frequency equals the commutating frequency of the electronic switch, the output of the digital filter shown in Fig. 6 is similar to the stepped sine wave shown in Fig. 1, only in this case there are four segments instead of the five shown. The output of the filter must be limited to one volt peak-to-peak, because transistor switches Q1-Q4, incl., are susceptible to overload. For this reason it is necessary to use a symmetrical clipper, such as that shown in Fig. 8, ahead of the filter. When this clipper is used in conjunction with the digital filter, the input signal may be any level between 10 milliwatts and 100 milliwatts.

The output of the filter will normally require amplifying before it is of any use. A word of warning here: the amplifier used must not limit the peaks of the stepped wave form. If limiting does take place in the amplifier, an apparent broadening of the frequency response will occur.

There is no reason to be alarmed at the multiple-frequency response shown in Fig. 7, if you are contemplating digital filters for RTTY use. The bandwidth response of a communications receiver will normally pass only signals in the range between 300 and 3000 Hz.

Although a high-amplitude sine wave may be used to drive the scale-of-four counter, it is desirable to use a pulse generator. A suitable generator is shown in Fig. 9. As can be seen, the circuit shown is a conventional astable multivibrator. The extra circuitry controls the frequency of the multivibrator. If only a fixed frequency is



In these four photographs, the lower oscilloscope trace shows the input waveform to the digital filter tuned to 2125 Hz, and the upper trace shows the output. In the top two photographs, the input frequency is 2125 Hz. At the left may be seen the output when the commutating frequency is 90-degrees out of phase with the input frequency. At the right, the commutating and input frequencies are in phase. At the lower left, the input frequency has been increased slightly. The amplitude of the output waveform is decreased, but the frequency is the same as that at the input. At the lower right, the input frequency has been increased still further, with a resulting greater decrease in output amplitude.

required, diodes CR1 and CR2, and resistors R1 and R2 may be omitted without upsetting the performance of the circuit. The frequency-control circuitry works as follows. Assume Q10 is off. If this is so, then capacitor C1 must be discharging toward the supply voltage, and the base voltage of Q10 is negative. The frequency of the multivibrator is determined by the total discharge times of C1 and C2. Since the base voltage of Q10 is negative, diode CR2 is conducting, thereby providing an extra discharge path for C1 via variable resistor R1 and resistor R2. This extra discharge path speeds the discharge time of C1 and thereby increases the frequency of the multivibrator. When transistor Q9 is off and C2 is discharging, diode CR1 is conducting, and once again a discharge path is provided by resistors R1 and R2. Since the additional discharge path has the same resistance in both cases, the mark-space ratio of the multivibrator has not been altered.

Two further advantages this circuit offers over the usual systems of frequency control are: (1) greater frequency change; (2) no possibility of damaging the transistors as there is with the usual method of varying the base resistors.

Using the Digital Filter

As mentioned previously, the filter is suitable as a detector circuit only, since it distorts the input waveform. When used to replace the mark and space filters in RTTY converters it offers the following advantages over a conventional *LC* filter.

1) The desired bandwidth may be obtained easily without trial and error.

2) The filter may be put on frequency easily and accurately. This is not always possible with *LC* types.

3) The bandwidth response of the filter remains the same as the center frequency is altered. This means that both the mark and the space filters have identical characteristics.

4) When built with integrated circuits, a digital filter can be made physically smaller than an *LC* counterpart.

5) Higher values of Q can be obtained with digital filters. The Q of the filter shown in Fig. 6 is 42.5. If required, Qs in the region of 1000 are possible.

6) The filter is tunable. This means that *any* amount of frequency shift may be received, simply by tuning the filter.

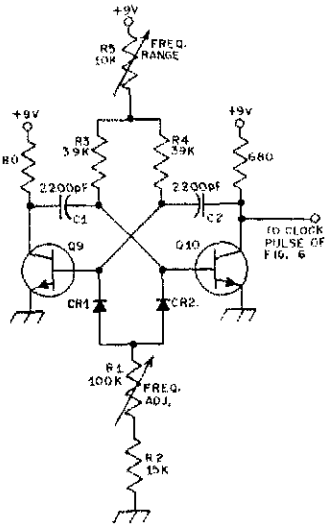


Fig. 9 — Pulse generator suitable for use with circuit of Fig. 6. All diodes are type 1N914 or equivalent; all transistors are type 2N706 or equivalent. R1 and R5 are linear controls. Assuming R5 = 0 and R1 = infinity, the frequency of the oscillator may be calculated:

$$F = \frac{1}{0.693\,(C1 \times R3 + C2 \times R4)}$$

With R1 at maximum resistance, adjust R5 for the desired frequency. The center frequency of the filter equals 2125 Hz when the oscillator frequency equals 8500 Hz. (See text.)

Conclusion

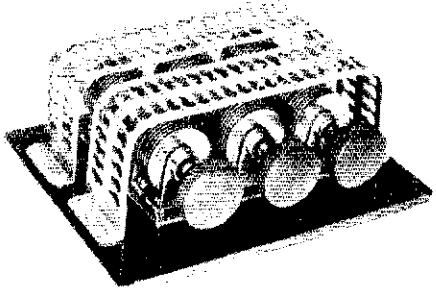
The filter may be constructed using any technique, as there are no regenerative tendencies.

Speed-up capacitors are not used in the bistable circuitry shown in Fig. 6, as only audio frequencies are involved. If the digital filter is to be used at higher frequencies, then a small value of capacity could be tried across the collector-base resistors to improve the wave forms.

The output capacitance of the transistor switches will probably limit the usefulness of this filter to low intermediate frequencies. Field-effect transistors could be used as the switching elements in place of the transistors Q1 through Q4, but so far this has not been tried.

As a point of interest, it should be noted that the filter will change its center-frequency in the order of milliseconds if the oscillator controlling the filter is keyed. This, in fact, is the basis of an experimental RTTY digital converter that uses the same digital filter to act as both the mark *and* the space filters of a conventional converter. On receipt of the mark frequency, the digital filter tunes itself to the space frequency and waits for the space signal to arrive. And so the process goes on. In practice, I have found this system susceptable to noise pulses, but it certainly provides food for thought. After all, why not use an unconventional device in an unconventional manner? QST

From the Museum of Amateur Radio



Here is a triple-spark gap, beautifully made, apparently by a professional. It is suspected of being part of a 3-phase spark transmitter, such as have been described in the *Proceedings of the I.R.E.* and mentioned in *QST*. This type never became popular and as far as we know never was used either commercially or by amateurs. — *W1ANA*

Digital Message Generator

(Continued from page 15)

Operation

For use with existing RTTY equipment, the keyed output should be connected in series with the keyboard contacts. With the reed keying relay (specified in the earlier article) mounted on the etched circuit board, erratic operation of the generator resulted during our attempts to key directly a 60-mA 120-V loop. The cause of this problem was traced to the relay's being in close proximity to the generator clock and binary counter circuits. If one is building the generator from "scratch," it would be wise to mount the relay well away from the etched board. Otherwise, the reed relay can certainly be used to key a low-current fsk or afsk circuit, or to key another relay. We obtained perfect loop keying through the relay driver shown in recent editions of the *Handbook*.[4] QST

4"Code Transmission" chapter, *The Radio Amateur's Handbook*, ARRL, 45th through 48th editions, 1968 through 1971.

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

The Down-To-Earth "Sky Hook"

BY TOM C. FREEDOM,* W3HVE

CUT-AND-TRY adjusting of elements is considered by most antenna enthusiasts to be the only way to get *maximum* performance from an array. In order for the amateur to adjust elements, he must invest in an expensive crank-up or tilt-over tower, or he must be willing to climb. Since none of these ideas seemed attractive, this author decided to design and build an inexpensive fold-over system which would permit easy access to the antenna.

What came off the drawing board was a design for a 30-foot tilt-over support with a mast extending five feet above its top. These modest dimensions were chosen because a large safety factor was desired without the use of guy wires. The tower hinges on a cradle 12 feet from the ground.

Assembly and Installation

It is assumed that the builder has a reasonable knowledge of how towers are installed. A free-standing 35-foot-high support for a triband quad requires about 1 1/3 cubic yards of concrete in the base. A hole of approximately 40 inches per side was used for this tower.

The cradle was made of three 10-foot lengths of 2 1/2-inch galvanized heavy-duty electrical conduit. (Don't use "thinwall" – there is a big difference.) The three legs, arranged in a triangle, are spaced slightly greater than those of the tower section. Permanent spacing of the bottom of the legs was accomplished with a 1/2-inch diameter threaded rod and nuts, and the top was held in place with a plywood template. The bottom of the cradle was placed on a layer of crushed stone, 2 inches deep. Temporary guy ropes were used to hold the cradle upright. Then, a layer of sand one inch thick was poured around the bottom of the three conduit legs and over the crushed stone. The purpose of the sand and stone was to prevent water accumulation. After these steps were taken, concrete was poured into the hole and smoothed on top. The concrete base was allowed to set (72 hours), at which time the guy ropes and the plywood template were removed.

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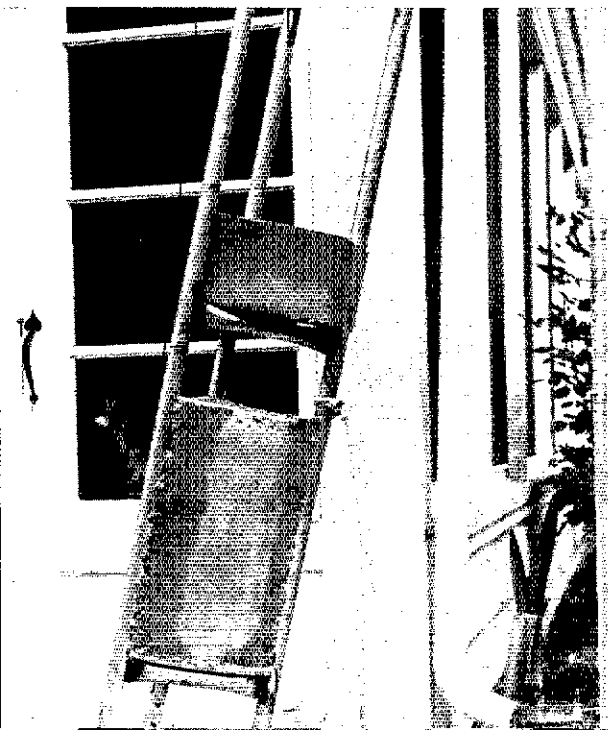
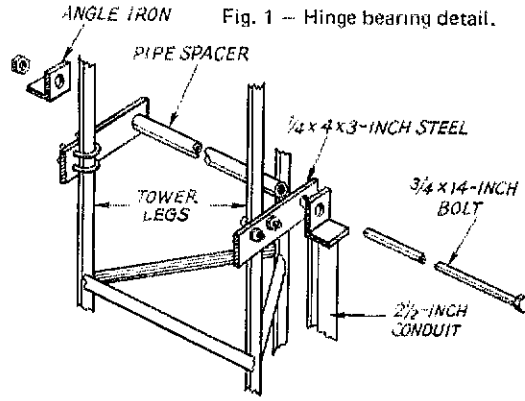


Fig. 1 – Hinge bearing detail.



To extend the cradle to sufficient height, another 10-foot piece of 2 1/2-inch diameter galvanized conduit was cut in half and attached to two of the lower legs, using the couplings supplied. The final arrangement is shown in the photograph. Before these two 5-foot pieces are installed, angle brackets with a clearance hole drilled through one face (for a 3/4-inch bolt) should be welded to the unthreaded ends. The couplings were used to align the holes and were then welded in place.

The two lower tower sections were assembled on the ground. The bearing hardware was located 11 feet, 8 inches from the bottom. To aid the folding process, two 15-foot ropes were used, one attached to each end of the assembly. Strong ropes are recommended. This 20-foot section was then set vertical against the cradle and "walked" up about 3 inches. It was secured in place using a 3/4-inch bolt through the bearing plates.

Both counterweights are shown here. The upper weight is easily changed if the amateur decides to use a lighter (or heavier!) antenna. The bottom weight must be formed to insure that it cannot slip out when the tower is in the folded position.

The top section was prepared on the ground by first installing the rotor and mast. Then, the hinge section was folded over and the top piece bolted in place. When tilted to the upright position, without the antenna, the tower was ready for permanent counterbalancing. A triangular piece of plywood was fitted into the bottom of the lowest section to serve as a base for the concrete. Wooden forms were attached to the sides of the tower for a distance of about 2 feet from the bottom. I used wire to hold them in place. Then the concrete was poured into the form until the tower balanced, with an inch or so more added to allow for the loss of weight as the concrete cured.

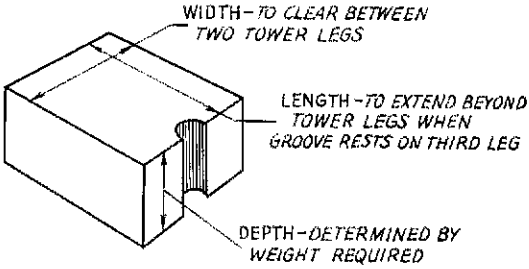


Fig. 2 — Second counterbalance with groove to allow placement in the triangular tower. The weight can be determined experimentally as described in the text.

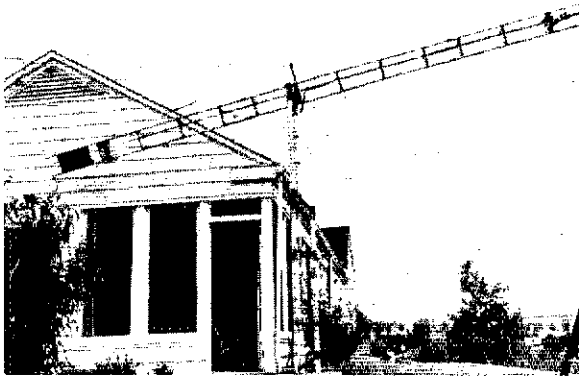
After the large counterweight had set, the side boards were removed and the tower folded over. At that point the quad was attached to the mast. The entire assembly then became top-heavy and another counterbalance was needed to bring everything back to equilibrium. The approximate weight was determined by standing on a bathroom scale and pulling down on the tower legs at the second counterbalance point. When the system balanced horizontally, the scale reading was subtracted from the builder's own weight. The proper amount of concrete was then mixed and poured to form a shape similar to the one shown in Fig. 2. After setting, the block was placed in the tower section.

The bearing bolt was adjusted to a point where no binding occurred. Strap iron, welded across the two sides of the cradle assembly, provided permanent spacing. This part of the job was left until last because the adjustment of the bolt determined the distance between the cradle arms.

The stress cable was a precaution against tower collapse. It is probably unnecessary, but the writer likes it. Belt and suspenders all the way! Stainless-steel hose clamps were used for holding the bottom of the tower in place.

Results and Operation

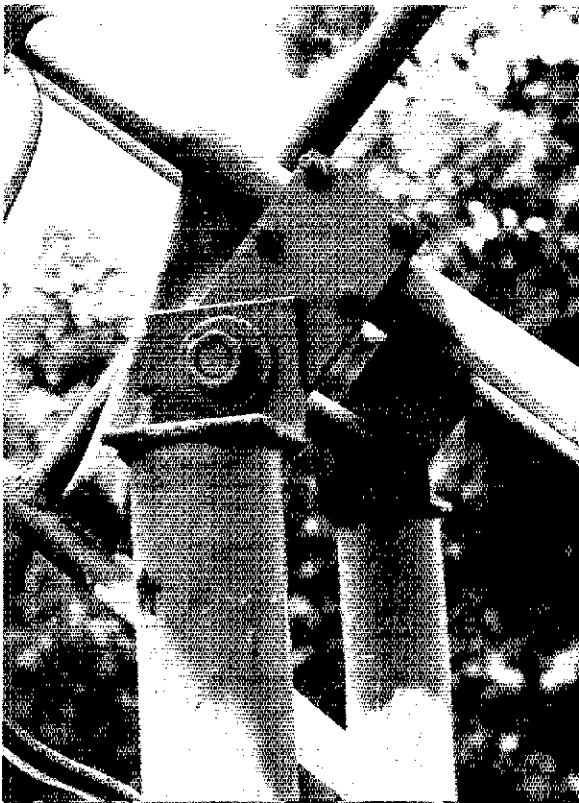
The tower can be raised or lowered in 8 seconds. While the cost of new parts was about $125, this figure could have been reduced considerably if the parts were purchased from a scrap dealer. The concrete was delivered at a cost of $26. The energetic builder can mix his own for much less.



Of course this system can be enlarged by adding tower sections. But then guying would be required and the convenience of quick fold over would be lost.

A note of thanks goes to W3GTL, W3OQV, and ex-W3YXC for their help with the construction, to the author's secretary for typing the original manuscript, and to the XYL for donating part of her rose garden. They were all in favor of keeping the OM's feet on the ground! QST

[EDITOR'S NOTE: Think safety! As with any tower, especially tilt-over and crank-up types, care must be exercised at *all* times. No one should be standing under either end during the folding process. Any modifications to the system should be clearly thought out before starting the job. Removing the antenna (or rotor) without anchoring the top of the mast to the ground could cause an unexpected raising of one end of the structure and an equally fast lowering of the other end! Establishing speed records for tower tilting or antenna tuning are just not worth the risks.]



The entire hinge assembly can be coated with rust-proof paint. A loop is needed in the coax at this point to allow the tower to fold without stretching the feed line.

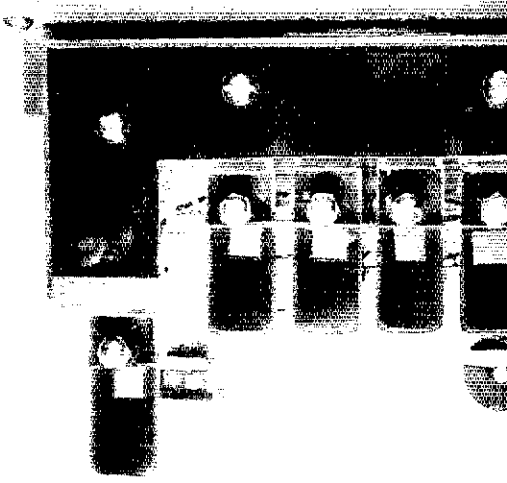


Fig. 1—The homemade keyboard for W2IMU's Five-Finger Keyer. The keys are marked with the subcharacters they send.

The Five-Finger Keyer

BY R. H. TURRIN,* W2IMU

THIS article presents a new and novel approach to the art of telegraphic communication. The traditional paddle-lever key is abandoned, and the formation of code characters is expanded in such a way that mental agility is traded for finger dexterity. It is the firm belief of the author that those cw operators who find that their upper speed limit (with accuracy) is limited by the two-position lever will, by religious application of these new concepts, be able to increase their sending speed significantly, and with improved accuracy.

The new approach is simply a study in motion economy. Since it is highly desirable for a cw operator to use only one hand for keying, it seems equally desirable to employ the full capability of the hand: all five fingers, for five distinct degrees of motion. This article will describe one method by which this new concept is reduced to practice. While other variations are surely worthy of consideration, the particular form described here is believed to be near optimum.

The Five-Finger Keyer employs a keyboard with five keys as shown in Fig. 1, arranged horizontally for natural access by the right hand (a left-handed keyboard is simply reversed). Each key actuates a subcharacter generator with self-completing action. The five subcharacters chosen for this keyer, as shown in Fig. 1, are, •, —, —•, •—, and • •. The latter subcharacter (dot — letter space — dot) is similar to an American Morse "O". The keys are mutually exclusive in operation; that is, if all the keys are depressed in one motion, the key which is depressed first operates its subcharacter generator only. If a key is depressed continuously, a series of subcharacters are repeatedly generated, separated by a single space. Thus, the function of the first two keys is exactly as in a fully-automatic keyer.

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Letter Formation

Consider now the formation of letters from the subcharacters. Obviously A and N are formed by their respective subcharacter generators by depressing their keys just long enough to start the generator. However, if the N key is held down slightly longer than one subcharacter period, a perfect C will be formed. Other letters are formed by depressing two keys in proper sequence. For example, a single dash followed immediately by an N will form a G. Similarly, Y is formed by depressing the N key followed by two dashes. The self-completing action and mutually-exclusive key operation permit liberties to be taken with the timing sequence of key operations. These subtle liberties in timing of key operations are what permit high-speed character formation without the usual high-speed finger dexterity required for operation of single-lever-type keyers. The secret to efficient formation of individual letters is to avoid manual insertion of single dots wherever possible. Table I lists the alphabet and the preferred formations by subcharacter combinations. The slant bar indicates the choice of subcharacters.

Letter Group Formation

Thus far only four of the five keys have been employed. The use of fifth key, • •, is included for the following reasons: One of the difficulties with sending high-speed code is that the letter E occurs frequently in the English language. Executing these isolated Es requires extremely-good finger dexterity. To circumvent the problem of inserting isolated Es, the "O" is employed in combination with other subcharacters to form letter groups. For example, the letter group DE is formed by first depressing the N key followed immediately by the "O" key: Similarly, the letter group ER is formed by first depressing the

Your keying hand getting tired? Here is a new approach to sending cw: Using all five fingers on different keys can reduce hand fatigue and improve keying at high speeds.

"O" key followed immediately by a single N. In this manner not only are two letters formed in proper sequence by only two contact closures, but the isolated E is inserted, with little finger dexterity required.

The "O" key alone forms a double E which can be used to great advantage in words such as SPEED or BEEN. Many more two-letter combinations or digraphs can be executed which involve the isolated E, and these are listed in Table II. In addition, Table II lists other digraphs and trigraphs which may be executed with smoother fingering than as separate letters. This list is by no means exhaustive, as part of the novelty and originality of the new concept is to seek out other letter groups which may be formed using the available subcharacters.

In order to take advantage of the motion economy offered by the Five-Finger Keyer, it is imperative that the letter formations and letter-group formations be practiced until they become thoroughly imbedded in the subconscious memory and may be recalled without hesitation. This also implies that words be broken down into letter groups where possible, and thus greater mental agility must be exercised. Occasionally two digraphs will overlap in a word construction and a decision must be made as to which grouping should be used. This decision must be anticipated by practicing such letter groups so that preferred combinations can be used without hesitation, minimizing the "real time" decision process. This then is the primary disadvantage of the Five-Finger Keyer. Not only must the new keyboard be accepted, but mental discipline and a great deal of practice is necessary before any of the advantages can be realized.

To illustrate the motion economy of the Five-Finger Keyer, Table III indicates the number of

TABLE I

A	• —	N	— •
B	— • • •	O	— — —
C	— • — •	P	• — — •
D	— • •	Q	— — • —
E	•	R	• — •
F	• • — •	S	• • •
G	— — •	T	—
H	• • • •	U	• • —
I	• •	V	• • • —
J	• — — —	W	• — —
K	— • —	X	— • • —
L	• — • •	Y	— • — —
M	— —	Z	— — • •

TABLE II

List of Digraphs And Trigraphs With Preferred Fingering

EA	• • / —	BE	— / • • / •	ERE	• • / — / • •
EF	• • / • — / •	CE	— • / — / • •	ELE	• • / — • / • •
EH	• • / • • •	DE	— • / • •	EIV	• • / • • • / —
EI	• • / •	FE	• • / — / • •	EIR	• • / • • / — •
EJ	• • / — — —	GE	— — / • •	ESE	• • / • / • •
EL	• • / — • / •	HE	• • • / • •	EPE	• • / — — / • •
EP	• • / — / — •	IE	• / • •	PIE	• — / — / • • / • •
ER	• • / — •	LE	• — / • / • •	FIE	• • / — / • • / • •
ES	• • / • •	NE	— / • •	CIE	— • / — / • • / • •
EU	• • / • —	PE	• — / — / • •	DIE	— • / • • / • •
EV	• • / • • / —	RE	• — / • •	RIE	• — / • • / • •
EW	• • / — —	SE	• • / • •	SIE	• • / • • / • •
		ZE	— — • / • •	NIE	— / • • / • •
				DIA	— • / • • / • • / —

RR	• — / •	• / — •
GU	— — / •	• / • —
GR	— — / •	• / — •
DR	— • / •	• / — •
RU	• — / •	• / • —

KEYS
KEY BUFFER
NOR GATES
MEMORY
TIMING AND RESET
CLOCK
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k=1000, M=1,000,000
CAPACITORS WITH POLARITY MARKED

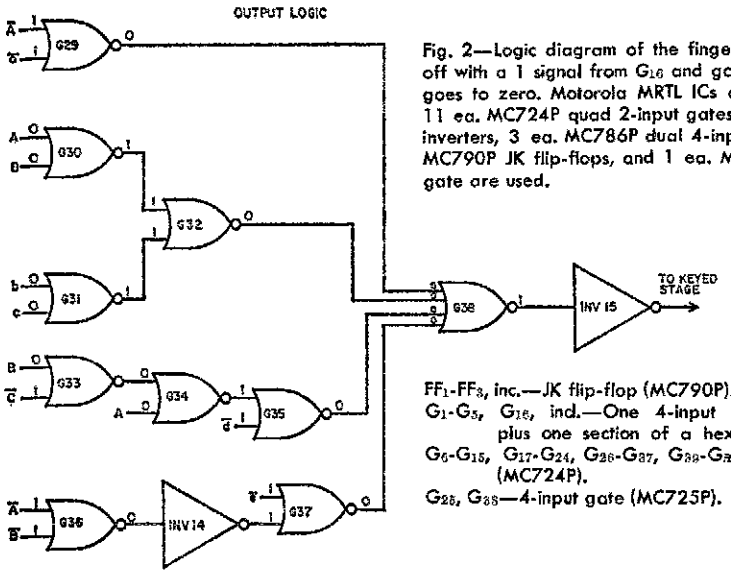
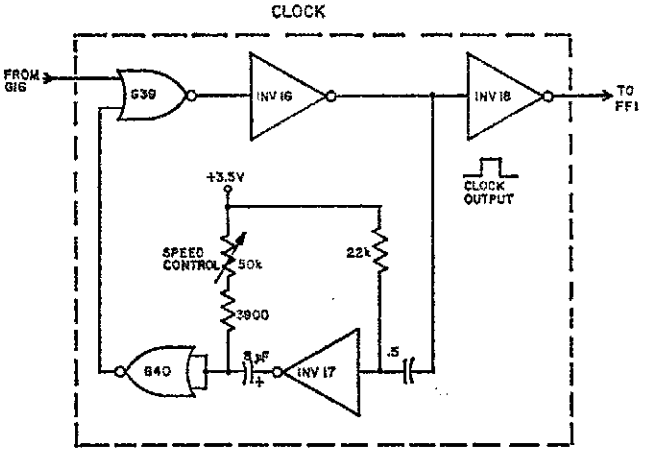


Fig. 2—Logic diagram of the finger keyer. The clock is off with a 1 signal from G_{16} and goes on when this gate goes to zero. Motorola MRTL ICs are used throughout, 11 ea. MC724P quad 2-input gates, 4 ea. MC789P hex inverters, 3 ea. MC786P dual 4-input expanders, 2 ea. MC790P JK flip-flops, and 1 ea. MC725P dual 4-input gate are used.

FF_1-FF_8, inc.—JK flip-flop (MC790P).
G_1-G_5, G_{16}, ind.—One 4-input expander (MC786P) plus one section of a hex inverter (MC789P).
G_6-G_{15}, G_{17}-G_{24}, G_{26}-G_{37}, G_{39}-G_{80}, incl.—2-input gate (MC724P).
G_{25}, G_{38}—4-input gate (MC725P).



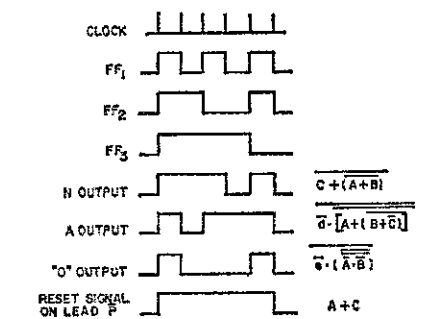


Fig. 3

TABLE III

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	*Total Number of Contact Closures*
Straight Key	2	4	4	3	1	4	3	4	2	4	3	4	2	2	3	4	4	3	3	1	3	4	3	4	4	4	82
Semi-Auto Key	2	2	4	2	1	3	3	1	1	4	3	3	2	2	3	4	4	3	1	1	2	2	3	3	4	3	66
Full-Auto Key	2	2	4	2	1	3	2	1	1	2	3	3	1	2	1	3	3	3	1	1	2	2	2	3	3	2	55
Squeeze Key	2	2	2	2	1	2	2	1	1	2	2	2	1	2	1	2	2	2	1	1	2	2	2	2	2	2	45
Five-Finger Key	1	2	1	2	1	2	2	1	1	2	2	2	1	1	1	2	2	2	1	1	2	2	2	2	2	2	42

contact closures required to generate each letter of the alphabet for the various keys in common use. It is at once obvious that an economy in total number of contact closures is achieved with the Five-Finger Keyer. The real advantage, however, is in the letter group formations, particularly those involving the letter E.

Examples of words which make prolific use of letter combination grouping are; RE C EIV ER, DE GR EE, SE N SE, RE F ER, DE NIE D, DIA GR A M, EV ER, FIE L D, PIE CE, T H EIR and many more which are left to the imagination and ingenuity of the reader. Words ending in ED may be difficult to execute because the isolated E must be inserted manually. However, when the entire word is considered there are many cases in which the E may be grouped with the preceding letter such as in DE F I NE D or T RIE D.

Ultimately, in receiving very high-speed code, letter groups and whole words are recognized by sound rather than by individual letters. In sending high-speed code a similar process is employed in which words and letter groups are executed by finger movement patterns.

The Five-Finger Keyer

Having proposed the concept for a five-finger keyer, there remains the problem of applying these ideas to a practical keyer. The remainder of this article describes a practical five-finger keyer built from modern integrated circuits (ICs) using resistor-transistor logic (RTL). A logic diagram of the complete keyer is shown by Fig. 2 with major logic functions blocked out for descriptive purposes. Quiescent logic circuit states are indicated by "0"s and "1"s on the diagram. While this circuit is not purported to be the most simple or least expensive, it is a working model which may be duplicated.

Briefly, the major logic functions are as follows.

1) The keys are small Microswitches[1] operated by short hinged key bars. These switches are single pole, double throw because they drive the set and reset inputs of the key buffer flip-flops.

2) The key buffers are bi-stable flip-flops which are necessary to eliminate false triggering from contact bounce of the microswitches. The ICs employed have a very high switching speed and will respond to very short input pulses. Even if hard contacts are substituted for the microswitches, the buffers should not be removed.

3) The NOR gates are provided to prevent the key inputs from overlapping each other electrically. Should two or more keys be operated almost simultaneously, only the first key contact closure will operate its subcharacter generator.

4) The memory flip-flops control the subcharacter self-completing function. The use of a separate inverter to generate the complementary output of the flip-flop is due to a functional problem in using a pair of 2-input gates to form a flip-flop. The memory flip-flops are set by key signal inputs and reset from the reset logic circuit.

5) The timing and reset logic is the main functional block and it consists of a clock pulse generator which is not free running but is started upon closure of any key through the five-input NOR gate. The clock pulse generator circuit was taken directly from an article in *QST*[2] and is detailed in Fig. 2.

The negative going edge of the clock output pulse toggles flip-flop FF_1. The output of FF_1 toggles FF_2 through an inhibit gate, G_{19}. And the output of FF_2 toggles FF_3 through another inhibit gate, G_{20}. The gates in the lower portion of this logic block perform the function of generating the reset signals for the memory flip-flops and signals for the inhibit gates. A more detailed description of this block will be given later.

6) The output logic simply gates the appropriate toggle flip-flop outputs to form the five subcharacters. The — and — • outputs appear through a common output since the — is simply a — • with premature recycling. The outputs are combined into a single-terminal output through the 4-input OR gate. It might be well to explain that the complete OR gate is composed of a 4-input NOR gate followed by an inverter. Likewise all gates shown in symbolic form are basically NAND/NOR gates.

Sub-Character Generation

Dots are generated in a straightforward way by toggling FF_1 only and taking the reset signal directly from FF_1 as shown by lead V. Dashes are generated by toggling both FF_1 and FF_2 by removing the inhibit signal on lead $\overline{M}$. Both the output and reset signal on lead W are obtained from the logic A + B (read A or B). FF_3 is not operated in generating dashes. Ns, As and "O"s are generated by removing the inhibit signal from both leads N and M, thus permitting all three toggle flip-flops to operate. A total of six clock pulses are required in generating each of these subcharacters. The selection of which subcharacter is formed at the output is the function of the output logic gates. A better understanding of this process can be obtained from the toggle flip-flop output graphs and logic combinations shown by Fig. 3. This figure also shows the manner in which the reset signal is generated for these three subcharacters. Although the reset signal is generated in the same way for all three subcharacters, it is necessary to individually distribute it to the memory flip-flops in order to incorporate a key-generated inhibit signal to produce an uninterrupted sequence of one particular subcharacter when required.

The only unusual part of the logic in generating these three subcharacters is the premature resetting of FF_2 at the sixth clock pulse. This reset signal is formed by the A + C gate and sub-

[1] The Microswitches used in the keyer were made by MICRO, Freeport, Illinois, part no. 118M86. They are available from electronic supply houses carrying the MICRO line.

[2] Halverson and Stordahl, "An Integrated-Circuit Electronic Keyer," *QST*, April, 1968.

sequently arrives as an a-c coupled pulse at a separate reset input of FF_2. The reset logic signal for both memory flip-flops and FF_2 is generated on lead P, which forms the logic A + C.

Construction

It is not the purpose of this article to detail the IC arrangement or wiring. A review of back issues of *QST* will suggest various methods of mounting and wiring. The original model of the Five-Finger Keyer was hand wired using printed circuit boards as mounting sockets for the ICs only. A later version was built on double-sided etched circuit boards. Although circuit boards may be devised from the logic diagram, the author will supply, on request, full-size paper copies of the double-sided boards. These may be used to duplicate the boards if facilities are available. Commercially-made double-sided boards for this keyer will be more expensive than the complete set of ICs required.

For those who desire to hand wire the circuit, the following general suggestions are made. Obtain or make up etched boards just to mount the ICs with small tabs on each IC pin for wiring. The Motorola ICs used in the construction have proven to be rugged, but overheating of the leads when soldering should be avoided. No difficulty was experienced with either the hand-wired or etched-board model due to wiring arrangement. All ICs are Motorola MC700P series which are medium-power units. The complete complement of ICs as indicated in Fig. 2 will cost about $25 at current prices.

Since the ICs operate at very low levels, there exists a great susceptibility to rf fouling of the keyer operation. It is therefore suggested that the entire keyer be well shielded and all external leads suitably filtered. This includes the individual key contact leads which must be partially exposed.

The complete keyer draws about one watt of power whether the keys are depressed or not. Turn-on is instantaneous and no ambiguity exists in any of the circuits. Power is supplied from three nickel-cadmium rechargeable "D" batteries. These are normally rated at 1.2 volts each thus supplying a total of 3.6 volts which is the manufacturer's specification for these ICs. Actually the battery voltage varies between 3.9 and 3.5 volts at full charge and near discharge, respectively. These limits are within manufacturer's limits for the ICs. Since the capacity of the "D" battery employed is 1.0 ampere-hours, about 3 hours of continuous service can be expected from one charging. Other sources of d-c power may be substituted but they *must* be very low in internal resistance to prevent cross-talk between the ICs; and must be suitably regulated to remain within the limits indicated above.

Comments

The use of miniature Microswitches as input keys was a convenience, and although they have worked well, it seems that a switch with less lost motion would be desirable.

A feature of this keyer is that it will not "walk" around the operating table during operation since all the forces are vertical. The bottom of the keyer may therefore be covered with a thin layer of adhesive felt to protect the top of the operating table.

The keyer has been in operation for over nine months with satisfactory performance, including many battery recharges. No difficulty has been experienced by the author in changing back to a lever-type keyer after operating the Five-Finger Keyer. A training period of approximately one month was required to gain sufficient facility with the keyer at speeds up to 45 wpm. QST

Strays

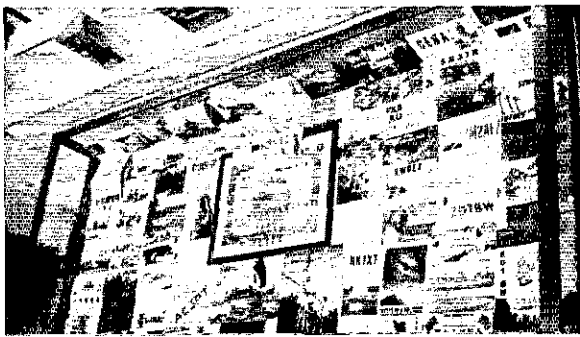
WB9CLN recently received severe burns over most of his body when an antenna he was attempting to raise at night came into contact with a 7,500-volt line. A close friend, W9ICF, asks us to remind hams once again:

1) Antennas should not be put up at night when it is too dark to see clearly what you are doing.

2) Antennas should not be put up where they can come in contact with power lines or where a falling power line may come in contact with the antenna.

Stolen Equipment

Over the weekend of January 23-24 the following equipment was stolen: Drake TR-4, Serial No. 19286; RV-4 remote VFO, No. 15138; AC-3 power supply; Heath SB-200, No. 812-133; SB-610 Monitor Scope, mobile mike; audio filter; and a Burnell key. The station log and license were also taken. Everything was housed in a homemade 3/4-in. plywood cabinet fitted with four 25-watt lamps used as heating elements and controlled by a microswitch and thermostat. Anyone having information is requested to contact W5KQD, 9374 East 12th St., Tulsa, OK 74112.



Assembled by W4NJF, this attractive exhibit at the Virginia Beach, Va. Public Library sparked considerable interest in amateur radio. Many libraries are looking for suitable display material. Why not contact your local library to arrange an amateur radio exhibit, perhaps tying it in with Amateur Radio Week (June 20-26).

• *Beginner and Novice*

Simplified Antenna Switching

How to switch the station antenna from transmit to receive? This is a problem that bothers many newcomers. Presented here are some methods for doing the job, and these techniques should make operating much more enjoyable.

BY LEWIS McCOY,* W1ICP

IT SEEMS almost every newly-licensed Novice has a problem when he sets up his first station: how to go from the receive to transmit mode and back with a minimum amount of effort. On a recent visit to a new ham, the writer found it interesting to observe the operating methods in use. His antenna was a random-length wire with a clip lead at the station end. When changing from receive to transmit, he unclipped the antenna from the receiver, put it on the transmitter, turned down the rf gain control on the receiver, and then proceeded to send cw. To make matters more complicated, his key was not secured to the operating table, so he had to hold the key down with one hand while tapping out the code with the other. It was apparent that he needed some advice on how to simplify the operation! This article shows different methods for taking care of the transmit/receive functions.

Separate Antennas

Some amateurs solve the switching problem by using one antenna for receiving and the other for transmitting. Unfortunately, this method has serious drawbacks. Most antennas have certain directional characteristics and it isn't likely that separate antennas at the same location will have identical patterns. Your transmitted signal might be stronger in some directions than in others. One thing to keep in mind: your best transmitting direction is nearly always also your best receiving direction. Also, one usually installs the transmitting antenna in the best location, so he handicaps the operation by using a poor antenna for receiving. The receiving antenna is often a random length of wire strung out of a window. Certainly, this cannot equal the transmitting antenna in performance. *Always* try to use the same (and most effective) antenna for receiving and transmitting. This, of course, brings up the problem of how best to accomplish antenna switching.

*Novice Editor

Relays

One method of switching from receiving to transmitting is by means of an antenna changeover relay. Fig. 1 shows a one-switch arrangement. A toggle switch is used to operate the relay which does the antenna switching. The switch can be mounted on the operating table. Also, a foot switch can be used instead of the desk-mounted toggle, leaving both hands free for other functions.

In Fig. 1, all the lines from the transmitter or receiver to the relay and antenna are of coaxial cable. A coax relay is designed to have approximately the same impedance as the line with which it is used. Also, these relays are shielded to prevent rf leakage. Contrary to popular belief, a coaxial relay is *not* required with coaxial line. Any mismatch that a non-coaxial relay may introduce

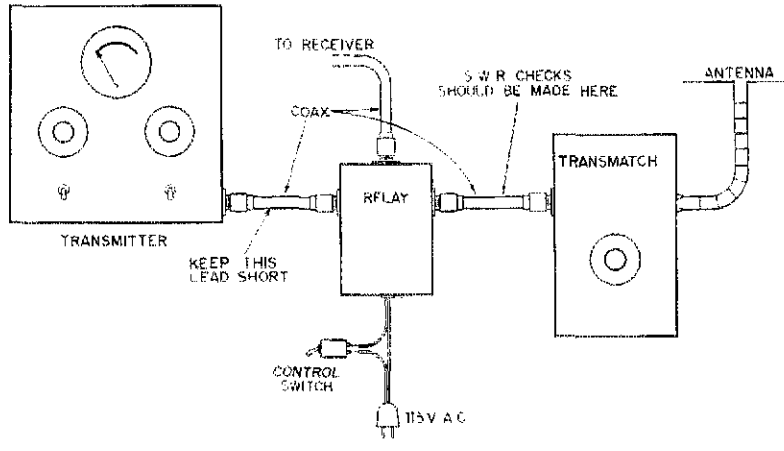
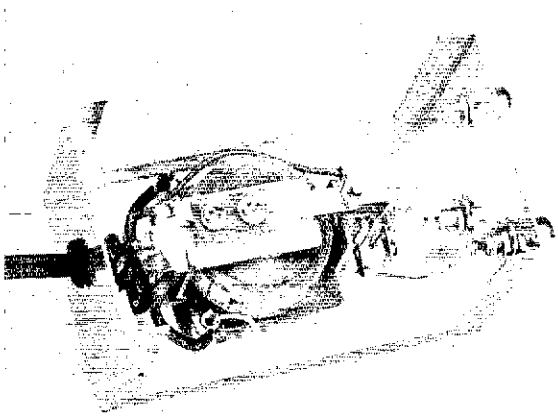


Fig. 1 — This shows the basic connections for using a relay to switch the antenna.



This is an example of a homemade coaxial relay. The connectors are phono jacks but regular coax fittings could be used.

will exist *only* between the transmitter and the relay. This is usually a very short lead, and the slight mismatch that could exist is of no importance in the hf bands. In fact, the relay can be mounted near the plate tank, inside the transmitter, and it will have little effect on the SWR. If we seem to belabor this point there is a very good reason. Coaxial relays are expensive. It is cheap and easy even for a beginner to make his own relay setup from low-cost parts.

The unit shown in the photograph is a homemade relay enclosure which uses phono jacks for connectors. Practically any relay will handle the Novice power level. The relay used in this unit is a 117-volt ac type, but one with a 6.3-volt ac winding could be used. Operating voltage could be taken from a 6.3-volt winding in the transmitter or receiver. The two choices of voltages should provide a wide selection of surplus, low-cost relays. If you are going to switch only the antenna, a single-pole, double-throw relay should suffice. However, if you want to reduce transmitter-feedthrough signal to the receiver during transmit periods, an additional set of contacts could be used to short the receiver antenna terminals to ground while transmitting. This method is shown in Fig. 2.

T-R Switches

Another solution to the antenna switching problem is to use a T-R (transmit/receive) switch. A T-R switch can be completely electronic in nature (no moving parts). There are several types of T-R switches. A vacuum-tube model is described in *The Radio Amateur's Handbook*.[1]

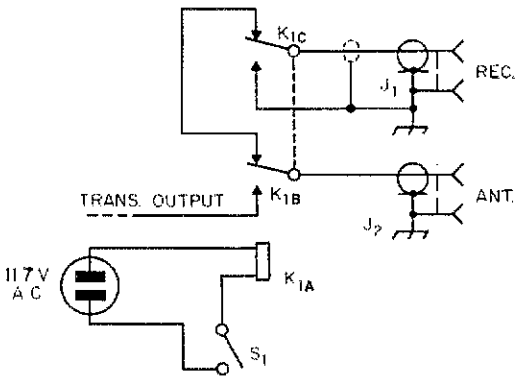


Fig. 2 — Use a double-pole, double-throw relay as shown here to reduce rf leakage to the receiver during transmit.

The T-R switch shown in Fig. 3, and in the photograph, uses a solid-state device. It was designed by W4ETO, and is used in his company's high-power amplifier.[2] The unit shown here was tried with several Novice-type transmitters and did an excellent job with all of them.

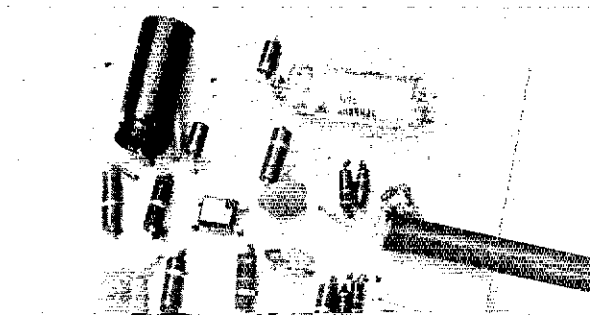
To use this circuit with a transmitter, all you need do is key the transmitter and all the switching functions are taken care of by the T-R switch. This is a good method to use because it completely frees the hands for keying, tuning, and logging. While testing the T-R switch we found that when the key was closed, the receiver audio level was about the same as when the transmitter wasn't keyed. In fact, listening to the transmit signal there was a comfortable monitor level from the receiver without having to adjust the receiver gain controls.

With use of a T-R switch some steps should be taken to prevent receiver blocking. Turn off the age or avc, decrease the rf gain, and advance the audio gain control. Use the rf gain control for obtaining the desired listening level. A little experimenting with the controls will provide the receiver settings best suited for your operating.

One thing about this type of device should be pointed out. The T-R switch is connected to the transmitter's tank circuit via C1, a low-value capacitor. If the amplifier plate current is not cut off when receiving (zero standby plate current), there may be enough noise generated in the amplifier tube to be objectionable during receive. However, most Novice rigs operate with the amplifier plate current completely cut off during non-transmit periods, so this shouldn't be a problem.

[1] 1971 edition, page 571.

[2] Ehrhorn Tech. Operations, Inc., Brooksville, FL 33512.



Here is the solid-state T-R switch.

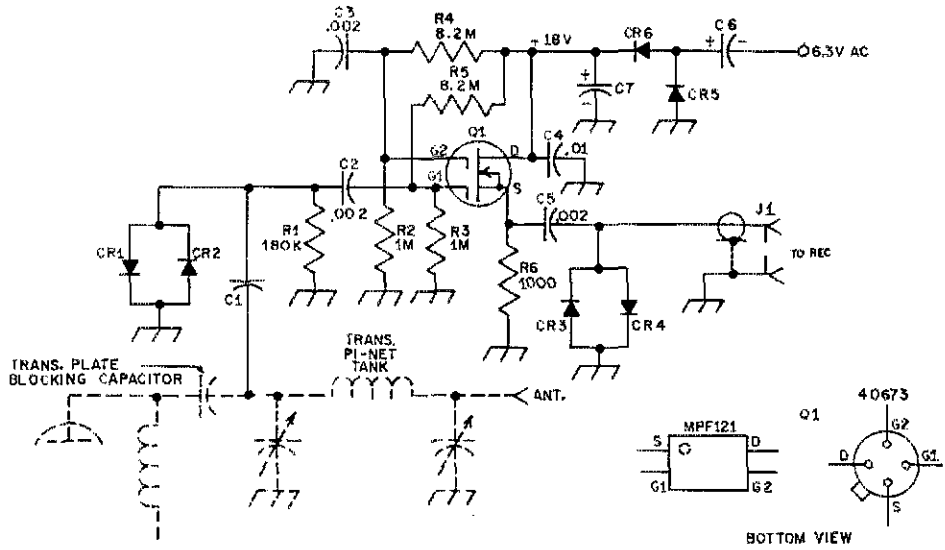


Fig. 3 — Circuit diagram of the T-R switch. All resistors are 1/2-watt composition.
C1 — 5- to 10-pF mica.
C2, C3, C5 — .002-μF disk.
C4 — .01 μF disk.
C6, C7 — 100-μF, 25-volt electrolytic.
CR1, CR2, CR3, CR4 — 1N914 or equiv.
CR5, CR6 — 100 PRV, 100-mA silicon diode.
J1 — Coax chassis fitting.
Q1 — Gate-protected dual-gate MOSFET.
R1 — 180,000 ohms.
R2, R3 — 1 megohm.
R3, R4 — 8.2 megohms.
R6 — 1000 ohms.
Q1 — RCA 40673 or Motorola MPF121.

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

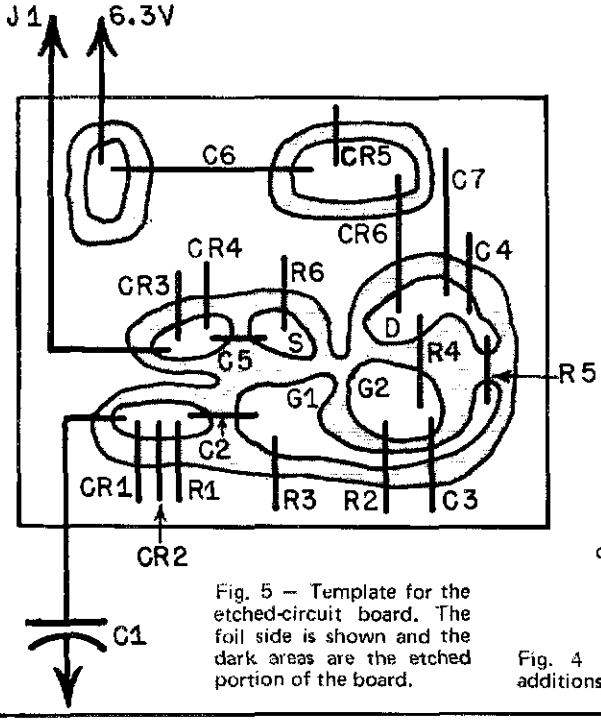


Fig. 5 — Template for the etched-circuit board. The foil side is shown and the dark areas are the etched portion of the board.

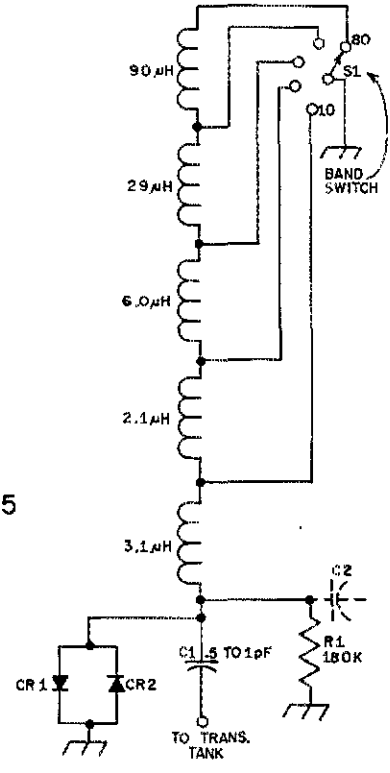


Fig. 4 — Circuit diagram of the T-R switch additions for high-power operation.

Construction Information

Construction of the solid-state T-R switch is simple. The unit shown is on an etched circuit board. Details for making etched circuits are given in the *Handbook.*[3] Also, the unit could be built on a piece of insulated board, or on "perf" board. Eighteen volts of dc are required to operate the T-R switch. This voltage can be obtained from a voltage-doubler rectifier connected to the 6.3-volt ac line in the transmitter or receiver. In Fig. 3, the voltage-doubler consists of C6, CR5, CR6, and C7. Connection to the 6.3-volt line should be made to the ungrounded side of the heater supply.

Installation

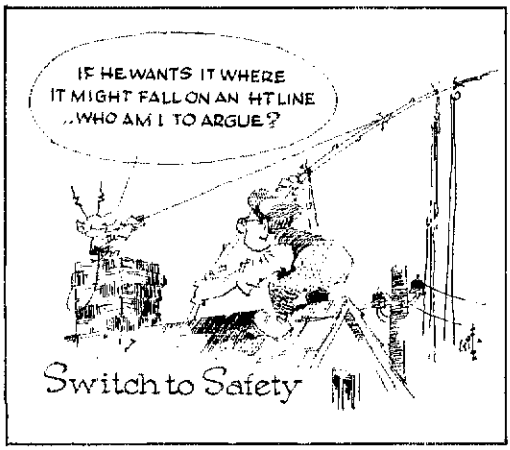
Installation of the T-R switch is simple. Mount it close to the transmitter PA tank. The coupling capacitor, C1, should be connected with one end to the input side of the pi-network coil; see Fig. 3. We suggest a value of 5 to 10 pF for C1, silver mica, with a 1000-volt rating or greater. Mount a coax chassis fitting on the back of the transmitter chassis, and run a connecting line of coax from the fitting to the T-R switch. Make sure the coax braid is grounded at the fitting and at the T-R switch. Your receiver antenna terminal can then be connected, using coax, to the T-R coax terminal on the transmitter.

Additional Information

Some readers of this article will be holders of higher-class amateur licenses, and would like to use this T-R switch with high-power amplifiers. Fig. 4 shows the additional circuitry required. C1 must be no more than 0.5 to 1 pF. Because of this light coupling, a broadly-resonant input circuit is required on the T-R switch in order to have adequate gain through the switch. Keep in mind the point mentioned earlier: the amplifier plate current should be cut off during receive periods.

Capacitor C1 must be capable of handling high rf voltages. A gimmick-type capacitor consisting of one or two turns of Teflon-covered wire wound around the end of the tank coil should do the job.

3Construction Practices. QST—



50 Years Ago this month

April 1921

. . . The winner of the Spark Station Contest, R. H. G. Mathews, 9ZN, tells all about his "ideal relay spark transmitter." His results, as all old timers well recall, completely justified his theory and design. Matty's signals were famous. He pleads for highest possible voltage, low spark frequency, high power factor in the high-voltage transformer and carefully designed antenna and ground systems.

. . . Since synchronous spark gaps have considerable merit, F. F. Hamilton, 9ZG, describes how to convert an induction motor into a synchronous one. This requires access to a machine shop since some new milled slots are required. The conversion job gives less power, but enough.

. . . C.w. sets are slowly but surely making their way into print. We have a description of a few simple rigs, together with photographs. I notice some curious wiring diagrams but apparently they work.

. . . Short article by Anthony D'Amico, 2QW, on "tuning honeycomb coils." You know, quite a few of the boys are dragging these old coils out putting them into simple rigs to tune in on vlf — NAA for example.

. . . 2SZ, Troy (New York) Radio Club is described. Mac Williams, now K3AC, was chief operator. I brought down a Kolster Decremeter from R. P. I. and we measured the decrement as .09, well below the .2 which was the legal maximum.

25 years ago

April 1946

. . . The great news this month is that the military services are to relinquish the ham frequencies from 3700 kc to 4000 kc. FCC has set April 1st as the great day, 3 A.M. EST., not before. Maybe I'd better wait till next month to mention the actual opening! Ten meters is having a grand warming up, of course. Warner is already cautioning us about phone operation — Class-A operators only in 3900-4000 kc., etc.

. . . Don Mix, W1TS, describes his new self-contained 60-watt transmitter for 3.5, 7, and 14 Mc. It puts out 45 watts in all these. It is a two-stage design using a 6V6GT oscillator and an 807.

. . . George Grammer, W1DF, discusses the matter of broad signals in the 144-Mc. band and accompanies his remarks with a description of an m.o.p.a. rig that greatly reduces frequency modulation. A couple of 6C4s and an 815 final are used. He also describes a high-C oscillator using an HY75.

. . . John Huntoon, W1LVQ, lectures us a little on good operating. His remarks apply as well today as they did then.

. . . Philip S. Rand, W1DBM, talks about the 1000 Mc. region and describes a rig using the Lighthouse tube and cavity resonators. Just how these work is set forth with great clarity. He also shows a detailed drawing for making such a device.

WIANA.

A 2.3-GHz Crystal-Controlled Converter

Practical Ideas for Narrow-Band UHF Reception

BY PAUL M. WILSON,* W4HHK/A4HHK

THIS DESCRIPTION of a 2300-MHz converter is not intended to be a detailed account, from which the reader would build a "Chinese copy." Some of the components used may not be available readily, but the experienced uhf operator should have little difficulty making substitutions, where necessary. The converter is a combination of solid-state devices, vacuum-tube circuitry, and surplus hardware that was available to the writer. Ways of improving it will be apparent, but the converter has performed well since completion in 1968, and has produced the desired results.

In using narrow-band techniques in a band 150-MHz wide, a spot frequency must be agreed on, to avoid needless broad-banding and fruitless searching for signals. The frequency of 2304.0 MHz was chosen because it is the 16th multiple of 144.0. This is convenient for frequency checking, and it permits use of 2-meter gear in the 2.3-GHz transmitter. A first intermediate frequency of 144 MHz allowed use of the station 2-meter converter and 75A3 communications receiver. The block diagram, Fig. 1, shows the frequencies and stages employed in the 2300-MHz converter.

Mechanical Features

The converter is built in subassemblies, mounted on an 8 3/4 by 19-inch aluminum vertical panel chassis (Bud CB1374). These include the mixer and i-f preamplifier, oscillator-multiplier chain, injection doubler stage, injection bandpass filter, and diode-current meter, arranged as shown in the photograph. The power supply is external.

Short pieces of 4-GHz WR-229 copper waveguide were used as "chassis" for three of the assemblies. Its outside dimensions are 2 13/32 by 1 1/4 inches, and inside 2 9/32 by 1 1/8 inches. It makes a rigid chassis of high conductivity, but may be difficult to obtain. Sheet brass, copper, or printed-circuit board could be used to make similar assemblies.

Diode mixer current is indicated on a small 1-mA meter, mounted in an aluminum box for shielding, and connected to the mixer assembly with RG-58/U coax. The shielding thus afforded is necessary to avoid signal pick-up at the first intermediate frequency. A small Butane torch, a jeweler's eye loupe and a jeweler's hacksaw may be helpful in assembling some of the units.

*Box 430, Collierville, TN 38017.

Mixer and I-F Preamplifier

The conversion loss inherent in the diode mixer is made up in a low-noise i-f preamplifier at 144 MHz. Both items are shown schematically in Fig. 2. The 2304-MHz signal is coupled to the half-wave line, L1, by a capacitive probe, C1, attached to J1. The local-oscillator energy is injected at J2 through a small inductive loop, L2. Originally a capacitive probe was used here, but adequate injection was possible only with inductive coupling. The LO energy on 2160 MHz is mixed with the 2304-MHz signal in a point-contact uhf diode, CR1. The difference-frequency signal on 144 MHz is amplified by the FET preamplifier, Q1, before it goes to the 2-meter converter.

The mixer diode is inductively coupled to the signal line by L3. Tuning is done with a 10-32 brass machine screw, located at the midpoint of L1, and shown as C2 in the diagram. The circuit tunes from about 2000 to 2500 MHz, and is not critical because of loading of the line by the diode and antenna. The screw has a locking nut, for use after adjustment to the signal frequency.

The uhf bypass capacitor, C3, consists of a brass plate 1/2 by 1 5/16 inches in size, insulated from the trough wall by a thin sheet of Teflon. It is held in place by a nylon screw near one end, and by the diode, near the opposite end. A spacer made from a No. 12 brass nut, soldered to the plate, makes a holder for the cathode end of the diode. A strip of spring brass mounted on a ceramic insulator holds this end of the diode firmly against the spacer. Inside the trough, the diode tip is held by a pin contact, removed from an octal socket. This is part of L3. The rest is a 1/8 by 1/2-inch strip of brass, parallel to L1 at a spacing of 3/32 inch, bolted to the cold end with a small machine screw. The dc blocking capacitor, C4, in the low-impedance line between the diode and the i-f amplifier, permits crystal current to be read on a meter connected to J3. The amplifier is essentially a copy of that described in *QST* for January, 1968, page 37.

Not many amateurs have built crystal-controlled converters for frequencies higher than 1300 MHz, but here is how one avid experimenter solved the problem of weak-signal reception at 2300 MHz. Though hardly a "how to build it" text, this description will suggest many useful ideas for microwave communications purposes. The converter, with a parametric amplifier ahead of it, was used at the W4HHK end of the first lunar communications circuit on this frequency, with W3GKP, as reported in QST *for December, 1970. It also was used in 249-mile troposcatter communication with WA4HGN/4, September, 1970,* QST.

The mixer and i-f amplifier, visible in the lower right portion of the photograph, are built into a 4 3/4-inch length of the 4-GHz waveguide. The guide stock has a 1/16-inch copper plate soldered to the mixer end and a 1/32-inch plate is fastened to the preamplifier end with machine screws. An opening cut in one of the large walls of the waveguide section leaves a 5/16-inch lip around the four edges. A copper partition is soldered across the "chassis," 1 1/8 inch from the mixer end plate. The result is a 1 1/8 by 1 1/8 by 2 9/32-inch box, which forms the outer conductor of the mixer line, L1.

A brass cover plate (removed for the photograph) held to the remaining lips with machine screws, completes the enclosure. The tuning screw, C2, mounts on this plate, directly over the midpoint of the inner conductor of L1. The latter is 5/16-inch brass tubing, centered in the trough and soldered at each end. The cover plate extends 11/16 inch past the inner trough wall, to the edge of the preamplifier. Removing it provides access to both ends of the diode when the preamp is in place.

The i-f preamplifier is built on a circuit board 2 13/32 by 2 13/16 inches in size, and is fastened to the chassis with seven machine screws. All wiring except the external connections is completed before the board is mounted. An opening cut in the underside guide wall (chassis bottom) opposite the preamplifier board provides access for connecting C4 to the diode. A copper cover plate is attached after this connection is made.

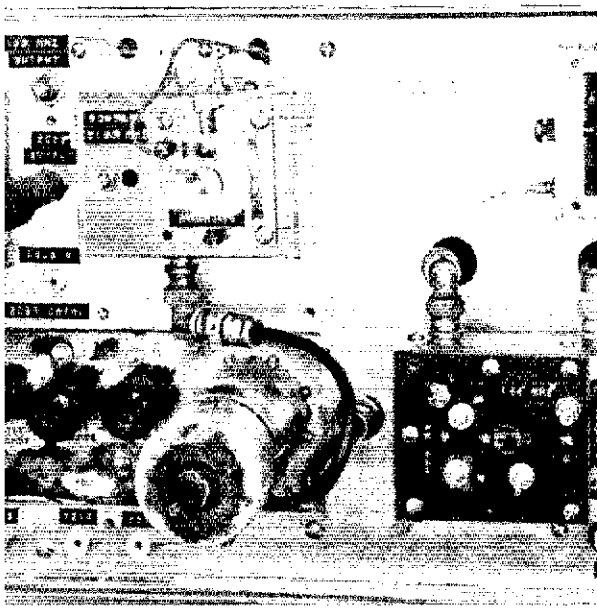
Removing the end plate provides access to J4, for soldering the link, L8. J3 and J4 mount on a side wall of the chassis. The jacks are on the top surface as seen in the photograph. An external battery supplies 9 volts by way of C5. The drain is about 5 mA.

Oscillator-Multiplier Section

Two units, one from a surplus L-Band receiver and one home built, are used in the local-oscillator chain. The LO assembly was lifted intact from a UPX-4 receiver, and secured in an opening in the chassis (lower left in the photo). Even the original 45-MHz crystal was used, and no modification of circuits was necessary to reach 1080 MHz, half the desired injection frequency. Only a brief description is given, as there would be no point in duplicating the UPX-4 lineup, if you don't have the unit. It has a 2C51 dual-triode oscillator and cathode follower, three 6AK5 doublers, and a 2C39 doubler, with a 10,000-ohm control in the cathode circuit for bias and output-level adjustment. Other uhf surplus, such as TACAN, DME, etc., might be useful. The Western Electric TD-2 Generator should be good for this purpose. Various published uhf converter designs may suggest ideas for the fellow who wants to build his own LO chain.[1]

An output of about 50 mW to a 50-ohm load is obtained at 1080 MHz, with a supply voltage of 200 and a current drain of 80 mA. The 2C39

[1]This and subsequent references will be found at the end of the text.



The W4HHK 2300-MHz converter is made up of subassemblies. At the lower left is an oscillator-multiplier chain from a surplus UPX-4. This drives a doubler to 2160 MHz, directly above. Output from the doubler goes through a two-section filter, upper right, and then to the 2300-MHz mixer, lower right. Mixer output on 144 MHz is fed to an FET preamplifier, which is the covered portion of the mixer unit. The balance of the 2300-MHz receiving setup is the converter and communications receiver used in 144-MHz communication. The filter and mixer assemblies have their covers removed, to show interior details.

heater is supplied with 5.5 volts dc, to avoid hum modulation. The plate supply is regulated, and a constant-voltage line transformer is used to obtain regulated ac voltage for the other tube heaters. The crystal is enclosed in a Styrofoam jacket to insulate it from drafts, and the oscillator tuning is locked securely. The frequency is checked carefully before each schedule, as changes in room temperature can shift the injection frequency a few kHz.

A separate doubler stage produces injection voltage at 2160 MHz. A varactor or the familiar 416B or 2C39[2] might serve this purpose, but the writer used a GE ceramic planar triode Y-1266, in a grounded-grid circuit.[3] This tube is about the size of a 416B, but it does not need forced-air cooling, and connections may be soldered directly to its contact surfaces. The schematic diagram is given in Fig. 3. The plate circuit construction recommended by GE, Fig. 4, was followed as closely as possible. A BNC fitting is too large for the output connector, J2, so a miniature fitting was scrounged from some surplus gear for this job. With the dimensions given, a single 10-32 tuning screw, C2 in Fig. 3, would resonate the plate circuit at 2304 MHz, but it would not reach 2160 MHz, so a second screw was used as a padder.

The input circuit, L1C1, is a half-wave line. As with the previous doubler, a control in the cathode circuit, R1, allows variation of the bias for optimum operating conditions. Input and output

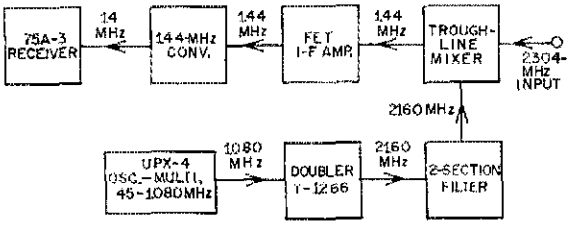


Fig. 1 — Block diagram of the stages and frequencies used in the W4HHK 2300-MHz converter.

coupling are by means of capacitive probes made of flashing copper. The chassis is 3 1/4 inches of the 4-GHz waveguide stock. The doubler produces enough output at 2160 MHz to develop more than 1 mA of mixer crystal current. Normally this is adjusted to about 500 μA by varying the two bias controls. Good mixer operation is possible with as low as 200 μA.

Injection Bandpass Filter

Originally, the final doubler stage fed the mixer directly. Later a two-section bandpass filter was added, in the hope that mixer performance would be improved by removal of unwanted harmonics from the output of the multiplier system. The filter details are given in Fig. 5, and it is visible in the upper right corner of the photograph. No improvement in weak-signal reception was apparent after the filter was installed, but only the desired frequency, 2160 MHz, gets through, which minimizes spurious responses.

The filter consists of two half-wave lines, tuned at their midpoints with 10-32 screws. It is built in a 2 5/8-inch waveguide section, with copper endplates soldered in place. An opening 1 11/16 inches square is cut in one surface, for assembling and adjustment. The complete assembly has a 1/16-inch copper cover, held in place with machine screws. This is removed in the photograph. There is no shield between the two lines and no coupling other than that existing between the lines directly. Bandwidth is 50 MHz at 10 dB down, and 80 MHz at 20 dB down. Tuning range is about 2000 to 2500 MHz. Insertion loss is negligible.

Tuning and Operation

Getting started with the right equipment is the hardest part of the alignment operation. Some ham-type dippers will permit checking the multiplier circuits up to around 500 MHz,[4] but for 1080 and 2160 MHz a uhf wavemeter[5] and/or a slotted line[6] or Lecher Wires[7] will be needed. If a UPX-4 or TD-2 generator is used, tune up should be no problem.

Selection of tubes becomes more critical as the frequency increases. The only sure way to check them is by the grid current developed state by stage, and the output-power level at 1080 or 2160 MHz, swapping tubes and retuning with each substitution.

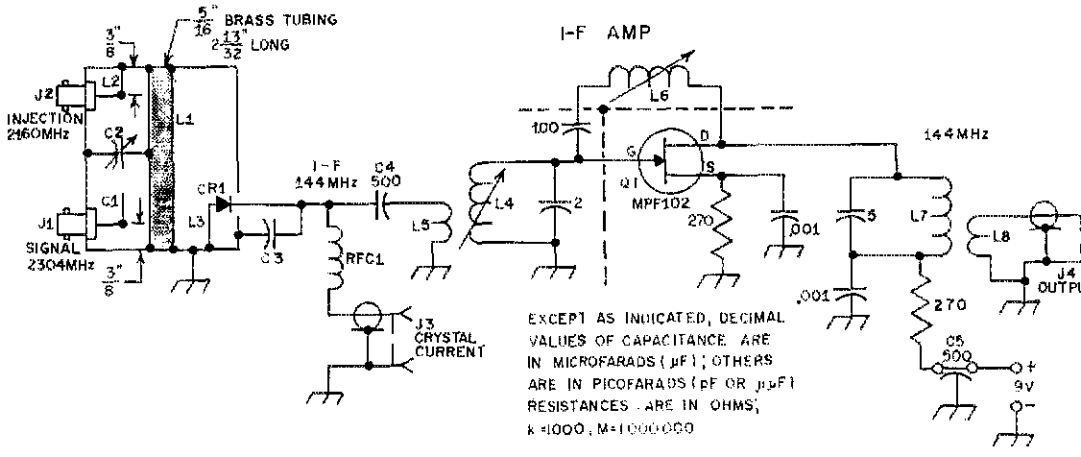


Fig. 2 — Schematic diagram and parts information for the mixer and i-f preamplifier portions of the W4HHK 2300-MHz converter. Components numbered but not described below are for text references.

C1 — Capacitive signal probe; flashing copper 1/4 by 1/2 inch, notched at one end for soldering to J1.
C2 — 10-32 brass screw; see text.
C3 — Uhf bypass, on outside of L1; see text.
CR1 — Uhf point-contact diode, 1N21F or 1N21G.
J1, J2, J3, J4 — BNC Fitting (A miniature type used for J2 could have been BNC.)
L1 — Mixer trough line; see text and photo.
L2 — Injection coupling loop; 1/4 by 3/8 inch, notched at one end for soldering to J2. Space 3/32 inch from L1. Bolt or solder other end to chassis.
L3 — Mixer coupling loop; see text.
L4 — 5 1/4 turns No. 26 enamel, 1/4-inch ceramic brass-slug form.
L5 — 2 turns No. 26 enamel at low end of L4.
L6 — 9 1/2 turns No. 34 enamel, like L4.
L7 — 5 turns like L4.
L8 — 1 1/4 turns No. 34 Enamel at low end of L7.

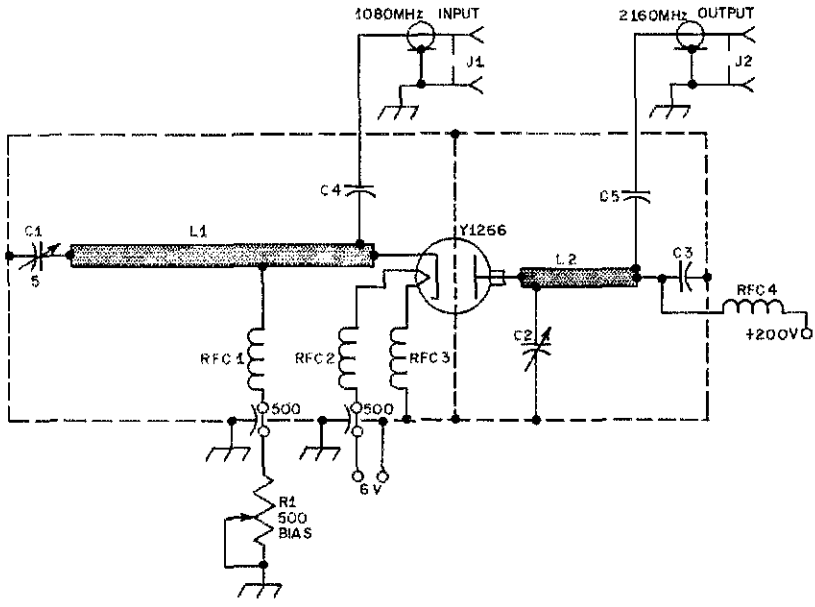


Fig. 3 — Circuit diagram of the final doubler stage in the 2300-MHz converter.

C1 — Glass trimmer, 0.5 to 5 pF.

C2 — Two 10-32 brass machine screws; see text.

C3 — 7/8-inch copper disk soldered to end of L2, insulated from end of outer conductor with thin Teflon disk.

C4 — Capacitive coupling probe; 1/4 by 1/2 inch, flashing copper, notched at one end for soldering to J1.

C5 — Similar to C4, but 3/8 inch long.

J1 — BNC fitting.

J2 — Miniature coaxial fitting.

L1 — Half-wave line, copper strip 1/2 by 1 3/4 inches.

L2 — 5/16-inch brass rod, 0.4 inch long. Outer conductor is 31/32-inch copper pipe. Length, Y-1266 grid flange to C3, 1/2 inch.

RFC1 -RFC4, incl. — 3 turns No. 20 enamel, 1/8 inch ID, spaced wire diameter.

When 25 milliwatts or more of output is developed at 1080 MHz, this energy should be fed to the final-doubler cathode circuit. This will tune very broadly. The 2160-MHz plate circuit tunes rather sharply, and a detector and sensitive microammeter should be connected to the doubler output jack, J2, initially as a tuning aid. Adjust the 10-32 tuning screw(s), C2, slowly until an output indication is observed. Adjust carefully, to avoid penetration to the point where the screw touches the inner conductor, which will short the plate supply. When output is obtained, use a less-sensitive meter for optimizing the tuning and coupling. This is a slow process, as coupling adjustment requires removal of the plate circuit.

The initial adjustment should be made without the bandpass filter in the line to the mixer, as the tuning of the filter is very sharp. It may be necessary to use the detector and microammeter on the filter output, as little or no energy will go through it unless both circuits are exactly on frequency. Arriving at usable settings of the doubler and filter without adjusting them step-by-step, as outlined here, is highly unlikely. When peaked for optimum results, the filter tuning screws extend into the assembly about 13/32 inch each, leaving a gap of about 1/16 inch between the screw ends and the inner conductors. Peaking should be for maximum crystal current. The injection level can be reduced, if necessary, with the bias controls on the two doubler stages.

Tuning the i-f preamplifier follows standard practice with neutralized-triode stages. A signal source at 2304 MHz is needed for mixer adjustment. A simple harmonic generator[8] was built for this, after a surplus uhf signal generator

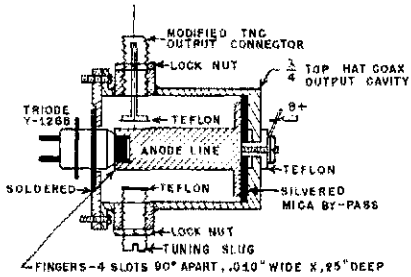


Fig. 4 — Details of anode circuit recommended for the Y-1266 triode. Basic GE design was followed as closely as possible by W4HHK, with variations described in the text. Inner and outer conductors are much smaller than they appear here. *(Drawing courtesy of General Electric Company.)*

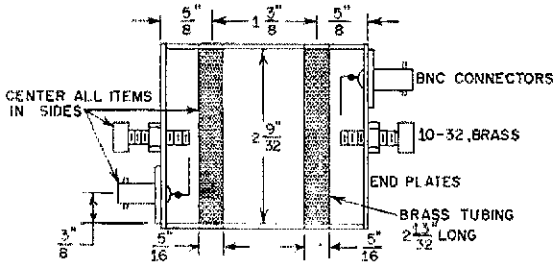


Fig. 5 – Details of the 2160-MHz filter used between the final doubler of the injection system and the mixer. The "chassis" is a piece of WR-229 4-GHz waveguide, but sheet brass, copper or circuit board could be used. Coupling probes are 1/4 by 1/2 inch, flashing copper.

proved too unstable for the narrow passband of the 75A3 receiver.

Output level of the crystal-controlled source was measured at approximately minus 52 dBm (500 *microvolts*, not millivolts, as given in the reference) at 50 ohms. With this fairly healthy signal, some attenuation is needed between the signal source and the mixer input. Lengths of RG-58/U coax can be used, if a calibrated attenuator is not available. Such coax has a loss of about 37 dB per 100 feet at 2300 MHz!

It is assumed that the 2-meter converter and communications receiver used with the 2300-MHz converter are already checked out, as to sensitivity and frequency calibration. The 2304-MHz signal is then fed into the mixer input jack, J1, and the tuning screw, C2, is run into the circuit about 7/16 inch. The communications receiver is then tuned for the signal. C1 is then peaked for maximum response at 2304 MHz, and the i-f preamplifier circuits are touched up carefully for maximum signal-to-noise ratio. Check the injection stages to be sure that crystal current can be maintained at about 500 μA.

The signal source as described in Reference 8 leaves the early-stage design up to the builder, as only the multipliers from 153.6 MHz are shown. A crystal oscillator at 51.200 MHz is used initially, to give the desired output frequency, 2304 MHz, without having harmonics at 144 MHz (the first intermediate frequency) or 2016 MHz (the mixer image frequency).

After the converter is adjusted properly, a 48.000-MHz crystal is recommended for the signal source. This makes possible accurate calibration against the 144th harmonic of a 1-MHz standard, which has been set to zero beat with WWV. All calibration must be done with care, as any error at 144 MHz is multiplied 16 times at 2304. This could make searching for a moonbounce signal (for example) a lost cause, even with everything else working well at both ends of a test.

Results

Initial receiving tests using ground-plane antennas required that the signal source be in the same room with the receiver. As performance was improved and experience gained, the signal source was receivable over ever-greater distances. With the W4HHK 18-foot dish connected to the receiver the signal source was heard at 200 feet, and then at 0.2 mile. Eventually, reception over a half mile called for a celebration! This indicated a receiver sensitivity of minus 130 dBm, which is about right for a 1N21F mixer and a 3-kHz receiver bandwidth.

The half mile could have been covered easily with 4-foot dishes on the signal source and converter. This points up the fact that interesting QRP communication can be enjoyed, using a converter of this general design, a selective receiver, fairly small antennas, and submilliwatt crystal-controlled trnasmitters. With this kind of receiver, a 100-milliwatt transmitter would provide a tremendous signal over open paths locally.

Using the converter as described, the best DX was work with WA4HGN/4, on a hilltop site at a distance of 117 miles. All attempts to detect solar noise have been unsuccessful. For greater DX, or work with weak signals, the addition of a parametric amplifier is a must. Using a "paramp" with the converter made possible moonbounce communication with W3GKP, and tropospheric scatter work with WA4HGN/4, over a 249-mile path, nearly 200 miles beyond line of sight. Replacing the 45-MHz converter crystal with one at 44.6 MHz made possible reception of signals from Apollo 10 and 12 missions, orbiting the moon. Solar noise readings of 10 to 13 dB above the background are typical of 2300-MHz reception with the "paramp" and converter combination.

Bibliography

Guba and Zimmer, "Pulse: A Practical Technique for Amateur Microwave Work," *QST*, February-May, 1963. Also *VHF Manual*, Chapter 10.

Peterson, "Practical Gear for Amateur Microwave Communication," *QST*, June, 1963.

Glazar, "Notes on Crystal Mixers," *QST*, October, 1961.

Montgomery, "Technique of Microwave Measurements," Dover Publications, Inc., 180 Varick Street, N.Y. 10014. Cat. No. S1595 and S1596.

Moreno, "Microwave Transmission Design Data," same source, Cat. No. S459.

Silver, "Microwave Antenna Theory and Design," same source, Cat. No. 486-61401-8. QST

1*Radio Communication Handbook*, RSGB, 4th Edition: "Experimental 13-CM Converter" and "Narrow Band Converter for 1300 MHz."
Radio Amateur's VHF Manual, ARRL, Chapter 10: "Crystal-Controlled 1296-Mc. Converter."
Radio Amateur's Handbook, ARRL, 1970 and 1971 Editions: "Solid-State Converter for 1296 MHz."
VHF For the Radio Amateur, Cowan Pub. Co.: "1296-Mc. Converter."

2Garrett and Manley, "Crystal Control on 10,000 Mc.," *QST*, November, 1963.

3Hudson, "Crystal-Controlled 2.25-Gc Planartube Transmitter," *Electronic Communicator*, September and October, 1966. Also *GE Technical Information Series*, Report No. R66ETR-2.

4*Radio Amateur's Handbook*, ARRL, 1970: "UHF Grid-Dip Oscillator"

5*Radio Communication Handbook*, RSGB, 4th Edition: "Tuned Circuits."

6Tilton, "Slotted Line for UHF SWR Checks," *QST*, January, 1969.

7*Radio Amateur's VHF Manual*, ARRL, Chapter 11.

8Wilson, "2304-MHz Harmonic Generator," *QST*, October, 1968, p. 97.

Receiving FM

Basic Principles and New Circuits

Part 4

BY DOUGLAS A. BLAKESLEE,* WIKLK

MANY AMATEUR projects start with the desire to experiment with a new circuit or component, and the receiver shown in Fig. 25 is no exception. With a crystal discriminator in hand, an fm receiver was built to try this interesting detector. Although designed for wide-band reception of 10-meter signals, narrow band and 50- or 144-MHz operation is also possible, as will be explained shortly.

A block diagram of the receiver is outlined in Fig. 36. The front-end circuit uses 40673 dual-gate MOSFETs for the rf amplifier and mixer. Toroid coils were chosen for the signal circuits because of their self-shielding properties. A crystal-controlled JFET oscillator provides injection voltage for Q2. Trimmer C3 is included to move the oscillator frequency "on channel."

A single-conversion scheme using a high i-f was chosen for simplicity, although having 120 dB of gain at 11.5 MHz requires careful layout and good bypassing techniques to insure stability. Three Motorola MC1590Gs are used, although two can achieve the required gain. Three stages, each with resistive loading, exhibited far better stability than two '1590s running "flat out."

The i-f amplifier circuit board uses extensive shielding. The finished product looks more like a piece of vhf gear than an i-f amp., but with high gain special precautions are necessary. The front end and i-f amplifier proved to be easy to build and adjust. The squelch circuit was a bother from the beginning. The basic circuit used for the noise-operated squelch is borrowed from the Motorola MOTRAC series. Output from the crystal discriminator proved to be quite a bit lower in level than would be obtained from an equivalent *LC* discriminator. Also, Z1 (Fig. 36) wants to "look into" an impedance of 100,000 ohms or more. The first version of the squelch circuit had far too little gain, so a redesign was required. The final version of the circuit is shown in Fig. 36. The voltages noted at the audio gate, Q8, are critical; any variation from the indicated values will cause a full squelch condition where the audio gate will not open, or, no squelch operation at all.

A commercial amplifier module was chosen for the audio output section. It delivers two watts (rms) to an 8-ohm load when using a 12-volt supply. Sufficient audio output is available for comfortable copy of weak stations when operating mobile. An inexpensive imported 0.5-watt audio amplifier may be substituted if the receiver will be used only in a ham shack. Power requirements for the receiver are 12 to 13.5 volts at 70-mA drain (squelch engaged) and 200 mA (at full audio output). Since automobile electrical systems can have voltages as high as 16 volts, a series regulator should be included for mobile operation.

Alternate values for the if and oscillator coils are given for 6-meter operation. To set the receiver for the 6-meter calling frequency, 52.525 MHz, a 41.025-MHz crystal is required. When built for 29.6 MHz, this unit can be used for 2-meter reception by adding any 144- to 148-MHz converter, having 10-meter i-f output, ahead of the fm receiver. Suitable designs are shown in the *Handbook* and *VHF Manual*.[31] The DL6SW converter is quite attractive for this use because of its small size.[32] It can be included within the

*Assistant Technical Editor, *QST*.

[31] *The Radio Amateur's Handbook*, Chapter 16; *The Radio Amateur's V.H.F. Manual*, Chapter 4.

[32] Van Schimmelman, "A 2-Metre Converter with Field Effect Transistors," *VHF Communications*, February, 1969. A kit is available for this unit from VHF Commucications, Box 283, Forestdale, MA 02644.

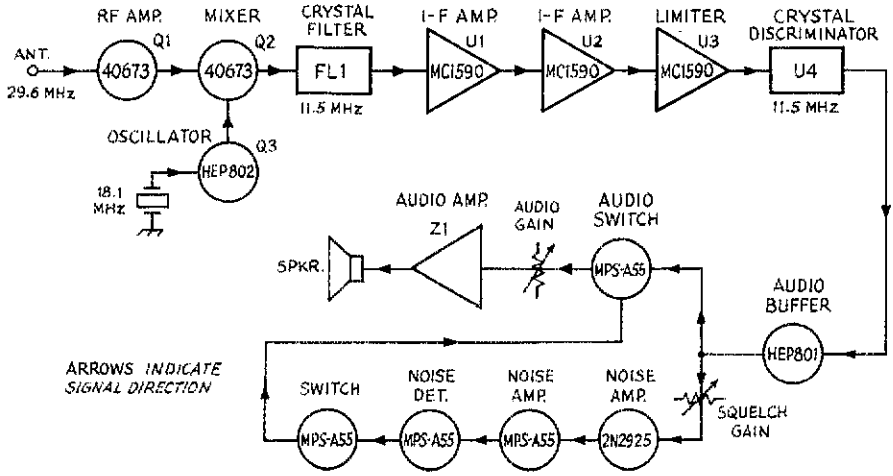
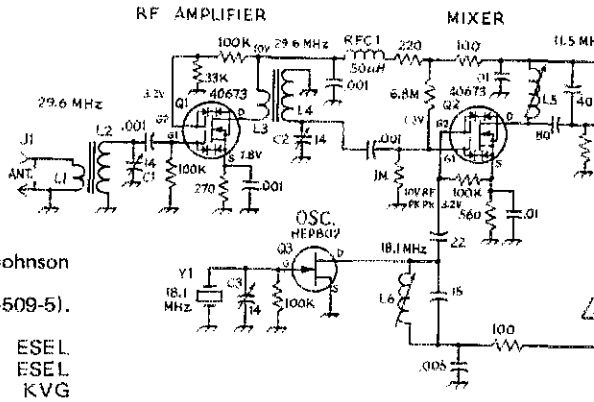


Fig. 35 — Block diagram of the 10-meter fm receiver using a crystal discriminator.

Fig. 36 — Schematic diagram of the fm receiver. Unless otherwise noted, resistors are 1/2-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic. Parts layouts and templates for the circuit boards may be obtained from ARRL for 25 cents and a large self-addressed stamped envelope.



C1-C6, incl. — Miniature air variable (Johnson 189-507-5).
C7 — Miniature air variable (Johnson 189-509-5).
C8-C10, incl. — Feedthrough type.
FL1 — For a wide-band 11.5-MHz i-f, ESEL MEL-3A; narrow-band 11.5-MHz i-f, ESEL DL-11A; wideband 10.7-MHz i-f, KVG XF-107D; narrow-band 10.7-MHz i-f, KVG XF-107B. If 10.7-MHz i-f is used, add 15-pF *ceramic capacitors across L5, L7, L9, L11, and* L13. (See Fig. 3 and Appendix A in Part I of this article which appeared in *QST* for January 1971 for a complete list of filter choices and addresses of the filter manufacturers.)
J1, J2 — Phone type, panel mount.
L1 — 5 turns No. 22 enam. over L2 for 29 MHz; use 2 turns for 52 MHz.
L2 — 21 turns No. 22 enam. on Amidon T-50-6 toroid core (yellow code) for 29 MHz; use 11 turns for 52 MHz (Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607).
L3 — 8 turns No. 22 enam. on L4 for 29 MHz; use 4 turns for 52 MHz.
L4 — 13 turns No. 22 enam. on Amidon T-50-6 (yellow code) for 29 MHz; use 6 turns for 52 MHz.
L5 — 2.96-3.14-μH variable inductor (J. W. Miller 46A336CPC).
L6 — For 18-MHz crystals (10-meter operation), 1.99-2.42-μH variable inductor (J. W. Miller 46A226CPC); for 41-MHz crystals (6-meter operation) 0.37 to 0.47-μH variable inductor (J. W. Miller 46A397CPC).
L7, L9, L11 — 36 turns No. 26 enam. on Amidon T-50-2 (red code) core.
L8, L10, L12 — 16 turns No. 26 enam. over L7, L9 and L11, respectively.
L13 — 24 turns No. 22 enam. on Amidon T-50-2 (red code) core.
L14 — 88-mH surplus telephone loading coil (see footnote 28).
Q1,Q2 — RCA dual-gate MOSFET.
Q3 — Motorola rf JFET.
Q4 — Motorola audio JFET.
Q5 — GE audio bipolar.
Q6-Q9, incl. — Motorola audio bipolar.
R1 — Linear-taper composition control.
RFC1 — 50-μH miniature choke (Millen 34300).
RFC2-RFC7, incl. — 500-μH miniature choke (J. W. Miller 70F504A1).
S1 — Spst miniature toggle.
TP1 — Vector T2.8 *terminal*.
U1-U3, incl. — Motorola IC.
U4 — ESEL AL-1A for 11.5-MHz i-f, KVG 107-01 for 10.7 MHz.
Y1 — International Crystal type EX.
Z1 — 2-watt audio amplifier, 1-volt sensitivity (Amperex PCA-1-14).

cabinet of the 10-meter fm receiver. With a converter i-f of 28 to 32 MHz, a 19.44-MHz crystal would be needed in the 10-meter receiver for reception of 146.94 MHz. *Circuit board layouts* are available for the three receiver subsections.[33]

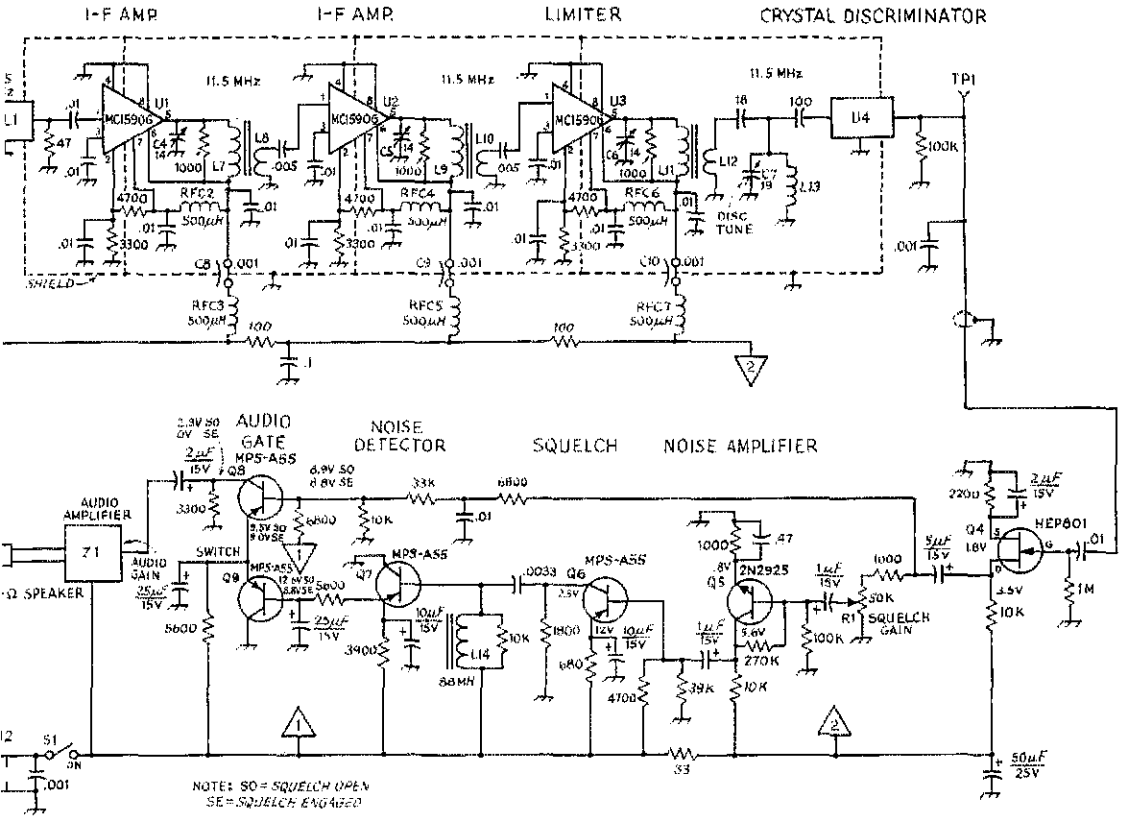
Alignment

A signal generator and a VTVM are required for receiver alignment. The VTVM should be connected to terminal TP1 and set to read 0-3 V dc. The generator should be set to about 29.6 MHz, and connected to J1 on the receiver. Rotate R1 *fully counterclockwise*, and you should hear noise in the speaker. If no noise is heard, place your finger on the input terminal of Z1. If the audio module is working, a loud hum will be heard. No noise output indicates that the squelch may be locked up. Check the voltages given in Fig. 36 against those found on the audio gate.

With a cw input signal, adjust C4, C5 and C6 for a maximum reading on the VTVM. Then set C1 and C2 for maximum indicated output voltage. Set the signal to 29.585 and note the VTVM reading. Then set the generator to 29.615 MHz and adjust

[33]Circuit-board foil patterns and parts layouts for the rf, i-f, and squelch sections are available from ARRL for 25 cents and a large self-addressed stamped envelope.

Fig. 37 — The bottom view of the i-f board shows the shielding and filtering used.



C7 for a VTVM reading of the same magnitude, but opposite polarity, from that obtained on the "low side" of 29.6 MHz. Repeat the procedure several times to assure a correct adjustment.

With the basic alignment completed, inject a 29.600-MHz signal — the output of a 100-kHz calibrator will do. Then set C3 so that the VTVM reads zero voltage. This completes the rf and i-f alignment. Connect an antenna and advance the squelch control, R1, until the background noise disappears. The squelch should close the audio gate at one-third to one-half scale rotation of R1.

With the winter openings on 10 meters providing signals from many parts of the country, the receiver copies both local and "skip" stations using just an eight-foot length of wire for an antenna. Fm is particularly susceptible to phase distortion when signals are propagated via the ionosphere. This causes the severe distortion often heard on some 10-meter fm transmissions. Both wide- and narrow-band fm are in use on 29.6 MHz, so the wideband i-f filter is the best choice, because it allows copy of stations using either deviation.

Acknowledgements

The author wishes to thank Peter Zilliox, WA3EQK, Peter Bertini, K1ZJH, Rick Liftig, WA1HSD, and Barron Littlefield, WA1GOI for their assistance on the construction and testing of the circuits featured in this series of articles. QST

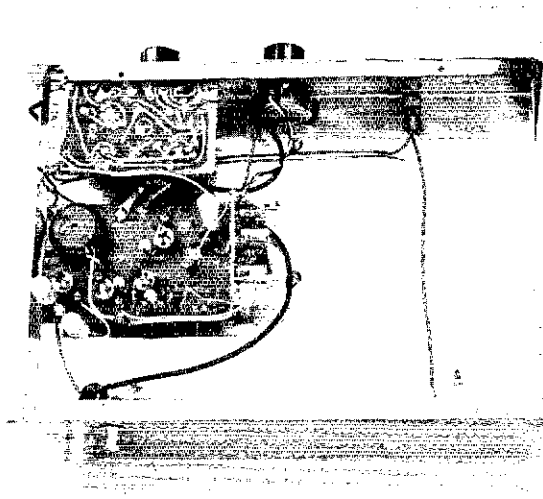
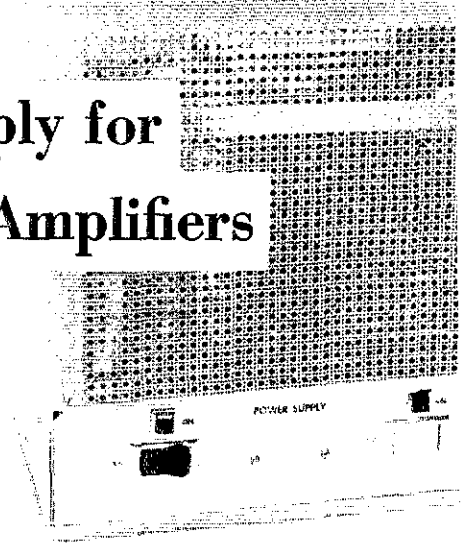


Fig. 38 — Bottom view of the receiver showing the squelch circuit board and the audio power amplifier.

A Husky Power Supply for Sweep-Tube Amplifiers

BY DOUG DeMAW,* W1CER



The 900-volt 1-ampere power supply is enclosed in Reynolds aluminum screening to permit the heat to exit, and to protect the operator from lethal voltages.

A NUMBER OF amateurs have written to ARRL headquarters asking for information on a high-current low-voltage dc supply for powering sweep-tube linear amplifiers. Run-of-the-mill power transformers listed in supply catalogs and surplus flyers will not meet the requirements set by a 1000- or 2000-watt-PEP low-voltage amplifier. The power supply described here was assembled with the foregoing requirements as the focal point of the project. will provide 900 volts dc, at up to one ampere, for a cw or ssb duty cycle. It also provides a minus 25 volts for operating a control relay. This voltage can be used as bias for setting the operating mode of the tubes – Class AB or Class B.

Since no provision is made for supplying a low-voltage bus to feed the screens of the sweep tubes, a grounded-cathode amplifier will require a separate 250-volt regulated supply for that purpose. However, this supply is intended mainly as the power source for a grounded-grid sweep-tube amplifier. Information on this type of operation was given in an earlier *QST* article.[1]

The Circuit

Referring to Fig. 1, it will be seen that T1 has a multiple primary to permit operation from either the 117-volt or 220-volt mains. It is shown connected for 117-volt operation. By placing the primary windings in series, 220-volt operation is possible. Modifications in the primary hookup, if 220-volt operation is desired, can be obtained from December 1969 *QST* ("A Power Supply For That Big Linear"). Some additional features are included in the power supply described therein and the builder may wish to incorporate some of them in this equipment.

Transformer T1 could also be used to power amplifiers that require approximately 2000 volts dc at up to 500 mA. If such a need exists one can connect the secondary circuit for a full-wave bridge rectifier. Of course, the filter capacitor string would have to be modified to accommodate the higher voltage across it. Information on this design aspect is given in the power-supply chapter of *The Radio Amateur's Handbook*. The standby switch, S2A would then be moved to the primary circuit of the supply because the center tap on the secondary of T1 would not be used.

In the circuit of Fig. 1, S2A is used mainly for testing during servicing of the equipment. Ordinarily, it is left in the "on" position when the supply is connected to the linear amplifier. The remaining switch section, S2B, manually controls any function relays that might be used in the amplifier. If the builder wishes to eliminate this switch he may do so.

Relay R1 acts as a time-delay device to protect the rectifier diodes until the capacitor bank charges. Initially, when power is applied to the primary circuit, the uncharged capacitors look like a dead short to the rectifiers, which could be damaged if some protective measure was not taken. When primary power is first applied to T1 a voltage drop occurs across R1 to lower the primary voltage, and to prevent K1 from closing. As the capacitors charge up, the current in the primary of T1 decreases and the voltage drop across R1 lowers to enable K1 to close. K1 then shorts out R1 until the supply is turned off and recycled. Alternatively, a 60-watt incandescent lamp can be used in place of R1, and K1 can be replaced by a manual switch. The supply would then be turned on with the manual switch open. As the capacitors would charge, the 60-watt lamp would diminish in brightness until only a faint glow remained. At that point the manual switch could be closed to permit normal operation. An example of that type of protective circuit is given in the *Handbook*.[2]

Concluding Remarks

Thyrector assembly U1 provides protection for the diodes and filter capacitors by clipping transients that ride in on the primary line. The daring operator can omit U1 from the circuit and may never have problems, but it is wise to include the device as an additional measure of protection.

*Technical Editor, *QST*.

1 As many as 10 color-TV sweep tubes, such as the 6KD6 and 6LF6 variety, can be operated in grounded-grid (parallel-connected) to provide 2000 watts PEP input. See "Some Ground Rules for Sweep-Tube Linear Amplifier Design," *QST*, July 1968.

2 *The Radio Amateur's Handbook*, 47th Edition, Chapter 12.

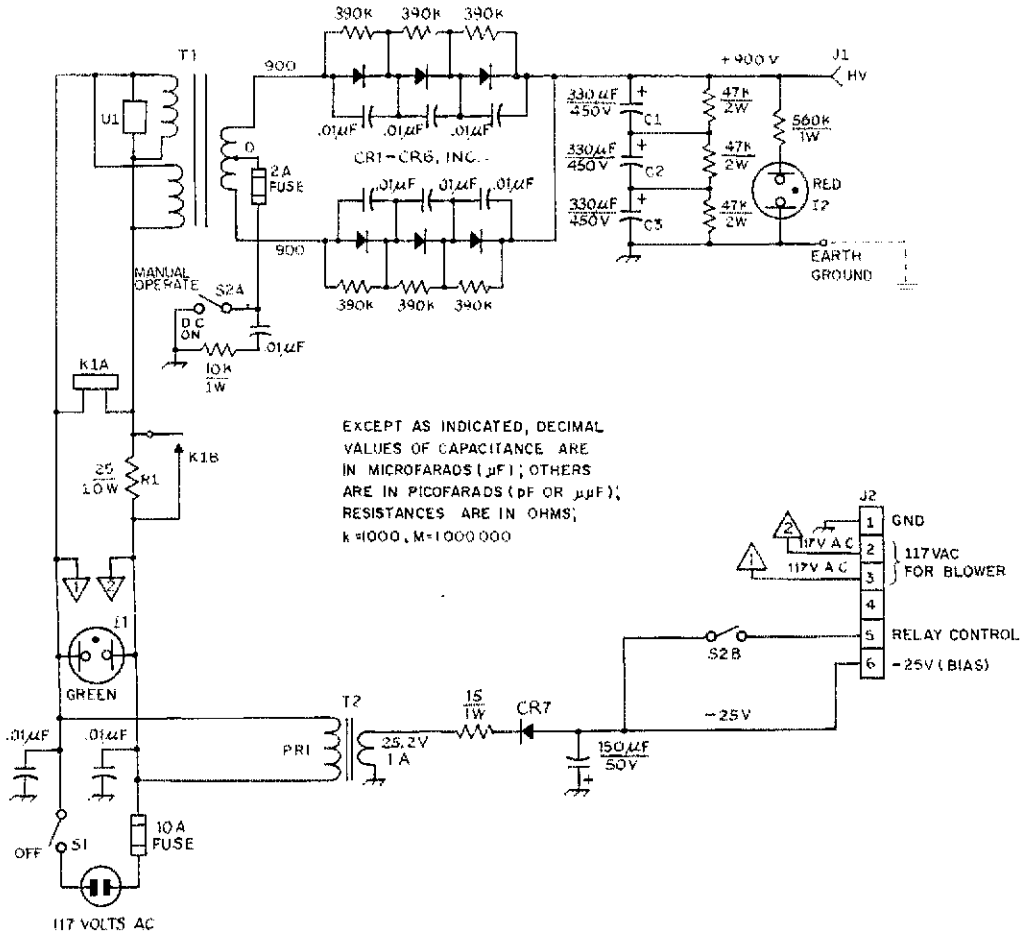
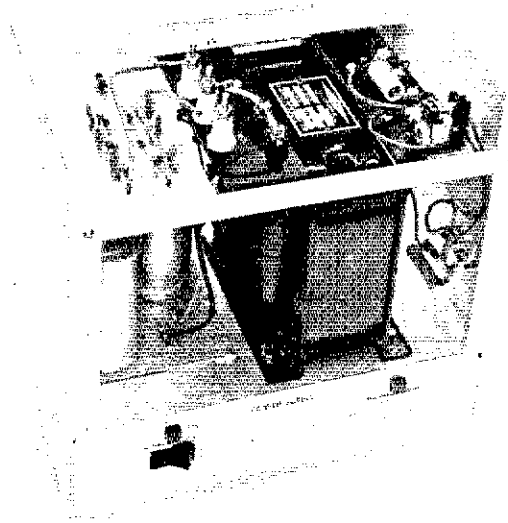


Fig. 1 — Schematic diagram of the sweep-tube amplifier supply. Polarized capacitors are electrolytic. All other capacitors are 1000-volt disk ceramic. The 390,000-ohm resistors are 1/2-watt carbon. Resistance is in ohms, K=1000.

C1-C3, incl. — Computer-grade capacitor (Sprague 331F450BC or equivalent).
CR1-CR6, incl. — 1000-volt, 2-ampere silicon rectifier (IOR 20A10 or similar).
CR7 — 2-ampere, 100-volt silicon rectifier (IOR 20A1 or equiv.).
I1, I2 — 117-volt ac neon panel lamp assembly.
J1 — James Millen high-voltage connector, No. 37001.
J2 — 6-pin female socket.
K1A — 117-vac spst relay with 10-ampere contacts.
R1 — Labeled for text discussion.
S1 — Spst rocker switch (Carling Co.), 10-ampere contacts.
S2 — Dpst rocker switch (Carling Co.).
T1 — Dual-primary plate transformer, 1800 volts c.t., 1140 VA, 700 mA. (Osborne Transformer Corp., 3834 Mitchell Ave., Detroit, Michigan. Write for price quotation).
T2 — 25.2-volt, 1-ampere filament transformer (Allied Radio No. 54D1421 or similar).
U1 — Thyrector-diode assembly (GE Co. 6RS20SP4B4).



Inside view of the power supply. The capacitor bank is at the left. The rectifier diodes and their protective resistors and capacitors are mounted on a pc board above the filter capacitors. QST

The Two-Meter Eggbeater

Omnidirectional Horizontal Antenna of Simple Design

BY DAVE THORNBURG,* WA2KZV/WA1MJD AND LES KRAMER,** WA2PTS/WA1JWN

WHEN OPERATING 2-meter mobile in the East the problem of antenna polarization is encountered frequently. The simple whip is vertically polarized, and most home station antennas not used for fm are horizontal. An omnidirectional horizontally-polarized antenna is desirable. Current 2-meter designs widely used include halos, turnstiles, and Big Wheels. WA2KZV, who had been experimenting with antennas for several years, decided to try a variation of the full-wave loop. The result described here provides the desired radiation pattern, and it is fairly easy to construct. It has performed very well.

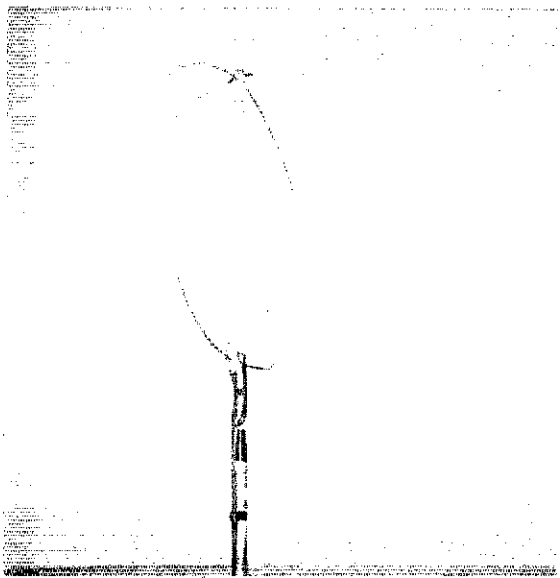
Electrical Description

The antenna is basically two circular full-wave loops, fed 90 degrees apart electrically, and placed at right angles mechanically. Each has two current maxima. With each loop oriented in a vertical plane and fed at the bottom, the polarization of the antenna is horizontal and the current maxima are at the top and bottom. This gives gain toward the horizon, as when separate antennas are stacked. The 90-degree phasing and right-angle placement of the elements give rise to the desired omnidirectional pattern.

The feed impedance of a full-wave loop is approximately 100 ohms. The two loops must be fed equal power, at 90 degrees out of phase, to produce the omnidirectional pattern. A convenient way to meet these requirements is to join the loops with a balanced line a quarter-wavelength long, of the same impedance as that of the loops, and feed one of the loops directly. A 100-ohm balanced line can be made of two pieces of 50-ohm coax, joining the braids at each end and feeding the inner conductors. With this arrangement, the impedance seen at either loop is then approximately half that of either one.

The balanced load must be converted to unbalanced, for feeding with coax. This may be done with a 1:1 balun, or another 100-ohm quarter-wave line may be used as a Q section to transform the 50 ohms to 200, and this fed through 50-ohm line and a conventional half-wave balun. This is the method we have used, as shown in Fig. 1.

*3 Elm Street, Natick, MA 01760
**133 Winthrop Street, Apt. 8, Framingham, MA 01701



The "Eggbeater" uses two full-wave loops oriented and fed 90 degrees apart. Its pattern is essentially omnidirectional, with slight bulges perpendicular to the plane of each loop. Polarization is horizontal.

Construction

A photograph of a complete "Eggbeater" is included, but details may be clearer from the drawings. The top insulator is optional, as the top is the voltage node of each loop. The insulating mount is a convenient way of supporting the elements, and it may help to prevent noise resulting from imperfect electrical grounding that might come from a metal mounting at the top. The feed points are supported on simple plastic blocks.

The loops were made from 3/16-inch diameter 1100-H alloy aluminum, 81 1/2 inches long. After these were passed through the top support the ends were flattened and drilled for the connections. The top support is 1 1/4-inch diameter polystyrene rod. Lengths of the Q section, phasing section and balun loop given in Fig. 1 are nominal values, assuming that the propagation factor of the coaxial line used is 0.66.[1] Even if the line used is rated as having this propagation factor, it can vary considerably, and dipping the sections for resonance in the band is recommended. A quarter-wave section of line is shorted with a small loop at one end, and left open at the other. Couple to the loop with the dipper coil to check the resonant frequency. Be sure to check the frequency calibration of your dipper. Some are far off in the vhf range.

All coax used in the Eggbeater construction was RG-58/U. The supporting mast was made from three telescoping sections of 6061-T6 alloy, 3/4, 7/8, and 1-inch diameter, .058-inch wall thickness.

[1]If foam-filled coax line is used, the velocity factor will be 0.81. EDITOR.

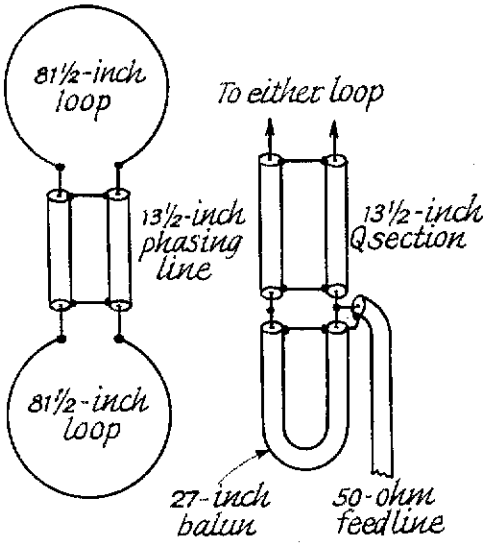


Fig. 1 — The two loops of the Eggbeater are fed 90 degrees apart, through a quarter-wave balanced phasing section. The 50-ohm feed system, right, includes a 4:1 balun and a quarter-wave *Q* section.

Connections and exposed ends of the coax were covered with RTV silicone rubber, sold in stores as bathtub caulk, for water-proofing. Finally, the entire antenna was painted, to help resist corrosion caused by salt spread on New England roads in winter.

Eggbeaters of this type have been built and used by WA2KZV, WA2PTS, and K1DRB, all with very encouraging results. In comparisons with a halo and a reference dipole on two occasions, on different paths, the Eggbeater was superior to the halo, and equal to the dipole when the latter was oriented for maximum signal. In mobile communication, it shows less flutter than the halo.

All three Eggbeaters show low SWR; less than 1.5:1 over the range of 144 to 146 MHz. The frequency response is broad, which is characteristic of full-wave loops. In addition to its excellent performance in mobile work, the Eggbeater should be a good choice for fixed-station service, where uncritical operation and omnidirectional pattern are desired, with horizontal polarization.

For inspiration and help in making measurements, we would like to thank WA1MFY, several operators at W1MX, and K9AQP/1. And last, but not least, Lew Collins, K4GGI/1 deserves credit for the name, "Eggbeater," which reduced the time required for on-the-air explanations of the antenna from a half hour to a half minute.

Some Observations with the Eggbeater

Never one to pass up a new or different idea for vhf mobile antennas, the undersigned built and tested several versions of the Eggbeater. Our loops were 1/8-inch hard aluminum wire, which just happened to come in coils about 2 feet in diameter. This expanded easily to the 27-inch diameter required, and maintained its shape well. A piece of fiber glass rod left over from another project was pressed into service as part of the vertical support. This kept metal out of the core of the loops, and simplified assembly. Half-inch aluminum fitted into the bottom end made up the rest of the support, and also was tried as part of a 1:1 balun, as explained later.

About Lengths

Loops 81 1/2 inches in length, recommended by the authors, worked well, but the impedance was high and the SWR was 2:1 or more, showing the lowest value at the high end of the band. This suggested too-short elements, so 83 inches was tried. The SWR was lower, but still was dropping at the high end — so we started digging for information on full-wave loops.

Perhaps the best available is given by Lindsay,[2] in a classic article on quads. He cites work done in Japan years ago, substantiated in much amateur work with quads and other full-wave loops, which gives the length in feet as

$$L = \frac{1005}{Freq.(MHz)}$$

[2]Lindsay, "Quads and Yagis," May, 1968, *QST*, Fig. 11-6.

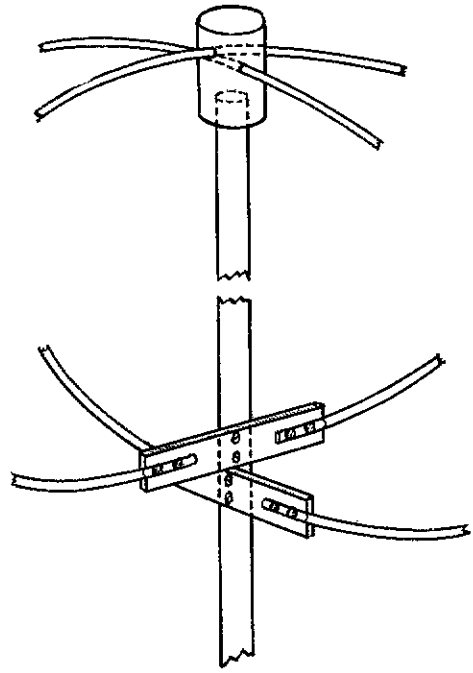


Fig. 2 — Principal details of the support for the mobile antenna. The top insulator and the blocks for fastening the element ends are of polystyrene. The main support is aluminum tubing.

This is for hf loops. In vhf service the ratio of loop circumference to conductor diameter becomes important. First we convert the formula to inches, using

$$L = \frac{12060}{Freq.(MHz)}$$

Then we multiply by the "shape factor," which for our dimensions is 1.04

$$L\ (inches) = \frac{12060}{145\ (MHz)} \times 1.04 = 86.5$$

Accordingly, we made two 86 1/2-inch loops, threading the ends so that 8-32 nuts could be used on each to hold lugs for connecting the feed system.

As suggested, we dipped the coaxial phasing, matching and balancing sections. The authors' recommendations of 13 1/2 and 27 inches are correct for coax of the propagation factor that RG-58/U is supposed to have, but it is well to check for sure. Two samples of RG-58/U from different manufacturers had to be cut to between 12 and 12 1/2 inches for the quarter-wave sections, and 24 to 25 inches for the balun, for resonance at 145 MHz.

First, a single 86 1/2-inch loop was fed through a 4:1 balun and 50-ohm line. It showed an SWR of 1.7+ across the band, indicating an impedance of about 115 ohms. This is close to the value for a full-wave loop given by Kraus.[3] Two loops at right angles, phased and fed as in Fig. 1, showed 1.5:1 across the band, as reported by the authors.

The very broad frequency response of the Eggbeater is reminiscent of experience years ago with the first Big Wheels. Both antennas are so broad that anyone who has worked with parasitic arrays extensively is almost convinced that these full-wave systems can't be working. As far as SWR checks are concerned, they might well be mistaken for dummy loads! In such antennas, small changes in element length make little observable difference in results.

[3]Kraus, *Antennas*, Fig. 6-12. McGraw-Hill, 1950.

Baluns

Our antennas were fed at first with the system shown in Fig. 1. Later the 1:1 balun idea was tried. The metal support, the top of which is just below the feedpoint of the loops, was used as one side of the balun. The outer sheath of the RG-58/U was cut at 19 inches down from the loops. A short length of No. 20 wire was wrapped around the outer conductor, and soldered in place. This was then soldered to a lug bolted to the aluminum support. Checks for rf on the outside of the coax showed that this balun was doing its job reasonably well.

The effective length of such a quarter-wave balun depends on how it is made. If the coax is taped to the metal support the length will have to be determined by experiment. If the coax and the support are separated, and held at a constant spacing with a minimum of insulation between them, the balun will be approximately a full quarter-wavelength. In view of the variables involved in the 1:1 balun, the authors' method (Fig. 1) seems the better choice.

Another and neater 1:1 balun, not tried in this instance but used with turnstiles in the past, involves running the coax inside a metal support. A self-tapping screw with a sharp point can be run through the support, at a point a quarter-wavelength down from the top, far enough to puncture the coax insulation and contact the braided outer conductor.

None of these baluns is particularly critical, nor does use or nonuse of them make a large difference in the performance of most mobile antennas. Too many fudge factors enter into typical amateur mobile installations to make the effect of such fine points very apparent. Especially with an antenna as uncritical as these full-wave loops, and with the short lines used in mobile setups, almost anything goes. – *W1HDQ*

Strays

After a recent showing of "Ham's Wide World" to members of the Theodore Roosevelt ARC, club sponsor and science department chairman, W8MPD, arranged to show the film to some of the English and communications classes. One teacher then made the assignment to his students to write an essay about the film. Here are some excerpts from their papers: If I had to rate this movie, 1 being bad, and 10 being good, I would rate it 2. First of all because it had no relevance to our English class and secondly, because I have no interest in ham radio. What's wrong with the telephone? . . . One of the faults of the movie was that there was too much beep-beep-beeping. This took away from watching the movie and was distracting. . . . Although I would not want to spend every Saturday with a ham set as some loyal hams do, this is definitely a hobby to look into. . . . It was a great movie with a lot of fast-moving speakers. The only bad part was that all of the actors in the movie were real hams. . . . Anyone who didn't know very much about hams certainly would after watching it. . . . When it first started, I didn't know what they were talking about. But by the end of the film I did. . . . There were two parts that I really enjoyed, they were when the young boys went out on a Saturday morning and tried to reach other people. The other part was when they were explaining about the cards. . . . It is good that schools have a radio club because then the students will be aware of the usefulness and the fun they can have using ham radio.

After many years of enjoying the cool breezes of Wisconsin W9PTJ transfered to Arizona. The day he reached into the mail box and found his new license the temperature was 118 degrees. The new call? You guessed it – W7HOT!

Strays

Talk about comedy of errors! Rex, W5QQQ, operated W7RM on phone in the 1970 Sweepstakes. Rex thought that Rush, W7RM, would send in the entry, but Rush thought that Rex had undertaken that job. Upshot, no W7RM phone entry! Meanwhile, back at the ranch, Rex's station was "loaned" to Chip, K7VPF/7, for the SS. Chip walked away with No. 1 score overall. *If* that W7RM entry had been received in time, there would have been an almost dead tie for first place. Now there's a moral to this, if we could only figure it out!

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Engineers interested in accurate frequency and/or time measurement will be glad to know there is a secondary standard of atomic time available in the Eastern U.S. Clear-channel radio station WSM in Nashville, which operates on 650 kHz with a carrier power of 50 kW, is now holding its frequency to an accuracy of better than 1×10^{-10} (SAT), according to station engineer L. H. Montgomery. The accuracy is traceable to the National Bureau of Standards by counting down the WSM 650 kHz carrier frequency to 60 kHz. The phase of the WSM 60 kHz is compared directly with the Bureau's station WWVB and recorded.

The fact that WWVB's signal loses some of its accuracy in transmission from Ft. Collins to Nashville because of changes in path length makes it necessary to average the phase information over several hours to restore WWVB's original accuracy. By making use of this information, it is possible to hold the WSM 60 kHz to within a few degrees of the averaged WWVB signal.

As a service to the general public, a time beep has recently been instituted on the WSM program. This is a 0.4 second burst of 1 kHz tone beginning on the hour and every 15 minutes thereafter. This is done by further counting down from the 60 kHz to 1 kHz for the tone, which gives it the same accuracy as the WSM carrier. Further counting to seconds and minutes brings us down to a 15-minute period with an accuracy of $\frac{1}{10,000}$ second.

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

As youngsters, Bill, 1AEH, and Henry, 1ETE, worked each other regularly during the Ford spark coil days of 1915-16. At that time 1AEH lived in Charlestown, Mass. and 1ETE lived 2 1/2 miles away in Chelsea.

Recently, after an interval of 55 years, they had a reunion in Miami Beach. Bill (right), founder of Hallicrafters, is now W4AK and lives in Miami Beach while Henry, now W4HO, resides nearby in North Miami Beach.

Last July at the West Virginia State Convention, Bryce Petersen, WA8KER, skillfully demonstrated his several radio-controlled models, much to the delight of those in attendance. The very next month Bryce flew a model seaplane 26.5 miles along the Kanawha River and copped the world's record — a performance just certified by the Federation Aeronautique International. Here (kneeling) FCCer Bill Grenfell, W4GF, Chuck Donley, K8BCF, convention chairman, and WA8KER show off the demonstration gear.

Technical Correspondence

CRYSTAL FILTERS FOR FM RECEIVERS

Technical Editor, *QST*:

In reference to *QST*'s "Receiving FM,"[1] according to *Reference Data for Radio Engineers* (International Telephone and Telegraph Corp.), the rule-of-thumb for determination of bandwidth requirements for an fm receiver is:

$$2(\Delta F + F_{A\,max})$$

where ΔF is one half of the total frequency deviation, and $F_{A\,max}$ is the maximum audio frequency (3 kHz for communications purposes). Thus, for narrow-band fm, the bandwidth equals 2(5 + 3) or 16 kHz. We usually recommend the KVG XF107B crystal filter (bandwidth is 16 kHz at −6-dB points), although as you say, the XF9E (12 kHz at −6 dB) or XF107A (14 kHz at −6 dB) will perform quite satisfactorily. For ΔF = 15 kHz, the bandwidth equals 2(15 + 3) or 36 kHz, and we recommend filter type XF107D (38 kHz at −6 dB). Of course, XF107C will do fine, also.

It is interesting to note that the original (German) specifications for the XF107 series show *minimum* bandwidths at the −3-dB points and the equivalent of *maximum* bandwidths at the −70- and −90-dB levels. This brings me to the next point: the importance of the shape factor of a crystal filter. In my opinion one of the more important characteristics, aside from the bandwidth at the −3- or −6-dB points, is the shape factor.[2] The manner in which KVG specifies the XF107 series would seem to support this view. Stopband (ultimate rejection) values are not extremely important to the average ham beyond the −50- to −70-dB level. Insertion loss and input-output impedance values are, of course, not quality factors of the filter, but are important parameters for circuit design. – *Henry Ingwersen, Spectrum International, Box 87, Topsfield, MA 01983.*

COMPUTING TOROIDAL INDUCTANCE WITH LIGHTNING CALCULATOR

Technical Editor, *QST*:

The older ARRL *Lightning Calculator*, or the newer *L/C/F Calculator, Type A*, will give a close approximation to the number of turns needed on a given toroid core for a required value of inductance.

First, to get a basis for the calculation, put a trial winding on the core and measure the resulting inductance. For an example, put 20 turns on the core, connect a 100-pF capacitor across it, measure the resonant frequency with a dip oscillator, and read the inductance from the *Calculator*. Using as an example the information published by Amidon on their T-94-6 core (the yellow sheet saying, "We hope this chart will be of value in the selection of toroid cores for your application"), a winding of 20 turns is stated to produce an inductance of 3 μH. If this was done experimentally, when paralleled by 100 pF of capacitance, it would resonate at 9120 kHz, from which information the *Calculator* would give the answer, 3 μH.

Suppose an inductor of 8.7 μH is desired. On the *Calculator*, set the known value of inductance (3 μH) opposite the number of turns in the trial winding (20) on the NUMBER OF TURNS PER INCH scale. Then, opposite the desired value of inductance (8.7 μH), read the number of turns needed, 34. The Amidon data sheet says 35 turns; the *Calculator* says 34.[3] Amidon also says 25 turns = 4.7 μH; the *Calculator* agrees exactly! Thus, from the data sheet, or at worst case, the measurement of an actual trial winding, the *Calculator* will give a quite useful answer. – *K3AH, Silver Spring, MD.*

CALCULATING COIL DIMENSIONS BY FORMULA

Technical Editor, *QST*:

Coil stock is available commercially in various diameters and numbers of turns per inch, and is quite popular for use in homemade rigs. The needed inductance may be found from the formula:

$$LC = \frac{25,330}{f^2}$$

where L = inductance in μH, C = capacitance in pF, and f = frequency in MHz. The coil demensions are given by:

$$L = \frac{a^2n^2}{9a + 10b}$$

where L = inductance in μH, a = coil radius in inches, b = coil length in inches, and n = number of turns.[4] The only catch is that with the available coil stock, the number of turns per inch is fixed and we can't assign a value to the length, b, until we know the number of turns, n, which we're trying to determine anyway. To solve this, let t be the number of turns per inch. Then t times the length, b, will give the number of turns, n. By substituting this information into the coil equation and rearranging, one gets the quadratic formula:

$$n = \frac{10L \pm \sqrt{100L^2 + 36a^3t^2L}}{2a^2t}$$

Thus, for a given piece of coil stock of a particular diameter and number of turns per inch, the number of turns for a certain inductance, L, can be calculated.

For example, let's say a coil of 20 μH was desired and coil stock 1 inch in diameter and 32 turns per inch was available. Then, a = 0.5, L = 20, and t = 32. Then

$$n = \frac{10 \times 20 \pm \sqrt{(100 \times 400) + (36 \times 0.125 \times 1024 \times 20}}{2 \times 0.25 \times 32}$$

$$= \frac{200 \pm \sqrt{40,000 + 92,160}}{16} = \frac{200 \pm 363.5}{16}$$

$$n = \frac{563.5}{16} = 35 \text{ turns.}^5$$

Then $b = n/t$ = 35/32 = 1.1 inches. – *Jerry W. Ellis, Asst. Professor of Chemistry, Eastern Illinois University, Charleston, IL 61920.*

[1]Blakeslee, "Receiving FM," in four parts, *QST*, January through April, 1971.

[2]Most designers also agree that phase distortion should be avoided in the i-f filter system, to preserve the phase relationships of the original modulating signal. Linear-phase fm i-f filters are now becoming available. – *Editor.*

[3]The author is using the older circular *Lightning Calculator, Type A*, which is no longer available. The new slide-rule version, *Single-Layer Coil Winding and L/C/F Calculator, Type A*, available from ARRL for $2.00 ppd., gives an answer of 35 and a fraction turns for this example, in closer agreement with the Amidon data sheet. – *Editor.*

[4]These two formulas are presented in the "Electrical Laws and Circuits" chapter of *The Radio Amateur's Handbook*, any recent edition. – *Editor.*

[5]All of which can be done on the *ARRL Type A Calculator* in 20 seconds flat. See footnote 3. – *Editor.*

SIMPLE THUNDERSTORM DIRECTION FINDER

Technical Editor, *QST*:

Inspired by WØVTP's *QST* article on the location of electrical storms,[6] I attempted to devise an effective locator scheme using already-available equipment. The notion of using the inherent directional capabilities of ordinary battery-portable transistor a-m radios plus the directional capabilities of one's hearing led me to the following scheme, which is simple and effective.

Two similar, preferably identical, battery-powered transistor radios are tuned to a station at the low-frequency end of the a-m band and adjusted for equal volume. This adjustment can be carried out by tuning both receivers to the same station. With the receivers *parallel* to each other and at some convenient equal distance from each side of one's head, the volume controls are adjusted so that the station seems to emanate from the center of one's head. Next, each receiver is tuned off the station to some adjacent clear channel. Finally, one receiver is turned at right angles to the other. Here, it is convenient to have one receiver lined up on an N-S line and the other on an E-W line. The storm direction finder is now ready for action.

One receiver will be sensitive to lightning discharges on an N-S line, and the other to discharges on an E-W line. Thus, a storm on a N-S line will be stronger in one ear, and a storm on an E-W line stronger in the other ear. Storms along intermediate lines of direction will be of equal strength in each ear. Receiver orientation for high and low sensitivity can be ascertained by making observations on an a-m station of known location. The orientation for high sensitivity is normally quite broad; the orientation for low sensitivity usually has a very sharp null.

The well-known ability of a person to sense direction by sound amplitude is accordingly put to good use in sensing storm direction. This ability can be enhanced by using a stereo headset with one earphone connected to each receiver. Use of headphones seems to give a keener sense of direction, probably because room echoes are eliminated.

The 180-degree ambiguity in the signal direction could be eliminated by the use of sense antennas as is commonly done with radio direction finders. This expedient was not tried in my location because the general direction of approaching storms is usually known.

Results with this simple thunderstorm direction finder have been very interesting. For example, early in the summer of 1969 I followed the southward motion of a strong storm front that stretched from Massachusetts to the western end of the Pennsylvania-New York border. Active storm cells could be detected clearly at different locations along the front. Aside from their locations, the various cells were characterized by their discharge intensity and repetitiveness. Of particular interest was the occasional observation that a discharge at one end of the storm front would apparently trigger a discharge that swept across the whole storm front. The location and motion of this storm front was verified by newspaper and TV weather reports.

I endorse WØVTP's enthusiasm for storm locators and refer the reader to his article for further details on thunderstorm characteristics. *E. O. Johnson, W2ZWA, 231 Snowden Ln., Princeton, NJ 08540.*

[6]Leary, "An Electronic Storm Finder," *QST*, June, 1964.

MORE ON COLOR-TELEVISION SUBCARRIER FREQUENCY

Technical Editor, *QST*:

The letter in February *QST* regarding the use of the television color subcarrier frequency as a frequency standard[7] was of interest. There is no question about the accuracy of this frequency, especially on network-originated programs.

There is, however, one error in the editorial footnote. The correct vertical scanning rate is 59.94 Hz, and not 55.73 Hz, as printed. This is obtained by multiplying 3.579545 by 2/455 which gives the horizontal scanning frequency, and again multiplying the latter by 2/525. — *Harold Dorschug, W1AST, Director of Engr. Research & Development, WTIC, Hartford, CT 06115.*

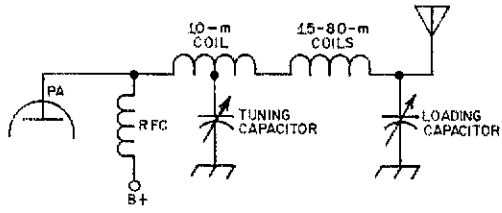


Fig. 1 — Tuning capacitor connected to tap of pi-network coil.

PI-NETWORK TUNING CIRCUITS

Technical Editor, *QST*:

With reference to the article on grounded-grid linear amplifiers,[8] there may be a comment of interest to *QST* readers. The authors correctly describe the problem of capacitance ratio encountered in the pi-network of the tuning circuit. This problem applies especially to the tuning capacitor. In addition to the three ways presented to design around this problem, a fourth can be added. See Fig. 1.

By connecting the tuning capacitor to a tap of the 10-meter coil, the reactance of this capacitor is transformed up by the square of the winding ratio. If 10-meter operation calls for a tuning capacitor of 20 pF, four times this value must be present if the tap is at half of the total windings. That is to say, for 10 meters the effective capacitance of the tuning capacitor is reduced by a factor of four — and also the minimum capacitance, thus avoiding some problems.

When switching additional series inductances for the lower bands, this transformation still holds, but as the ratio of tapped-to-total windings approaches unity on 75 meters, this transformation becomes less noticeable with lower frequencies. This is exactly what we want! I use this method with my linear amplifier and formerly used it with several a-m amplifiers with good success. It gives a very reasonable tuning characteristic for the plate capacitor.

Congratulations to both authors for their very fine article, and my compliments for their solution. — *R. Fischer, DL6WD, Kristall-Verarbeitung Neckarbischofsheim Gmbh., 6924 Neckarbischofsheim, Postf. 7, Federal Republic of Germany.*

[7]Huntley, "TV Color-Burst Signal for Primary Frequency Reference," Technical Correspondence, *QST*, February, 1971.

[8]Blakeslee and Smith, "Some Notes on the Design and Construction of Grounded-Grid Linear Amplifiers," *QST*, December, 1970.

Hints and Kinks For the Experimenter

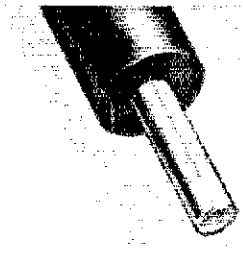
LOW-COST WIRE FOR ANTENNAS AND GROUND RADIALS

Recently, while scanning the pages of a non-radio "wish book," the *Sears* catalog, the writer spotted what seemed to be a 1st-class bargain in antenna wire – neoprene-jacketed No. 10 solid aluminum wire at 2 cents a foot! Not bad, eh? And this style of conductor is also available in sizes 8, 6, and 4. The prices, respectively, for the latter are 3 3/4 cents, 4 1/2 cents, and 5 3/4 cents per foot.

Since neoprene is resistant to acid, oil, and abrasion, it makes an ideal insulating and protective agent for buried radials in amateur antenna systems. Similarly, the neoprene protects the wire from corrosion and weathering when the conductor is used for the radiating portion of an antenna. The insulating jacket tightly encircles the aluminum wire. It is unlikely that moisture could seep in between the sheath and the wire to cause deterioration of the aluminum.

A 150-foot length of the No. 10 wire was tried as an end-fed random-length antenna. The job of erection was much simpler than if copper wire of comparable gauge had been used. The lighter aluminum was easy to draw taut, single-handed. No doubt this material would be suitable for use in any wire-type antenna system where minimum cost, lightness of weight, and long life are requisites. The neoprene jacket contributes to the strength of the antenna too.

Sears lists this wire in its catalog section on electrical supplies. The conductor is specified primarily as "weatherproof outdoor cable" suitable for overhead wiring on farms. – *W1CER.*

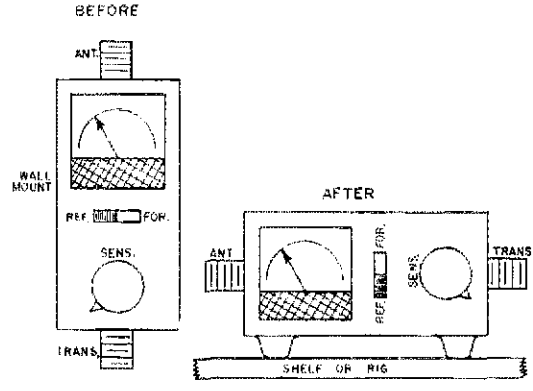


CONNECTOR ADAPTER

Amateurs inconvenienced by type-N connectors on the rear of some commercially-made gear can solve the problem by purchasing an Amphenol 4400 adapter (UG-146/U). It is listed in catalogs under "between-series adapters." The price is under $4. – *Fred A. Hatfield, W8GUZ*

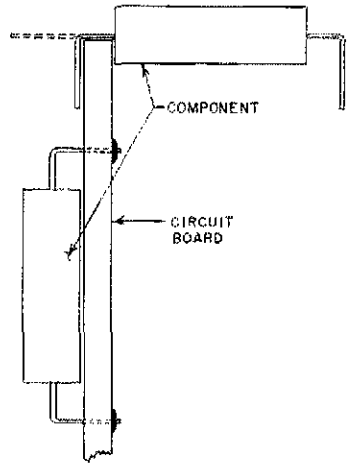
SWR-INDICATOR MOUNTING

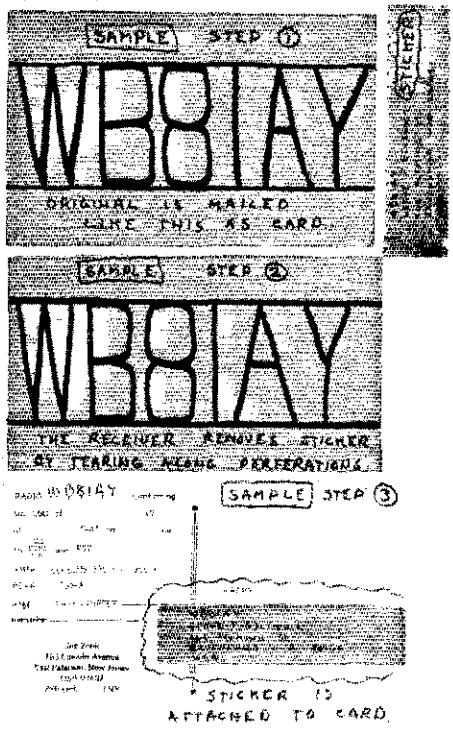
There are many pocket-size SWR meters on the market which have a hole in the back for wall mounting. These devices are awkward to use if they are not mounted this way. However, if the meter case is rotated 90 degrees, and four rubber feet are attached to one side, the unit may be set on the shelf horizontally. – *John Bipes, KØYQX*



MOUNTING COMPONENTS ON PRINTED-CIRCUIT BOARDS

The spacing between holes on many commercially-made boards is approximately the length of the component plus twice the thickness of the board. When placing components on these boards, the edge of the board can be used as a form for bending the leads. I have found that this rule applies to about 8 out of 10 boards. – *David McClafferty, VE1ADH*





ADDRESS LABEL FOR QSL CARDS

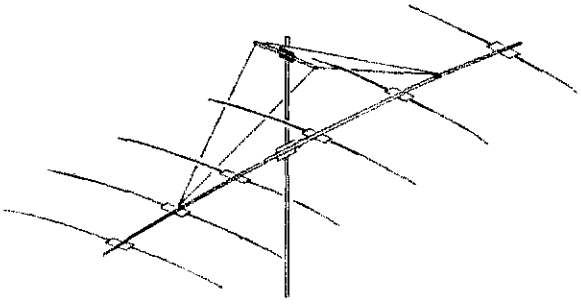
The filling out of a QSL card takes less than a minute, assuming one has a readable logbook and other necessary information. When you multiply one minute by the number of QSOs in a DX Contest or Sweepstakes, this simple task becomes a real chore. If you are a foreign amateur with an exotic prefix, you deserve some kind of help from your fellow amateur.

My solution to this problem is to send a QSL which has a return address affixed to the card. The card shown in the photograph is a conventional QSL, except that an end portion of the card, divided by perforations, is adhesive backed and contains the proper address. Upon receipt of the card, an amateur removes the address label and uses it on his own QSL card. The only additional work is filling in the normal confirmation information, including call sign.

At present, a commercially-made QSL of this type does not exist; however, it is hoped that a forward-thinking printer will adopt this technique. – *Steve P. Gecewicz, WB8IAY*

T-BRACE FOR LARGE ARRAYS

The arrangement shown in the sketch works very well for reducing lateral boom movement. The purpose of the 4-wire brace is to allow the use of a small diameter boom on a very long Yagi. In one of our models, a 6-element 20-meter monobander, the 67-foot boom is only 2 1/2 inches in diameter. The entire weight of the boom and elements tends to hold the boom in place. In order for wind to move



the boom laterally, it must move it in an upward direction. With our 67-foot boom, an 8-foot cross-bar, pinned to the mast 10 feet above the antenna, works quite well. The dimensions could be reduced a bit for smaller arrays.

Not only does the T-brace reduce the amount of lateral movement in the boom, it allows the use of a small boom diameter which reduces the wind loading. – *Alex Dolgosh, K8EUR, Antenna Specialists Co.*

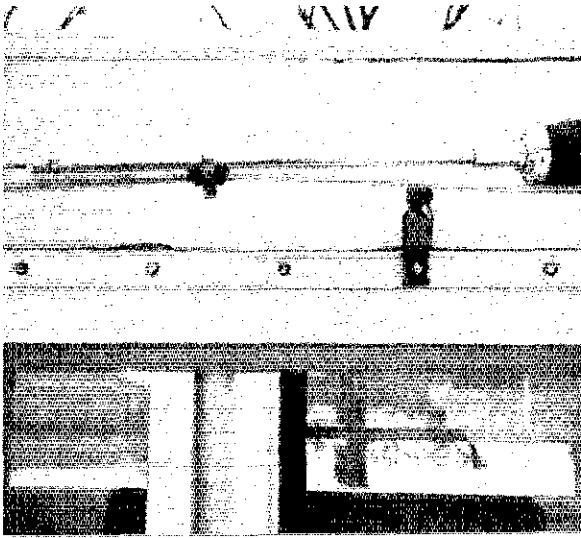
DUST COVER FOR SMALL PADDLES

A handy storage box and carrier for the Brown Bros. paddle is a card file box. And it's cheap, too! – *Chuck Adams, K5FJZ*

ANTENNA ADJUSTMENTS FROM THE DRIVER'S SEAT

Push rods can be used to adjust the movable end of a loaded mobile antenna. Most hobby stores carry various lengths (up to 4 feet). In my case, I joined three of these push rods together with fiber sleeves and epoxy. The inner rods were connected with 3/4-inch long threaded rod.

The picture shows how I attached the end of the rod to the top of the mobile antenna. The push rod works almost as freely with the mast folded over as it does in the upright position. With a travel of 3 inches, my antenna covers 100 kHz on 80 meters. – *Allen Moore, WA8COT*



Recent Equipment

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

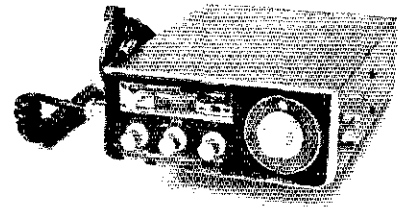
The Lafayette HA-750 6-Meter Transceiver

THE HA-750 50-MHz transceiver is a good example of the ingenious way in which Japanese designers use the same or basically-similar components to do many different jobs. You will find several HAs in the Lafayette catalog, which may be multichannel CB rigs, commercial fm monitor receivers or amateur vhf transceivers. Even the interiors may not appear too different from one application to the next, though what happens inside these look-alike boxes may be very different, indeed.

This one is a solid-state transceiver for the lower half of the 50-MHz band, with tunable oscillators for transmitting and receiving frequency control, operating from a single vernier dial. A fine-tuning control on the receiver oscillator permits covering plus or minus about 200 kHz from the transmitting frequency without disturbing the latter, when the transmitting VFO is in use. The transmitter is also capable of operating with crystal control, independent of the variable oscillators. Receiver audio amplification and transmitter modulation are performed by one audio system. (Yes, potential occupants of the 50-MHz band, there is still considerable a-m operation here, and we suspect that it will continue to be fairly popular for a long time to come.) The audio amplifier also serves as a PA system, when an external speaker is plugged into a jack provided for that purpose, and the function switch is placed in the PA position.

Stages and Functions

Our block diagram, Fig. 1, is somewhat simpler than the one given in the HA-750 instruction manual, in order to show the principal circuit functions clearly. The upper half shows the receiver and audio stages, and the lower portion the transmitter. Signals enter the rf amplifier, Q1, by way of a tuned circuit, L16 C1, and protective diodes CR1 and CR2. After amplification they pass to the mixer, Q2, where they beat with local oscillator energy in the frequency range of 48.35 to 50.35 MHz, to yield an intermediate frequency of 1.635 MHz. The local oscillator, Q3, is tuned by one section of a three-gang capacitor, C3B, or by the fine-tuning capacitor, C4. The collector circuit of Q1 is also tuned, by C3C of the 3-gang unit.

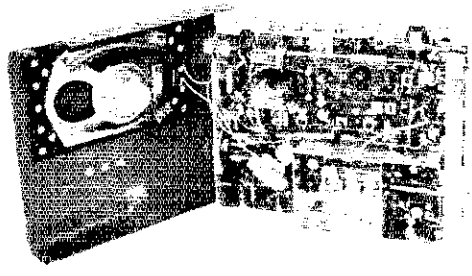


Next come two i-f amplifiers, Q4 and Q5, followed by diodes CR4, CR5, and CR6, which are detector, automatic noise limiter and S-meter rectifier, respectively. The balance of the receiving lineup is the audio amplifier series, Q7, Q8 and the output pushpull stage, Q9 and Q10.

The transmitter VFO, Q12, tunes 8.33 to 8.66 MHz, by means of C3A, which with the other two sections already mentioned comprise the variable capacitor operated by the vernier dial. A tripler, Q13, and a doubler, Q14, multiply the frequency to some point in the lower 2 MHz of the 50-MHz band. The crystal oscillator, Q11, uses third-overtone crystals between 50 and 52 MHz. The function switch selects the output of Q14 or Q11, to drive a three-stage 50-MHz amplifier, Q15, Q16, and Q17. Modulated dc voltage is fed to the collectors of all three amplifier transistors. A small panel meter, M1, is made to read relative rf power on transmitting or signal strength on receiving. The meter also reads when the spotting switch is used, and the transmitter frequency is tuned in on the receiver. All send-receive functions are handled by a relay, actuated by the PTT switch on the microphone.

Installation and Use

Looking at the front view of the transceiver, the vernier dial is at the right. The three small knobs are for receiver fine tuning (C4) lower center of the panel; VFO-Xtal-PA switch, center; and volume control and on-off switch, left. The bright insert in the upper left portion has the antenna-tuning capacitor (C1), the meter, and the spotting



Interior of the HA-750 transceiver. 3-section variable capacitor, bottom tunes VFO, receiver oscillator and rf amplifier collector circuit. Receiver circuits at the top.

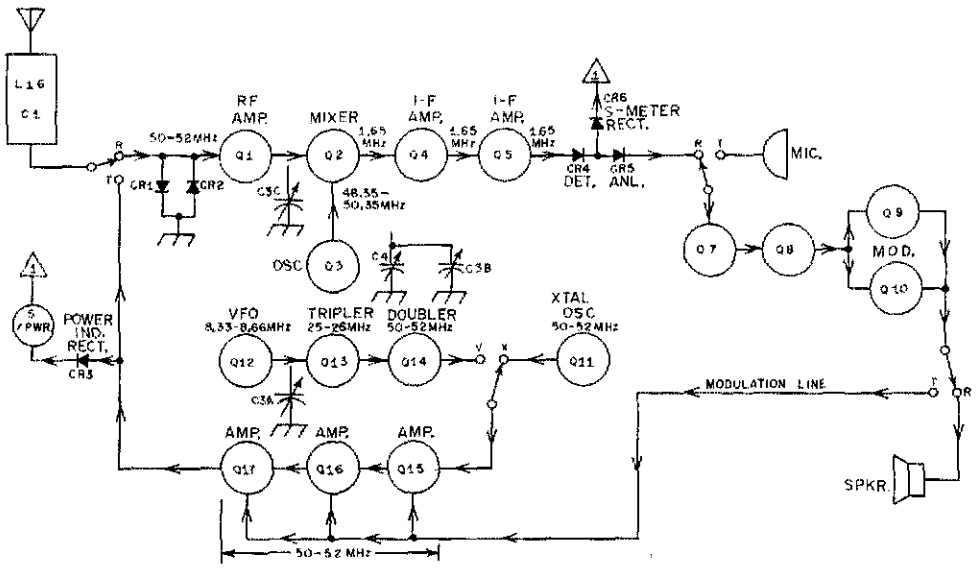


Fig. 1 — Simplified block diagram of the HA-750 50-MHz transceiver.

switch, left to right in that order. The capacitor can be peaked on either the transmitter output or the received signal level. A separate peaking control for the transmitter output, C2, is reached with a screwdriver, through a hole in the rear wall of the chassis. The main dial has a small illuminated spot, but in common with many small Japanese dials, this one is almost unreadable in daylight, and completely so at night. This writer strongly recommends crystal control of the transmitter for any mobile operation, as you will never know where you are in frequency, from this dial, when the VFO is in use.

With its low profile and small size, the HA-750 is easily installed under the dash of most cars, with the mounting bracket provided. Large knurled knobs permit tightening the unit firmly in any position of slope, and the bracket can be used for holding the transceiver above a mounting surface, if desired. The two-wire fused battery cable is flexible enough to permit running it almost anywhere, to clip onto any source of car battery voltage. Be sure that the red lead is connected to the positive side of the system. (Negative-ground systems only.) A battery pack for portable use is available as an extra-cost option, as is an ac supply equipped with a battery charger. The current drain is high for inexpensive D cells, but is well within the capabilities of rechargeable cells of the alkaline or nickel-cadmium variety.

The receiver has a threshold characteristic very much like its predecessors for 6 and 2, the HA-650 (*QST*, March, 1966) and HA-144 (June, 1967). This can be blessing or curse, depending on the operator's approach to vhf work. The receiver makes hardly a sound, until you tune across a signal. There is no squelch, as such, but the effect is that of a high-threshold squelch that cannot be turned off. One unpleasant result is that weak signals tend to pop in and out, with the signal variation that is encountered in vhf mobile reception. In a strange location, where you may not know where and when to expect activity, you tend to get the feeling that nobody is on the band within your receiving range. The weaker signals are not heard at all, unless the antenna is aimed in the right direction. Of course, with the low power of the transmitter (2 to 5 watts output, depending on battery voltage) you're not going to work the weak ones very often, but it is reassuring to be able to *hear* them.

On the credit side, noise limiter action is quite good, and signals of readable level come through your own and others' ignition noise very well. The transmitter and receiver oscillators have separate Zener-diode-and-transistor regulators for their supply voltages, and stability is good over the range of battery voltage normally encountered in mobile operation. Operators in cold climates will be glad to learn that the transceiver tested delivered normal output, when turned on cold at a car-

(Continued on page 55)

The Lafayette HA-750 6-Meter Transceiver

Height: 2 3/8 inches.
Width: 6 1/4 inches.
Depth: 8 inches.
Weight: 4 1/2 pounds.
Power requirement: 11.5 to 14.5 volts, dc; 1.2A, max., at 12.6 volts.
Price Class: $120. Battery pack (less batteries) $20. AC supply, with battery charger, $20.
Distributor: Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, NY 11791.

Polydimensional CW

The Ultimate Solution to CW QRM

BY R. W. JOHNSON,* W6MUR

WHEN YOU think about the matter for a while, you realize that identification of a signal has a lot in common with identifying anything else — say, a person. In such case, the identification becomes more complete the more facts you know: hair (length, location, and color), eyes, height, weight, build, teeth, scars, ears, nose, sex (these days somewhat indeterminate), and so on — through maybe a couple of dozen characteristics and distinguishing features. Then, of course, there are the positive things like fingerprints and voiceprints.

In identifying a signal, you are also aided by its distinguishing characteristics. This fact, of course, has been known since amateur radio first started. There was something distinctive about the rotary spark gap, or the MOPA, or resonant filters, or three-phase unfiltered dc. But we've tended to ignore that fact all these years, concentrating instead on "cleaning up" our signals to the point where now the key clicks, tone — and even the electronic-key fist — all sound almost exactly the same for thousands of hams. It's as though we were all dressed alike, drove the same model cars at the same speed in the same way, lived in identical row-houses, worked the same hours, and ate the same food. Uniformity, regimentation, mass obedience, sheer monotony. Homoousianism, that's what we have!

The Problem

In today's cw pile-ups you can hardly sort out the DX. He never signs his call, just yours (once) and the "579K" with his electronic key and T9X signal. It's hours, sometimes, before you know whom you've worked, and even then it could have been some wag imposter doing the same thing just to clear out the pile.

But now all this can change. A solution to the QRM problem has been buried for about 20 years in the classified literature, and only recently came to light due to an oversight in the original classification permitting downgrading.[1] Now the story can be told, and it is important that it be told because it will open up a vast new spectrum for amateur radio. We won't have to worry any more about international conferences, or intruding commercials, or even man-made noise.

The Solution

This little-known technique is called *polydimensional cw* — the government named it — and it involves the simultaneous radiation of more than one signal on a given frequency band. These are *not* spurious signals; they are deliberate and intentional, so FCC Rule 97.73 doesn't apply. Also, Rule 97.67 that specifies "1 kilowatt to *the* plate circuit of *the* final amplifier stage" doesn't say anything about the plate circuit of *another* final amplifier stage, nor does it mention the collector circuit if we happen to find a good high-power rf transistor lying around. So it's all perfectly legal for ham use.

In its most elementary form, the polydimensional cw system consists of but two transmitters, each radiating the same power into its own antenna, each independently variable in frequency within a given band, and both keyed simultaneously. The keying characteristics of each transmitter are, for this elementary system, identical. If you have an extra class license, one frequency might be chosen as 14005, and the other 14090.

The receiving setup in the polydimensional system is the tricky part. It is not an ordinary receiver, but is actually two receivers in the same box. You can have two tuning dials, one for frequency A and one for frequency B. The two receivers are gated together so that a signal must be *simultaneously* present in both outputs in order to be heard. Fig. 1 shows a block diagram, in which the autocorrelator operates as an AND gate that permits signal transmission to the output circuits only when the signal is simultaneously present on both frequencies.

You can see that, automatically, we now have a two-dimensional band, in which the location of a signal is determined by its position on a plane, one dimension being the frequency of signal A and the other dimension being the frequency of signal B, as shown in Fig. 2. Instead of only 100 places for a signal to be received in a given chunk of spectrum, now there are 100 x 100 or 10,000 places for that signal to be received! Obviously, QRM on only one signal will not affect our gated output. It would have to be simultaneously present dot for dot, dash for dash, on the other signal as well. Mathematically, it can be shown that the probability of this

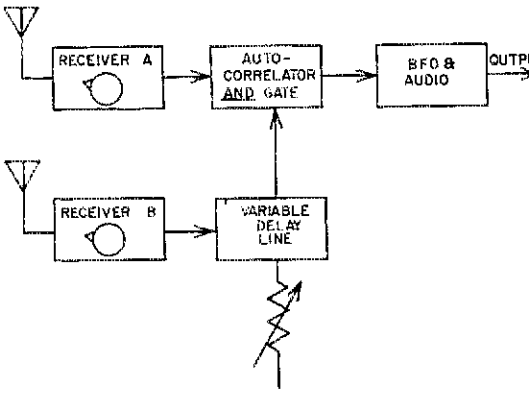


Fig. 1 — Block Diagram of the simple two-dimensional receiver.

*9372 Hill View Rd., Anaheim, CA 92804.

[1]See Central Security Agency Report GUS-14020-TSEC (Title Classified), April 1, 1950. (Downgraded at 20-year intervals.)

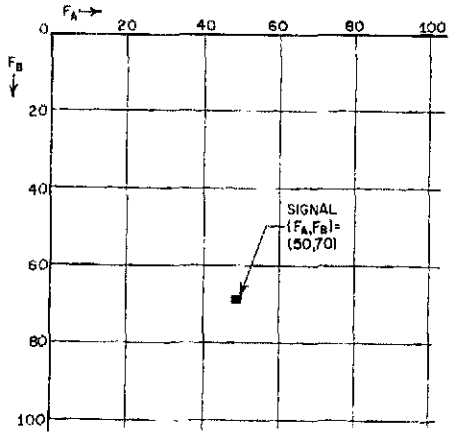


Fig. 2 — Coordinate plane of two-dimensional band.

occurring is infinitesimal. Space does not permit presenting this analysis, but the reader is referred to the aforementioned government report.

The Third and Fourth Dimensions

The above describes only a simple, two-dimensional system. We can now add other dimensions, and our position plane grows into a cube, and then into the fourth and higher dimensions. For example, we can deliberately add a controlled chirp to the signal, and design the receiver so that it will respond to a specified chirp only. A chirp may be described by the rate of frequency shift in the first 10 milliseconds of a dot or dash, the amount of the frequency shift, and the direction (up or down). Transmitted signal A can be set to chirp up, and signal B set for down-chirp. Then only the receiver that has frequency A set for up-chirp and B set for down-chirp, and also tunes exactly the two frequencies, will respond.

We can also add some other distinguishing characteristics. Signal A can be pure T9X, and signal B can have a slight modulation, say 5% at some frequency between 200 and 400 Hz. The receiver design can include provisions for recognizing only those signals with a prescribed modulation frequency and percentage. The possibilities are endless. Think of all the brand-new knobs we can have to tweak, and all the varied models of receivers that can now be introduced on the market! This might be exactly what is needed to revitalize the electronic industry now suffering from defense cut backs. However, another advantage of polydimensional cw is that, like compatible color TV, an ordinary receiver can be used to receive either one of the radiated signals. So this new system won't obsolete any present equipment.

It was stated earlier that the polydimensional system also reduces the effect of man-made noise. This is accomplished because, as is well known, the most troublesome man-made noise is periodic in character. That is, it is usually in sync with the 60-Hz supply line, and sounds the same throughout the entire band. Shown in Fig. 1 is a phasing box, which is actually a variable delay line applied to one receiver channel. This introduces a very slight delay equal to the duration of a noise spike, so that the autocorrelator will not respond. The only effect on the desired signal is a slight reduction in the apparent dot length or dash length as heard in the output.

The government has kept this development secret for years, but it has now leaked out. The details of actual receiver designs are still classified, however, so it is up to our amateur ingenuity to come up with suitable designs for receivers. There will be ample rewards, for here at last is the ultimate solution to cw QRM. What was once a mere "frequency" now becomes a coordinate in a polydimensional system. See you on (7001, UP CHIRP, 7010, DOWN CHIRP, 360/4%) some evening! QST

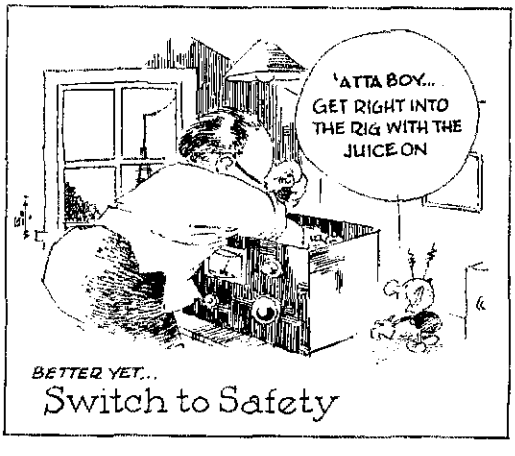
Recent Equipment

(Continued from page 53)

interior temperature of 6 below zero. No claims are made for freedom from warmup drift under these circumstances, however. Again, we recommend crystal control for mobile service!

Like every simple VFO we've seen in a vhf rig, this one is no better than barely passable. Being all-dc, it has a nice T9 note, but modulation pulls the transmitter frequency more than is pleasant to listen to, with a receiver having an i-f passband of 6kHz or less. The VFO is better than many in use for 50-MHz a-m work, but this is not saying much. On crystal control, the signal is above reproach, and in the unit tested the output was slightly higher than with VFO control.

On receiving, signals above about 1 microvolt are easily copied, if they are well-modulated. This is probably good enough for most communication, but the writer would not be happy for long without a good low-noise preamplifier in the receiving line to the HA-750. Any simple vhf transistor stage should do the trick, and it should be possible to find space for one somewhere in the unit. — *W1HDQ*



Modern Ham Jargon Defined

BY PAUL C. AMIS,* W7RGL

AS TIME creaks on, the old Ham slang, hoary with age and venerable with such terms as "inhaler" for receiver, and "wormwarmer" for ground plane antenna, has clearly gone the route. We have a modern brood on the ether waves now, whose language, at 20-per, can be as indefinable as a Novice's fist, and can leave a fine mulch all over the shack floor.

As an assist to the sages of Ham radio (a "sage" is defined as an amateur with either a single-letter "W," "K," or two-letter call) who must learn this language or reside exclusively on cw, the following is offered:

A HAM: The Man.
A HAM'S ALLOWANCE: The Man's Bread.
HIS XYL: *The Man's Shackle; the Bread Block.*
HIS CHILDREN: Crumb-Snatchers.
AMATEUR RADIO: The Man's Song.
THE ARRL: The Man's Mouth; the Band. Someplace for The Man to gig for things he digs. Sometimes he gets things he didn't gig for.
QST MAGAZINE: *Wordland; the Big Horn.*
ARRL DIRECTORS: Tight Wheels who preach The Man's Song to the Band.
SCM: *The Man's Man; a Wheel.*
JOHN HUNTOON: The Man's Stick; his Friend-In-Law. A heavy swinger.
LAIRD CAMPBELL, RICHARD BALDWIN: Big Wheels; a set of Wigs.
ED TILTON, LEWIS McCOY, JERRY HALL, DOUG BLAKESLEE, ROBERT MYERS: Spare Wigs.
DOUG DeMAW: The Brain; Bumper Jack for the Wheels.
ROD NEWKIRK: VIP of the Far Out Set.
ARRL HEADQUARTERS: The Closet, where the Wigs hang.
ALL OTHER HAMS: Dues Payers; the Whiners.
THE FCC: The Fuzz.
73 MAGAZINE: An off-key Horn; the Rag. Only happy when it can blow the whole cool.
WAYNE GREEN: Daddy Warbucks; waves the Rag and wears a "WHATS TO LIKE?" button.
SHACK: The Man's Stash; where he cools it.
CITIZEN BAND: The Shouting Society. *A very big band which jumped sour with The Fuzz.*
FREQUENCY ALLOCATION CONFERENCE ATTENDEES: The Stone Downies. Doesn't get *to town often.*
CQ MAGAZINE: A Rebuilt Horn that auditions fair dinkum.
APPLIANCE OPERATOR: Daddy Warbucks' pet riff; the Hard Jacks.

Feesville, and All That

The Fuzz hasn't been digging The Man lately. The Man's Stick has been making like a salty cat on the gang of rain slipped to the Whiners on fees, and the Rebuilt Horn has grooved it, like, outtasight. The Man's been grumbling that he can't come on strong for both his Crumb-Snatchers and his Song, what with The Fuzz blowing nothing but snakes. This turkey is still hanging high.

The Closet, where the Wigs hang.

On Wayne Green, Ad Nauseum

His band isn't so big, but he wants it to play big arrangements. Been found lately jazzing around Oilsville on a free bag, cacking out on the Whiners, and rapping uncool stanzas. Divides his time between being Mr. Clean with the HJs, while singing to The Fuzz to split a part of VHF to the Shouting Society. To Daddy Warbucks, a million Yo-Yos with a mike at the ready looks like "wow" in the bread-box department, so he hung a ditto on the Rag and is lining the bottom of the Shouter's cage with it.

On a Ham Lobby

The Man's Friend-In-Law and The Closet say, like, "who needs 'em?" and has been copping *ZZZZZ's on the whole bit.* Daddy Warbucks grooved it once back in the intro, but bagged it when the bread cut thin. The Rebuilt Horn is *laying its ace on the fence.*

On Masters-of-Ceremonies, and "Lists"

This new combo is teaching the funky Whiners a two-step when slipping five to the Far Outs. The VIP and The Man's Mouth has rippled an upper lip, but The Rag thinks it's a finger-popping bit. Some of the Far Out Set and their Sidemen figure it's a gas, but most of the crowd read it as a bum bag and ain't buying.

On Incentive Licensing

A nervous scene. The Man's Mouth vs. the Hard Jacks. The Tight Wheels and Wigs first laid it out: "Shape up or slip out. The Stone Downies and their Set don't dig us – say we're Nilsville." Daddy Warbucks' Rag and the HJs got mouthy and slipped the blocks to the Dues Payers to cool it with The Fuzz. It was a crazy score for The Man. The Rebuilt Horn, after taking five, said the cats had been cut out, but hung tough and laid out a late ace on The Mouth's pile. Enter The Fuzz who bugged-off with The Horn and leaned on the Rag, blowing Daddy Warbucks and the HJs West, only some of the crowd still don't fully dig. In the *meantime, it's a Purple Heart bit.* QST

*Route 5, Box 5559, Bainbridge Island, WA 98110.

Results, 10th World-Wide RTTY DX "Manitoba Centennial" Sweepstakes

IN SUMMARIZING the 10th World-wide RTTY DX "Manitoba Centennial" Sweepstakes of 1970, reports from all corners of the world give propagation as being very poor on the first day, though somewhat improved for the final day.

There were 52 countries worked, an increase over the 39 last year. They were as follows: KL7 CR6 LU VK OE ON VP9 PY VE KZ5 OK CE HK OZ HI G ET3 BV F FG7 KG6 DJ SV KH6 HA VU EI I JA FB8 VO2 EL LX XE PAØ PJ VO1 ZL LA HP OA KP4 IS1 IT1 ZS EA SM HB FO8 W/K and YV. The abundance of Asian contacts resulted in 28 stations making W.A.C.

Plaque and Medallion awards went to: VK2FZ, I1KG, CR6CA, FO8BS, I1CGE, K3NSS, 9F3USA, ON4BX, VE2LO/W6, W3KV, VE7UBC, FG7XT and I1CLC.

Log checking was much easier, due to the fact that separate sheets were used for each band worked. And while the vast majority of participants were single-operator stations, there did appear to be an increase in multi-operated stations, radio clubs, etc.

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.

We wish to extend thanks to all who contributed so much to make the 1970 RTTY DX Sweepstakes so very successful. – C.A.R.T.G.

* * *

SCORES

Listed below are the final scores of all entrants who submitted logs. A single asterisk denotes "CARTG" certificates earned for high score in each U.S.A. and Canadian district and each country; double asterisk equals a station listed for record purposes only, and not eligible for any award.

VK2FZ*	3,470,536	VE7UBC*	518,170
I1KG*	1,235,798	I1CLC	514,668
CR6CA*	1,037,505	KZ5LF*	463,988
FO8BS*	839,072	W4EGY	446,200
I1CGE	776,336	ON4CK	440,598
K3NSS*	689,660	W7TZL*	435,960
9F3USA*	678,360	DJ6JC*	410,036
ON4BX*	676,062	W8CQ*	387,200
VE2LO/W6*	664,010	OZ4FF*	370,620
W3KV	651,335	YV5AS	354,590
SVØWO*	636,238	W1BZT*	341,695
VU2VK*	588,756	IT1ZWS*	324,674
I1CAQ	576,776	W6LDF	306,600
WA3HXR/YV5*	563,350	DK3CU	303,246
VK3DM	533,840	WA6WGL	298,400
W4YG*	529,080	ZM2ALW*	295,670
ZS6BBL*	525,636	WA2YVK*	288,515
W9BT*	286,464	WAØJCE	39,032
W9AE	279,880	DL8KS	38,400
WB4FPK	268,600	SMØFO*	35,190
W1KJL	235,290	K2CY	34,160
HB9AKA*	233,956	WB6HZH	32,720
K4VDM	226,600	K4AT	30,660
HB9P	223,200	DLØEL	28,770
GB2SM*	212,104	WA8GVK	26,784
FG7XT*	196,572	PY2BXV	26,596
WA2BYJ	193,720	W6MTJ	25,252
WA8ENN	190,780	EI5BH*	24,273
KP4JM*	185,000	K8JTT	23,152
K6YUI	170,785	W2VAQ	22,800
VE3RTT**	162,860	W1BFS	20,140
K8ILL	162,765	SM3AVQ	19,530
HI8XRM*	158,250	K2RYI	16,040
WB6RXM	157,984	KØIBB	15,488
K4AGC	152,800	K7BJM	14,700
DJ8BT	147,408	WA4FHY	13,084
W6JOX	145,040	LA6VC*	12,244
F9RC*	141,192	VE6MM*	11,440
K5ARH*	136,935	KL7FLR	10,748
WAØWST*	133,295	W3ZPZ	.9744
DL1VR	128,360	F5KD	.9600
WØITU	118,988	K8KAG	.9160
PY2CBS*	113,620	ON5WG	.7923
W3ABT	108,250	DJ1XT	.6260
DL9VD	101,775	VE7AFJ	.5692
WB2JBH	82,145	K4GJW	.4302
WA4VYL	80,550	W1CKD	.3964
W5EUN	73,400	SK5AA	.3910
VK2EG	68,840	W7RPV	.2250
VE5LG*	64,356	KZ5GO	.2235
WA5LJZ	63,700	I1AMP	.1606
KL7GPS*	63,076	VE4FG*	.1490
WØMT	62,160	SM4CMG	.1220
PJ2CR*	60,590	WA1HOL	.768
WB4RKA	59,900	WA2HVM/VO2*	.480
W3BIP	59,425	K9WJB	.345
CE3EX*	59,034	VE4XD	.216
WA6LWB	55,624	W8TCO	.54
I1KFL	46,850		
JA1ACB*	43,972		
WAØTLT	43,400		
I1THB	42,665		
OK1MP*	42,300		

Late Log

DM2BRN 272,700

Soapbox

The RTTY contests are great! Much better than the other modes. Really like the way the contest is set up. – K3NSS. Propagation was not especially smashing in that the bands went out early in the evening, except for 40 meters which is virtually useless here anyway. Worked three new countries. – SVØWO. Contest was good opportunity to work some good DX. Afraid it will be my first and also the last CARTG contest with this call sign as I leave Tahiti for some time next year in July. – FO8BS. Heard some rare ones. Band conditions were excellent right throughout Saturday, but Sunday bands went dead with nothing coming through, not even noise. Thanks for nice contest. – VU2KV. This was my first contest and really enjoyed it very much. Thank you for the well organized contest. – ZS6BBL. Sincere thanks for a most enjoyable contest. We look forward to next year's event and hope it will be bigger and better still. – VE7UBC. QST

Results

1st ARRL

160-Meter Contest

In May of 1970, the ARRL Board of Directors authorized the holding of a new event. Some months later, after correspondence with the ARRL Contest Advisory Committee and interested "Top Banders", rules were formulated and the ARRL 1st 160-Meter Contest was held on December 12-13, 1970. What follows are the results.

REPORTED BY AL NOONE, *WA1KQM

THE FIRST ARRL 160-Meter Contest appears to have turned out very well. Many commented that they had never heard "Top Band" so crowded. Section totals in the high 60s were recorded, proof in itself that participation was widespread throughout the USA and Canada.

A total of 270 entries were received at HQ. Of these, 20 were in the multioperator category. Certificates are scheduled for an April 15th mailing.

Special thanks should go to VP2VL, VP9GR and the numerous other DX stations who helped add spice to this new activity. We certainly appreciate your efforts.

As far as the rules are concerned, most entrants seemed pleased, few had suggestions for improvement. Those who did, however, need not worry, ALL relevant suggestions will be forwarded to the ARRL Contest Advisory Committee for their consideration.

A recent FCC action in late February (required by a Coast Guard reshuffle of Loran chain frequencies on the west coast) will shift amateurs there and in certain noncoastal states from the 1900 kHz segment to the 1800 kHz segment. This 160-meter realignment will take effect May 1. (full details appear elsewhere in this issue) Undoubtedly, this will come as a delight to many, due to the prospect of increased coast-to-coast QSOs.

TOP TEN

Single Operator: W9EWC (W9SZR, opr.) 62,100 – 69 sections; WØAIH 49,178 – 67; W3IN 46,431 – 63; W9DL 46,431 – 67; K1PBW 45,548 – 59; K4GSU 41,846 – 61; K8HKB 36,146 – 62; K1KSH 35,844 – 58; WØNFL 35,588 – 67 and K8SJU 32,292 – 54.

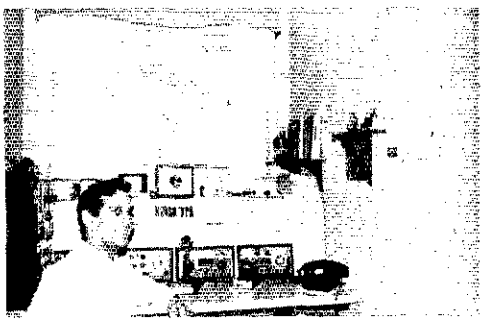
TOP FIVE

Multioperator: W4QCW 42,966 – 63 sections; W8LT 37,294 – 58; K3RUQ 31,950 – 50; W9YB 27,780 – 60 and K8BYI 27,738 – 46.

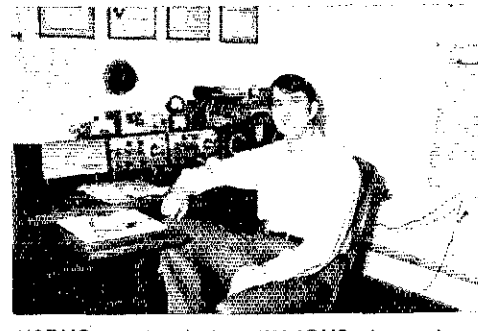
SOAPBOX

Congratulations on a very fine kickoff on the "Top Band". – W8EMG. Worked six new states! – WA3LLZ. I was amazed at the number of two letter calls that seemed to predominate. It must have been nostalgia to many of us who had cut *their teeth on the old 160 band. I will certainly* look forward to another contest there next year. – VE2IL. Conditions not too good 'tho heard VK6NK "pop" in on the 1800 segment at approximately 1100 GMT. Heard JA3AA, but he secured, working no one. Did manage JA2CLI, who was S 7/8 here. – W7DZO. Perhaps some additional points might be given for East Coast/West Coast QSOs, particularly for the North Atlantic states who are restricted to the low end of the band and the Pacific states limited to the top end of the band. Encouragement also needs to be given to DX participation. – W2BP. Nice to meet so many old friends on 160, everyone I talked to thought it was great. – W1QV. The contest period seems just right and cw only is a great idea. – WA8TNO. The scoring procedure certainly speeds things up. Let us hope everyone remains honest so it can be retained. I had all the scoring done after about an hour of work. – WØRV. Conditions fair. DX and anything over 1500 miles spotty. Added to all this for us in the northeast was snow and *freezing rain both nights of the contest*, creating much unneeded precipatation static. – K1PBW. Thanks very much for having the contest, I think it was a smashing success. There were many more stations than I expected. – WBØCGR. Surprised at

*Asst. Communications Mgr., ARRL.



Here's VP9GR, Frank who gave many their DX *multiplier from Bermuda.*



K3RUQ, assisted by WA4DUS (not shown) managed 315 QSOs in 50 sections to place third *nation-wide in the multioperator category.*

DIVISION LEADERS

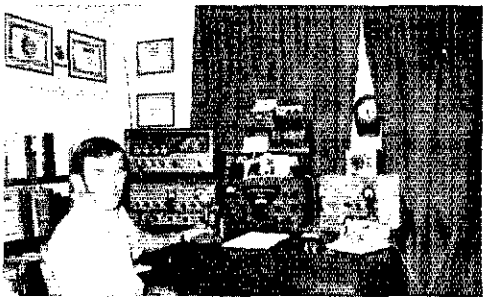
Single Op.		*Multiop.*
W3IN	Atlantic	K3RUQ
W9EWC	Central	W9YB
WØAIH	Dakota	. . . . .
W4EX	Delta	WA5NYG/5
K4GSU	Gr. Lakes	W8LT
W2DXL/2	Hudson	. . . . .
WØNFL	Midwest	WAØQJX
K1PBW	New Engl.	W1KVI/1
W7DZO	Northwest	. . . . .
W6KWE/6	Pacific	. . . . .
W4TMR	Roanoke	W4QCW
WAØCVS	Rocky Mt.	. . . . .
W4KVC	Southeast	. . . . .
W6YRA	Southwest	. . . . .
W5RTQ	West Gulf	K5LZJ
VE1ASJ	Canadian	VE1EK/1

the many loud sigs, the relatively few WA/WBs and most of all, the early hour (2000Z) that workable signals appeared. – K4JM. Present rules seem okay. Perhaps open it to DX to DX, too. Leave it cw only. Hours are good, exchange good. – W7YB. An excellent contest, I can think of nothing to improve it except better conditions. Newcomers should know that conditions will improve greatly over the next several years and that they should not judge 160 by conditions we had this year. – W6AMO. Propagation to W1/W2 land was very poor from West Virginia on 1.8 MHz. – W8HZA. The contest was magnificent. It showed me that the 160- meter band could match any of the other upper frequencies. – WA5KKY.

1st ARRL 160-Meter Contest

Scores are grouped by Divisions and Sections. Within each section, scores are broken down by callsign, final score, contacts, sections and operating time. Example of listings: W3NNK 28,037-254-53-25 or final score of 28,037, number of contacts 254, number of sections 53 and total operating time 25 hours. An asterisk denotes a Hq. staff member, incligible for an award. The station first-listed under each section or non-W/VE country is the award winner. Multi-operator stations are grouped in order of score following single-operator station listings in each section tabulation.

For those who asked, "Where was New Hampshire?" – here's Basil, W1JB. Look for him next year!



W5RTQ takes honors as the West Gulf Division leader. Nice going, Earl.

K8SJU, Mike finished a strong second in the Ohio section. That's junior op. Mickey checking out daddy's key!

ATLANTIC DIVISION

Delaware

W3NNK	28,037-254-53-25
K3NYG	8349-125-33- 6

Eastern Pennsylvania

W3HUS	16,200-171-45-11
W3AJS	14,840-184-40-23
W3HTF	11,520-157-36-11
W3ADE	8365-118-35-20
W3QOR	754- 29-13- 2

Maryland–D.C.

W3IN	46,431-343-63-30
W3GN	22,102-253-43-
W3FA	10,080-141-35-
W3FE	4140- 66-29- 4
W3BHE	2450- 49-25- 7
W3KE	1748- 46-19-
W3EWP	1404- 39-18- 3
K3RUQ (+WA4DUS)	31,950-315-50-33
WA3LLZ (+WA3LHN)	8505-120-35-21

Southern New Jersey

W2FJ	28,600-283-50-21
K2GAL	16,764-186- 44
WA2KWB	13,338-174-38-14
WA2HPB	780- 30-13- 2
W2BP	60- 4- 3- 1
K2AA/2 (4 oprs.)	9603-144-33-21

Western New York

W2MTA	6231- 99-31- 5
W2TMI	4680- 90-26- 8
W2FHU (+W2BHP)	6570-108-30-

Western Pennsylvania

W3UHP	14,800-200-37-25
W3SN	4292- 74-29- 6
W3YO	2616- 53-24-

CENTRAL DIVISION

Illinois

W9DL	46,431-345-67-22
W9TGB	18,522-170-54-17
K9IFO	13,860-156-44-
W9PNE	12,780-139-45- 7
W9LVT	11,739-135-43- 9
K9WTS	8568-102-42-12

K9JUU 6798-103-33-10
W9DCN 6468- 98-33-12
K9DUA 5460- 78-35- 3
W9ABA 4828- 71-34-
WA9NKT 3596- 62-29- 5
W9REC 2850- 57-25-
K9KEP 1330- 35-19 5
W9HVP 960- 30-16-
W9HPG 352- 16-11- 1
W9TAL 60- 6- 5- 1
K9ORP 36- 6- 3- 2
W9AML/9 (3 oprs.) 8132-107-38-12

Indiana

W9BF (WA4FDF, opr.) 23,130-254-45-32
W9BRN 20,350-202-50-15
WA9WMK 9450-135-35-
W9DPL 8760-108-40-15
W9YB (4 oprs.) 27,780-330-60-

Wisconsin

W9EWC (W9SZR, opr.) 62,100-444-69-29
W9BQM 10,088- 94-52- 7
W9CTI 2916- 54-27-

DAKOTA DIVISION

Minnesota

WØAIH 49,178-364-67-21
WØCA 22,440-204-55-30
WØBE 22,098-189-58-17
WØHW 13,500-150-45-
WØRHI 11,088-126-44-15
WAØWBG 1760- 44-20- 2

North Dakota

WØSDN 12,056-137-44-10
WØRTK 3658- 59-31-11

South Dakota

WØIT 3752- 67-28- 5
WAØOML 2916- 54-27-13
KØUDZ 1920- 40-24-

DELTA DIVISION

Arkansas

W4OQG/5 3886- 67-29- 6
WA5SDT 2325- 45-25- 5

Louisiana

K5TFG 21,094-193-53-21
K5AJK 3267- 59-27- 8
WA5VYS 1817- 38-23- 7

Mississippi

W5RUB 16,698-180-46-11

Tennessee

W4EX 28,826-244-58-22
W4UD 6516- 89-36- 6
WA5LJZ 4123-65-31-10
W5GWD 84- 7- 6-
WA5NYG/5 (+WA9RAT) 7236- 99-36-
W4OQG 2886- 54-26- 3
W4ZZ 1344- 32-21-12
WB4LHK 784- 28-14- 6

GREAT LAKES DIVISION

Kentucky

K4GSU 41,846-340-61-23
K4FU 23,980-215-55-12
K4AVX 2496- 48-26- 4
W4YOK (3 oprs.) 7105-100-35-11
K4DWO (3 oprs.) 168- 12- 7- 2

Michigan

W8TZZ 3536- 68-26- 8
W8HFM 936- 26-18- 4
K8BYI (3 oprs.) 27,738-300-46-34
W8HID (+WA8ZOF) 19,651-227-41-29

Ohio

K8HKB 36,146-287-62-25
K8SJU 32,292-296-54-30
W8DB 28,500-247-57-14
W8YCP 16,575-158-51-10
WA8TNO 12,960-141-45-15
W8EX 10,626-125-42-
K8RXD 7920-120-33-12
W8AQ 4650- 75-31- 4
W8PMJ 3150- 63-25- 5
K8SBZ 2100- 50-21- 7
W8VZE 1806- 43-21- 6
W8LT (5 oprs.) 37,294-317-58-30
W8TFZ (3 oprs.) 24,892-251-49-

HUDSON DIVISION

Eastern New York

W2DXL/2 17,200-194-43-14
WB2SIH 13,860-195-35-15
W2AGQ 4992- 78-32- 7
W2IP 100- 10- 5-

N.Y.C.–L.I.

WB2MFZ 224- 14- 8- 3

Northern New Jersey

W2TA 17,024-221-38-16
WB2OZW 8032-124-32-13
W2GBY 7035- 99-35-18
W2HUG 6630-109-30- 7
W2AQT 6603-105-31- 8
WB2URU 4100- 82-25-12
W2EQS 3864- 69-28-
WA2CCF 3036- 69-22- 6
WA2EUX 2436- 58-21- 4
W2MNK 1312- 41-16-12
W2CVW 1036- 37-14-
W2DEN 992- 31-16- 6

MIDWEST DIVISION

Iowa

WØNFL 35,588-284-67-28
WAØTVD 18,564-182-51-24
WØFK 4384- 67-32- 6
WØII 3870- 63-30- 4
WØBQ 3240- 60-27-10
WØYSE 572- 26-11-2
WAØQJX (WAØ PKE YSU) 2760- 60-23-10

Kansas

WØPSF 31,860-264-60-28
WBØCGR 29,585-241-61-
WAØJVS 25,144-223-56-31
WØCHJ 374- 17-11-

Missouri

WAØRDJ 20,474-175-58-
WØBV 11,808-144-41-18

Nebraska

WØVFA 918- 27-17- 4

NEW ENGLAND DIVISION

Connecticut

K1PBW 45,548-359-59-28
K1KSH 35,844-306-58-32
W1QV 14,319-189-37- 9
W1WY 13,505-178-37-13
WA1FDV 9424-152-31-19
WA3JSU/1 9114-144-31-15
K1ZND/1 7264-112-32- 4
WA1NFS* 4648- 83- 8- 3
W1ACR 3240- 66-24- 5
WA1KQM/1* 1060- 25-20- 2
WA1GFH 440- 22-10-
W1ADW 270- 15-9- 1
WØDRE/1* 6- 3- 1- 1

Eastern Massachusetts

W1PL 16,644-213-38-21
W1HGT 16,086-175-42-16
W1AX 10,881-135-39-10
W1FJN 10,710-150-35-
K9DHN/1 9415-130-35- 9
W1BB 3749- 80-23- 7
WA1MKR 3699- 67-27- 7

Maine

W1EF 3976- 71-28- 7
W1KV1/1 (5 oprs.) 20,636-230-44-27

New Hampshire

W1JB 3504- 73-24-10
W1FKF 1980- 45-22- 3

Rhode Island

W1FLN 10,044-138-36-18
W1OP (K1HZN, opr.) 9540-131-36-15
K1NQG (WA1IWS, opr.) 858- 33-13- 2

Western Massachusetts

WA1FBX 1598- 47-17-13

NORTHWESTERN DIVISION

Idaho

W7IWU 2142- 51-21- 6

Montana

W7YB (W7LR, opr.) 4131- 75-27- 4
W7GBL 1440- 45-6- 5
K7LTV/7 1064- 28-19-

Oregon

K7WWR 9880-122-40-14
WA7LZX 3024- 72-21-21
W7VOK 2310- 55-21-
W7IMP 748- 34-11-12
W7LT 400- 25- 8- 7

Washington

W7DZO 14,210-142-49-32
W7IEU 3683- 62-29-20
K7IDX 3618- 67-27-15
K7UWT 2808- 52-27-
W7FIM 416- 26- 8- 4
WA7PSO 8- 4- 1-

PACIFIC DIVISION

East Bay

K6ILG 4316- 83-26-16
WA6HMT 2480- 62-20- 8
W6MAV 986- 29-17- 3

Hawaii

KH6IJ 1785- 41-21-
KH6HCM 1387- 35-19- 7
KH6RS (KH6GPQ, opr.) 1139- 32-17- 5

Nevada

W7CRT 10,692-120-44-17
W7OK 1944- 54-18- 5

Sacramento Valley

W6NKR 4125- 61-33- 5

San Joaquin Valley

W6MUV/6 2160- 54-20-14
K6TG 2128- 56-19-12

Santa Clara Valley

W6KWE/6 26,961-232-57-
W6WX 10,707-123-43-10
W6GWQ 7385-104-35-
WB6RGR 4150- 83-25-
W6FUV 266- 19- 7- 5

ROANOKE DIVISION

North Carolina

W4TMR 20,430-224-45-27
K4CAX 16,029-204-39-16
K4JO 1480- 37-20- 7
WA4BNO 32- 4- 4- 2
WB4RCB (4 oprs.) 8382-127-33-26

South Carolina

K4DBV 18,737-224-41-22

Virginia

K4JM 15,949-193-41-11
W4ZM 7400-100-37- 5
WB4JEZ 4872- 87-28- 9
W4DM 3614- 68-26- 3
K4PCL 3306- 57-29- 7
W4KXV 1480- 37-20- 2
WA4RGH 1350- 45-15- 3
W4KMS 192- 12- 8- 2
W4QCW (+W4VZQ) 42,966-324-63-29

West Virginia

WA8SDA/8 10,842-139-39- 9
W8HZA 5772- 78-37- 8

ROCKY MOUNTAIN DIVISION

Colorado

WAØCVS 24,168-225-53-18
WØBWJ 384- 16-12- 2
WØSIN 264- 12-11-

New Mexico

W5RSZ 12,350-122-50-12
W5LT 2160- 54-20-10
W5PNY 1280- 32-20- 3
W5PDO (W5QNY, opr.) 360- 18-10- 2

Utah

K7ZIA 14,256-162-44-24
W7OHR (K7RAJ, opr.) 14,233-164-43-20
W7ZC 9120-114-40-12

Wyoming

W7HLA 1886- 41-23- 8

SOUTHEASTERN DIVISION

Alabama

W4KVC 14,112-144-48-18

Eastern Florida

W4BRB 14,063-167-41-
K4IA 11,616-117-44- 8
K4YXC 6026-131-23-28
K4ERM 5336- 89-29- 7
W4OZF 4191- 62-33- 2

Georgia

K4BAI 12,516-146-42-23
W6LQI/4 6237- 93-33-16
W4DXI 1520- 38-20- 5

SOUTHWESTERN DIVISION

Arizona

W7CFJ 11,480-142-40- 8
K7NEQ 8668- 97-44-15
W7LEE 2754- 51-27-16
W7CAL 2548- 49-26-
W7GAF 2016- 48-21- 7

Los Angeles

W6YRA (WB6WIT,opr.) 15,778-170-46-21
W6DQX 9044-116-38-13
K6DDO 8019-120-33-28
W6DGH 6880-106-32-10
W6NJU 3500- 61-28- 5
K6KVC 2394- 63-19-11
W6JPH 2268- 54-21- 6
WA6OWM 2000- 50-20- 5
W6WHK 1494- 40-18-16
K5MHG/6 620- 31-10- 6

Orange

W6AMO 10,179-129-39-20
WB6NRK 3816- 78-24-17

San Diego

W6ISA (K6VZA, opr.) 11,309-130-43-
W6JVA 2948- 67-22- 9
W6MAR 2244- 51-22- 7

Santa Barbara

W7DOL/6 12,546-150-41-30

WEST GULF DIVISION

North Texas

K5LIW 13,545-149-45-19
W5FIX 3444- 60-28-11
W5KYD 986- 29-17- 3
W5JKD 70- 7- 5-
WA5KYY (+WA5AGF) 6084- 83-36-12

Oklahoma

W5FF 1702- 37-23- 6

South Texas

W5RTQ 23,072-203-56-15
K5DEG 17,199-174-49-21
W5EVL 2328- 47-24-12
K5BBM 1659- 38-21- 5
K5HGB/5 517- 22-11- 3
K5LZJ (+K5SOR) 6435- 96-33-19

CANADIAN DIVISION

Maritime

VE1ASJ 16,080-163-48-
VE1EK/1 (+VE1s MX OM) 5022- 90-28-12

Quebec

VE2IL 3288- 67-24-

Ontario

VE3BS 13,920-174-40-12
VE3DVR 10,915-146-37-14
VE3DU 8970-115-39-14

British Columbia

VE7HQ 2210- 65-17-14

FOREIGN

Ireland

EI9J 700- 14-10- 4

Bermuda

VP9GR 7491-112-33-10

British Virgin Islands

VP2VL 26,562-221-57-22

Czechoslovakia

OK1ATP 108- 9-6- QST

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity HRH

CONDUCTED BY GEORGE HART,* W1NJM

ALL THAT GLITTERS

IT *NEVER fails! No sooner do our emergency*-oriented operators finish their labors in the annual Simulated Emergency Test than the real thing comes along. Either that, or the real thing happens *during* the SET, or comes before the SET so the boys are all played out and feel they don't need the simulated exercise – as well they might!

This time it was the California earthquake that shook us all up, barely a week after we had gone all out to show what we were capable of. In the SET, all nets were deliberately overloaded with traffic, so we could observe ourselves working beyond our peak. The traffic piled up, started taking alternate routes, confusion reigned, just as it would in a real emergency. When it was all over, we relaxed, glad *of a respite and the opportunity to return to* normal operation, while we appraised our performances.

It is not the intention here to reveal the results of this appraisal. Indeed, it is far from complete at this writing. What the ARPSC *didn't* need, a week after the SET, was a real emergency which would precipitate us into almost exactly the kind of situation we had been simulating. To say the earthquake was anti-climactic would be a distortion of the truth. It would be truer to say that the SET was *pre*-climactic.

So, what happened? Amateurs in several parts of the country, with publicity as the principal objective, arranged for various means of solicitation of the general public for message of inquiry to the earthquake area, mostly by radio and TV. The result was a deluge of traffic on NTS and other amateur facilities which made the jam of the previous week, during SET, seem minor by comparison. About 90% of this traffic was Q (inquiry) precedence, although some originators, in their zeal to have their messages handled promptly, erroneously labeled them P (Priority). Stations in the disaster area still handling official traffic were importuned by amateurs from outside to start clearing the Q load, hampering their efficiency.

NTS Transcontinental Corps directors added additional stations to their rosters and beat the bushes for more, but the most that could be done was to get the traffic to the west coast. Delivery was, for the most part, out of the question until most of the official traffic was cleared, then it was delayed because of the backup or the inability to find addresses.

Among many, there was some question as to what *kind* of publicity the amateur service gets out of this kind of an operation – that is, good or bad. To be sure, members of the public at the originating point are favorably impressed by our eagerness and willingness to take their traffic when the telephone system is so overloaded that dialing Area Code 213 gets you only a tape recording saying, in effect, "Are you kidding?" But how impressed are they when the traffic doesn't arrive at all, or arrives a day or a week after telephone service has been restored and concerned relatives have long since conversed at length with the objects of their concern? It seems inevitable that this will be the fate of the majority of the inQuiry messages originated.

Could it be that sometimes in our over-zealous quest for favorable PR we sometimes accomplish *just the opposite? It is one thing to accept* messages when appealed to by someone in personal distress who has a relative in the disaster area, when it can be explained that the likelihood of getting through is not good. It is quite another to go on radio or TV suggesting, recommending that people call in with such traffic. It is asking for a deluge, for trouble. If a network as extensive as the Bell Systen and A T & T can't handle it, how can we?

So about originating inQuiry traffic during an emergency – let's NOT, if we can avoid it. People in distress through worry alone is not an emergency. Hardly anyone ever dies from it. Meanwhile, in the disaster area, people *are* suffering through lack of food, clothing, shelter, medicine and

*Communications Manager, ARRL.

The 1971 earthquake which hit Los Angeles in February wasn't severe as earthquakes go, but in a heavily-populated area it can do a lot of damage. As buildings collapsed, roads buckled and utilities were disrupted, amateurs galvanized into action to provide emergency communications. One of the stations activated was W6IN, station of the San Fernando AREC, part of which is shown here with operators WB6NST, WB6ZVC and WB6NHS on duty. In charge was WA6QZY, Los Angeles SEC. More details next month. *(Photo by W6BVN)*

On January 16, members of the Brazoria County (Texas) Amateur Radio Club participated in a March of Dimes drive. Collection centers, manned by students of local high schools were set up at the busier intersections and shopping centers. Operating from the Beechway Shopping Center were WA5MHD and K5OON, left to right. Additional stations were operated from various cities and mobiles helped out.

equipment, and amateur stations on behalf of civil defense, the Red Cross, local, state and federal government and other served agencies, are struggling to cope with communications shortages brought about through disruption of normal facilities – communications having to do with obtaining and providing relief for the stricken populace *first*, assurances of safety or otherwise notices of status of disaster-affected people *second*, and prodding those people to accept delivery (if you can find 'em!) and provide answers for messages of inquiry about them *third*, if at all. A much better system, if facilities are available, is to set up and maintain, or designate, stations specifically to originate outgoing traffic to friends and relatives advising them of safety or otherwise of the welfare of persons in the disaster area, going on TV and radio to solicit *this* traffic, and let the hams on the outside eager to get good PR get it by servicing this traffic, which can be precedence P (Priority), a higher precedence (and rightfully so) than Q. The sad fact is, however, that usually disaster-area stations are too busy to do this just as they are too busy to handle incoming inquiry traffic.

Repeater Directory

This year, in connection with the annual net directory registration, there is going to be a listing of repeaters for the information of anybody interested. It will be an attachment to the annual printed net directory, available in late summer or early fall, and headquarters is starting to compile the list right now. A standard card form designated CD-85A is available on request, copies of which have already been distributed to all ARRL appointees and affiliated clubs. If your repeater is "open" to casual passers-by, or for use by anyone in range, submit your data on a CD-85A or give the following information:

1. Location of repeater and/or area served.
2. Repeater call letters.
3. Input and output frequencies, and mode.
4. Access method, if special method is required.
5. Identity of sponsor (group or individual).
6. Special features or remarks, if any. Restrictions on use, if any.
7. Name, call and full mailing address of person submitting the data.
8. Date submitted.

We hope this new listing will make possible more widespread information concerning and availability of repeater facilities to more amateurs, both those traveling who may have need for information or assistance and those residing in the area who do not know of the repeater's existence.

Regarding restrictions, it is conceivable that repeater sponsors who have gone to considerable expense and/or perspiration to obtain a site, install and maintain a repeater will take a dim view of the prospect of having it monopolized by non-participants in its sponsorship, but not (we hope) to the extent of forbidding its use for emergency or less-urgent but still more-than-casual purposes. This information can be footnoted in the listing, and we expect most amateurs will respect it. Thus, if you are unwilling to have the repeater used for casual operation by just anyone, but do not want to completely restrict its use to your own tight circle, state the conditions of use. Categorical footnotes could include such things as emergency only, members or mobiles from out of area only, information and assistance only, etc. If no restrictions are mentioned, it will be assumed that the repeater is open to anybody, any time for any purpose. We hope most repeaters will be in this category (although it is to be assumed that *all* casual use will quickly terminate in the event of an emergency call), but we also want those whose sponsors wish to restrict their use to be included on the list for possible emergency use. This, mainly, is what it's all about. – *WINJM.*

Public Service Diary

On Aug. 25, KH6GQW, Hawaiian SEC, answered a call from K6ALL who was in contact with the *S.S. Stella Lykes* located 950 miles northwest of Honolulu. The ship's radio officer had suffered an apparent heart attack leaving her without communications except for WA5YNH who had his amateur gear aboard. The attack had not been fatal, but the victim was required to curtail activities and was in need of medical assistance. Contact was established with the Coast Guard Rescue Service via phone patch through KH6GQW and the decision was reached that *Stella Lykes* would remain on a course toward Hawaii until she was within range of Coast Guard helicopter and the victim could be evacuated. *KH6BZF, SCM Hawaii.*

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On the evening of Nov. 14, the Huntington, W. Va., Civil Defense and RACES was turned out in response to a plane crash near that city. Operating the radio equipment from c.d. headquarters was WB8ARY while K8SXO and WA8HSZ were mobile. WA8AKU and K8WMX came from Albans and brought walkie-talkie equipment to be used through the local repeater, operated by W8NJI.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Jan. Traffic

Call ..... Orig.	Recd.	Rel.	Del.	Total
W3CUL/4 357	1416	1301	74	3128
K@UNK 191	592	576	12	1371
WA1JTM 20	599	583	8	1210
K1BCS 992	109	33	35	1169
K5IEY 1	549	531	9	1090
W7EKB 5	547	546	1	1079
W3VR/4 221	401	361	15	998
K@ZSQ 1	498	498	0	997
WA7JOS 3	456	449	11	924
WA8EFX 114	408	363	19	896
W7JWI 10	571	510	40	831
W@LCX 27	410	387	14	758
W6LPW 6	365	365	0	736
W7BA 10	459	423	34	726
WA2BAN 52	471	283	12	718
W7TYN 325	61	308	10	704
WB4NNO 45	459	284	7	695
WA@GRX 34	328	316	9	687
K8MIK 4	612	9	0	625
WA1GCE 370	190	53	19	612
WB9BXX 65	213	109	14	601
WA1JVV 50	288	241	12	591
K@CSF 36	269	269	0	574
WB2TUL 46	279	204	36	565
WA4SSB 1	265	288	11	565
W1OFM 5	277	277	0	559
WB4KDI 196	152	132	61	541
W4SQO 24	288	211	8	531
W3MPX 147	222	140	13	522
W3EML 24	307	186	2	519
WA5YRO 6	255	224	31	516
WA6DEI 41	240	226	8	515
W7PJ 24	239	244	7	514
WA8VYQ 32	243	217	17	509
W1PFA 65	251	187	3	506
WA3LYS 10	260	204	38	502
WA8FFX(Dec.) ..79	436	420	7	942
WA1JFM(Dec.) ..44	316	242	62	664
W@AVS/8 (Dec.) .24	278	236	42	580
W1QYY (Dec.) ..22	213	236	37	508

More-Than-One Operator Station

K4IWT 99	148	209	149	605

BPL for 100 or more originations-plus deliveries

VE3DV 251	W8TFL 142	VE2DCW 108
W9IYO 207	K1VXX/1 136	WA1LPJ 107
WA4VEK 206	WA4ABY 135	WA8IWL 106
WA7EUX 182	W2OF 134	WA5IMC/5 105
W4LKB 179	W3CDR 134	VE3DPO 105
WB9BJR 172	K1WQH/1 133	W4ZYT 103
K@LPE 172	WA4WQU 133	W4BAZ 102
K9IXJ 166	WB4LDI 132	WB4OMG 102
W5IN 152	VE3ARS 132	WA2CRW 101
WB8DSV 152	WA3AII 124	WA2JIM 101
WA4MKH 151	WB8BPB 117	WB2LGA 101
W4EVN 150	WB4OKI 113	K1BCS (Dec.) 313
WB6SXY 150	W6JIA 111	K8ONA (Dec.) 233
WA5PPF 148	W7AXT 111	W8QCU (Dec.) 226
K8ONA 148	W1TXL 110	WA1GCE (Dec.) 187
WA@VAS 148	WA2JNQ 110	WB8DSV (Dec.) 180
W7RZY 146	WA5ESN 110	W8TEL (Dec.) 133
WA2EGS 144	W4OYI 109	K2KDQ (Dec.) 100

More-Than-One Operator Station

K2DEL/2 349	K8LMI/8 313	W8SH 107

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA2ITQ, W7PJ.

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

and K8CAY. Amateurs, civil defense personnel and state police worked their way to the crash site where seventy-five persons, including the whole Marshall University football team, perished. – *WN8FIN.*

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On Jan. 3, a severe snow storm struck the eastern and central portions of Nebraska, eventually reaching blizzard proportions. Hundreds of motorists were stranded at various locations and inquiries were pouring into the state's radio amateurs. All the major roads were closed and travel was impossible.

After the regular session of the Cornhusker Net closed at 1900Z, an emergency net was activated to try and handle the multitude of incoming queries. Approximately seventy amateurs finally participated in the program, which not only required copying the messages, but also required locating the addressees. No accurate tabulation was kept, but literally hundreds of the inquiries were handled until the net closed the following day. – *K@ODF, SEC Nebraska.*

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The Clinton Co. (N.Y.) RACES was activated on Jan. 10 and 11 to assist c.d. and local officials in the Morrisonville area where the Saranac River was causing a flooding problem. A total of 17 units responded on the tenth with WA2JOG mobile at the site. On the eleventh, mobiles WA2HSB and WA2JOH assisted at the site until the situation was relieved. WA2YKT acted as control station during most of the operation. – *WA2HSB.*

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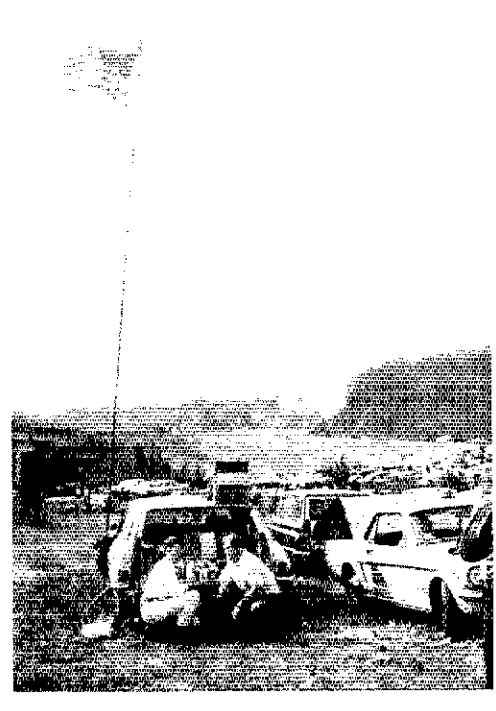
On Jan. 14 at 1300Z, a tandem gasoline tanker overturned just as it was entering Interstate Route 75 near Flint, Mich. It slid under a ramp carrying other traffic and burst into flames. WA8UXN was about a hundred feet behind the tanker when the accident occured. Using two meter fm, contact was established with WA8VDA who reported the acci



Twenty-three members of the Birmingham (Ala.) Amateur Radio Emergency Service provided communications and emergency help during the Magic City Enduro, a motorcycling event. Six stations were set up at check-points along the route of the rally. Pictured are W4ATK and WB4MKU at the starting and finishing line.

Public Service Honor Roll January, 1971

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below. In some cases scores have been adjusted to agree with new maximum allowable points which have taken effect. Use CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 *QST* for initial description and page 72, Sept. '70 for latest point evaluation. Please note new maximum points for each category.

Category	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	
Max. Pts.	10	10	12	12	12	20	3		5	Totals
WA2BAN	10	10	12	12	12	3	3		5	67
WA8ETX	10	10	12	12	12	1	3		5	65
W6BNX	10		12		12	20		4	5	63
WA3FMI	10	5	12	12	6	2	3	2		62
WA2DRH	10	10	12	12	12				5	61
K8BDH	10	10	12	12	12				5	61
WA5IMC/5	10	10	12	12	12		3			59
WB4JMH	10	10	12	12	12					56
WB4KOI	10	10	12	12	12					56
WB8BBG	10	5	12	12	12				5	56
WA2KHQ	10	10	12	12	9					53
WB4OKI	10	10	12	6	12		3			53
WB9BXX	10	10	12	6	12	3				53
VE3EXA	10	5	12	12	12					51
W4QGG	10	5	12	12	12					51
W7LBK	10	5	12	12	12					51
WA8UPI	10	10		12	12	2			5	51
WB2LGA	10	10	12	3	12		3			50
WA3AMI	10	5	12	3	12		3		5	50
W8CT*	10	9	9	10	12					50
WA@YMU	10	10	12	12		6				50
WA2JMM	3	10	9	12	12		3			49
WA2VYS	10	10	12	12					5	49
W3MPX	10	10	12		12				5	49
W4HEU	10	10	12		12				5	49
WB4PWD	10	10	12	12		5				49
W5SBM	10	10	12		12				5	49
W6BGE	10	10	12		12				5	49
W6LRU	10	10	12		12				5	49
W7CAE	10	5		12	12	5			5	49
W7MCW	10	5		12	2	20				49
W8IMI	10	10	12		12				5	49
W9HRY	10	10	12		12				5	49
WB6SXY		10		3	12	20	3			48
WA@VAS		10		9	9	20				48
WA1LPJ	10	10	12		12		3			47
WB4LAO	10	10	3	12	12					47
W4NOG		10		12		20			5	47
W6MNY	10	5	12	3	12				5	47
W8KKY*	10	10	3	12	12					47
W@LRW	6	5	12	12	12					47
W7AXT	10	5	12		12		3			46
W7RQ	10	4	12	9	6				5	46
8R1Y/W4	10	10	12		12	1				45
VE4GF	10	8	12		12				6	44
WI8VR	10	10	12		12					44
WA2ICU	10	10	12	12						44
K5ROZ	10	10	12		12					44
W7GYE	10	5	12		12				5	44
K7NHL	10	5	12		12				5	44
WB8CWD	10	7	12	3	12					44
WA8NOQ*	10	10		12	12					44
WA9WMT	10	5	12		12				5	44
WA@OEJ	10	10	9	12		3				44
W7JWJ	10	5		12	3	10	3			43
VE3DV	10	5	12		12		3			42
VE4LQ	10	3	12		12				5	42
WA3IPU	10	3	12		12				5	42
WB4DAJ	10	10	12		10					42
W5QJA	10	3	12		12				5	42
W7PI	10	5	12		12			3		42
W2MIA	10	5	12		9				5	41
WA8ZNC	10	10	9		12					41
WA2BEX	10	6	12		12					40
W3EZT	8	5	12	3	6	1			5	40
WA@KUH		5		6	12	12			5	40
VE3EHL	10	5	12		12					39
VE3ERU	10		12		12				5	39
K1EIR	5	3	12		12			2	5	39
W2ER	10		12		12				5	39
W2RUF	10		12		12				5	39
W3LOS	10		12		12				5	39
W3NEM	10		12		12				5	39
K4BSS	10	5	12		12					39
WA5VQF	10		12		12				5	39
W6VNQ	10		12		12				5	39
WB6ZVC	10	12			12	5				39
WA8PIM	10		12		12				5	39
W@BV	10	5	12		12					39
W1YNE	10	10	12	6						38
WA2CRW	10	10		12	6					38
W4IIQ	10	3	12		12			1		38
W6INH	10		12		12	4				38
WA8VYQ		10		12	12	1	3			38
VE3ARS	10		12		12		3			37
W3IN	10		12		12		3			37
K4EAC	10	3	12		12					37
WB4MIQ	10	10	9	3					5	37
K1EIC	1	5	3	12	12			2		36
WB4OJD	10	2	12		12					36
K2KTK	10	1	12		12					35
WB4OMG	10	10	12					3		35
WA@MNL	10	1	12		12					35
VE3AWF	10		12		12					34
VE3EXI	10		12		12					34
K1NAF		5		12	12				5	34
KA1KK	10		12		12					34
WA3BYC	10		12		12					34
K3OIO	10		12		12					34
W3OKN	10		12		12					34
WB4KSL	10		12		12					34
W4ZJY	10		12		12					34
WA5VIW	10		12		12					34
W6YBV	10		12		12					34
WB8ALU	10	3	9		12					34
WB8BZX	4	5		12	12	1				34
K8LGA	10		12		12					34
WA9VZM	10		12		12					34
WA@HTN	10		12		12					34
K@JSP	10		12		12					34
WA7MAD	10	2	12	9						33
WA3EXW	10	7			12		3			32
W4CS	10	5			12				5	32
W2BUN		5		12	12	3				32
WB8BLH	10	10			12					32
WB@AEM	10	10	12							32
WA3IYS	10		12		6		3			31
W8IZ	10		12		9					31
VE3DPO	10		12				3		5	30
WA1MEB		10		12	3				5	30
WB2IAE	10	2	6		12					30
K4KNP	10		8		12					30
W6DFF	10	5	12	3						30
W6LLT	10		3			17				30

dent to state police. Through the quick action of the amateurs, there were no injuries, although the extreme heat of the fire caused girders supporting the ramp to buckle. — *WB8BOT.*

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On the afternoon of Feb. 1, the weather bureau reported high winds moving toward Mississippi from Arkansas and Louisiana ahead of a cold front which might have spawned tornado activity. Hearing the warnings, WA5WEG reported to the state RACES frequency where several amateurs were already operating. WA5OHQ eventually confirmed the only serious report of damage. Seven persons had been killed in Gore Springs when their mobile home was hit by tornadic winds. A total of twelve amateurs participated in the emergency net. — *WA5WJD, SEC Mississippi.*

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HK1DEK/MM aboard a fishing vessel near San Andres Island, contacted W3EZT on Feb. 5 for assistance in administering to the needs of a stroke victim on the boat. W3EZT contacted the Washington Hospital Center and put them in contact with HK1DEK via phone patch. Information was exchanged, but no word on the outcome of the incident is available.

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At about 2030Z on Feb. 13, the Shawnee Co. Sheriff's Department in Topeka, Kans., contacted

W4IYT, SEC E. Fla., and W4RKH, SCM, W. Fla., have a friendly chat at the League Booth at the Miami Tropical Hamboree and Southeastern Division Convention.

units of the Red Cross Search and Rescue team to look for a missing child on a farm near Silver Lake. Among those to respond to the call were WØQNI, who took several disaster units to the search site, and WAØPOP, who summoned additional communications assistance on two-meter fm. Three additional station mobiled to the site. About two and one-half hours after the initial call, WAØSQN found the lost child and took him to the sheriff's command post that had been set up and the search was secured. – *WØQNI, EC Zone 4, Kansas.*

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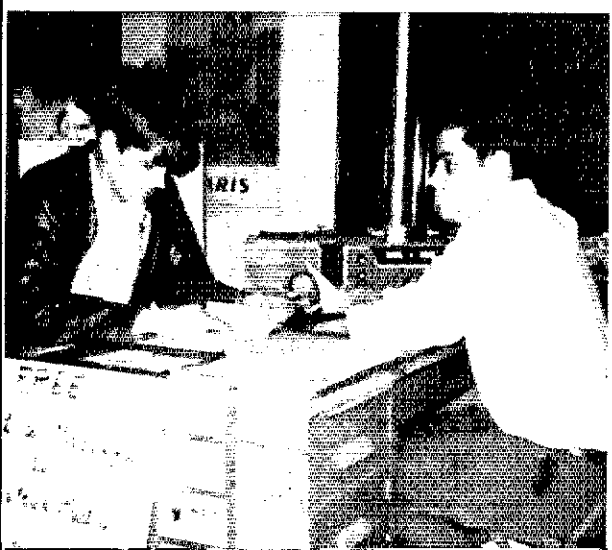
WN5DHK witnessed an accident on Feb. 14 while on a campout, in which a rider was thrown from his motocycle, sustaining severe leg injuries. Returning to camp, the accident was reported to WA5PEV who immediately raised W5NRJ on the local repeater and requested that an ambulance be sent from the nearby town of Tomball, Texas. The family of the injured party was also notified. While waiting for the ambulance, K5CNU, a Red Cross first aid instructor, was able to help the victim by fixing splints for the injured leg. – *WA5ABA, EC Harris Co., Texas.*



The Hamilton (Ont.) Amateur Radio Club began assisting the Burlington Christmas Bureau Dec. 5, in an effort to collect food, clothing and toys for underprivileged children in the area. As donations were telephoned to the Bureau's switchboard, amateur units were dispatched to make the pick-ups. In all 178 such pick-ups were accomplished with the thirteen amateurs and four SWL assistants taking part.– *VE3AYR, EC Halton-Wentworth, Ont.*

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Forty-six SEC reports were received during the month of December representing 15,750 AREC members. This is the high mark for 1970 in both categories. For the same month in 1969, 46 reports were also received, but slightly over 16,000 members were mentioned. Sections reporting: Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Kans, Ky, La, Mar, MDC, Mich, Miss, Mont, Nebr, Nev, NLI, NC, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, Que, SDgo, SF, SJV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WMass, WNY, WPa.

During all of 1970, a total of 511 SEC reports were received, a decrease of six from the previous year, but these were received from 57 different sections, four greater than 1969. Thirty-one sections had perfect reporting records for the year. They are: (figures in parentheses are the number of consecutive years of perfect reporting) EFla (19), SDak (11), Alta (9), Sask (6), Colo (5), EMass (5), Mont (5), Ark (4), Mar (4), Nebr (4), Que (4), SNJ (4), Utah (3), Nev (3), Tenn (3), WFla (3), Ariz (2), EPa (2), Ind (2), Iowa (2), Mich (2), NLI (2), Ohio (2), SF (2), Conn, NNJ, NTex, Okla, Ont, Org, WPa.

Traffic Talk

With the high price of postage (destined to be even higher, perhaps before this sees print), the delivery by mail of traffic which cannot be delivered by other means is cutting deeply into the budgets of many quantity traffic handlers. It is a problem with which most traffickers can readily sympathize. Let's say you are stuck with 100 messages for your end of the state, with no "takers." Not too far-fetched an example, especially if the traffic is old, or "junk" traffic originated at a fair or other solicitation facility. Either you mail it or discard it in the nearest wastebasket. Since the latter is unthinkable, the only alternative is to blow five bucks on delivering traffic the recipient may or may not want, may or may not have already received, or which may or may not be important enough to bother with. This, the victim may proclaim, is my reward for being conscientious.

W1MRW/1 was set up at church fair in Bethel, Vt., just before the Christmas holidays, handling traffic and demonstrating amateur radio to the many visitors. The two ops in the photo aren't identified, but it is probably safe to assume one of them is W1MRW.

In order to get around such difficulties, traffic people have resorted to various devices. Some simply refuse traffic destined for delivery by them which doesn't sound important. Some exercise various other selective restrictions, one of which is to refuse traffic without a telephone number included. Others attempt to deliver all traffic by telephone, calling collect for points outside their local calling area. What happens, then, to our tradition of responsibility and the ethic that all traffic be delivered by whatever means is available from the amateur nearest its destination?

It takes a beating, that's what. Some amateurs have even deserted the traffic game in disgust at the quality of some of the traffic and the expense of delivery. Judging by year-end-statistics, there have been more of these than we would like to see. After all, Western Union is going out of the written message business, why should we continue to engage in an obsolete practice? Telephone and TWX are used widely today, particularly the former, why don't we concentrate on phone patches and RTTY and forget about handling of written traffic that has to depend on the frailties of a human mind for transmission and reception accuracy?

But let's not get sidetracked. In an emergency situation we find that "exotic" facilities involving phone patches and radioteletype often are not available, and we are back to depending on human beings to transmit, copy, correctly transcribe and deliver written messages. As long as our function is primarily back-up and emergency, we are going to have to maintain such facilities at top efficiency as long as we can; thus, the phone and cw traffic handler is still essential, along with all the patching and RTTY facilities we can muster.

And so the above-mentioned problems of delivery remain unresolved. The rule remains, if you cannot hand the message to the addressee, can't phone it to him, can't give it to someone else to relay, it's your responsibility to mail it, regardless of how old it is or how meaningless it seems. You do *not* service the originating station that you don't want to deliver it because it's too much trouble or too expensive. If you don't intend delivering it if necessary, you shouldn't have accepted it in the first place. And if you are in a traffic net, you don't turn down traffic the NCS directs be sent to you.

As for telephoning collect, we have to conclude that this is an inimical practice. In too many cases it damages, rather than helps, our image. True, the addressee can always refuse the collect call, but nobody likes to be considered a cheapskate. Besides, human nature demands the satisfaction of curiosity in such cases. So the called party accepts the charge, only to find that the message is a simple greeting from some exhibit station, or is a week old and he has already heard from the originator, or is garbled beyond recognition – or any combination or all of these. Would he then feel kindly toward you and toward amateur radio? Of course he wouldn't feel any too kindly if he received the same message two days later by mail, either, but at least he wouldn't be out the price of a toll telephone call.

No, fellers and gals, let's handle the traffic as it comes. Let's not be picky and choosy. If you can't relay it or phone it, mail it. If you aren't willing to do this, don't take it; but don't report into a net and tell the NCS what you will or will not handle. He is the boss? if you aren't willing to follow his instructions, then you don't belong in the net. – *W1NJM.*

National Traffic System. W3NEM has issued 3RN certificates to *W3s* ATQ EFB EML EZT FA KUN LOS MPX NNL TN, *K3s* FSY HKK KTH LFD MVO OIO PIE, *WA3s* CKA EAW IPU LAK LMO. On 9RN, WB9ANT has received wallpaper from W9HRY. W9HJ has been officially appointed as the new TEN manager.

January reports.

Net	*Sessions*	*Traffic*	*Rate*	*Avg. Rep. (%)*	
1RN[1]	73	1266	.506	43.5	94.0
2RN	60	489	.724	8.2	98.0
3RN[1]	85	769	.500	9.0	95.3
4RN[1]	70	770	.397	11.0	94.6
RN5[1]	74	1393	.564	22.5	94.1
RN6	60	647	.453	10.8	100.0
RN7	58	252	.290	4.3	59.2
8RN[1]	74	899	.471	12.2	99.6
9RN[1]	84	859	.526	10.2	98.3
TEN	58	460	.494	8.0	74.6
ECN	60	261	.287	4.3	92.0
TWN	54	197	.198	3.7	61.0
PAN[1]	41	2924	1.524	71.3	97.5
CAN	30	945	.951	31.5	100.0
PAN[1]	43	1838	.937	44.1	100.0
TCC Eastern[1]	182[2]	1425			
TCC Central[1]	121[2]	924			
TCC Pacific[1]	171[2]	1521			
Sections	3308	18435		5.6	
Summary	4016	35818	EAN	19.1	
Record	3665	38538	1.590	18.6	

[1] 1971 SET information included.
[2] TCC functions not counted as net sessions.

Transcontinental Corps. January Reports

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	182	94.5	3805	1425
Central	121	97.5	1914	924
Pacific	171	98.2	3042	1521
Summary	*474*	*96.7*	*9761*	*3870*

The TCC Roster: Eastern Area (W3EML, Dir.) – *W1s* BIG EJI NJM, K1SSH, WA1JTM, *W2s* FR GKZ QC, K3K1K, *WA2s* BLV UWA, WB2RRK, W3EML, K3MVO, *WA3s* NEC SQQ UQ, K4KNP, *WB4s* GTS NNO, *W5s* PMJ RYP, K8KNQ, *WA8s* POS YVR, VE3ERU. Central Area (W9LCX, Dir.) – W4OGG, WB4KPE, W5MI, W9CXY, WA9VZM, WB9DPU, *W0s* HI INH LCX ZHN, KØAEM. *WA0s* DOU IAW. Pacific Area (W6VNQ, Dir.) – W5RE, *W6s* BGE BNX EOT IPW MLE MNY VZT, K6DYX, *WA6s* DEL EFA. *W7s* DZX EM KZ PI, KØJSP.

Independent Net Reports.

Net	*Sessions*	*Check-ins*	*Traffic*
Mike Farad E & I	26	403	228
Hit & Bounce/Morning Watch	31	415	894
EASN	28	103	127
Clearing House	26	401	202
20 Meter Interstate	21	486	1567
Northeast Traffic	32	348	685
All Service	8	109	63
North American 20 meter	26	536	408
ECTEN	34	389	146

QST

Strays

W7NUN and W7GNT claim the first 100 percent solid-state QSO, using 1-watt transistor transmitters and homebrew transistorized receivers on 7135 kHz at 1722 GMT October 31, 1968. Any challengers?

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Amateurs vacationing in Rome: IIDP works as a tourist guide in the Holy City. His address is Via Pandosia 43, 00183 Rome, Italy. Telephone 75 67 918 or 75 78 354.

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

ARRL Advisory Committees:

A Broader Opportunity for Membership Participation

IN 1968, the ARRL Board of Directors set up two advisory committees for a trial period of 18 months, to see whether this concept could be used to broaden membership participation in ARRL's decision-making process, especially as concerns specialties within our hobby. At the 1970 meeting, the Board refined the rules for these advisory committees, made them a permanent part of the League's structure, and added a committee on DX to the two already in existence: repeaters and contests.

The President chooses the committee members from among the names of ARRL Full Members who have been nominated by three or more Full Members. Nominations may be submitted at any time; a call for nominations is made in September *QST* each year. A file is maintained at headquarters of those who have been nominated, from which the President chooses replacements for those whose terms have expired, about November each year, or at other times when vacancies occur. A candidate who is not selected at a particular time is still eligible for later appointment.

Normally, advisory committeemen serve for two years, and may be appointed for a second term, but they have to take a year off after two consecutive terms before becoming eligible again. The chairman is designated by the President, too, and may serve for two consecutive one-year terms. Some of the appointments listed below are for only one year, to get the system established on a staggered basis.

By correspondence and perhaps over the air, advisory committeemen can talk over matters in their field which have been brought up by a committee member, forwarded for discussion from headquarters, assigned to the committee by the Board, or offered by a League member directly.

President Robert W. Denniston, WØDX, has announced the committee assignments for 1971 from among a great many names nominated by members. We'll take them, committee by committee, for brief introductions.

VHF Repeater Advisory Committee

Because the work of this committee is pending before FCC in Docket 18803 and before the Department of Communications in respect to trial rules for repeaters in Canada, WØDX has reappointed the entire group:

Chairman: Gilbert J. Kowols, W9BUB, 216 Belle Plaine Avenue, Park Ridge, Illinois 60068; two-year term.

Howard L. Lester, W2ODC, 8 Bath Street, Alplaus, N.Y. 12008; two years.

George D. Rose, Jr., W4GCE, 105 Middleboro Place, Lynchburg, Virginia 24502; one year.

George F. Munsch, W5VPQ, 11314 Janet Lee, San Antonio, Texas 78230; two years.

Jon J. O'Brien, W6GDO, 6605 Fifth Street, Rio Linda, California 95673; two years.

Arthur M. Gentry, W6MEP, 7832 Jellico Avenue, Northridge, California 91324; one year.

Jon Marcinko, W7FHZ, 26501 18th Place South, Kent, Washington 98031; one year.

Taylor Shreve, WØCXW, 1230 Valentia Street, Denver, Colorado 80220; one year.

H. H. Lang, VE3ADO, 12 Orchard Drive, Port Colborne, Ontario; one year.

Liaison Director: John R. Griggs, W6KW, 1273 13th Street, Baywood Park, San Luis Obispo, California 93401.

Staff Liaison: Edward P. Tilton, W1HDQ, 225 Main Street, Newington, Connecticut 06111.

Nominations on file: K1ABR, K2AQG, W2EUP, W2GHR, W2JTP, W3WLF, WA4LHK, WA5BPS, W6GCG, K6GSJ, K6MVH, W6NKR, W6NQJ, WA7BEU, K9VVL, WØLVJ, WAØUGW, KØYFR, VE3BUI

Biographical sketches on the reappointed committee members appeared in the March, 1969 issue of *QST*, page 62.

Contest Advisory Committee

President Denniston has reappointed three members and named six new members to the Contest Advisory Committee. Holdovers, who were also introduced in that March 1969 issue are:

Chairman Leonard Chertok, W3GRF, 8301 Temple Hills Road, Washington, DC 20031; two year terms.

Roger Corey, W1AX, 60 Warwick Drive, Westwood, Massachusetts 02090; two years.

Jack Ravenscroft, VE2NV, 353 Thornerest Avenue, Montreal 780, Quebec; one year.

New appointees are:

George W. Hippisley, Jr., K2KIR, 112 Kennedy Lane, North Syracuse, New York 13212; one year.

Bud is an old top-scoring hand at SS, Field Day, vhf QSO parties, and "CD Parties." Last year he made his first all-out try at the DX contest and placed fifth in the national rankings on cw. Licensed since 1954, Bud is an Extra Class licensee and a Life Member of ARRL.

Ronald Sigismonti, W3WJD, 790 Bridge Road, Rahns, Pennsylvania 19426; one year.

Sig is a member of the Frankford Radio Club and has been a consistent high scorer in Sweepstakes and the DX contest. In 1969 and 1970 he was part of the winning 5-transmitter-class Field Day entry of the Penn Wireless Association. First licensed in 1953, Sig now holds Extra Class; he's also closing in on 5 Band DXCC.

Kenneth Bay, W4UQ, 1925 Parkland Drive, Lynchburg, Virginia 24503; two years.

Ken has been active in sixteen consecutive Sweepstakes contests; the past ten DX tests, and

dozens of lesser frays. He holds DXCC, WAS, and WAC, the latter two endorsed for 80 meters; is active in the Intruder Watch; and has served over twelve years in the National Traffic System, currently as chairman of the Eastern Area Staff. Ken holds the Extra Class ticket and is a Charter Life Member of the League.

William Wortman, W5QNY, P.O. Box 305, Los Alamos, New Mexico 87544; one year.

Bill is another Extra Class licensee whose main love in amateur radio is contests. He's also been on the other end, having helped set up the 1970 New Mexico QSO Party. First licensed in 1957, Bill is an ORS and holds 5B-WAS No. 31.

Katashi Nose, KH6IJ, 4207 Huanui Street, Honolulu, Hawaii 96816; two years.

Nose's reputation for rat-a-tat-tat contest operation and to-the-point concise exchanges is also evidenced in his brief application for the committee post. "Licensed in 1932. Extra. Have been in many ARRL contests for a long time," is all he said! But there's a saying around Hq., "If you want to know how to work a contest, ask Katashi. Katashi Nose." (Sorry!)

Fred T. Deziel, WØHP, 2417 West 112th Street, Bloomington, Minnesota 55431; one year.

It all began in 1938 for Fred with the first amateur license. He's an active contester on phone and cw; for instance, in the 1970 DX test, he racked up Dakota Division firsts in both modes. He has both cw/phone and all-phone DXCCs, holds Extra Class, and is a member of the A-1 Operator Club.

Liaison Director: Victor C. Clark, W4KFC, 12927 Popes Head Road, Clifton, Virginia 22024.

Staff Liaison: Ellen White, W1YYM, 225 Main Street, Newington, Connecticut 06111.

Nominations on file: W1BGD, W1OOP, W1YRC, K1ZND, WA2BLV, W2FIF, W2LWI, W3DRD, W3WPG, K4IPW, K4BAI, K4POL, W5LEF, W6BHY, W6BIP, W6DQX, W6GEN, W6RR, W7SFA, W8BVF, W8JIN, WØBF, WAØCVS, WØPAN.

Retiring members: K2CPR, W4BRB, W6CUF, W8DB, W9RQM, WAØSDC – Congrats on a job well done!

DX Advisory Committee

The DX Advisory Committee was authorized by the 1970 Board meeting, and attracted nearly 30 nominations. Those chosen:

(Interim) Chairman: Robert Eshleman, W4QCW, 3716 Drakeshire Road, Richmond, Virginia 23234; two year term.

Bob is an avid DX chaser, and has worked all "countries" which are presently credited for DXCC except two on mixed modes, three on phone, and he nailed down 5B-DXCC number 1! He's been on the far end, too, at KC4AB, EA9EJ, and K4IA/KC4 and has been a winner in several DX contests. First licensed in 1950, Bob now holds the Extra Class ticket.

Edward L. Raub, Jr., W1RAN, 207 Thames Street, New London, Conn. 06320; two years.

Ned was first licensed in 1948, and has been DXCC for twenty years, now with 320 countries confirmed. He's been active in ARRL DX contests, too, from W1, DL4 and FP8 stations. Active in First Class CW Operators Club (FOC), he helped reorganize its administration. Ned was also an early advocate of 5B-DXCC, and holds Extra Class.

Ted M. Marks, WA2FQG, 35 Claire Court, West Babylon, New York 11704; one year.

Another Extra Class licensee, Ted is also over the 300 mark in DXCC; holds WAC, WPX, WAZ, DUF-4 and many other awards; and is QSL manager for ZS1AB, ZS3AB, and VP2KL. He's president of Suffolk County Radio Club and a member of RSGB, INDXA, and the Camel Drivers Radio Club. His first license was in 1959.

Robert B. Vallio, W6RGG, 18655 Sheffield Road, Castro Valley, California 94040; two years.

Bob was first licensed in 1952, holds the Extra, and started chasing DX in 1963. An Honor Roll member of DXCC, he's also organizationally minded – past president, past vice president, past director of the Northern California DX Club and trustee of its station W6TI; secretary and QSL Manager, Yasme Foundation. He was also picked as NCDXC DXer of the Year in 1970.

Norman G. Ray, W7LFA, 14005–132 Avenue NE, Kirkland, Washington 98033; two years.

The amateur background Norm brings to the DX Advisory Committee is quite broad. Of course it includes holding of DXCC, WAC, and WAZ, but it also includes Public Service awards, BPLs, past service as Phone Activities Manager, 20 years as committeeman for the annual Skagit hamfests, executive committeeman for the 1951 ARRL National Convention at Seattle, assistant director of the ARRL Northwestern Division and many et ceteras. He's been continuously active as an amateur since 1947 and holds the Advanced Class ticket.

J. O. Baumgardner, W8BF, 20470 Lorain Road, Fairview Park, Ohio 44126; one year.

First place in the DXCC Honor Roll is shared by 28 people on the mixed mode side, three on the phone-only side; W8BF appears in both places with 322 current, 345 all-time "countries." Orrie has been licensed since 1925, and holds the Advanced Class license. He's a member of the OOTC, past president of his local QCWA chapter, and past president of the Cleveland Wireless Association.

Robert E. Baird, W9NN, 524 Crestwood Avenue, Des Plaines, Illinois 60016; one year.

Bob is a founder of W9-DXCC, a charter member of QCWA, recipient of the 50-Year Award, a member of OOTC and of the A-1 Operator Club. He's a former OO and served on KV4AA's DX Committee in the '50s. He holds the Advanced Class license, and first had a ticket in 1920.

Clyde F. Norton, WØELA, 14 Westwood Circle, Minnetonka, Minnesota 55343; two years.

Another DXCC Honor Roll member, at 321/346 mixed, Clyde is an Extra Class licensee who has been hamming for more than 25 years. He's been on the pileup side of DXing too, as VS5ELA, Brunei (featured in February 1953 *QST*).

Morton Wolfson, VE3ACD, 305 Rosemary Road, Toronto 10, Ontario; one year.

Mort is president of the Canadian DX Association. His DXCC total stands at the 310 mark though he's been operating for a comparatively short time (1963). He's also been on Caribbean

(Continued on page 98)

Amateur Radio and the International Regulations

BY R. P. HAVILAND,* W3MR

A UNIQUE ASPECT of amateur radio is the fact that its existence as a radio service and its largely-personal characteristics are recognized by international treaty, so that it has status in international law. The specific provisions relating to amateur radio are contained in the "Radio Regulations," an annex to the International Telecommunication Convention.

Now, international law is a complex field, in which it is not easy to make precise statements, or, in many cases, to reconcile principle and practice. Fortunately, in telecommunication the principles and practices are very similar and usually identical. Therefore, it is possible to understand how the international treaties affect amateur radio by examining the specific provisions relating to amateur radio, i.e., the Radio Regulations.

One of the more important principles of international law is that a treaty overlies national laws. In effect, this means that the treaty provisions are an integral part of national law, and further that a conflicting element of national law is rendered void on the effective date of the treaty. If this principle is not followed, the specific national provision (or practice) is said to be "in derogation of the treaty." While such derogation does occur, it is most unusual in amateur radio itself. However, it is less unusual in actions which affect amateur radio.

Since treaty provisions overlie national law, they also form a basis for this law. One side effect is that proposals to modify national law may, in ignorance, be contrary to treaty provisions. Another is that it may, at times, be desirable to seek modifications of treaty provisions, often combined with change in national law. In any event, it appears that all amateurs should be familiar with the general provisions, just as they should be completely familiar with their national laws governing amateur radio. This familiarization is the purpose of this article.

Specific Application to Amateurs

In the following, the provisions of the existing Radio Regulations which specifically relate to amateur radio will be quoted and discussed. Some of the most important provisions relating to amateur radio are also set forth. In each case, the provision is that of the 1968 edition of the Radio Regulations, issued by the General Secretariat of the ITU, Geneva. The provisions are quoted exactly, and are identified by the same reference number shown in the 1968 edition.

In reading the provisions, it is well to keep in mind that there are differences in interpretation. In the U.S.A., the usual tendency, at least in the amateur field, is to make the interpretation on the basis that "what is not prohibited is allowed." In at least some other countries, the basis tends to be "that which is not specifically allowed is prohibited."

The fundamental limits of the Radio Regulations are given by:

2 *Telecommunication:* Any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, visual or other electromagnetic systems.

9 *Radiocommunication:* Telecommunication by means of radio waves.

7 *Radio Waves (or Hertzian Waves):* Electromagnetic waves of frequencies lower than 3000 Gc/s, propagated in space without artificial guide.

8 *Radio:* A general term applied to the use of radio waves.

In effect, these limit the Radio Regulations to radiated r.f. signals: there is an implicit assumption that signals can cross international boundaries, or affect signals intended to cross such boundaries, a concept basic to the formation of the ITU. Note that there are other, non-radio regulations which do not affect amateur radio.

The Regulations divide radiocommunications into categories called "Services." For amateur radio, the fundamental definition is given by:

78 *Amateur Service:* A service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

which is so important that it needs to be examined in detail.

This definition in the first place defines *who* an amateur is, by stating three qualifications. The first of these is interest in radio solely with a personal aim, and the second is that such interest is without a pecuniary basis. The nature of the due authorization, the third factor, is not stated, although a later paragraph, to be discussed, defines it. Presumably the first two of these factors form necessary and sufficient conditions for inclusion in the group "duly authorized," subject to some additional qualifications also discussed later: this is the interpretation followed by most, if not all, countries.

Secondly, RR78 also defines *what* an amateur does. Three factors are involved: self training, intercommunication, and technical investigations. These are linked by the word "and" — however, there can be a question as to whether all three must be present simultaneously or not. The usual practice seems to assume that "duly authorized" implies all three, but not necessarily simultaneously.

The inclusion of the word "intercommunication" is significant, especially since it is not included in other service definitions. It implies that

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amateurs communicate with amateurs. Such a restriction exists in the U.S. regulations, except for emergencies, tests and some special functions such as radio control, nets, and information bulletins; special authorization is also possible. This seems to be the usual pattern.

Licensing Requirements

One reason why the amateur service appears in the Radio Regulations is given by:

79 *Amateur Station:* A station in the amateur service.

21 *Station:* One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment necessary at one location for carrying on a radiocommunication service. Each station shall be classified by the service in which it operates permanently or temporarily.

725 1. (1) No transmitting station may be established or operated by a private person or by any enterprise without a licence issued by the government of the country to which the station in question is subject. (However, see Nos. 726 and 732.)

In other words, it has been agreed that all transmitting stations should be licensed, and since a majority of countries desired an amateur service, provisions for it were needed. Note that, internationally, only transmitting stations need to be licensed: however, some countries also require licenses for receiving equipment.

All license holders are subject to the following provisions:

722 The administrations bind themselves to take the necessary measures to prohibit and prevent:

723 a) The unauthorized interception of radiocommunications not intended for the general use of the public;

724 b) the divulgence of the contents, simple disclosure of the existence, publication or any use whatever, without authorization, of information of any nature whatever obtained by the interception of the radiocommunications mentioned in No. 723,

728 2. The holder of a licence is required to preserve the secrecy of telecommunication, as provided in Article 35 of the Convention. Moreover, the licence shall provide, specifically or by reference, that if the station includes a receiver, the interception of radiocommunication correspondence, other than that which the station is authorized to receive, is forbidden, and that in the case where such correspondence is involuntarily received, it shall not be reproduced, nor communicated to third parties, nor used for any purpose, and even its existence shall not be disclosed.

In addition, there are specific provisions for each service. For amateurs, this is given by Article 41, Paragraphs 1560 to 1567 inclusive. These provide:

1560 1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

This is the basis for the "banned countries list."

1561 2. (1) When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

1562 (2) The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

which form the basis for the third party agreements. A number of countries are very strict in their interpretation of third party traffic, and in their internal prohibitions of it. Many others follow the pattern of the U.S.A. The two paragraphs allow either to be followed for international traffic.

1563 3. (1) Any person operating the apparatus of an amateur station shall have proved that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. Administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 144 Mc/s.

which is also unique to amateur radio in that it requires *all* operators (at least below 144 MHz) to have code ability: other services allow "radiotelephone" licenses. Without attempting to comment on merit, it should be noted that a proposal to change national regulations to allow a "no-code" license is faulty if it does not recognize the international regulations.

The bases for each administration to prescribe license qualification requirements, and for power limits, are contained in:

1564 (2) Administrations shall take such measures as they judge necessary to verify the technical qualifications of any person operating the apparatus of an amateur station.

1565 4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to work.

In practice, power, frequency, method of frequency control and mode of modulation are usually considered in conditions of working.

There are also two additional provisions:

1566 5. (1) All the general rules of the Convention and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permit.

1567 (2) During the course of their transmissions, amateur stations shall transmit their call sign at short intervals.

The first confirms that amateur stations are subject to such general rules as secrecy, banning of false identifications, prohibition of class B emission, etc., and to such permissive actions as use of standard "Q" signals. The second is included to simplify monitoring identification.

Chart of Regions as Defined in Table of Frequency Allocations

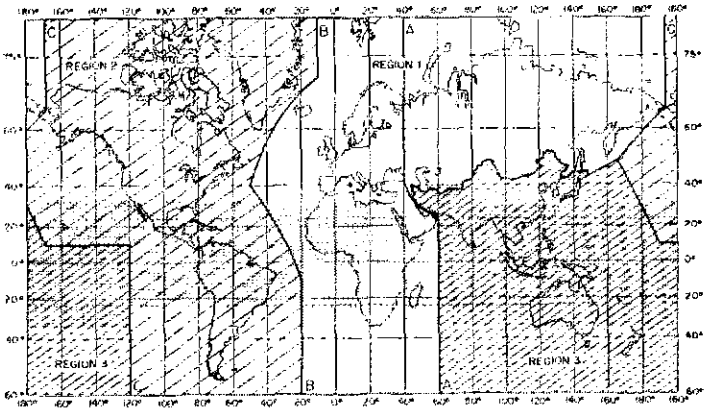

Fig. 1

The shaded part represents the Tropical Zone

Frequency Allocations

A license to operate a transmitter is without meaning unless frequencies are available for operation. Internationally, the process of making such frequencies available is called "allocation." A specific band of frequencies is allocated to a specific service, sometimes for "exclusive" use and sometimes for "sharing" with other services. The allocations are recorded in the "Table of Allocations." Nationally, one or more frequencies or frequency bands are then "assigned" to a station. In most countries assignments for a station are in accord with a frequency plan, which is usually set up by services, and which follows the international allocation. However, there are many differences in national practices and problems, both in communication needs and in assigned priority. As a result, the allocation table is complex, and usually, the national plan is even more complex.

The general rules relating the allocations and assignments are:

113 1. The Members and Associate Members of the Union agree that in assigning frequencies to stations which are capable of causing harmful interference to the services rendered by the stations of another country, such assignments are to be made in accordance with the Table of Frequency Allocations and other provisions of these Regulations.

115 3. Administrations of the Members and Associate Members of the Union shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations.

117 5. Where, in adjacent Regions or sub-Regions, a band of frequencies is allocated to different services of the same category (see Section II of Article 5), the basic principle is the equality of right to operate. Accordingly, the stations of each service in one Region or sub-Region must operate so as not to cause harmful interference to services in the other Regions or sub-Regions.

One effect of these is to allow assignments to vary from allocations, the intent being, however, that such variations do not cause harmful interference. There is also an implicit assumption that interference can and will occur: there are separate provisions as to the steps to be followed if such interference is harmful. For the operating amateur, the most important of these is the reporting of non-amateur signals in the amateur bands to the national organization. There is also a specific provision:

116 4. The frequency assigned to a station of a given service shall be separated from the limits of the band allocated to this service in such a way that, taking account of the frequency band assigned to a station, no harmful interference is caused to services to which frequency bands immediately adjoining are allocated.

which requires all services to observe band edges. The regions mentioned in Paragraph 117 are defined by geographical points, and are as shown in Fig. 1. The Americas are in Region II.

For a given band, allocations are made on a basis of a priority, defined by:

137 Where, in a box of the Table in Section IV of this Article, a band is indicated as allocated to more than one service, either on a worldwide or Regional basis, such services are listed in the following order:

a) services, the names of which are printed in "small capitals" (example: FIXED); these services are called "primary" services;

b) services the names of which are printed in "grotesque light" (example: Radiolocation); these are "permitted" services (see No. 138);

c) services, the names of which are printed in "italics" (example: *Mobile*); these are "secondary" services (see No. 139).

138 Permitted and primary services have equal rights, except that, in the preparation of frequency plans, the primary service, as compared with the permitted service, shall have prior choice of frequencies.

139 Stations of a secondary service:

a) shall not cause harmful interference to stations of primary or permitted services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

b) cannot claim protection from harmful interference from stations of a primary or permitted service to which frequencies are already assigned or may be assigned at a later date;

c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

There are also footnotes which apply to areas smaller than a region, or to a country, and which modify the general table only for the specified area or country. Certain bands may be exclusively allocated to a particular service: if allocations are not exclusive, stations of the same category have equal rights internationally. Nationally only one service may be allowed.

The complexity of the allocation tables may be seen by considering the 160-meter band:

Allocation to Services[1]

Region 1	Region 2	Region 3
1 605–2 000	1 605–1 800	1 605–1 800
FIXED	FIXED	FIXED
MOBILE exc aero mobile	MOBILE	MOBILE
	AERO	
	RADIONAV	
	Radiolocation	
194	1 800–2 000	
	AMATEUR	
	FIXED	
	MOBILE exc aero mobile	
	RADIONAV	
	198	

194 In Austria, Denmark, Finland, Ireland, *Netherlands, F.R. of Germany, Rhodesia and* Nyasaland, United Kingdom, Switzerland, Czechoslovakia, and the Union of South Africa and Territory of South West Africa, administrations may allocate up to 200 kc/s to their *amateur service within the band 1 715-2000* kc/s. However, when allocating bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighbouring countries, take *such steps as may be necessary to prevent* harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 watts.

198 In Region 2 the Loran system has priority. Other services to which the band is allocated may use any frequency in this band provided that they do not cause harmful interference to the Loran system.

In Region 3 the Loran system in any particular area operates either on 1 850 or 1 950 kc/s, the bands occupied being 1825-1875 kc/s and 1925-1975 kc/s respectively. Other services to which the band 1 800-2 000 kc/s is allocated may use any frequency therein on condition that no harmful interference is caused to the Loran system operating on 1 850 or 1 950 kc/s.

In Region 1, Footnote 194 governs for the specified countries: note the power limit and the requirement for coordination. There is no amateur allocation for other countries in the region.[2] In Regions 2 and 3, footnote 198 governs. This is the basis for power, time, frequency and geographical restrictions in this band.

The 80-meter band is also shared:

Region 1	Region 2	Region 3
3 500–3 800	3 500–4 000	3 500–3 900
AMATEUR		AMATEUR
FIXED	AMATEUR	FIXED
MOBILE exc aero mobile	FIXED	MOBILE 206 207
3 800–3 900		3 900–3 950
FIXED	MOBILE exc aero mobile	AERO MOBILE
AERO MOBILE		BROADCAST
LAND MOBILE		
3 900–3 950		3 950–4 000
AERO MOBILE		FIXED
3 950–4 000		BROADCAST
FIXED		
BROADCAST		

206 In Australia, the band 3 500-3 700 kc/s is allocated to the amateur service; the band 3 700-3 900 kc/s is allocated to the fixed and mobile services.

207 In India, the band 3 500-3 890 kc/s is allocated to the fixed and mobile services; the band *3 890-3 900 kc/s is allocated to the amateur* service.

The 40-meter band, internationally, includes two bands:

7 000–7 100	
	AMATEUR

Region 1	Region 2	Region 3
7 100–7 300	7 100–7 300	7 100–7 300
BROADCAST	AMATEUR	BROADCAST
212		

212 In the Union of South Africa and the Territory of South West Africa, the band 7100-7 150 kc/s is allocated to the amateur service.

which appears simple. However, most countries regard international shortwave broadcasting as a high priority matter, and some have not followed *the allocation table in their assignments. Such* actions led to a special resolution, the only one relating to amateur radio:

RESOLUTION No. 10

Relating to the Use of the Bands 7 000 to 7 100 kc/s and 7 100 to 7 300 kc/s by the Amateur Service and the Broadcasting Service

The Administrative Radio Conference, 1959,

considering

a) that the sharing of frequency bands by amateur, fixed and broadcasting services is undesirable and should be avoided;

b) that it is desirable to have world-wide exclusive allocations for these services in Band 7;

c) that the band 7 000 to 7 100 kc/s is allocated on a world-wide basis exclusively to the amateur service;

d) that the band 7 100 to 7 300 kc/s is allocated in Regions 1 and 3 to the broadcasting service and in Region 2 to the amateur service;

[1] In these reproductions of the table, only footnotes with direct bearing on the amateur service are shown.

[2] But a few other countries grant their amateurs 160-meter privileges and have asked to be added to the footnote.

resolves

that the broadcasting service should be prohibited from the band 7 000 to 7 100 kc/s and that broadcasting stations operating on frequencies in this band should cease such operation;

and noting

the provisions of No. 117 of the Radio Regulations;

further resolves

that inter-Regional amateur contacts should be only in the band 7 000 to 7 100 kc/s and that the administrations should make every effort to ensure that the broadcasting service in the band 7 100 to 7 300 kc/s, in Regions 1 and 3, does not cause interference to the amateur service in Region 2; such being consistent with the provisions of No. 117 of the Radio Regulations.

A resolution does not have the force of a numbered provision, but the first 100 kHz should be free of non-Amateur interference, and the remainder of the band should not have harmful interference. Because of its characteristics and high desirability this band continues to present a definite problem.

The 20-meter band is quite good from an amateur view, and 15 and 10 meters are ideal:

14 000–14 350
AMATEUR 218

21 000–21 450
AMATEUR

28 – 29.7 (MHz)
AMATEUR

218 In the U.S.S.R., the band 14 250-14 350 kc/s is also allocated to the fixed service.

World-wide exclusive allocations are, of course, greatly to be desired.

VHF and Up

The six-meter band is again not world-wide:

Region 1	Region 2	Region 3
47 – 68	50 – 54	
BROADCAST	AMATEUR	
238	246 247	

238 In Rhodesia and Nyasaland, the band 41-44 Mc/s is allocated to the fixed mobile and aeronautical radionavigation services; the bands 44-50 and 54-68 Mc/s are allocated to the fixed, mobile and broadcasting services; the band 50-54 Mc/s is allocated to the amateur service.

246 In Australia, the band 50-54 Mc/s is allocated to the fixed, mobile and broadcasting services; the band 56-58 Mc/s is allocated to the amateur service.

247 In New Zealand, the band 51-53 Mc/s is also allocated to the fixed and mobile services; the band 53-54 Mc/s is allocated to the fixed and mobile services.

and the two-meter band contains an interesting footnote:

144 – 146
AMATEUR 284A

146 – 149.9
FIXED
MOBILE exc aero mobile

146 – 148
AMATEUR

284A In the band 144-146 Mc/s, artificial satellites may be used by the amateur service.

which is the basis for nearly all of the amateur satellite experiments. Amateur use of other bands, specifically the 10-meter band, can and has been authorized under No. 115, quoted above, and it is presently planned that specific new provisions will be sought for all suitable bands.

In some of the remaining bands the amateur service becomes a permitted service:

216 – 223
AERO RDONAV
BROADCAST 301
223 – 235
AERO RDONAV
Fixed
Mobile

220 – 225
AMATEUR
RDOLOCAT'N

216 – 225
AERO RDONAV
Radiolocation

301 In Rhodesia and Nyasaland, the band 220-225 Mc/s is allocated to the amateur service.

420 – 430
FIXED
MOBILE exc aero mobile
Rdolocat'n
319
430 – 440
AMATEUR
RDOL'CN
319
440 – 450
FIXED
MOBILE exc aero mobile
Radiolocation
319

420 – 450
RADIOLOCATION
Amateur

319 In the United Kingdom, the band 420-450 Mc/s is allocated, on a primary basis to the radiolocation service and on a secondary basis to the amateur service.

1215 – 1300
RADIOLOCATION
Amateur

2 300 – 2 450
FIXED
Amateur
Mobile
Radiolocation

2 300 – 2 450
RADIOLOCATION
Amateur
Fixed
Mobile

3 300 – 3 400
RDOLOC'N

3 400 – 3 600
FIXED
MOBILE
COMM SAT
Radiolocation

3 300 – 3 400
RADIOLOCATION
Amateur

3 400 – 3 500
RADIOLOCATION
COMM SATELLITE
Amateur

5 650 – 5 670
RADIOLOCATION
Amateur

5 670 – 5 725 RADIOLOCATION *Amateur* *Space Research*		
5 725 – 5 850 RDOLOC'N COMM SAT *Amateur*	5 725 – 5 850 RADIOLOCATION *Amateur*	
5 850 – 5 925 FIXED MOBILE COMM SAT	5 850 – 5 925 RDOLOC'N *Amateur*	5 850 – 5 925 FIXED MOBILE COMM SAT *Radiolocation*
10 000 – 10 500 RADIOLOCATION *Amateur*		
21 – 22 (GHz) AMATEUR		

In the use of frequencies, there are some general restrictions, the important ones from the amateur view being:

693 1. All stations are forbidden to carry out:
– unnecessary transmissions;
– the transmission of superfluous signals and correspondence;
– the transmission of signals without identification (see Article 19).

694 2. All stations shall radiate only as much power as is necessary to ensure a satisfactory service.

722 The administrations bind themselves to take the necessary measures to prohibit and prevent:

723 a) the unauthorized interception of radiocommunications not intended for the general use of the public;

724 b) the divulgence of the contents, simple disclosure of the existence, publication or any use whatever, without authorization, of information of any nature whatever obtained by the interception of the radiocommunications mentioned in No. 723.

The remainder of the provisions relating to amateur radio cover identification:

735 1. (1) Transmissions without identification or with false identification are prohibited.

743 7. (1) All stations open to the international public correspondence service, all amateur stations, and other stations which are capable of causing harmful interference beyond the boundaries of the country to which they belong, shall have call signs from the international series allocated to each country as given in the Table of Allocation of Call Sign Series in No. 747.

Amateur and experimental stations.

772 21. (1) – one or two letters and a single digit (other than 0 or 1), followed by a group of not more than three letters.

773 (2) However, the prohibition of the use of the digits 0 and 1 does not apply to *amateur stations.*

The table of call signs gives the block of number-letter combinations allocated to various countries.

These comprise the regulations now in force. They will remain in force until about the end of the year 1972, or longer.

From time to time the regulations are revised, amended or simply extended. This is accomplished at a Radio Conference. Proposals for changes or additions are formally submitted to the conference by member countries of the ITU. These are acted on by groups of experts on frequency allocations, and legal, technical and operational aspects: they seek to combine the various proposals, making adjustments and compromises where necessary, and to secure a draft which will be generally acceptable. This draft is acted on by a smaller group having plenipotentiary (i.e., treaty making) powers, and who may accept, modify or return the draft for more work. In time, a final draft is prepared, which, on signature by the representatives, becomes the Final Acts. On ratification, this becomes a treaty. The process is involved, tedious, and occasionally, extremely formal.

Future Conference Preparation

In the past, conferences were scheduled every seven to ten years; each time the entire matter of the regulations was reopened. As the communication field grew, this procedure became more and more impractical because of the tremendous effort involved. More recently, conferences have been limited to a single service, such as the Maritime Mobile conference in 1967. The next conference scheduled is to consider Space Communications, and is scheduled to start in June, 1971.

Amateurs participate in the conference in three ways. The first is as members of national delegations. Here, they may be present as representatives of national amateur societies, and may serve as a spokesman for the delegation on amateur matters, or they may be present for other duties.

Amateurs are also present in their basic capacity as members of the ITU staff. E.g., the former Secretary General is an amateur, as is the present Director of the CCIR, ITU technical arm for radio. That they and other staff members are amateurs is purely incidental to their duties.

The final method of participation is as observers. The key group in this is the IARU, which is recognized by the ITU as an international organisation. Observers participate in working sessions of the conference, but do not have a voice in decision matters.

Overall, about five to ten percent of the attendees at a conference will either be active amateurs, or will have held an amateur license at one time.

One of the questions which the amateur service must face is the matter of changes in the regulations and allocations. There are two general thoughts about this. One is to leave well enough alone, the fear being that some undesirable feature may be added to any proposal during the complex process of preparing the Final Acts. The other is to seek modifications as found desirable and as opportunity permits. In view of the fact that all radio services are continually evolving, the second

(Continued on page 81)

Happenings of the Month

Western 160-Meter Subbands Shift
One-year Wait, Code Credit for Extra Proposed
NASA Approves Another Oscar
Canada Fases Reciprocity

SHIFTS IN 160 METERS

Amateur frequency assignments in the 160-meter band have been shifted by FCC to conform to changes in the Loran chain being effected by the Coast Guard. There is no loss of total kiloHertz in the band to any amateur station; in fact, some amateurs will gain in power privileges as a result of the switch. The table on page 77 becomes effective May 1, 1971.

TWO EXTRA CLASS PROPOSALS

FCC has issued a Notice of Proposed Rulemaking, Docket 19163, which incorporates two of the three Extra Class changes requested by the ARRL Board of Directors at its 1969 meeting: "Grandfathering" of old Extra Firsts toward today's Extra (but only for code credit) and reduction of the experience requirement for Extra to one year (from the present two years as Conditional or higher). The third request, for one-by-three calls (e.g. W1XYZ, K1XXX) for Extras who don't have the seniority for two-letter calls, has not yet been acted upon. The three League requests, RM 1590, 1591, and 1597, were paralleled by a petition filed by William K. Smith, WA3JHB, RM-1646.

In part, the Commission's notice reads:

". . . 4. A comparison of the present day and former examinations indicates that the level of difficulty of the Extra First Class license examination was far below that for the present Amateur Extra Class license. Since the period during which the Extra First Class license was originally available, the title of the license has been changed successively to "Class A" and then to "Advanced Class." Thus, without further examination, those former Extra First Class licensees who have kept renewing their licenses on time are now holders of Advanced Class licenses. When the Extra Class license was established in 1952, it was intended to be a new class, indicative of attainment of a level of achievement distinctly above that of any then existing or previously available amateur operator license. Therefore, it is determined that no credit should be given for the written portion of the examination. However, since the 20 word code test requirement remains unchanged from the earlier requisite, the Commission agrees that it is unfair to require eligible former holders of the Amateur Extra First Class license to again take the code test. Accordingly, the proposal in the attached Appendix would require those licensees seeking to receive credit for the 20 word per minute code requirement to establish that they held an Amateur Extra First Class license and have continued, without interruption, to hold its successor, the Advanced Class license. Authentication of a claim to having held the older Extra First Class license may present something of a problem and comments regarding this are invited. In general, copies of licenses, other official government documents or correspondence and other material giving a reasonably clear indication of the facts regarding the claim, are examples of the possibilities in this regard.

5. Both ARRL (in RM-1591) and Mr. Smith request that Section 97.9(a) of the Commission's Rules be modified to reduce the eligibility period for the Amateur Extra Class operator license from two years to one year. In support of their requests, the petitioners state that the two-year waiting period tends to decrease rather than increase interest in advancement to the Amateur Extra Class license because the licensees' sustained interest is dependent on rapid upward movement in rank. It appears that the two-year waiting period requirement for attainment of the Amateur Extra Class operator license may present an unwarranted deterrent to obtaining the higher class license. Adoption of the petitioners' request to reduce the waiting period to one year will achieve a continuing movement toward the goals set forth in Section 97.1 of the Commission's Rules and be consistent with the incentive licensing program in effect since August, 1967.

6. Accordingly, we propose to amend Sections 97.9(a) and 97.25 of the Rules as set forth in the attached Appendix. . . ."

APPENDIX

1. Part 97 of the Commission's Rules is proposed to be amended as follows:

97.9 (a) *Amateur Extra Class.* Any citizen or national of the United States who either (1) any time prior to receipt of his application by the Commission has held for at least one year an amateur operator license of other than the Novice or Technician Class, issued by any agency of the United States government, or submits proof that he held for a period of one year an amateur operator license at least equivalent to a General Class license issued by a foreign government, or (2) submits evidence of having held a valid amateur radio station or operator license issued by any agency of the U.S. Government during or prior to April 1917.

97.25 Examination credit. . . . (d) An applicant for the Amateur Extra Class operator license will be given credit for examination element 1(C) if he so requests and submits evidence of having held the Amateur Extra First Class license, having continuously held its successor licenses and currently holding an amateur operator license of the Advanced Class.

Comments may be filed by any interested party until June 1, and replies to the comments of others until June 18. As usual, the order calls for "an original and 14 copies," but in amateur matters FCC usually accepts even single copies as "informal comments," and adds them to the docket.

SHIFTS IN 160 METERS

Maximum DC plate input power in watts

Area	*1800-1825 kc/s Day/Night*	*1825-1850 kc/s Day/Night*	*1850-1875 kc/s Day/Night*	*1875-1900 kc/s Day/Night*	*1900-1925 kc/s Day/Night*	*1925-1950 kc/s Day/Night*	*1950-1975 kc/s Day/Night*	*1975-2000 kc/s Day/Night*
Alabama	500/100	100/25	0	0	0	0	100/25	500/100
Alaska	1000/200	500/100	500/100	100/25	0	0	0	0
Arizona	1000/200	500/100	500/100	0	0	0	0	0
Arkansas	1000/200	500/100	100/25	0	0	100/25	100/25	500/100
California	1000/200	500/100	500/100	100/25	0	0	0	0
Colorado	1000/200	500/100	200/50	0	0	0	0	200/50
Connecticut	500/100	100/25	0	0	0	0	0	0
Delaware	500/100	100/25	0	0	0	0	0	100/25
District of Columbia	500/100	100/25	0	0	0	0	0	100/25
Florida	500/100	100/25	0	0	0	0	100/25	500/100
Georgia	500/100	100/25	0	0	0	0	0	200/50
Hawaii	0	0	0	0	200/50	100/25	100/25	500/100
Idaho	1000/200	500/100	500/100	100/25	100/25	100/25	100/25	500/100
Illinois	1000/200	500/100	100/25	0	0	0	0	200/50
Indiana	1000/200	500/100	100/25	0	0	0	0	200/50
Iowa	1000/200	500/100	200/50	0	0	100/25	100/25	500/100
Kansas	1000/200	500/100	100/25	0	0	100/25	100/25	500/100
Kentucky	1000/200	500/100	100/25	0	0	0	0	200/50
Louisiana	500/100	100/25	0	0	0	0	100/25	500/100
Maine	500/100	100/25	0	0	0	0	0	0
Maryland	500/100	100/25	0	0	0	0	0	100/25
Massachusetts	500/100	100/25	0	0	0	0	0	0
Michigan	1000/200	500/100	100/25	0	0	0	0	100/25
Minnesota	1000/200	500/100	500/100	100/25	100/25	100/25	100/25	500/100
Mississippi	500/100	100/25	0	0	0	0	100/25	500/100
Missouri	1000/200	500/100	100/25	0	0	100/25	100/25	500/100
Montana	1000/200	500/100	500/100	100/25	100/25	100/25	100/25	500/100
Nebraska	1000/200	500/100	200/50	0	0	100/25	100/25	500/100
Nevada	1000/200	500/100	500/100	100/25	0	0	0	0
New Hampshire	500/100	100/25	0	0	0	0	0	0
New Jersey	500/100	100/25	0	0	0	0	0	0
New Mexico	1000/200	500/100	100/25	0	0	100/25	500/100	1000/200
New York	500/100	100/25	0	0	0	0	0	0
North Carolina	500/100	100/25	0	0	0	0	0	100/25
North Dakota	1000/200	500/100	500/100	100/25	100/25	100/25	100/25	500/100
Ohio	1000/200	500/200	100/25	0	0	0	0	100/25
Oklahoma	1000/200	500/100	100/25	0	0	100/25	100/25	500/100
Oregon	1000/200	500/100	500/100	100/25	0	0	0	0
Pennsylvania	500/100	100/25	0	0	0	0	0	0
Rhode Island	500/100	100/25	0	0	0	0	0	0
South Carolina	500/100	100/25	0	0	0	0	0	200/50
South Dakota	1000/500	500/100	500/100	100/25	100/25	100/25	100/25	500/100
Tennessee	1000/200	500/100	200/25	0	0	0	0	200/50
Texas	500/100	100/25	0	0	0	0	0	200/50
Utah	1000/200	500/100	500/100	100/25	100/25	0	0	100/25
Vermont	500/100	100/25	0	0	0	0	0	0
Virginia	500/100	100/25	0	0	0	0	0	100/25
Washington	1000/200	500/100	500/100	100/25	0	0	0	0
West Virginia	1000/200	500/100	100/25	0	0	0	0	100/25
Wisconsin	1000/200	500/100	200/50	0	0	0	0	200/50
Wyoming	1000/200	500/100	500/100	100/25	100/25	0	0	200/50
Puerto Rico	500/100	100/25	0	0	0	0	0	200/50
Virgin Islands	500/100	100/25	0	0	0	0	0	200/50
Swan Island	500/100	100/25	0	0	0	0	100/25	500/100
Serrana Bank	500/100	100/25	0	0	0	0	100/25	500/100
Roncador Key	500/100	100/25	0	0	0	0	100/25	500/100
Navassa Island	500/100	100/25	0	0	0	0	0	200/50
Baker, Canton, Enderbury, Howland	100/25	0	0	100/25	100/25	0	0	100/25
Guam, Johnston, Midway	0	0	0	0	100/25	0	0	100/25
American Samoa	200/50	0	0	200/50	200/50	0	0	200/50
Wake	100/25	0	0	100/25	0	0	0	0
Palmyra, Jarvis	0	0	0	0	200/50	0	0	200/50

CANADA EASES RECIPROCITY

Canada – already one of the most liberal countries in respect to reciprocal licensing – has further relaxed its rules and procedures. Citizens of any British Commonwealth country who are licensed amateurs of that country are eligible now for reciprocity in Canada unless there is evidence that the country does *not* grant privileges to Canadians. Citizens of non-Commonwealth countries continue to be eligible "If we are satisfied that reciprocity exists, through formal or informal arrangements. . ."

If a Canadian permanently resident in some other country holds a license in the place where he lives, he may have temporary privileges when he visits Canada, provided that reciprocity exists. In other words, the Canadian doesn't have to go through the licensing process during a short visit home, but instead may operate as a visitor would.

CIVIL AIR PATROL GETS RTTY

Section 87.513 (a) of the FCC Rules for aviation services have been amended to permit F1 (radioteleprinter) emission on 2372.5 kHz with 400 watts maximum power. Previously, only A3A and A3J (single sideband voice) had been authorized. The new rule was requested by CAP hq and was agreed upon by the Interdepartment Radio Advisory Committee (IRAC); it's effective March 24, 1971.

NASA APPROVES A-O-B LAUNCH

The National Aeronautics and Space Administration has announced approval of a request by the Radio Amateur Satellite Corporation (Amsat) for the launch of the Amsat-Oscar B (which, upon achieving orbit, would probably be redesignated Oscar 6). In its request, Amsat cited the following contributions A-O-B could make: demonstration of small ground stations with communications satellites; the usefulness of low orbits; educational and training benefits of amateur satellites. For amateurs, of course, the next Oscar could make available DX capability on the 144 and 420 MHz bands, and expand coverage for traffic handling, contesting, and the like. (A discussion of A-O-B's possible makeup appeared on page 58 of last month's *QST*).

Here is the text of the NASA statement:

This is in response to the Amsat proposal of 25 August, 1970, requesting NASA's assistance in launching the Amsat-Oscar B (A-O-B) radio amateur satellite as a secondary payload. The proposal is acceptable and NASA will undertake to launch the A-O-B satellite as a secondary payload subject to the following conditions:

1. Identification of a scheduled mission with excess payload capacity.
2. Demonstrated reliability in methods of ground control over satellite radio emissions.
3. Assurance that there will be no interference with the primary payload.

To satisfy the second condition, we will require a technical evaluation by Goddard Space Flight Center of the communications, command, and control systems planned for the A-O-B satellite. Therefore, you are requested to submit to this office detailed design information on these systems at your earliest convenience along with a description of the test program you propose to follow.

As with the Australis-Oscar 5, the approval to launch the A-O-B is confined to the specific mission described in your proposal. At the completion of this mission, you should submit a formal report to this office covering all significant results of the experiment program. It is hoped that a specific mission to launch the A-O-B satellite can be identified shortly and that your undertaking will be an unqualified success.

RAY BIRREN, W9MSG

It is with sincere regret we report the death of Ray Birren, W9MSG, on November 25, 1970, at the age of 54. Ray has been manager of the ARRL 9th call area QSL Bureau since 1961. First licensed when he was 13, W9MSG was a past president of the Chicago Radio Traffic Association, a collector of antique radio gear, and a willing helper of newcomers to amateur radio. He is survived by his wife Lee and daughter Marion.

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The work of the bureau will be carried on through the Northern Illinois DX Association, though details are not yet complete. The address remains the same: Box 519, Elmhurst, Illinois 60126.

GOLDWATER BILL FILED AGAIN

Senator Barry Goldwater's bill to allow aliens (who have declared their intentions of becoming citizens) to receive amateur radio licenses from FCC did not quite make it through the "lame duck" session of the Congress last year. It has been reintroduced this year by K7UGA and is co-sponsored by 29 additional Senators; the number of the bill is S. 485. The text is identical to that which passed the Senate and was approved by a House subcommittee on the last try.

COVER PLAQUES FOR 1970

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

Winners of 1970 plaques were:

January: "Transistor Module for SSB Transceivers," by Guy M. Gillet, ON5FE

February: "Equipment Modification for the Blind," by A. E. Schwaneke, WØGS

March: "An Engineer's Ham-Band Receiver," by Rudolf Fischer, DL6WD

April: "The Mainline ST-3 RTTY Demodulator," by Irvin M. Hoff, W6FFC

May: "The Two-Meter QRP Mountain Topper," by Richard Preiss, W7HCV

June: "Slow-Scan TV Viewing Adapter for Oscilloscopes," by Bill Briles, W7ABW, and Robert Gervenack, W7FEN

July: "W8JK 5-Band Rotary Beam Antenna," by John Kraus, W8JK

August: "Short Antennas for the Lower Frequencies," by Yardley Beers, WØJF

A luncheon was held recently at which Jim Lawson, W2PV, was presented the *QST* "Cover Plaque Award." The award, which was presented by ARRL Hudson Division Assistant Director Howard Lester, W2ODC, was in recognition of the outstanding article in November *QST* on the theory of inverted vee antennas and a practical wideband two-band inverted vee. Present at the luncheon were officers and members of the Albany Amateur Radio Club and the Schenectady Amateur Radio Club. In the picture, Jim, at center, is accepting congratulations from Howard L. Lester, W2ODC, with Ray Albers, President of the Schenectady club, holding the plaque.

September: "Automatic Amplifier Tuning," by Frank Walsmith, W8PHR
October: "A Frequency Counter for the Amateur Station," by Kenneth Macleish, W1EO
November: "160/80/75-Meter Broad-Band Inverted-V Antenna," by James L. Lawson, W2PV
December: "A Second-Generation MOSFET Receiver," by Wes Hayward, W7ZOI

Have *you* a project which would make a good *QST* story?We have a technical editing staff who can pretty up the words, should they need it – ideas are more important for *QST* articles than a finished writing job.

An annual award is made, too, for a major contribution to the technical side of amateur radio – The ARRL Technical Merit Award. The 1969 Award, by the Board at its May 1970 meeting, was to William L. Smith, W3GKP, and Paul M. Wilson, W4HHK, for advancing the frontiers of amateur moonbounce communication to the 2300 MHz band.

Nominations for the 1970 Award may be sent by any person directly to the chairman of the Merit and Awards Committee, Honorary Vice President Wayland M. Groves, W5NW, 1406 West 12th Street, Odessa, Texas, preferably before April 15, 1971.

KUDOS FOR TVI WORK

Mr. Francis C. South, W3AIR, Chairman, Washington TVI Committee, recently received the following letter from FCC:

The Engineer in Charge of the Commission's Washington District Office, Harold R. Richman, has on occasion made available to me formal and informal reviews of the activities of the Washington Television Interference Committee. I have over the years prior to and since my tenure as Chief of the Field Engineering Bureau followed with keen interest the numerous projects and accomplishments with which the WTVIC has been identified.

It is indeed gratifying to know of the continuing nature of this volunteer work in affording amateur and television viewer protection and prompt relief from the effects of TVI.

The unbroken string of regularly scheduled meetings the WTVIC has held since 1952 has no doubt served as a cohesive bond to hold your working group "in the ready" to anticipate and effectively cope with eventualities. This long term constancy in itself sets an enviable record. I feel that the constructive and cooperative attitude of your people is in large part responsible for the present relatively uncomplicated and stable nature of the Amateur TVI situation in the Washington, D. C. metropolitan area.

Keep up the good work. The Commission as a whole and this Bureau in particular is highly appreciative of such unselfish and dedicated "helping hands" extended in service to fellow amateurs and TV viewers. The end result for the radio amateur individually, is certain to be a more relaxed and congenial atmosphere in which to enjoy his hobby while retaining the good will of his neighbor.

My staff and I extend to you and your group our thanks and congratulations on the eve of the 19th Anniversary of the founding of the Washington TVI Committee. *Curtis B. Plummer, Chief, Field Engineering Bureau, FCC.*

CARDIOGRAMS BY RADIO

Dr. Earl E. Weston, W8BXO, reports in the March-April issue of the Medical Amateur Radio Council (MARCO) *Bulletin* on the transmission of two electrocardiograms from Glen Eschtruth, M.D. at 9Q5GE in the Congo to W8BXO, some 7000 miles. The carrier at 21,385 kHz was frequency-modulated by a 1700 Hertz tone, fed by the same sort of e.c.g. equipment which is used with landline telephones. The landmark transmission took place on December 16, 1970 – another outstanding accomplishment for amateur radio!

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MARCO will hold its annual meeting on June 24 during the AMA Convention at Atlantic City, NJ. WB4SVR will be operating /2 from the Traymore Hotel June 21-24. Details from J. J. Boris, Box 229, Manchester, CT 06040.

EVERETT HENRY, W3BG, RETIRES

Everett Henry, W3BG, since 1966 Chief of the Amateur and Citizens Radio Division, retired from government service on February 16, 1971. Ev joined the Commission staff in 1938 as a field radio inspector. He was employed in private industry from 1945 to 1948, and then returned to FCC. From 1953 to 1956, he was engineering

assistant to then-Commissioner Edward M. Webster, and in 1957 was named assistant chief for engineering, Office of Opinions and Review. From 1960 until 1966 he was chief of the Marine Radio Division.

Ev is a native of Corvallis, Oregon, took a B.S. degree from the University of Washington in 1930, and spent time as an operator at sea and as a broadcast engineer before joining FCC. He previously held the call W7BR. Retiring to California, he'll soon be signing W6AP.

CONVENTION NOTES

Gremlins got into our printing process somehow, and the Rocky Mountain Division Convention was inadvertently left out of "Coming Conventions" in February and March *QSTs*. It's June 19-20, at Colorado Springs.

On the other hand, the sponsors of conventions at Grand Rapids, Michigan, and Richmond, Virginia, had to call off the conventions scheduled respectively for April 16-17 and October 9-10, 1971.

EXAM CHANGE AT NORFOLK

The FCC office in Norfolk, Virginia now conducts General, Advanced and Extra Class examinations only at 9 a.m. on Thursdays; no appointment is required. The office will also conduct exams May 5-6, August 11-13, and November 3-4 at Winston-Salem, N.C.; June 2 and December 1 at Wilmington, N.C.; April 7 and October 6 at Salem, Virginia. Advanced application on Form 610 is required for examination at these cities; a check or money order for $9 must be enclosed with the application.

Examinations are conducted in other parts of the country in accordance with the schedule shown on page 75, February *QST*.

AMATEUR RADIO WEEKS

Massachusetts has picked June 13-19 as amateur radio week in the Commonwealth. Governor Francis W. Sargent's proclamation mentions developments in electronics, disaster communications, and Civil Defense work as accomplishments of the radio amateur.

Kentucky settled on May 1-9, 1971, for its observance. In his proclamation, Governor Louis B. Nunn mentions the same points and adds the promotion of international understanding and goodwill.

Where local conditions do not dictate a choice of a specific week, amateurs seeking proclamations by mayors and governors should pick June 21-27, 1971, to coincide with the listing in *Chases' Calendar of Annual Events*, the authority in such matters.

EXECUTIVE COMMITTEE MINUTES

No. 333 *February 27, 1971*

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., was called to order at 9:10 a.m. February 27, 1971, at the headquarters offices of the League in Newington, Conn. Present: President Robert W. Denniston, WØDX, in the chair; First Vice President Charles G. Compton, WØBUO; Directors Victor C. Clark, W4KFC, Harry J. Dannals, W2TUK, Noel B. Eaton, VE3CJ, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Also present were General Counsel Robert M. Booth, Jr., W3PS, Assistant General Manager Richard L. Baldwin, W1RU, Dakota Division Director Larry J. Shima, WØPAN, and New England Division Director Robert York Chapman, W1QV.

On motion of Mr. Clark, affiliation was unanimously GRANTED to the following societies: Connecticut Yankee Amateur Radio Club, Marlborough, CT; Delta County Amateur Radio Society, Gladstone, MI; Divine Heart Seminary Radio Club, Donaldson, IN; Kearny Amateur Radio Club, Kearny, NJ; Lincoln High School Amateur Radio Club, Manitowoc, WI; Nashville Amateur Radio Explorer Post 15, Nashville, TN; New York City Repeater Association, Inc., Staten Island, NY; Northern California Contest Club, Santa Clara, CA; The Northeast Mississippi Amateur Radio Association, Ripley, MS; Pennsylvania Amateur Radio Club (PENNARC), Glenside, PA; Pioneer Valley Repeater Assn., Manchester, CT; Southwest Minnesota Amateur Radio Association, Fairmont, MN; Sterling Park Amateur Radio Club, Sterling, VA; Syracuse University Amateur Radio Club, Syracuse, NY; Teaneck PAL Radio Club, Teaneck, NJ; TRW Systems Amateur Radio Club, Redondo Beach, CA; Twin City DX Association, Minnetonka, MN; UCLA Health Sciences Radio Club, Los Angeles, CA; Valley High School Amateur Radio Club, New Kensington, PA; Wenoca Twin City Amateur Radio Club, Winston-Salem, NC; West Palm Beach Amateur Radio Club, Inc., West Palm Beach, FL.

On motion of Mr. Eaton, in ratification of earlier mail actions, unanimously VOTED to grant approval for the holding of a Great Lakes Division Convention in Muskegon, Michigan, March 26-27, 1971; a Virginia State Convention in Vinton, May 22-23, 1971; a West Virginia State Convention in Jackson's Mill, July 3-4, 1971; and a Dakota Division Convention in Sioux Falls, South Dakota, October 9, 1971; and further to approve the holding of a Northwestern Division Convention in Tacoma, Washington, August 21-23, 1972.

Behind the scenes for Pennsylvania ham plates is this crew: Paul Hay, Director of Motor Vehicles (left); Elna Hoaglund, specialist in amateur plates; Arthur Grove, in charge of special plates. *(Photo thanks to David L. Heller, K3HNP)*

On motion of Mr. Thurston, Life Membership in the League was unanimously GRANTED the following applicants: Emile F. Alline, Jr., WA5WUJ; James H. Barrows, W7BCT; Jules Beaudoin, W1GPY; F. Arnold Beaver, W3BIH; Walter H. Boynton, W1AYI; Hugh Cassidy, WA6AUD; John Denis Catalano, WØKFR; James A. Chappell, Jr., WA3AEC; Henry R. Chipman, W2AUK/5; Joel E. Clark, W7EPA; Eldred J. Daigre, W5ILR; Robert M. Darst, W8CMC; Robert E. Dickerson, Jr., WA8DON; Herman Diebler, W2ERZ; Charles K. Epps, K4BVD; David L. Fayman, WØGI; Arthur H. Feller, WB2GFV; Clive Frazier, K9FWF; Gerald L. Hall, K1PLP; Henry W. Hall, Jr., K5FPJ; Richard H. Harris, WA5VKJ; Harold J. Hebert, W8FAR; Edward A. Heller, W8ADH; Ben Hillis, W5YEK; H. Richard Holmes, Jr., W4FGI; Joseph H. Hussey, W8RIK; Daniel D. Jernigan, K8VXD; David W. Johnson, WAØVLB; Robert M. Kelley, WØBW; Don Kelly, WA6ZMT; Robert J. King, K7GUZ; Francis G. Klanka, K2IYF; John J. LoRe, W2FDK; Roberto Luis Matos, K2DQL; Robert L. Mayhercy, K9CFT; Fred J. Merry, W2GN; John E. Montague, K6PXQ; Edgar A. Naratil, W3BNR; LaVerne C. Nelson, W7BJ; Frederick D. Niswander, WA8VRB; Charles J. Nobes, K8UTY; Louis E. Pfeifer, Jr., K8COU/W2CDS; Joseph F. Poges, W1FED; Thomas H. Raymond, W5NJD; Robert L. Reifsteck, K2LZG; Raymond Reuland, WB2HWP/YV1; Glenn L. Ricketson, K8LOY; James L. Russell, W8BU; Timothy C. Russell, VE3WL; Paul D. Schrader, W4BCV; A. O. Shaw, W7GPB; Harvey Shore, K6FXO; Seppo Siren, OH3XP; Dale Skoog, K4JJR; Dave Soldan, WAØMLE; Charles F. Spitz, W4API; Robert M. Summers, KØBXF; Otto J. Supliski, WB2SLQ; John H. Swafford, W4HU; Faber Tan, WB6QGL; Douglas H. Tidwell, Jr., K4UUW; Harold C. Todd, W7ZXM; Gene F. Tomlinson, W1OQC; James L. Trout, W8GGK; Ralph E. Tyrrell, W1TFS; Gene W. Wilkerson, WB2FIL.

The Committee next examined, at considerable length, the newly-issued FCC proposals calling for expansion of the voice subbands; inasmuch as the comment date set is well after the annual meeting of the Board, no action was felt necessary, but the Committee requested the General Manager to obtain as wide and as rapid dissemination as possible so that League members and other amateurs would have full opportunity, after appropriate study, to express their views both to ARRL directors and to the Commission directly.

After examination of a proposal from the Radio Amateur Satellite Corporation (AMSAT), on motion of Mr. Clark, unanimously VOTED that the General Manager is authorized to reimburse Amsat for various administrative expenditures during 1971, but not to exceed $3,000.

The Committee was in recess for luncheon from 12:30 to 1:00 p.m.

On motion of Mr. Thurston, unanimously VOTED to instruct the General Counsel to file League comment in support of the general intent of the proposal in Docket 19110 for additional RTTY speeds, but to urge the Federal Communications Commission to remove existing restrictions on permitted speeds and types of codes so that amateur developmental work with this mode might proceed without such limitations.

On motion of Mr. Compton, after discussion, unanimously VOTED to instruct the General Counsel immediately to file comment of the League strongly in opposition to the petition of the Electronics Industries Association seeking reassignment of a portion of the amateur 220-MHz band to the Citizens Radio Service.

There being no further business, the Committee adjourned, at 3:45 p.m.

(During the course of its meeting the Committee discussed, without formal action, ARRL and IARU representation at the forthcoming space conference, participation in an IARU exhibit of amateur space activities at an exhibition during said conference, various DXpeditions, the new youth film, "This is Ham Radio," malicious interference to amateur nets, the new Goldwater bill for licensing immigrants, and proposed measurement standards for amateur equipment issued by the Electronics Industries Association.)

Respectfully submitted,
JOHN HUNTOON, W1RW
Secretary

AR and the International Regulations

(Continued from page 75)

seems to be the best, recognizing that it must involve considerable preparatory work, and that a formal proposal should not be made until it is evident that key delegations will support it.

As noted by W4BW,[3] development of satellite and cable communications is reducing the pressure on the hf bands. In time, this may allow adjustment of the allocations for the 160-, 80-, 40- and 6-meter bands, bringing these to the pattern of the 20- or even the 15-meter bands. As BW says, eventually it may be possible to think of new bands.

The regulations tend to be a reflection of tested practices. At present it appears that there are two provisions which might be desirable additions to the regulations. The first would relate to the status, rights (and duties) of amateur stations in times of great distress, such as the Alaskan and Peruvian earthquakes. The second would be more formal recognition of the existence of reciprocal licensing, through agreements of two or more countries.

Opportunities for small adjustments arise at each of the conferences. At some conferences the scope is such as to include the Amateur Service as an element of the conference agenda, as for example the upcoming space conference. Therefore, continued participation by the national societies and the IARU is needed.

3 Walker, "Mandatory Considerations Relative to Expansion of American Phone Bands," *QST*, Sept. 1970.

Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for two dollars postpaid. Titled Fifty Years of ARRL, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic 200 Meters and Down, a reprint of which is also available from the ARRL for two dollars.

Phone Subband Expansion Proposed

THE FEDERAL COMMUNICATIONS Commission has issued a Notice of Proposed Rulemaking, Docket No. 19162, which looks toward expansion of the phone suballocations in the 80 through 10 meter bands; reduction of the Extra Class cw subbands to 10 kHz each; shifting two Novice cw bands; and creation of a new Novice cw allocation at 28,15-28,25 MHz. A quick summary of the proposed allocations by license class looks like this:

Extra Only: 3750-3775, 7150-7175, 14,150-14,175, 21,200-21,225, 28,350-28,375 phone; 3500-3510, 7000-7010, 14,000-14,010, 21,000-21,010 kHz, cw.

Extra and Advanced Only: 3775-3875, 7175-7225, 14,175-14,250, 21,225-21,325, 28,375-28,500 plus, for interregional contacts only, 7075-7100 kHz, all for phone.

General, Conditional and higher: 3875-4000, 7225-7300, 14,250-14,350, 21,325-21,450 and 28,500-29,700 kHz, phone.

Novice: 3700-3750, 7100-7150 21,100-21,200 and 28,150-28,250 kHz, all cw.

There are some special rules for U.S. amateurs including Novices outside Region 2. No changes are proposed to the 160-meter band (but see separate story for geographical changes effective May 1) or to frequencies above 50 MHz.

The proposals in Docket 19162 were triggered by 15 petitions, ***none*** of them by ARRL; fourteen proposed expansion of voice sub-bands, while one proposed a reduction. Deadline for comment is June 1, 1971, with replies to the comments of others due by June 18, 1971. As of this writing, ARRL has not established a specific policy toward the docket; the League position will be formed at the May 7, 1971, Board meeting and will be based on members' comments to the individual directors as shown on page 8 of any *QST*.

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

In the Matter of	DOCKET NO. 19162
Amendment of Part 97 of the Commission's Rules to provide for Expansion of the telephone *segments of the high frequency amateur bands.*	RM-1306, RM-1349, RM-1477, RM-1479, RM-1544, RM-1550, RM-1593, RM-1603, RM-1614, RM-1616, RM-1644, RM-1665, RM-1695, RM-1723, RM-1729,

NOTICE OF PROPOSED RULE MAKING

Adopted: February 24, 1971 Released: March 1, 1971

By the Commission:

1. On September 24, 1969, the Commission adopted an Order (FCC 69-1020), which affirmed the implementation on November 22, 1969, of high frequency band "incentive" telephony allocations for Amateur Extra and Advanced Class licensees previously adopted in Docket 15928. Expansion of the total space available in the high frequency bands for telephony was not considered in that proceeding. Fourteen petitions and a number of letters have been received which request *expansion of one or more of the amateur high* frequency telephony sub-bands. One petition proposes reduction of telephony space.

2. Petition RM-1349 proposes expanded phone bands for United States licensees in Puerto Rico, Guantanamo Bay and the Virgin Islands without regard to license class. RM-1603 urges phone band expansion and early action on RM's 1306, 1477, 1479, 1544, and 1550. RM-1616 proposes phone band expansion and abolishment of exclusive bands for Advanced and Extra Class operators. RM-1695 proposes 50 kHz additions to the present phone bands for only net operation without change to the current segments reserved for Advanced and Extra Class operators. Reduction *of the present 14 MHz telephony sub-band to* 14,225-14,350 MHz is proposed in RM-1723. Of the remaining ten petitions, all propose additional

exclusive space for Extra Class; seven propose expansion of the telephony space available to Conditional and General Class operators. In addition to RM-1616, RM's 1550, 1593, and 1614 would make the space available to General and Conditional Class equal to that which was available prior to the implementation of Docket 15928. A tabulation of the total kHz now allocated and requested follows:

	CLASS								
	A=Advanced C=Conditional			E=Extra			G=General		
Band:	3500-4000 kHz			7000-7300 kHz			14,000-14,350 kHz		
Class:	G,C	E,A	E	G,C	E,A	E	G,C	E,A	E
Current kHz:	100	175	200	50	100	100	75	150	150
RM-1306							75	150	200
1349	250	250	250	125	125	125	250	250	250
1477	100	200	225	50	150	150	75	200	200
1479	100	175	225	50	100	125	75	150	175
1544				50	75	100	75	150	200
1550	200	225	250	100	125	150	150	175	200
1593	200	275	300	100	150	150	150	225	225
1614	200	200	275	100	100	125	150	200	200
1616	300	300	300	200	200	200	250	250	250
1644	175	225	250	100	150	150	75	150	200
1665	200	225	250	100	100	125	150	200	250
1695	150	225	250	100	150	150	125	200	200
1723							100	125	125
1729	200	275	300	100	150	150	150	200	200

Band:	21,000-21,450 kHz			28,000-29,700 kHz		
Class:	G,C	E,A	E	G,C	E,A	E
Current kHz:	100	175	200	1200	1200	1200
RM-1306	100	175	250			1500
1349	350	350	350	1600	1600	1600
1477	100	250	250	1200	1300	1300
1479	100	175	250			
1544	200	225	250			
1550	200	225	250			
1593	200	200	225			
1614	200	250	250			
1616	200	200	200			
1644	150	200	250	1200	1500	1500
1665						
1695	150	225	250			
1723						
1729	150	225	250			

3. In most cases, the proposed General-Conditional Class operator segments extend downward from the top edge of each amateur band with an adjacent Advanced-Extra reserved band next below and the Extra-only band at the low end of a contiguous group of telephony sub-bands, in the same pattern as the current telephony bands. However, a 7075-7100 kHz telephony band was proposed for Extra only (RM-1644), for Extra and Advanced (RM-1655); 7100-7150 kHz for telephony nets (RM-1695); 7075-7150 kHz for Puerto Rican telephony (RM-1349), and; 3525-3600, 7025-7050 kHz for telephony by Extra Class operators only (RM-1614).

4. Some petitioners proposed conditions on the use of the added telephony segments such as: 1) limitation of contacts to "DX" stations (other countries) only (RM-1306, 1477); 2) limitation to use of single sideband emission only (RM-1477, 1644, 1695); 3) maximum of 150 watts input power (RM-1306); 4) maximum of one kilowatt (kw) output power for Advanced Class and 1.5 kw output for Extra Class (RM-1665). RM-1593 would allow Advanced Class to use telegraphy in the exclusive Extra Class telephony bands. Most petitioners would move the Novice telegraphy bands downward without change in bandwidth to make way for the telephony expansion proposed. However, in exception to just shifting the Novice space, 28.1–28.2 MHz is proposed in lieu of 21.1–21.25 MHz (RM-1306, 1644) and/or reduction of the 21 MHz band to 21.1–21.2 MHz is proposed (RM-1479, 1644). A 50 kHz over-lap of the Novice and the net allocation would be permitted by RM-1695. The effect of RM-1616 would be to eliminate the current exclusive Extra Class telegraphy segments while RM-1665 proposes reduction to 3500-3510, 7000-7005 and 14000-14005 kHz. In RM-1665, 3510-3525, 7005-7010 and 14005-14010 kHz is proposed for exclusive Advanced and Extra Class telegraphy operation. In RM-1614, 21000-21025 kHz is proposed for Advanced as well as Extra Class telegraphy operation. The 50 kHz telegraphy Extra Class segments, proposed in RM-1479, were rejected in the Commission's Order (FCC 69-1020) adopted September 24, 1969. The matter of credit for certain amateur examination elements proposed in RM-1477 for holders of Commercial operator licenses will be considered in a separate proceeding.

5. Except as noted, these petitions are based on the purpose of providing more operating room in the high frequency telephony sub-bands for all operator classes and/or providing further incentive to obtain the Advanced Class and the Extra Class operator licenses. One of the petitioners said daily listening indicates ". . . that the division of frequency spectrum between radiotelephone and CW (telegraphy) is very inequitable, based on the number of stations using each mode and the bandwidths required." He also stated "The emphasis of the Extra Class license privileges should not be heavily weighted towards cw as is now, but should provide more opportunity and incentive for the amateur who is interested in other modes of transmission."

6. In evaluating the effect of the first phase of the incentive licensing (Docket 15928) program and of the second phase,[1] the Commission considered correspondence, license statistics, petitions, and occupancy surveys of the reserved sub-bands. In addition to observation of the relative occupancy of portions of the bands adjacent to the Extra and the Extra-Advanced reserved sub-bands, the overall relative occupancy throughout each of the amateur high frequency bands was studied. These observations were made during periods of moderate and heavy occupancy of the band being studied. During such periods, the telephony sub-bands were invariably much more heavily occupied than were the segments remaining for telegraphy. This was determined with a receiver of good selectivity for each mode of operation. Beginning with the 7 MHz band and becoming progressively more pronounced up through the 28 MHz band, it was evident that, in each band there was a territory of significantly reduced activity between the more popularly used lower 100 kHz of the telegraphy segment and the telephony

[1]Order, FCC 69-1020, adopted September 24, 1969.

sub-band. With the exception of the 7 MHz and 21 MHz Novice segments, there was very little telegraphy operation therein by U.S. amateurs, the occupancy being almost wholly by foreign amateurs using telephony. Even during periods of greatest activity, the foreign telephony station occupancy of these segments appears to be relatively light. The observations also revealed that occupancy of the 25 kHz Extra Class reserved telegraphy segments was low even during times of high telegraphy activity on adjacent frequencies.

7. Heretofore, there has been opposition to such telephony sub-band expansion by telegraphy proponents on the basis that the foreign amateurs using telephony would shift downward and cause severe interference in the informally, but internationally recognized exclusive telegraphy segments.[2] Since the use of single sideband suppressed carrier techniques by foreign amateur telephony stations has become predominant, destructive interference to telegraphy from telephony carriers is no longer a significant factor. In fact, it appears that foreign amateurs using suppressed carrier telephony now avoid the popular telegraphy segments apparently because of the interference suffered from telegraphy in receivers being operated for reception of suppressed carrier telephony.

8. The Commission believes that some expansion of the amateur high frequency telephony sub-bands is desirable. The encouraging result of the present license class - frequency allocation incentive system indicates that its continuation in approximately the same pattern is warranted. This is predicated upon provision of an attractive advantage of operating space to number of licensees ratio for the Advanced and Extra Class operators. Therefore, appropriate amendment of the Amateur Radio Service Rules is proposed as set forth in the attached Appendix. Generally, an exclusive 25 kHz segment for Amateur Extra Class operator is provided at the low end of each telephony sub-band. The modest number of United States licensees of this class should not significantly affect foreign telephony operation therein and the greater possibility of establishing foreign contacts should be an incentive to qualify for the Extra Class license. With the exception of the 7 MHz band, expansion of each of the current Extra-Advanced Class reserved sub-bands is proposed. Expansion of current General-Conditional Class sub-bands is proposed in four bands. Expansion of the 28 MHz telephony sub-band to provide a similar pattern of Extra and Extra-Advanced telephony sub-bands is proposed. Appropriate modification of the 7 and 21 MHz Novice sub-bands is included. A 28 MHz Novice band is proposed as compensation for the proposed reduction in the 21 MHz Novice band. Because of the light occupancy in the current 25 kHz Extra Class telegraphy segments, reduction of each to 10 kHz is proposed.

9. The requested limitation of Extra or Advanced Class operation to low power, "SSB" emission and to only international contacts is not proposed herein. The petitioners gave no reasons for proposing such limitations and it is the Commission's view that some of the limitations would serve to reduce the attractiveness of the sub-bands to would-be Extra Class and Advanced Class licensees. Since there is so little double sideband telephony operation left in these bands, the imposition of a limitation to the use of only single sideband suppressed carrier appears to be unnecessary. The limitation to only international contacts would be difficult to comply with and enforce in many situations such as, for example, a multilateral exchange of communications amoung a foreign station and two or more United States stations.

10. The request for additional telephony space for use by the amateurs of the Commonwealth of Puerto Rico appears to be designed primarily to allow them to operate with telephony on frequencies where many Spanish speaking amateurs of other countries are most likely to be operating. It would also obviously permit freedom from the heavier interference from amateur telephony stations in the 50 states. However convenient this might be, it is believed that Puerto Rican licensees should also be encouraged to up-grade their license class and the allocations proposed herein will provide some of the benefits desired by the petitioner, to those who are willing to exert the effort to obtain the higher class licenses. It is also believed desirable to encourage more communication between the citizens residing in the Commonwealth and in the 50 states.

11. The requested use of 1875-1900 kHz in Puerto Rico (RM-1349) is not possible because of United States Coast Guard requirements for protection of the LORAN system of navigation with which amateur sharing of the band must be on a non-interfering basis. 1800 to 1850 and 1975 to 2000 kHz is available for telephony and telegraphy in Puerto Rico.

12. In Regions 1 and 3 (as defined by the International Radio Regulations, Geneva, 1959) 7100-7300 kHz is not allocated to the Amateur Radio Service. Appropriate amendment of the operator privileges, making provision for a substitute Novice sub-band and a telephony sub-band for U. S. licensees located in the far Pacific Island possessions in Region 3, is included. Recognizing that off-frequency telephony contacts with stations in Region 1 or 3 operating below 7100 kHz may be more difficult for U. S. stations operating above 7150 kHz, provision for the exchange of telephony communications with stations outside Region 2 is proposed at 7075 to 7100 kHz for Advanced and Extra Class operators as an incentive to encourage qualification for these classes.

13. The specific rule changes proposed herein are set forth in the attached Appendix. Authority for these proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended.

14. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before June 1, 1971, and reply comments on or before June 18, 1971. In accordance with the provisions of Section 1.419(b) of the Commission's Rules, an original and fourteen copies of all statements, briefs, and comments shall be furnished the Commission. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken. The Commission may also take into account other relevant information before it, in addition to specific comments invited by this Notice.

FEDERAL COMMUNICATIONS COMMISSION

BEN F. WAPLE Secretary

[2]The regulations of most countries permit the use of telephony throughout each high frequency amateur band. The International Amateur Radio Union has adopted a set of voluntary sub-allocations (*QST*, November, 1969, page 81).

APPENDIX I

Petitioners

RM-1306	Richard Ebeling, K2UTC, White Plains, New York
RM-1349	Radio Club de Puerto Rico, Jose E. Saldana, President, San Juan, Puerto Rico
RM-1477	Lowell E. White, W2CNQ, Closter, New Jersey
RM-1479	Paul H. Lee, W3JM, Kensington, Maryland
RM-1544	Bernard Ostrofsky, W9HTF, Gary, Indiana
RM-1550	Andrew G. Bourassa, WA1LJJ, Laconia, New Hampshire
RM-1593	Joseph Santangelo, W1NXY, Waltham, Mass.
RM-1603	Paul H. Lee, W3JM, Kensington, Maryland,
RM-1614	R. L. Cope, W8MOK, Marion, Ohio
RM-1616	Kenneth H. Dearborn, K6EVO, et. al.
RM-1644	J. S. Brown, W9IPK; Wallace H. Raymond, K4EKJ; C. Everett Coon, W2KNU/4; Gary O. Poorman, W4UPJ; W. I. Bull, W4TRI, and L. M. Rundlett, W3ZA
RM-1665	David W. Clements, WA6FHB, FPO, New York
RM-1695	Charles R. Clark, WB4OBZ, Moncks Corner, South Carolina
RM-1723	George E. Cushing, W4QVJ, Hollywood, Florida
RM-1729	Gary A. Stillwell, W6NIU, Canoga Park, California

APPENDIX II

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

1. Section 97.7(a) and table, paragraph (b), and subparagraph (d) (2) are amended to read as follows:

97.7 Privileges of operator licenses.

(a) *Amateur Extra Class and Advanced Class.* All authorized amateur privileges including exclusive frequency operating authority in accordance with the following table:

Frequencies	*Class of license authorized*
3500-3510 kc/s 3750-3775 7000-7010 7150-7175 14000-14010 14150-14175 21000-21010 21200-21225 28350-28375	Amateur Extra Only
3775-3875 kc/s 7075-7100 7175-7225 14175-14250 21225-21325 28375-28500 50.0 - 50.1 Mc/s	Amateur Extra and Advanced

(b) *General and Conditional Class.* All authorized amateur privileges except those exclusive frequency operating privileges which are reserved to the Advanced and/or the Amateur Extra Class but including operating privileges in the band 7075-7100 kc/s with telegraphy, and with telephony when located outside Region 2 (Refer to 97.95(b)(2) for a description of Region 2).

* * *

(d) *Novice Class.* Those amateur privileges designated and limited as follows:

* * *

(2) Radiotelegraphy is authorized in the frequency bands 3700-3750 kc/s, 7100-7150 kc/s (7050-7075 kc/s when located outside Region 2), 21100-21200 kc/s, and 28150-28250 kc/s, using only type A-1 emission and 145–147 Mc/s, using radiotelegraphy emissions as set forth in 97.61. Refer to 97.95(b)(2) for a description of Region 2.

* * *

2. In 97.61, the table in paragraph (a) is amended and, in paragraph (b), subparagraph (10) is added to read as follows:

97.61 Authorized frequencies and emissions.

(a) * * *

Frequency band	*Emissions*	*Limitations (see para. (b))*
kc/s		
1800-2000	A1,A3	1,2
3500-4000	A1	
3500-3750	F1	
3750-3875	A5, F5	
3750-4000	A3, F3	4
7000-7300	A1	3,4
7000-7075	F1	
7075-7100	A3, F3, A5, F5	10
7100-7150	F1	3,4
7150-7225	A5, F5	3,4
7150-7300	A3, F3	3,4
14000-14350	A1	
14000-14150	F1	
14150-14250	A5, F5	
14150-14350	A3, F3	
Mc/s		
21.00-21.45	A1	
21.00-21.20	F1	
21.200-21.325	A5, F5	
21.20-21.45	A3, F3	
28.00-29.70	A1	
28.00-28.35	F1	
28.35-29.70	A3, F3, A5, F5	

(b) * * *

(10) The use of telephony in this band is limited to the calling of, and the exchange of communications with, amateur stations located outside Region 2. Refer to 97.95(b)(2) for a description of Region 2.

(This docket will be a major topic for discussion at the Board of Directors meeting; make sure your director (page 8) has your views.) QST

Strays

Stolen Equipment

The following equipment was stolen from John Hultquist, Jr., K6GSS, 660 Timberpine St., Sunnyvale, CA 94086, between the hours of 8:45 A.M. and 6:15 P.M. on Friday, Feb. 19: Drake R-4B, Ser. No. 9733C; SB-400 (pushbutton switch on rear next to 110 vac; HX30, mint condx, scratch behind rf gain control; NC-240D, BNC antenna connector, original W6SAI modifications. Matching speakers for the receivers not taken. Anyone having information is requested to contact me (home 408-246-6499, work 415-962-4329 and 415-962-3904).

Strays

Via K6CTL and W6EJK we learn that a pacemaker (an electronic stimulator for weak hearts) can malfunction when the wearer comes too close to a microwave oven. The gadgets have *some leakage field*, despite use of pressure plates or rf-absorbing gaskets on the door. K6HV adds that the braking system of the 69-70 Continental and Thunderbird uses an electronic control system also susceptible to *failure in the vicinity of a strong rf* field. Mobilers, take heed!

— • • • —

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 W1AW visiting hours, see the schedule in "Operating News.")

— • • • —

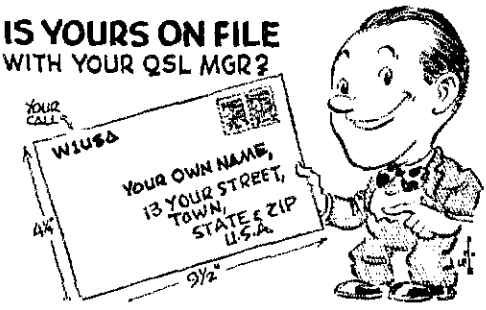
Feedback

The text for the 2-Meter FM Pip-Squeak (March 1971 *QST*, page 21) states that the 18-MHz crystal *frequency is multiplied* 5 times in the oscillator stage. The multiplication factor is, of course, 4 . . . not 5.

— • • • —

The coil table for the up-converter (page 19, January 1971 *QST*) did not include coils L20 and L21. Their values, respectively, are 0.99 to 1.5 μH (Miller 4403), and 1.6 to 3.1 μH (Miller 4404).

During the Apollo 14 mission the "Space Net" met on 145.2 MHz to discuss the happenings. Participants were awarded by WB2MTU a handsome certificate like this one issued to W1AW. The net meets every Tuesday evening to talk about all phases of the U.S. space effort and ventures of other countries.



A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left hand corner.

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

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

W2,K2,WA2,WB2,WN2 – North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.

W3,K3,WA3,WN3 – Jesse Bieberman, W3KT, RD 1, Box 86, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4,K4 – H. L. Parrish, K4HXL, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4[1] – J. R. Baker, W4LR, P.O. Box 1084, *Melbourne, FL, 32901*.

W5,K5,WA5,WB5,WN5 – Kenneth E. Isbell, W5QMU, 406 Easterfield Blvd., Enid, Oklahoma 73701.

W6,K6,WA6,WB6,WN6[1] – No. California DX Club, Box 11, Los Altos, California 94022.

W7,K7,WA7,WN7 – Willamette Valley DX Club, Inc., PO Box 565, Portland, Oregon 97207.

W8,K8,WA8,WB8,WN8[1] – Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio 43215.

W9,K9,WA9,WN9 – ARRL 9th area QSL Bureau, Box 549, Elmhurst, Illinois 60126.

WØ[1] – *Peggie Hoare, WØDYP*, P.O. Box 115, *Mitchellville, Iowa* 50169.

WAØ[1] – Lloyd Harvey, WØQCL, P.O. Box 7, Africa, Iowa 50034.

KØ,WNØ[1] – Dr. Philip D. Rowley, KØZII, Route 1, Box 488, Alamosa, Colorado, 81101.

KP4 – Alicia Rodriguez, KP4ELR, PO Box 1061, San Juan, P.R. 00902.

KZ5 – Canal Zone Amateur Radio Association, Box 407, Balboa, Canal Zone.

KH6,WH6 – John H. Oka, KH6DQ, PO Box 101, Wen. Oahu, *Hawaii 96701*.

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

VE1 – F. C. Fader, VE1FQ, PO Box 663, Halifax, N.S.

VE2 – John Ravenscroft, VE2NV, 354 Thorncrest Ave., Montreal 780, Quebec.

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

VE4 – D.J. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 – A. Lloyd Jones, VE5IL, 2328 Grant Rd., Regina, Saskatchewan.

VE6 – Karel Tetrelaar, VE6AAV, Sub. Po 55 N. Edmonton, Alberta.

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

VE8 – *George T. Kuabo, C/o Ministry of Transport, Norman* Wells, N.W.T.

VO1 – Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.

VO2 – Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.

SWL – Leroy Waite, 39 Hamlin St., Ballston Spa, New York 12020.

[1] These bureaus prefer 6¼ inch or #6 manila envelopes.

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

Note: Stations operating portable should continue to receive their QSL cards at the bureau in their home call area; i.e., WA1ORX/VE8 gets his cards through the W1 Bureau.

Around the World in Five Steps

THE NAVY recently honored Dave Porter, K2BPP, with a plaque commemorating the 50,000th phone patch handled by him during the past 16 years for the men in the Antarctic (Strays, page 30, February *QST*).

As a further expression of their appreciation of his role as a prime link between the men of "Operation Deepfreeze" and their families and friends back home, Dave was included in a special V.I.P. party visiting bases in the Pacific, New Zealand, and Antarctica during December.

Arriving at the South Pole on December 14, the 59th anniversary of Roald Amundsen's polar conquest, Dave had the unique experience of walking around the world in five steps.

Following a round of hearty greetings from the men he had so often talked to but never seen, Dave headed for the shack and a contact with his family back at K2BPP.

K2BPP appears to be remembering his visit to the South Pole as he completes another phone patch for the men of "Operation Deepfreeze."

After tracing the route of explorers Shackleton and Amundsen across the bottom of the world, Dave's party returned to the States in late December. QST

Home-Brew Condenser

HAVE YOU ever heard of a beer-bottle transmitting condenser? Read on and I'll tell you how to make one.

In April of 1917, I was hired by Libby McNeil & Libby to go north and operate radio station KMG at their salmon cannery at Nushagak, Alaska, on the Bering Sea. Our ship, the square-rigged three-masted bark, *Standard*, sailed north from San Francisco, and thirty six days later ran aground on the rugged Alaskan Coast. Everything went down, including a lot of much-needed replacement radio equipment for the station. We were in the lifeboats for four days, lost, with no compass, and little food. But that is another story.

I had brought aboard the *Standard* a one-inch spark coil for transmitting and a small receiver, both battery operated. With a haywire antenna strung up to the after-mast, the rig was capable of transmitting and receiving to about a hundred miles. When we ran aground I sent out an SOS which was picked up at KMY, Naknek.

Because of my SOS, we were finally picked up by tugs and towed into the cannery. The radio shack was a little one-room frame cottage, detached from the cannery buildings. Two seventy-five foot masts supported the antenna.

The radio equipment wasn't anything to write home about. The receiver was a Haller-Cunningham 600-meter job using a galena or carborundum crystal detector. The transmitter was about one and a half kilowatts, open-spark gap, helix, and antenna ammeter, everything nicely corroded. Then there was the condenser, truly a work of art and ingenuity.

Evidently, in the previous summer the regular condenser had blown, with no spares available closer than Seattle, two thousand miles away. So our intrepid operator genius, after much mental anguish and sweat, had made his own. Getting two galvanized wash tubs, like that Grandma used to wash Grandpa's "Long Johns" in, he filled each tub almost full with a saturated solution of salt water. Then he scrounged around the cannery for about two dozen empty beer bottles. Filling each bottle to within two inches of the top with the same salt water solution, he stuck a piece of wire into the neck of each bottle, leaving some of the wire sticking out at the top. Then, all of these wires were connected together, forming one side of the condenser. The two washtubs, connected together, formed the other side. Crude, but it worked. Allah be praised.

I operated KMG all that summer, keeping schedules and handling traffic with other canneries and ships. Occasionally I would hear a sharp "plop" as the high voltage would break through the glass of some bottle. To fix it, I merely pulled out the offending bottle, put in a new one, and KMG was back on the air.

I have often wondered what the note sounded like. — *Howard A. Cookson, W2GW*

Hamfest Calendar

Alabama – The Birminghamfest will be on May 2 this year at the Armory on Oporto Ave. (just off U.S. 78 East – near Eastwood Mall). For entertainment, contests, net meetings, eyeball QSOs, and fun for the entire family, plan to attend. For further information contact the Birmingham ARC, W4CUE, P.O. Box 603, Birmingham, AL 35201.

Connecticut – The Tri-City ARC 22nd Annual Hamfest will be held at the Crocker House Hotel in New London on April 24. Tickets are $7.50 which includes a steak dinner and the registration. Full day of activities starting at 0900. Big swap and shop tables, technical talks, MARS, ARRL forum, CD meetings, CN/CPN, DX info, and repeaters. Registration and information available from the *General Chairman, Robert York Chapman, W1QV*, 28 South Road, Groton, CT 06340.

Illinois – The Moultrie ARC is having its 10th Annual Hamfest on April 25 at Sullivan, Illinois in the American Legion Pavilion. Food, fun, swap, and eyeball QSOs. For more information write Mark Inc., P.O. Box 10, Sullivan, IL 61951.

Kansas – The Hi Plains ARC annual Hamfest will be held May 16 at the Plains grade school auditorium. Basket dinner at noon (bring your own service). Drinks furnished. Large swap table; bring your trading gear. *Talk-in on 146.94 MHz.* Camper round-up and space available at the City Park on May 15. Airport near park. Registration is $2 at the door. For further information write WØNIO, Plains, KA 67869.

Louisiana – The Baton Rouge ARC will hold their Annual Ham Fest in Baton Rouge on the first weekend in May. Festivities start with a hospitality room Saturday afternoon at 1:00 P.M. at the Holiday Inn-South, followed by a supper and dance at the same location. Sunday, May 2, a *barbecue lunch, along with swap tables and* auctioning at the United Commercial Travelers Camp one mile east of Baton Rouge on Highway 190. Write John A. Dobbs, WA5OLU, 10934 Effingham Ave., Baton Rouge, LA 70815, for more information.

Missouri – The second annual Northwest Missouri Hamfest will be held Sunday, May 16, 10:00 A.M. to 4:00 P.M., at Bennett Park, Liberty, Mo. For more information send an s.a.s.e. to PHDARA, P.O. Box 11, Liberty, MO 64068.

New Jersey – The Tri County Radio Assn. will hold an auction sale on Sunday, April 18 at the Arbor Inn, West 7th and Rock Ave., Plainfield. Equipment may be brought in starting at 12:00 noon. Sale will begin at 1:00 P.M.. All amateurs welcome. *Further information may be obtained* from George A. Diehl, W2IHA, 20 Wilson Ave., Chatham, NJ 07928. Tel: 201-635-8703.

New York – The Rockaway ARC Spring Auction will take place Friday evening, April 23 at 8:00 P.M. at the American Irish Hall at Beach Channel Drive (at Beach 81st. St.), Rockaway Beach. Doors will be open at 6:00 P.M. to accept items for the sale. One dollar donation accepted at the door. For further information write to Al Smith, WA2TAQ, P.O. Box 341, Lynbrook, NY *11563*.

Ohio – The 20th Anniversary Dayton Hamvention will be held at the Hara Arena and Exhibition Center on April 24. Large exhibit of the latest amateur equipment. Technical sessions and forums covering such subjects as antennas, DX, ATV, fm, ARRY, ARPS, ARRL, VHF, *and MARS. Hidden* transmitter hunt and a large outdoor flea market. An interesting program for the XYL. Banquet Saturday night. Numerous nets are planning to hold meetings in conjunction with their attendance at the Hamvention. Advance ticket sale closes April 21. For hotel/motel reservations write: Accommodations, Dayton Hamvention, Box 44, Dayton, OH 45401, before April 14.

Pennsylvania – The Radio Association of Erie's Annual Auction will take place Saturday, April 17, from 4 to 10 P.M. at the St. George School auditorium, 5145 Peach Street, Erie. There is plenty of parking, and refreshments will be served. Free admission.

Washington – The Skagit ARC of Washington State will hold its 18th Annual Hamfest and Banquet at the Bryant Grange Hall on Saturday *April 17. An all-day program is planned, with* Northwestern Division Director Thurston and other ARRL officials on hand. Special activities for the women and a tour of the Navy's million-watt radio station at Jim Creek planned. For further information and advanced registrations, contact John R. Sleeth, WA7GDU, 1403 Avon Allen Rd., Mount Vernon, WA 98273. QST

COMING A.R.R.L. CONVENTIONS

May 22-23 – Virginia State, Vinton, Roanoke County
June 19-20 – Rocky Mountain Division, Colorado Springs, Colorado
July 3-4 – West Virginia State, Jackson's Mills
July 3-5 – Pacific Division, San Jose, California
September 4-6 – Southwestern Division, Anaheim, California
October 9 – Dakota Division, Sioux Falls, *South Dakota*

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

Strays

Feedback

In *QST* for February 1971, page 18, Fig. 15, the junction of the two V1-grid capacitors should be connected to the cathode, pin 2, not to ground *as shown*.

Stolen Equipment

The following equipment was stolen from the University of Akron Amateur Radio Club in January: Collins 32S-3 Serial 10235S8; 75S-3C 11863; 30L-1, serial not known; 312B-4, 52245 516F-2, 19064; Swan 250C, F211312; 016891 TV-2B, T149805; Heathkit SB-610, 8331512A Sony 260 stereo recorder, Vibroplex, and Brown CTL keyer paddle. There is a reward for recovery of any of the above and/or information leading to the arrest and conviction of the person or persons involved. Contact Dean Samad, Akron University School of Law (216-762-2441, ext. 441), Akron University Security (216-762-2441, ext. 273), or the Akron Police Department (216-375-2181).

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

VK LICENSE FEES UP

Since 1924, the fee for an Australian amateur license has been $2 (Australian). In an effort to bring licensing revenues closer to expenses, the authorities have now instituted a $6 fee. Efforts of the *Wireless Institute of Australia* to bring about a reconsideration of the increase have been unsuccessful. The *WIA* plea cited the amateurs' contributions in emergency communications and technical training and the self-policing nature of the amateur service. Rejecting the request, the Postmaster-General stated, ". . . I regret to advise that the Government cannot continue to subsidise the administration of amateur radio stations to the extent that it has done over recent years and that the way is not clear, therefore, to reduce the new fee of $6." Expenses involving the amateur service include those for granting licenses and call signs, investigating complaints, negotiating reciprocal agreements, and conducting liaison with other administrations and the International Telecommunication Union on amateur matters.

SPECIAL SZØ PREFIX

Commemorating the 150th anniversary of the independence of Greece, the Ministry of Transports and Communication has made available for use by Greek radio amateurs, the special prefix SZØ for 1971. During this period, the *Radio Amateur Association of Greece* is inaugurating the "Hellas Diploma." It is available for contacting 10 different SZØ stations (contacts made in the 2-meter band count as five stations). Applicants should send their QSLs with 3 IRCs to the *Radio Amateur Association of Greece*, P.O. Box 564, Athens, Greece. Cards will be returned with the diploma.

WORKED ALL CONTINENTS?

The popularity of the IARU Worked All Continents award remained high in 1970. Headquarters recorded the issuance of a total of 2073 awards. There were 902 for ssb, 5 for RTTY, and 34 for 3.5 MHz. Amateurs interested in applying for this award should send to the IARU society in their country, a confirmation from each of the six continents (North America, South America, Europe, Africa, Asia, and Oceania) along with their name and address with sufficient return postage. An application form for U.S. and Canadian amateurs is available from ARRL, Newington, CT 06111.

ARSI EXPEDITION TO LACCADIVES

The *Amateur Radio Society of India* has announced that VU7US will be operating from the Laccadives beginning Saturday, April 10, and ending Monday, April 19. Activity will be primarily on 20 meters with 10 and 15 meters also in use. The expedition is sponsored by *ARSI* and QSLs should be sent to them at P.O. Box 534, New Delhi-1, India.

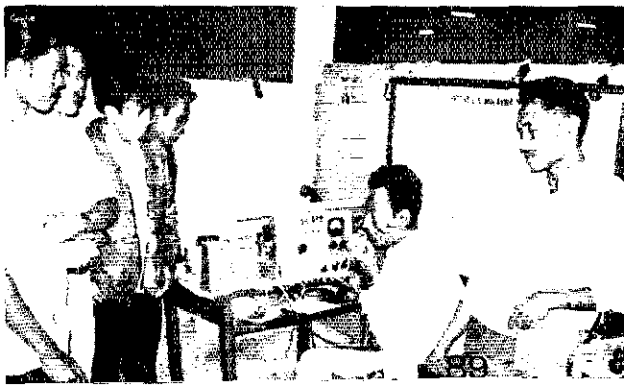
GENEVA GROUP STUDIES HAM SATELLITES

For the first time the Amateur Radio Service has become the subject of study within the CCIR (branch of the International Telecommunication Union for technical studies). The group met in Geneva from February 3 to March 3 to make technical preparations for the World Administrative Radio Conference on space telecommunications to be held in June.

CCIR interest in amateur activities comes as a result of the operation of Oscar satellites over the past decade and in consideration of future amateur space activities. Since there is a potential for amateur satellite transmissions to interfere with other radio services, there is a need for technical study of frequency sharing.

Amsat, the Radio Amateur Satellite Corporation undertook a study of the sharing problems involved. The conclusion was that through means of ground control of satellite transmissions, amateurs could effectively alleviate any possible interference problems. Supporting this conclusion, papers were introduced at the CCIR meeting by Australia and the United States. Both recommend that the amateurs be permitted to operate satellites with the provision that when shared frequency bands are used, the spacecraft include a ground command system to prevent harmful interference.

The papers introduced are being combined into a "working paper" for approval by the full CCIR. While final action has not been taken as this column goes to press in late February, we hope to report further in a subsequent issue. QST



Operating from the amateur radio display at the East Java Exposition, a general public show in Indonesia, is YC3AD. Observing from left, are YD3CV, YD3ET, YD3EV, YD3FP, and YC3BB.

Correspondence From Members-

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

CRAFTY GENTLEMAN

● Help! During a friendly discussion a fellow member of ARRL subtly jabbed me with the statement, "Ham radio is a man's hobby." As I marshalled my defense, he felled me by pointing (with a crafty smile) to the ARRL Amateur's Code *in the Handbook.*

Now, I've been able to be loyal, progressive, friendly, balanced, and patriotic (I'm also clean and reverent, if anyone cares), but I've had real difficulty with that first one. Can anyone help? – *Helene R. Torbenson, WA@OEJ, St. Paul, MN*

NASTY LETTERS

● Perhaps I made a mistake by being honest and sending you a picture of my shack to go with the article on my 15-meter beam (February *QST*).

I have really received a lot of nasty mail about *the vfo in the picture. No one bothered to look at* the crystal plugged into the socket. The vfo just happens to be used by my room mate Ron Jones, WA4YQQ/7, who is a fellow student here at BYU. I didn't know it was against the law to *have* a vfo, but only to *use* one.

My real concern is for the ARRL. I just hope that I haven't *caused anyone to think less of the* League. Had I known that people always assume that the other guy is dishonest, I might have acted differently. If I were using it, I certainly would not have taken a picture of it to be put in the magazine. One man even wanted to know if I had a linear hidden behind the wall. . . . – *Chuck Daily, WN7PDT, Provo, UT*

SPIRIT OF '76

● I need the support of *QST* to convince the Miami Bicentennial Committee that amateurs are as much a part of the United States as hotdogs and *hamburgers, and that we should be a part of our* country's 200th birthday celebration.

My idea, which is to have special bicentennial QSLs for amateurs in the Miami area, could become a reality if your readers would give me a vote of support. – *Steven Kaplan, WN4SJQ, 17111 N.E. 6th Ave., North Miami Beach, FL 33162*

[EDITOR'S NOTE: How about lending Steven a helping hand with a card supporting his idea?]

BONE OF CONTENTION

● Boy, what a great idea. A Novice roundup! There apparently isn't enough QRM on the Novice bands already, so from Feb. 6 - Feb. 21, the association "of, by, and for the amateur," the ARRL, *stages a Novice Roundup so almost every* Novice in the country (and some consenting Generals) gets on the bands and makes a ragchew or any real communicating virtually impossible. One can hardly talk across town without being jammed by "CQ NR CQ NR."

Now, I think a contest, however silly it happens to be, *is a fine thing for those who wish to* participate. However, there might be a couple of dozen amateurs around who don't. Why should they be practically driven off the air?

I know it's too late to do anything about the '71 NR, but, in the future, wouldn't it be possible *to declare a portion (or portions) of the bands* off-limits to contestants (say the top or bottom 1/4 or 1/2) so folks who wish to *talk* on the radio can at least try to do so unmolested? That would not only give federally licensed amateurs who are non-contestants elbow room to talk, but would make the contest all the more fun for the potential award collectors. *Not to mention putting the* QRM where it belongs – right in the laps of the QRMers. – *Warren D. Anderson, WN9CWG, Elgin, IL*

[The Novice license is an interim one, for *training.* What better way to improve code speed than by participating in a contest? More practice of this sort and less ordinary "talk" would likely increase *the present percentage (50) of Novices who* graduate to a higher class – EDITOR.]

● I *often wonder if those who organize contests* ever realize that there are members who do not desire to participate in them, but prefer to ragchew instead. It is quite irritating to find a clear spot in the band, if that is possible during some of these contests, only to have someone with a kilowatt or more come on your frequency and break up your QSO. What has happened *to the common courtesy* that used to exist in the amateur fraternity?

Some contests are set up to operate on a specified frequency, plus or minus so many kHz. Why not set a spot like this for the non-contestants to use to give them some sort of a break. Then have observer stations listen on these reserved spots *during the contests and impose a penalty upon* those who violate the rule. – *Chester H. Young, W4KF, Sheffield, AL*

● I had never taken part seriously in a contest before, but after reading and hearing so much abuse being poured on the ARRL, besides the claims that your contests were lagging, I decided I *should do my bit to help* restore confidence in the established institutions which are doing their best under adverse circumstances.

I didn't realize a contest could be so much fun. You couldn't have picked a better time. Conditions were excellent in all bands and the activity was terrific to the point that I overheard some South American phone-patchers grumble: "You can't put a word edgewise into the U.S. today." – *Bob de La Rosa, XE2I, Monterrey, Mexico*

OUT OF TOUCH?

● I don't have to be told the League is doing a *very fine job. My gripe is with the people that pu* the monthly journal together. Why must every issue read as dry as a text book; are these people so out of touch with the average amateur? – *John J Hora, Brookfield, IL*

● I have been reading *QST* for about six years "CQ From a Novice," Feb. issue, was one of th best articles I have read in *QST*. Perhaps as Novice myself it had special meaning, but it sur was well written and the satire superb. – *Charle Westrich, WN8GIG, Canton, OH*

● The handicap story in January *QST* and the Stray about WØIRJ were certainly interesting, well done, and well placed. Congratulations on maintaining the high level of editing excellence which places *QST* in a unique position among today's technical publications! – *Robert W. Schoening, WØBE, Bloomington, MN*

● "Lightning Strikes," by W2FRC, in February, *QST*, should be required reading for every licensed amateur and every prospective amateur. I am sure that W2FRC doesn't claim being struck by lightning as the major accomplishment of his life. However, once the shock of the strike was over (pun intended), he set about on an almost incredibly detailed and exhaustive study of the aftermath. Imagine, a metallurgical analysis of the twinlead and sectioning a shorted diode! – *Herbert Lacey, K4FBG, Cary, NC*

● Congratulations for the very fine articles that appeared in February *QST* – namely:

"A Ham in the People's Paradise"
"Amateur Radio and the Press. . . and You"
"Lightning Strikes!"
"CQ from a Novice"

Let's have more! – *Bill Anton, K4ATZ, Alexandria, VA*

MULTIELEMENT ARRAY

● It is a pleasure to read a "how-to-do-it" antenna article without a magic gimmick and without being able to pick out fallacies. Bob Myers hit the jackpot with his "Wide-Spaced Multielement Tribander" (December *QST*). Although a project of this magnitude will probably not be attempted by many, the comprehensive and accurate information contained therein should find a permanent place in any ham's reference library. – *Alex Dolgosh, K8EUR, Technical Services Supervisor, The Antenna Specialists Co., Ashtabula, OH*

HAMS IN DISTRESS

● In January *QST*, George Hart, W1NJM, called for a discussion by the members of the fraternity concerning standardization of distress calls.

There are two defects in the present system of calls. First, none of the ones presently in use among amateurs conform to any international standard, either within the amateur service or among the other two-way services. QRRR, ostensibly a Q signal, has no meaning in the international Q code. The use of Q signals is discouraged on phone, and the welter of non-standardized phone distress calls could lead to confusion under difficult conditions.

The second difficulty is that there is no provision for degrees of seriousness or urgency among calls. Thus, a mobile with a flat tire is faced with the dilemma: Do I call CQ Emergency or the equivalent, scaring everyone unnecessarily, or do I call normally and risk getting no attention?

Why don't amateurs conquer their instinctive tendency toward chauvinism and adopt standard commercial practice, recognized internationally by the professionals and of proven worth and effectiveness?

Phone calls:

1. MAYDAY (pronounced like the French *m'aidez*). Distress call of the highest priority, to be used where life or property are in immediate or imminent danger and the prompt summoning of aid is essential.
2. PAN (Pronounced like the French *panne*). Call of lower priority, for use when in difficulty other than the above.

Cw calls:

1. SOS SOS SOS, sent as a single character, the equivalent of MAYDAY.
2. XXX XXX XXX, sent as separate characters, the equivalent of PAN.

The appropriate distress call is followed by the call letters of the station, which are succeeded in turn by a statement of the situation, the location of the station in distress, and the type of aid desired. This information should be transmitted even if no QSO results because some stations may be able to receive, but not contact, the station in distress.

These procedures are established in article 36 of the Radio Regulations of the I.T.U. as applying to all stations engaged in international communications. We are an international service; why not comply?

If you are still wondering why it is desirable to bring the amateur radio service in line with the others in this respect, consider this: wouldn't it be wonderful if, when you are in trouble, you could take the mike or key of any station, apply the emergency procedure you knew, and be assured that your calls would be instantly recognized by anyone, no matter what service they were licensed in? You would be helped that much sooner. – *R. Bruce Peters, WB2LRS/FØTL, Bronxville, NY*

● Every group likes to have its own jargon. Each time a new specialty or sub-specialty is created, we add more bricks to the Tower of Babel. I accept it as inevitable, and offer no resistance as long as we retain enough common terms to insure our survival; words like "bourbon on the rocks" and "sex." And, oh yes, "SOS" and "Mayday." The latter two are certainly international and understood by radio operators and SWLs of any language. "QRRR" and "Emergency" are not.

I have no objection to the ARPS having its own procedures and "in-group" language. The preservation of human life, however, is a universal concern, and demands universal language. If we aren't big enough to accept it, we may not be big enough to do the job. – *Roy A. Raney, KØOVQ, Denver, CO*

INTERESTING READING?

● I wonder if the rest of the amateur operators around the country go through the same procedure when *QST* arrives each month? My habit is to turn to the "Correspondence" section, and get that same ol' disappointment. Seriously, is one or two pages the best that the members can voice their views on? This section of your fine mag should have *ten* pages set aside each month for member correspondence, and if only eight get filled up, leave the other two blank to attract attention and induce incentive to voice our views. – *Steve Lucker, WAØZND, St. Paul, MN*

● Sure enjoy *QST*. Only one suggestion. Please increase your "Correspondence" section to *six* pages instead of just two. It's the most interesting part of the magazine. For those who don't go in for technical or how-to-build articles, the letters from members are the most interesting reading. – *Frank C. Rodman, Wichita, KS*

– . . . –

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

A State-of-the-Art 2-Meter Preamplifier

High Gain and Low Noise Figure on 144 MHz and Higher Frequencies

BY J. R. HATTAWAY,* K4PKV AND DONALD K. BELCHER,** WA4JVE

FOR SEVERAL years now, FETs have held the spotlight where low-noise vhf amplification is required. Here is a simple amplifier utilizing a new-generation bipolar device which out-performs FETs on all fronts. The transistor is a low-noise uhf device, adapted to vhf service in this application.

When FET amplifiers are built by the average amateur, the result may turn out to be an oscillator. The FET must be matched with highly-reactive high-impedance networks on both input and output, to deliver usable gain. High impedances generally require shielding, but with FETs even this may not insure stable operation. In order to perform properly, an FET amplifier is generally neutralized, but some workers feel that "neutralization" is something akin to black magic!

The type of device used here has replaced many FETs in aerospace and military electronics of new design. It is extremely easy to use, yields low-impedance designs, does not require neutralization or shielding, exhibits excellent intermodulation and noise-figure characteristics, and has good temperature stability. The transistor used here is the MS-0150A, produced by Texas Instruments. (TI now supplies it, as the MS175, in several different packages. – *Editor.*) Similar devices are being made by most major semiconductor companies.

The circuit, Fig. 1, shows a simple common-emitter amplifier, with bias established by R1, R2, and R3. The input matching network, C1, C2, and L1, has enough range to "peak" practically any antenna system. A broadband output match is provided by L2 and C5, and R4, R5, and R6 comprise an output attenuator, permitting the preamplifier to be mated to any receiver or converter, with little detuning of the output circuitry. The amplifier is designed to operate into a 50-ohm load, but will perform well into a moderate mismatch.

*312 W. Lakeside, Columbia, SC 29201.
**Dept. of Electrical Engineering, University of Florida, Gainesville, FL 32601.

Construction

As with all vhf construction, care must be taken to *insure that all leads are as short as possible.* This is particularly important in the emitter circuit, where the bypass is a standoff capacitor, C4. The "microstrip" package of the transistor, designed for uhf applications, makes an almost ideal layout possible. The arrangement apparent from the photograph is far superior in respect to lead length to anything possible with conventional vhf transistor packaging. (The MS175ME is rated for operation up to 4 GHz. *Editor.*)

It is suggested that the amplifier be constructed on copper-clad board, or a metal subchassis, in order to have an effective ground in all areas. Perforated board should be avoided. When mounting the transistor, use good planning, so that *leads will have to be formed only once. They are* made of a silver alloy, and are quite fragile. Another construction precaution, which should be observed with all amplifiers, is to keep the input and output circuitry separated physically. Notice from the photograph that the amplifier is laid out in a line.

Testing and Use

When applying power for the first time, insert a 330-ohm resistor in series with the power supply. *When this is done, the voltage measured at the* amplifier input should be approximately half the power supply voltage. This indicates proper biasing and current drain, and the supply should not be connected directly to the amplifier until this condition is assured. Any supply voltage from 8 to 12 is satisfactory.

Once it established that the amplifier is drawing the proper current, connect the full supply voltage, 8 to 12, to the amplifier and connect J2 to your receiver or converter. Tune the 2-meter band, listening for evidence of spurious oscillation. The amplifier should be stable with no connection externally to J1, while adjusting C1 and C2 throughout their tuning ranges.

If oscillation is in evidence, the emitter lead is too long, the standoff bypass capacitor, C4, is ineffective at the receiving frequency, or the amplifier has a wrong part or wiring error. The authors have built ten amplifiers of this basic design, for frequencies from 30 to 700 MHz, and all were completely stable.

Interior of the low-noise preamplifier, input side at the left. Only RFC1 is below the chassis.

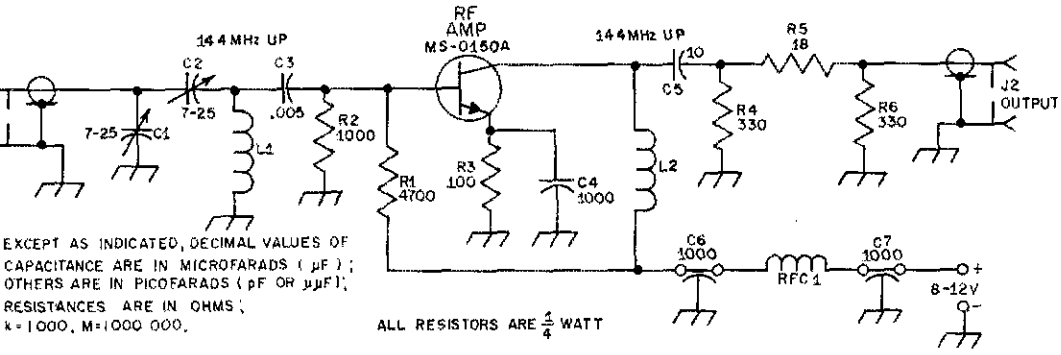


Fig. 1 — Schematic diagram and parts information for the vhf preamplifier. Some parts numbering is for text reference only.

C1, C2 — 7 to 25-pF ceramic variable (Erie 538-000A-7-25).

C3 — .005-μF (Centralab CK-502).

C4 — 1000-pF standoff (Erie 2425 061 X5UO 102AA).

C5 — 10-pF dipped-mica.

C6, C7 — 1000-pF feedthrough (Erie 2425 001 X5UO 102AA).

J1, J2 — BNC fitting.

L1 — 8 turns No. 22 on 1000-ohm 1/2-watt resistor

L2 — 5 1/2 turns No. 22 on 10,000-ohm 1/2-watt resistor.

RFC1 — 10 turns No. 33 enamel, toroid, on ferrite bead.

If the amplifier is operating properly, connect the antenna line to J1, and start listening for signals. Adjust C1 and C2 for maximum signal-to-noise ratio in the part of the band where you most want this result. When operating properly the amplifier will have a very broad response, so adjustment is not at all critical. Be prepared for the most effective reception of weak signals you have ever heard.

For absolute maximum performance in weak-signal reception, mount the preamplifier at the antenna. The lower the amplifier noise figure, the greater will be the benefit from this rarely-used but highly-recommended step. Standard practices of isolation from high rf fields should be observed. Back-to-back hot-carrier diodes may be connected across the input terminal without altering the preamplifier performance.

Noise Figure and Gain

The amplifier photographed for this article exhibited approximately 20 dB gain, with a noise figure of less than 1.5 dB, in the 2-meter band. Its performance is shown below in comparison with that of a stage using a 2N4416, one of the better JFETs available for vhf and uhf amplifier service. The gain measurement was made without the 3-dB attenuator in the output circuit, but use of the attenuator is recommended. Unless yours is a very poor 2-meter receiver, the lower gain with the attenuator will have no adverse effect on weak-signal reception.

Noise figure was measured with Hewlett-Packard automatic noise-figure measuring equipment, and intermodulation was checked with an H-P spectrum analyzer, with two in-band signals of approximately 7 millivolts at the preamplifier input. It should be stressed that accurate measurement of low noise figures cannot be accomplished with rather haywire diode generators as noise sources, such as have been responsible for some "optimistic" noise figures being quoted in the past.

The only significant disadvantage of this device is cost: about $16 for the transistor, in unit quantities. Estimated total cost, including all parts new, is about $25. This should not be prohibitive, for the vhf enthusiast who desires state-of-the-art performance. The MS-0150A or MS-175 can be ordered from Texas Instruments distributors.

In summary, some FETs have practically peaked-out in vhf reception, while bipolars are still on a steep climb. It may be three to five years before these new bipolar devices thoroughly infiltrate the commercial radio industry, so here is your chance to get state-of-the-art performance three years early. Watch out, FETs — here they come!

Two-Meter Amplifier Performance

	Neutralized 2N4416 (dB)	*MS-0150A, no neutralization (dB)*
Gain, no pad	21	23
Noise Figure	3.0	1.45
Intermod.	-53	-63

QST

[EDITOR'S NOTE: Though the authors did not discuss it in detail in their text, they pointed out to the undersigned that this amplifier is a high-pass device that works very well on higher amateur bands. The writer can attest to this, having used the original on 432 MHz with surprising results.

Both in laboratory tests and in actual reception of weak signals on 432 MHz, the Hattaway-Belcher preamplifier outperformed the best front ends we've had previously. Used ahead of a good transistor converter it made a definite improvement in reception of all weak signals. The authors say that the noise figure obtained at 432 MHz, without readjustment of the preamplifier from the optimum 144-MHz setting, is 3.2 dB. After using it for a while on 432, we have no grounds for disputing this claim. The device manufacturer rates the MS175 noise figure as "less than 2 dB, typical, at 500 MHz, and less than 3.5 dB at 1 GHz. — *WIHDQ*]

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

ADJACENT TO this department you'll find a description of an exceptional vhf preamplifier. It provides high gain and very low noise figure, not unusual attainments these days, but it does this with stability and uncritical adjustment characteristics. Perhaps even more surprising, the preamp is ostensibly designed for the 144-MHz band, but it works well on 220 and 432 without readjustment *or change in circuitry. In case you're wondering,* this is no April Fool thing; the amplifier does all that is claimed for it by the authors.

In order to get the description into print at the earliest possible time, we asked VHF Contributing Editor KØCER if we could use some of his space allotment this month to present the information from K4PKV and WA4JVE. Bill will be back to his full page quota next month. – *WIHDQ*

Central States VHF Conference

Plans for the August 20-22 Central States VHF Conference to be held in Sioux Falls, S.D. are progressing. A full three-day program has been planned which includes Sam Harris, KP4DJN, Oliver Swan, W6KZK, president of Swan Antennas, Mike Staal, K6MYC, and Dr. Ernest K. Smith, of the Institute of Telecommunication Sciences at Boulder, Colorado. Dr. Smith has devoted many years to the study of sporadic-*E* phenomena. WØLER is president of the Central States VHF Society for the 1970-71 year.

OVS and Operating News

50-MHz DX was made interesting during January and February with the appearance of TG9KM *in Guatemala. One opening came about 0150* GMT, January 14, when TG9KM was worked by K5LZJ and WA5ATF/5. A more widespread opening January 23 apparently began around 2300 GMT, when WA7JTM, Phoenix, heard TG9KM calling CQ. WA7JTM and fourteen other Phoenix area stations worked the Central American on 50.11. TG9KM was heard in Phoenix for two hours, working stations from Texas to Southern California. Shortly after TG9KM faded at 0209 GMT, XE1AAN appeared at 50.04 a-m. He was worked by WA7JTM who says many stateside stations missed the Mexican station by not listening below the U.S. phone band. XE1AAN was running 6 watts.

Peter, WA6HXM, Los Angeles, says many Southern California stations worked TG9KM, XE1AAN, *and XE2RH, and also that K6GMV* worked two stations in Peru. TG9KM was worked from the Los Angeles area again on January 25.

WA5HNK, Texas, reports that TG9KM uses the Yaesu 400 line, with a 6-meter transverter running a 6146, feeding a 5-element Yagi. Whether TG9KM will remain in Guatemala wasn't known at this writing, but Joe says there are two other stations in Guatemala now active. They are TG9FS and his XYL, TG9EF, who have gear similar to TG9KM. WA5HNK has been running scatter schedules with TG9FS. He says a good indicator of openings to Central America is a commercial teletype station in Guatemala on 49.92, running 24 hours a day. Joe *also has some encouraging news from the South* Pacific. KS6DR told him he will be active this spring from American Samoa. KS6DR is Aaron Farr, Department of Education, Pago Pago, American Samoa 96920.

WA5HNK says the winter *E* season was fairly good, and during the January contest he worked W4GDS, near Miami, on what appears to have been another of those Gulf tropo ducts. W4GDS was heard for 2 hours over a 970-mile path, but no other stations were heard. There was a stalled frontal system in the Gulf from Florida to Texas along the same line as the path between W4GDS and WA5HNK, near Houston.

Ray Clark, KR6RI, Okinawa, who signs K5ZMS stateside, had several January contacts with Japanese stations, and one with HL9WI in Seoul, Korea. *In a letter to KR6RI, JA1PLI told* Ray that there are nearly 200 JAs on ssb and many others on a-m. JA1PLI listed a number of active Pacific area stations in about a dozen countries, worked from Japan. *KR6RI says he is still trying to work* KR6RS, but the 175-mile path has proven difficult.

From Seoul, HL9WI reports working DU1JS in the Philippines for his first DU contact. DU1ZAI is also reported active. Philippine amateurs apparently have to pay a tax of approximately 10 dollars per watt on imported equipment. That would be enough to keep many U.S. stations off the air. Bill, HL9WI, has worked six countries from Korea and continues to run his 50.1 beacon.

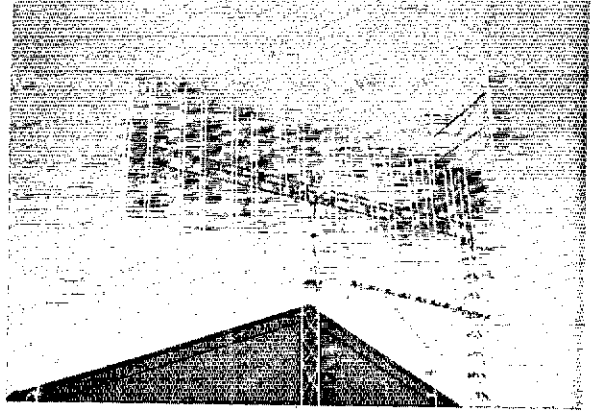
Closer to home, WB5CHP, New Orleans, sent an interesting report on the evening of January 29. Buddy worked four Florida stations shortly after a research rocket was launched from Eglin Air Force Base, Pensacola. The rocket released a barium cloud seen as far away as Pennsylvania. Buddy says 50-MHz signals from the Florida stations were fading rapidly and difficult to copy.

Reports of winter *E* openings were received from K3QCQ/3, WA6HXM, WA6IYC, K7ICW, and WB9DTW. K7ICW, Las Vegas, reports an unusual *E* or *F* backscatter opening January 26, when he heard strong signals between 0200 and 0445 GMT from throughout California and Arizona. This coincides with WA6HXM's report of Arizona and *Southern California stations working* TG9KM, Peruvian and Mexican stations, on what was apparently *E*.

And finally, ARRL has issued 50-MHz WAS number 92 to WA7FPO, Phoenix. W1HDQ says WA7FPO's award may be the first 50-state 50-MHz WAS made without *F2*. Congratulations Glen!

144-MHz DXers are awaiting the return of *warmer weather, favorable tropo, and summer* meteor activity. K1HTV, reporting on the January Quadrantid shower, says the shower peaked between 1630 and 1800 GMT, January 3 according to his TV observations. That agrees closely with previous reports. W3BDP, Delaware, worked his 28th state January 23 during a random meteor

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



W0WYZ, near Denver, is getting 432-meteor scatter results with this 256-element collinear array. The antenna is az/el mounted and Ray says sun noise measurements indicate excellent array performance. How about furnishing phasing details, Ray?

schedule with WØLCN, Minneapolis. W3TMZ, Maryland, tried meteor scatter for the first time during the Quads and was impressed. Jack caught a 45-second burst during a schedule with W5UKQ, Baton Rouge, for state number 19.

One lone report was received from K9KQR, near Chicago, of what may have been another 2-meter E opening. Dick says he observed E_s as high as TV channel 7 during the evening hours. Anyone have similar observations?

The following appears to have been 144-MHz sporadic E, though the middle of February is seemingly an unlikely time for such doings. K5PTG and K5PTK, near Galveston, Texas, worked K7ICW, Las Vegas, Nevada, on 144 between 0315 and 0340 GMT Feb. 13. Al's signals were strong, with E-type fading, for some 25 minutes. K5PTK had his beam north at the start, but found K7ICW's signal to peak on the line to Las Vegas. Sam says that Nevada was No. 24 for him on 144, and that 12 of these have been worked via E_s.

WAØITU, Kansas City, says a sideband net has begun in that area on 145.3 daily at 0200 GMT. VE2HW is building a 750-watt amplifier for renewed meteor scatter activity, after missing with K4GL on 200 watts during the Quads. VE3EMS has completed a 500-watt amplifier, prompted by results similar to those at VE2HW. VE3EMS is seeking meteor and tropo schedules.

220 MHz and Up activity has suffered since the January Quadrantid meteor shower. K2YCO has systems working on 220, 432, and 1296. On 1296, Chuck runs 100 watts output to a 6-foot Yagi and enjoys frequent contacts with K2GGA and VE3DKW, from Rochester, N.Y. From New York City, K2TMB reports having a pair of 4CX300s running a kW on 220, feeding four 6-element Yagis at 50 feet. George says nightly contacts include W2PU, K2RTH, WA2FFB, WA2LKJ, WB2BCQ, WB2KSZ, and WB2LJW.

On 432, WØWYZ, near Denver, offers tropo and meteor scatter schedules. Ray has a 256-element collinear, pictured elsewhere in this column, and 600 watts. On 2 meters he runs 350 watts to four 5-element Yagis. WA3MCK, Philadelphia, says the Pennara ARC is ready with ATV, and is looking for two-way television contacts. Dave, K8UQA, and Jim, K8BBN, are active with 150 watts and long Tilton Yagis. Both stations are seeking schedules.

K8DEO, Cedarville, Ohio, ran nightly skeds on 432 with W4FJ, Richmond, Va., during the winter months. After much work on the antenna system, and installation of a low-noise preamplifier at the antenna, Don now hears Ted regularly over this 400-mile path. He also hears solar noise daily, sunrise and sunset, and figures this to be a pretty good check on 432 receiving ability. If you can't hear some solar noise consistently, with the beam on the sun, you've got work to do. The antenna-mounted preamplifier may be the best single step you can take, if you already have a sizable array that is working well, and a low-loss line running up to it.

W4HHK reports hearing the voice transmissions on 2286.25 MHz from the Apollo 14 command module *Kittyhawk*, while it was in orbit around the moon during the lunar landing mission. Paul was using his EME system, used in his moonbounce communication with W3GKP on 2304 MHz. For more on this see his description of the converter elsewhere in this issue.

Teletype and the FM Repeater

Everyone who has observed a good fm repeater in operation (and who hasn't by now?) concedes its tremendous potential for instant, reliable communication over its service area. Teletype enthusiasts see in the repeater an almost ideal tool for their kind of communication, as well.

A program to combine the virtues of Teletype and 2-meter fm repeaters is underway in Colorado, coordinated by Duwayne McCrary, WØMQH, and Bob Shriner, WAØUZO, of the Pueblo Ham Club. They invite any and all who may be interested to let them know, as there is much work to be done.

Permission has been obtained to use the Colorado Springs repeater, WAØVTV, for tests that will be run this spring between Pueblo (WAØSNO repeater) and Denver. The Denver Amateur Radio Teletype Society is presently working on deviation levels and other factors. Also being investigated is the possibility of transmitting RTTY information simultaneously at low signal level under the voice, as is now done with tone identification in many repeaters.

An instant emergency communications system covering nearly all of Colorado and some adjoining areas seems possible, for enterprising vhf hams of this rugged part of the United States.

Erie County, Pa., Repeater

WA3KUV, 146.19 - 146.79 repeater of the Erie County Amateur FM Association, went on the air early in February. It is a dual-site installation, with uhf control link, open-access. Automatic identification and logging are provided, and users are asked to give the local time and call when signing in and out. A 3-minute timer locks the repeater out until 3 seconds after the carrier has been removed. At other times, a 1-second signal on the input channel will key-up the repeater for 15 seconds transmission, which includes the tone identification. Barry Capell, WA3GSH, originator and trustee of WA3KUV, is ARRL Emergency Coordinator for Erie County.

WA2SUR Repeater 64 Stories Up!

Formerly operated as K1TKJ/2, WA2SUR is on 19 - 73, high up in the Cities Service Building in Manhattan, carrier-operated, narrow-band, with 3-minute timer. George Ledoux, K1TKJ, is putting out a small newsletter, *The World of FM*, and will be glad to have news for same, primarily from the areas served by WA1KGK, Trumbull, CT, or WA2SUR. Address WA2SUR, Room 5501, 70 Pine St., NY 10005. Don't forget the room number. QST

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Shall We Join the Ladies?

POUR A second cup of coffee and exchange news across a table that is three thousand miles long. Talk about little personal adventures with very close friends we have never met. Belong to a club that isn't like any other club and often meets seven days a week. These closely-knit groups that make up the YL Nets may be found from 80 through 6 meters, Sunday through Saturday, on phone and cw, and include every class of Licensee in the membership.

"YL News and Views" is grateful to K5PFF, Audrey Beyer, for this YL Net Directory:

Day	*GMT*	*Freq. (MHz.)*	*Name of Net*
Daily	1600	14.332	YLISSB
Sun.	1900	14.070	YLISSB
Mon.	1200	3.950	BUCKEYE BELLES
"	1400	3.915	LARK
"	1600	21.272	YLISSB
"	1700	7.260	LOADED CLOTHESLINE
"	1900	3.905	ALASKA LASSIES
"	2300	3.925	HONEY BEE
Tue.	1230	3.935	BLUE RIDGE
"	1400*	3.933	FLORIDORA
"	1500	7.175	NOVICE
"	1530	14.160	CLARA
"	1530*	3.940	JAYHAWKER
"	1600	7.135	MINOW
"	1700*	7.235	IRONING BOARD
"	1800	21.150	NOVICE
"	1900	21.360	SNOWFLAKE
"	0300*	51.400	CHIX-ON-SIX
"	0300	3.780	YL NET
"	0330**	3.905	ALASKA LASSIES
Wed.	1330	3.910	YANKEE LASSIES
"	1330	3.770	MARITIME SPARKETTES
"	1400	3.950	YL WELCOME
"	1500	50.335	BUCKEYE BELLES
"	1600	21.272	YLISSB
"	1900	14.288	YL OPEN HOUSE
"	0000	14.160	CLARA
"	0100	3.933	FLORIDORA
"	0300	3.780	YL NET
Thurs.	1400*	3.940	TYLRUN
"	1400	3.950	FASYL
"	1600	21.390	CROSS COUNTRY
"	1630*	7.262	TYLRUN
"	1700*	3.933	WORKING GIRLS
"	1800	14.295	TANGLE NET
"	2100	3.650	PJYL CW
"	2200	3.970	PJYL
"	0130	50.335	BUCKEYE BELLES
"	0030	3.770	MARITIME SPARKETTES
Fri.	1400	7.270	MIDWEST YL
"	1600	3.913	MINOW
"	1600	21.272	YLISSB
"	1830	14.313	MINOW
"	1830	7.185	NOVICE
"	1830	28.625	HAIRPIN
"	2100	3.721	NOVICE
Sat.	1200	14.332	YLISSB
"	1400	3.910	HAWK ROOST
"	1600	14.140	TRILLIUMS (TOT)
"	1900	14.070	YLISSB TRILLIUMS (TOT)
"	2000	3.770	

† indicates these nets operate one hour earlier during DST.

** Business meeting

Many of the nets are indeed clubs that tie together the YLs of a state, or a country, or, as with YLRL, world-wide; clubs that are exclusively YL in their membership, as any that we attend at home.

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

SP9KR, Anna Skura, in Krakow, one of the very active gals from Poland who is found on 20-meter phone.

QST for

Trillium Contest Results

The November Trillium Weekend Contest results show the following winners: First – VE3FSA, Reg Pearson; Second – VE3GNI, Gerry Robertson; Third – VE3FPR, Roy Manning.

There was a special "Lucky Draw" prize for those who submitted logs. These winners were VE3BFN, VE3BLM, VE3BEI.

The next Trillium weekend will be in November, 1971.

TASYL Certificate Requirement Changes

The Auto State Young Ladies of Michigan have revised the requirements for their certificate, effective January 1, 1971. The new requirements are:

1. All Michigan stations must submit 20 points; other US, and VE stations must submit 10 points; DX (including KL7 and KH6) VHF, Novice, Technician, submit 6 points.
2. Points are awarded as follows: Contacts with TASYL Charter Members (No. 1 through No. 50) count as 2 points. Contacts with members from No. 51 on count as 1 point each.
3. Persons requesting a certificate must submit all contacts listed alphabetically. QSLs for all contacts must be in the applicant's possession. GCR rules apply and must be signed by two amateurs. Include 75 cents (US) or 5 IRC (DX) with the signed list.

For further details write TASYL certificate custodian, Betty House, K8VCB, Route 1, Spruce, MI 48762.

YLs of India

We are indebted to Leela Chowdappan, VU2CP, who has sent a list of the YL operators of India for those who are anxious to work YLs in that country, or who are interested in the worldwide YL picture.

They are VU2AIC, VU2CP, VU2DNZ, VU2EV, VU2IS, VU2JD, VU2KY, VU2LA, VU2LD, VU2LY (now in U.K.), VU2NC, VU2NKZ, VU2MI, VU2OV, VU2QC, VU2QF, VU2QI, VU2SC, VU2UAZ, VU2WW, VU2YL.

Leela writes that for want of modernized equipment, and due to foreign exchange restrictions, most of the YLs are not using as high power as is allowed under Indian regulations.

Meet the Club – CLARA

The Canadian Ladies Amateur Radio Association (CLARA) was formed in 1967 as a Centennial project of the Ontario Trilliums. The purpose of CLARA is to "encourage and promote proficiency and fellowship in amateur radio amongst Canadian women and to further a good relationship between the amateur and the general public."

CLARA has members from every province in Canada and NWT, and each call area has representation on the Board of Directors. The 1971 officers are: President, VE3BII, Jan Burgess; Vice-president, VE4ST, Bubbles Timlick; Secretary, VE5HO, Ina Brander; Rec. Trea., VE3BBO, Doris Cody; Dis. Trea., VE7AKT, Audrey Hughes. Others are appointed, one member for each call area.

CLARA's publication is issued four times yearly. The CLARA Net combines club business, traffic handling, DX-ing, and plain, old-fashioned chatting. Everyone is welcome to check in, including OMs. You do not have to be a club member to participate. CLARA has recently completed the *Canadian YL Directory*. This publication includes over 300 Canadian YLs and is available to anyone. Price is $1, and the directory may be obtained by writing to Cathy Hrischenko, VE3GJH, 30 Lisbon Cresc., Willowdale, Ontario. Please remember that yearly additions, deletions, and amendments to the list will be automatically forwarded, so make sure the address is complete, including Zip code if any.

Looking for Asia for WAC-YL, or DX-YL? Try VU2NC, Rajeswari Narasimhan. She meets on the air with the other VU-YLs each Sunday afternoon.

Mid-West YL- Next Month!

Final reminder that the Mid-west YL Convention will be May 14, 15, 16, 1971, in Cleveland, Ohio, at the Airport Ramada Inn. If you haven't registered for the convention, now is the time to send your registration for yourself, and any guests, to Dot Baumgardner, 20470 Lorain Road, Cleveland OH 44126. The $12.25 fee includes Registration, YL Luncheon, Saturday Banquet, and Sightseeing Tour. The Friday night dinner will be courtesy of the Convention Hostesses, the Buckeye Belles, and Chix-on-Six.

Hotel reservations are to be made directly to the Airport Ramada Inn, 13930 Brookpart Road, Cleveland, OH 44135.

VE4ST, Bubbles Timlick

If it is a YL Net on 20 meters, it's a good bet that there is a sign "Bubbles was here!" because "happiness" is a YL net, and 20 meters is the band for VE4ST. A close second in favorite activities is working as a YL-OM team with the OM, Ted, VE4TT.

Bubbles is a childhood nickname that has stuck and become well-known to anyone who is hunting Manitoba in a contest, or for a certificate. She and the OM were first licensed in 1953, and received the Advanced Class license in 1959. Although she is a full-time working YL, Bubbles never misses the CLARA evening sessions or the Saturday Trillium Net on 20 meters.

A confirmed certificate hunter, Bubbles' goal is to earn all the awards offered by the individual YL Clubs and Nets. At present she holds TOT, Alaska

VE4ST, Bubbles Timlick

Lassies, MINOW, YLCC, WAC/YL, DXCC, the Illinois Sesquicentennial, and was the first YL in Manitoba to earn that province's Centennial Award. First Place has become a part of the results of her operating and she holds this coveted position for Manitoba in the W/VE, for Canada in the YL-OM, for her call area in YLAP, and she and the OM placed Manitoba at the top of the list as YL-OM team in the YLISSB QSO Party.

A member of CLARA, and Vice-president this year, TOT, YLRL, ARRL, Amateur Radio League of Manitoba, and YLISSB, Bubbles' outside activities are her garden and her flowers. For those who are curious, her given name is Sigrun.

Feedback

An error in the January YL Column on the caption under the picture of the Mid-west YL Convention Chairmen. It should read: Eila Russell, WA8EBS, and Dot Baumgardner, co-chairman, and registration chairman, respectively, for the 1971 Mid-west YL Convention. QST

Advisory Committees

(Continued from page 69)

DXpeditions and handles QSL chores for 18 DX stations. He holds the Advanced Amateur certificate of proficiency.

Liaison Director: Dale Strieter, W4DQS, 928 Trinidad, Cocoa Beach, Florida 32931

Staff Liaison: Robert L. White, W1CW, 225 Main Street, Newington, Connecticut 06111

Nominations on file: W1BIH, W1DGJ, K1KNQ, W2CP, W2GKZ, W3BWZ, W3GRS, K4HNA, W4QVJ, W5OJZ, W6NJU, W6QJW, W6WX, W7PHO, K7YUC, W9QQN, WAØEMS, WØMLY, WØMYN.

The Committees Need Your Support

You, the individual League Member, should feed your ideas, your suggestions for improvements and changes in these specialized areas directly to the advisory committee, via its chairman or the member living nearest you. These are *your* committees, and they will continue to produce something of value to the extent that the members support them and provide meaningful input. QST

Silent Keys

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

K1BJX, Glynn L. Morrissey, Bennington, VT
W1BNB, Hubert N. Lugg, Plainville, CT
W1EUW, Ernest R. Strautman, South Weymouth, MA
W1FA, Harris B. McIntyre, Marblehead, MA
W1HRR, Frank P. O'Neil, Taconic, CT
ex-W1HE/ex-1UQ, H. W. Castner, Damariscotta, ME
WA2AIL, Loren R. Springett, Rochester, NY
W2ATD, Harold W. Drobny, Babylon, NY
W2FGJ, Henry L. Dabrowski, Short Hills, NJ
W2FSA, Marguerite P. Sloan, Lakewood, NJ
W2FZF, Louis Mascara, East Northport, LI, NY
K2HTG, Julian B. Anderson, Jamestown, NY
W2PUL, William K. Squires, Martinsville, NJ
K2QQL, Robert F. Nelson, Sr., Florence, NJ
W2VSQ, Frank A. Tamborelli, Corona, NY
W3ACV, Arthur Krouse, Philadelphia, PA
WN3MUZ, Harvey A. Ritter, Philadelphia, PA
ex-3TF, Harold L. Harvey, Baltimore, MD
W3UHN, Anthony J. Mroczka, Donora, PA
W3YZC, Allan B. Schechner, Conshohocken, PA
K4CJB, Roy F. Berndt, Bradenton, FL
W4EBA, Thomas B. Smiley, Raleigh, NC
W4EDI, Mildred B. Brewster, Cedartown, GA
K4EG, Francis E. Beaudry, Graham, NC
WA4OTW, Howard A. Hedges, Gainesville, FL
W5BUV, Chester A. Murgatroyd, Buchanan Dam, TX
WB5BWU, Willie L. Lindley, Golden, MS
W5CWS, Ernest C. Williams, Silsbee, TX
W5FGH, William H. Baldwin, Kerrville, TX
W5VEG, Del S. Beeman, Fort Stockton, TX
W5VLU, Earl C. Vandervoort, Sr., Sweetwater, TX
W5KAL, Dr. Quain K. Jahrman, Greeley, CO
WA5WSS, John W. Kemp, Pasadena, TX
WN6EUE, Joseph W. deYoung, Westminster, CA
W6KVJ, Philip N. Good, Glendora, CA
WB6OEC, Nathan F. Helper, San Mateo, CA
W6PPO, Horace S. Walling, Fresno, CA
W6YGV, John B. "Jack" Kihm, Torrance, CA
W7CJU, Blaine Ringer, Seattle, WA
W7CQP, Fred S. Warner, Ogden, UT
W7GOU, Fredrick W. Homad, Edmonds, WA
W7JUP, William F. Snell, Portland, OR
WA7OOD, Hugh B. Tripp, Port Townsend, WA
K8BRJ, John A. Hagstrom, Muskegon, MI
WA8CZJ, Harold J. Abbott, Jr., Battle Creek, MI
W8GGA, William J. Reilly, University Heights, OH
W8JTQ, Howard A. Walker, Flint, MI
WA8LHC, Vernon J. Barton, Manistique, MI
K8RLC, Robert Armentrout, Clay, WV
W8ZN, Charles H. Thornton, Gaylord, MI
W9EBC, William J. Beetham, Fennimore, WI
W9HFI, Melvin O. Frank, Milwaukee, WI
W9NSE, Marion A. Nash, Liberty, IN
K9SAM, Robert L. Bunch, Decatur, IL
K9SNQ, Orin J. Lloyd, Gary, IN
WA9THY, Joseph A. Urbas, Milwaukee, WI
WN9VIU, Rex Urbas, Milwaukee, WI
WØGGY, Charles F. McCamish, Kansas City, KS
WØKSY, Brigadier General Phillip W. Smyth, Topeka, KS
WØMMF, Wilfred B. Hoaglin, Mt. Pleasant, IA
KØPEF, Lester W. Robson, Sioux Falls, SD
WØRWQ, Ernest M. Bethune, Prairie Village, KS
WØVJK, Eugene D. Eller, Columbus, NB
VE2IZ, Francis N. Beattie, Beaurepaire, PQ
VE3DCX, Sidney C. Cusack, Sault Sainte Marie, ON
VE3EWD, P. J. J. Doyle, Ottawa, ON
VE3NB, G. W. Crossan, Willowdale, Canada
VE5WI, J. A. Spark, Prince Albert, SK
VE6AHA, Edward H. Andrews, Ponoka, AB
VO1BP, Ellis R. Hayward, St. John's, NF
DL8WF, Hans U. Anders, Speckh, Germany
G2AIW, F. G. Lambeth, Middlesex, England
G3BVG, N. Caws, London, England
9Y4IC, John Correia, Woodbrook, Trinidad & Tobago

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

H o w :

Where all the brand new enthusiastic 40- and 80-meter cw DXers keep coming from has been a nagging little mystery. So many of them rarely work 14 MHz or higher, haven't yet developed Five-Band DX Century Club appetites, and haven't quite collected their Extra privileges for DX sport in the productive lower-25-kHz segments. But they're grabbing plenty of goodies. Now comes a letter from WB4LAC that seems to spill the beans. Apparently much new DX blood comes along thanks to your Elmer-on-the-air, W1AW. Howard writes,

> Had to let you know about the DX I stumbled onto the other night. I tuned down to 7020 kHz to catch the tail end of W1AW's code practice session. Suddenly I heard a number of prefixes I had never logged before. LZ2KRE was coming through near 7031 kHz. A few minutes later I was happy to be working HA4KYH on 7029. This was a real thrill because I hadn't realized 40-meter DX was so easy to find. Next evening the LZ was banging in again. I guess DX is always in there, especially in the winter months, if you listen carefully.

Come to think of it, when the bands are in decent shape it's hard *not* to hear tempting overseas prefixes around W1AW's current code spots. Keep QSTing those incentive DX invitations, Elmer!

That 7-MHz phenomenon isn't as weird as a recent incident reported by WN6GQR of San Luis Obispo. If you go for the propagational sensational (and who doesn't?) you'll enjoy Danny's yarn. . . .

> I've been a Novice for about a year and a half now, doing most of my operating with a Navigator, HQ-110A, a quad on 15 and dipole on 40. The rig puts out about fifty watts and does a good job on 21 MHz in the daytime. Forty, however, is pretty local during the day, normally limited to about 200-300 miles.
>
> Well, one day last spring I was working 7 MHz out of my home in the L.A. area at about 2100 GMT (two in the afternoon local time) finding mostly 100-mile-radius stuff as usual. I decided to try a CQ. Someone came back, and after four QRZ?s I finally copied the OM's call: KC4USM! This threw me into panic. While trying to send his RST I flipped through maps and books trying to establish the whereabouts of KC4s. Before I found it KC4USM gave his QTH as Byrd Station, Radio Noise Facility, Little America, Antarctica. The operator's name was Bob and his weather a minus 20 degrees. After our 45-minute QSO every Novice in southern California must have been digging for him.

Just another April tale or some kook putting Danny on? Not this time. We have a photocopy of the resultant KC4USM QSL, a rare trophy of the hunt now framed and prominently displayed at WN6GQR.

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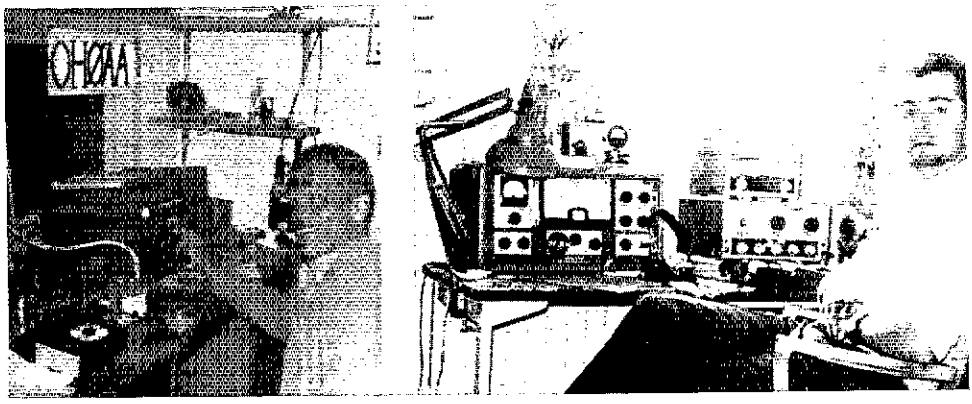
W h a t :

Our mail is increasingly flavored with the contagious enthusiasm of DX newcomers so we'll carry through a bit on the theme. Old-time DX hounds, obsessively sidetracked by the numbers game, dB over S9, lists, donations and other frittering frustrations can only envy the unsophisticated approach of beginners – DXing just for *fun*. . . .

I was a ham-band SWL for much of fifteen years with time out for college and grad school (I'm now a 29-year-old chemist with IBM). After hearing 300 countries on voice I finally decided to get my license. Received my Novice last September. Since that time I've had a ball working more than fifty countries on 15 meters despite time out for rig repairs and a tough line noise problem. I use Yaesu gear and a ground-plane 30 feet high. A major factor is a pocketful of crystals for 21,100-21,120 kHz plus a few others up to 21,150. You've got to get close to a DX station's frequency so my rocks are spaced about every three kHz for the low part of the Novice subband. And of course, as is so often said, one must *listen*. The successful Novice DXer listens 80 or 90 percent of his operating time. My main interest is DX but I do give the contests a try. Being a Novice is much more enjoyable than I had imagined since, with 15 meters holding up, DX QSOs are so available. *WN4SIJ*. . . . The countries get a little tougher to come by after you've been at it for a while. JW

*7862-B West Lawrence Ave., Chicago, Ill. 60656.

OZ1LO, proprietor at your QTH of the Month, has Danish diggings quaintly reminiscent of a Durer engraving. Leif's Five-Bnad DX Century Club membership and outstanding ARRL DX Contest performances are proof that the place also is a worthy radio location.



K2ALO/OHØ (left) and DL7NS/OHØ, concentrating on code and voice respectively, spend enjoyable reciprocal-operating holidays in the Aland islands. Don and Klaus also join in manning the OHØAA club station.

CR4 9Y and VP2AL are recent new ones here. — *WN7OLT.* . . . Finished my last day as a Novice in fine shape by QSOing K7HWC/KL7 on Amchitka, Aleutians, and two YVs with a trap vertical and Apache. By the way, ex-Novices who still have such cw/a-m transmitters as the DX-60 should give carrier phone a try after getting their Generals. There's a-m activity in many parts of the world, especially on 10 meters. Not much phone activity here, though, as I usually find more DX on cw. I'm a 14-year-old in the ninth grade. — *WAØVJF.* . . . Fifteen meters has given this 50-year-old some hard-to-get DX QSOs, the band staying in until around 0030-0130 GMT here in New Jersey. I'm also having QRP fun with Ten-Tec modules on 40 and 80. — *WN2KLB.* . . . I know forty is a good DX band but I'm still after something better than KL7. A VFO would help but cash is hard to scare up when you're only fourteen. See you at the DXHPDS meeting! — *WN6BRM.* . . . After twelve years of reading about it I was finally bitten by that DX bug a year ago. Now at 72/56 countries worked/confirmed with 200 watts of cw, a dipole, groundplane and limited time. — *K4BYK.* . . . Hurrah! Passed my General last Thursday. Please look for me about mid-April from Tonga as VR5DK with a 500C on 10, 15, and 20 meters. — *ex-WN6FSC via WA1CYT.* . . . After 22 years QRT PAØSN is a DX newcomer again! Very pleased to meet old U.S.A. friends on cw or phone, 14, 21, or 28 MHz. American equipment is too dear for me in Holland so I now use a 150-watt Trio with separate vfo, much different than my old rig and HRO. The antenna, an old Twinlead folded dipole, soon will be replaced by a triband rotary beam. In my first three weeks back on the air QSOing seventy countries on five continents I find my code speed returning. Many W/Ks welcome me as their first PA contact. Now for New Mexico and Utah to finish WAS! — *PAØSN.* . . . While we're about it, here's a handful of stuff lately worked on 21-MHz cw by the "How's" WN gang: CE2s NH PN, CM2ZU, COs 2KG 2BM 7AI, CR7SR, CT1s DJ UM, CXs 3AN 6BBW, fifty-five DJ-DK-DLs, DMs 2BBK 2CHM 2DZH 3SXO, FAs 1EH 2IG 3QW 5BS 7IL 7KF 8BE 8HB, EI9J, EL2CB, twenty-five Frenchmen, FB8YY, FM7WG, FO8AA, three dozen Britishers, GMs 3MHG 3XVJ 3VNW 3BNX 5AIH 5ASI 8MJ, GWs 2DPD 3FQZ, HAs 3MJ 5KBM 5KFZ 7LU 8KCP 8KUX 8UO, HB9s AHP ALD AMZ APJ DX QH, HC1s FM JU PR, HKs 7YB ØBKX, HL9VE, HM4FA, HP1XHG, I1s CRC FTU JX KH MGZ MSA, JAs 1MIN 1WPX 3BVM 6YCU, JH1WIX, JD1YAA, KG4s AN CS NET, KH6EQI, KJ6CF, KM6DT, KP4s DJ1 DLC USN, KV4GP, KZ5s GJN GP NBN PNN SIN, eleven Norwegians, LUs 3DSI 6DJX 7EAR 8AHW 9FAN, LZ2KRZ, OA4DMZ, OD5s EJ LX, OEs 1NY 2JZ 3SEW 5BHL 5XPL 9AHI, thirteen Finns, twenty-one Czechs, ONs 4GD 4GQ 4KR 4PG 5BI 5EQ 5GL 5JW, OY3MH, OZs 2CE 7A 8WH 9VR, PAØs ABM BFN DV KF LRK POC, PYs 1NEW 2BIP 2DCR 2EWF 5ASN 5XQ, PZ1CU, SK7AK, SLs 2CU 3AG 6BH, thirty-eight SMs, SPs 2UU 5ATO, TJ1AW, TU2CC, UAs 3AV 3ET 3HI 3WI 4BP 4SQ 9HM ØML ØMO, UB5s CI HR SL MZ SR, UC2AW, UF6LA, UKs 1ADK 2PAA 2PAD 5TAA 6LAZ 9HAD, UWs 1ZJ 3AU 6AO /BU ØLN, VE8BH, VKs 2BMB 3YD 4HY 5OB 5RD 6AI, VOs 1DK 1JN 2NA, VP9BY, VR6TC, WBØASR/KP4, WNØBED/KP4, WL7GPM, WP4s DHD DJZ DLG, XEs 1EFC 1OOZ 1TI 1WWE 2EEL 2MX 2PCW/M, YN4LS, YOs 2RA 3RO 6AW 8MH, YUs 1AG 1BEF 2CAW 2NAS 3APR 3BU 3EM 3ER 4FDE 5CYZ 5XAG, YVs 1AB 5ATX 5BPJ 5CKR, ZE1BL, ZLs 1BHP 1HW 1TB 1UU 2CD 2GH 3JC 3JO 4FX, ZSs 1JP 2EM 2MI 4IO 6AYU 6SS 6TY, 4U1ITU, 4S7PL, 5N2AAU, 5R8AP, 6Y5GA and 7Q7AA, all mostly in the 21,100-21,125-kHz region. We count about eighty countries in that small sampling — watch out ARRL DXCC Desk!

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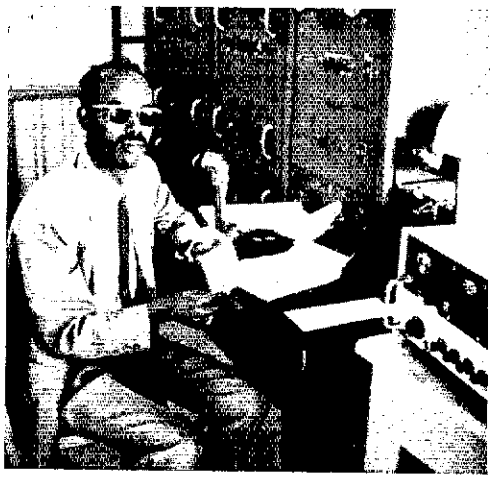
W h e r e :

HEREABOUTS — W1SWX, K8LUH, WAs 2EAH 2GMD 2MSF 8TNJ, WBs 4KZG 9BUV and 9CJS nominate a worthy batch of QSLers of the Month for particularly prompt pasteboard pushin': AX2APH/LH, CM3s LM LN, CO2DC, CT1OF, EA7DJ, EL2CB, FPØCA, HH9DL, HI3ABB, HKØBMO, JD1ABO, MP4MBB, OA8V, PJ9JR, SM5BUT, UW9DZ, VPs 2EE 8JV 9GK, VS5RG, VU2IE, WB8IEC/TF, YU3EY, YV5CKR, ZEs 1CX 4JS, ZK2AF, ZL4OL, 5R8AP, 8R1U, 9V1OI, and 9X5AA, together with QSL aides Ws 1YRC 2CTN 2YY 3AVJ 3KJZ 3HNK 3ZKH 4NJF 6DI 9GFF 9ZRX, Ks 1WPS 2OJD, WAs 3HUP 6AHF 9VOL, G3LQP, JA1BA, VE7BWG and ZI2GX. Any quickies we missed? . . . . . Help! Several italicized brethren hunt hints on coaxing QSLs from holdouts mentioned: *W4YOK*, VP2VV; *W7FCD*, AX9RY, UA2CA '68, VK9RJ '69; *K6UMV*, VR3L '62; *K8NSA*, 8Z3A '70; *K9DKU*, XW8CD; *WA8TNJ*, FK8AG '69, KJ6BZ, MP4BEU; *KV4FN*, VP9EE; *VE2EJ*, HV1AK, KM6DQ/KH6, TG9AC '68, VQ9B '69, W7HST/8R1, 8R1J; *VE6JW*, YBØAAB and 9Q5PI. Any 'alp? . . . . . W2BHK, WAs 2HZR 2MSF and 8TNJ are on call for overseas ops in need of Stateside clerical QSL assistance . . . . . Mail was down thirty percent at one local post office last Christmas. — *NNRC.* . . . CO2FA says he gets only three

ET3UA often hangs around 14,210 kHz, usually at 1400-1530 GMT, when not on duty as Ethiopian Air Lines radioman. *(Photo via W6DDB-W6LS)*



cents per IRC (International Reply Coupon) so direct QSL reply requires four. By the way, U.S. postal rates are due to move upward again next month. – *WCDXB.* . . . W5QPX and I would like to clean up QSLing for our HT4s 1M and CI operation respectively. Still many unclaimed cards. – *WB9BUV.* . . . Many await QSLs from VP2KX because he ran short of cards. I'm Ed's QSL manager now. – *WA3IUV.* . . . Here's a reminder that W4VPD/KC4 (Navassa '69), W4VPD/KS4 (Swan '70), VP1AJ, TU2CX, K6JGS/HKØ and 1N2A QSLs go to my address. – *W4VPD.* . . . Bookbinder Publishing Company inaugurated a new monthly QTH bulletin service in February, inquiries welcomed here. – *W6GSV.* . . . Worked on PJØCW QSLing while on a two-month stay in Japan as JA6YAO. After returning in March PJØFC cards will also go out. – *W1FJJ.* . . . Still have plenty of QSLs and logs for MP4s BGR BGW BGY, SVØWm, 9K2s CA CB CC, 9V1s OI OX and April 21, 1969, YBØAAD operation. – *K9CSM.*

EUROPE – QSLs for my QSOs between July 30, 1970, and January 9, 1971, go to JW5NM, N-9172, Isfjord Radio, Svalbard via Tromso, Norway. Cards for QSOs on and after January 10th go via LA7RB who is a stamp collector like myself. – *JW5NM.* . . . Returning from a visit to 4U1ITU I brought back nearly a thousand QSLs destined for W/K amateurs who QSOd that station from July through November last year. These cards have been forwarded to ARRL call area bureaus. – *WA3NHG.* . . . I held the call GC8NO but gave it up at least ten years ago. So far as I know it has never been re-alloted but during the past year I have received a number of U.S.A. QSLs. It seems clear that someone has been using the callsign illegally. – *ex-GC8NO via W7EA.* . . . Radio clubs in France are authorized to sign our HW prefix. F6KAW signed HW6KAW in the '71 ARRL DX COntest on five bands. – *F5QE.* . . . Due to cooperation between the two ham associations in Holland the P.O. Box 190, Groningen, bureau has closed. QSLs for all Dutch amateurs may be sent to P.O. Box 400, Rotterdam. We also learn that Germany is issuing the DB1-DB9 prefix, and that March 16th-23rd HV3SJ code QSOs can be confirmed via DL1CU. – *VERON.*

OCEANIA – I left the Gilberts a year ago but no doubt there are some who for some reason or other have never received my VR1V QSLs. They may reapply via my New Zealand address. I'm trying hard for my own DXCC now but confirmations are slow to get, with or without IRCs. – *ZL1BKE.* . . . Your recent listing for AX7GC/VK7GC QSLs to go via Mr. Blair of California applies to s.w.l. reports only. We forwarded the ham cards to VK7GC but, as he is moving to VK2-land, there is now a hold order on his mail. – *E. Hamill, Golden Gate QSL Bureau.* . . . I am QSL manager for ZL5AX of Scott Base, Antarctica, requiring IRCs for direct replies [QTH in March "How's"]. – *ZL1SV.* . . . QSLs for VKØHM operation by operator Girard, formerly of FB8XX, go via F2MO. W7PHO handled QSLs only for former VKØHM operator Hugh who is in Washington state. Incidentally, VK8HA now serves as Australia's Northern Territory QSL bureau. – *WCDXB.*

AFRICA – QSL manager JA3BVW will complete my SR8AB QSLing via sea mail because air mail is so expensive. *JA3DYU.* . . . I'm not managing TU2AK QSLs, just those of TU2DD (F5ZZ). – *K2QHT.* . . . QSLs for me may go via W4WHF or, for stamp collectors, with IRCs and self-addressed stamped envelopes care of U.S. Embassy, Tunis, Tunisia. – *3V8AL (W4KIL).* . . . I am no longer QSL manager for CR6CA. Since logs were taking six months to arrive I feel that QSLing via the CT1 bureau (*not* the Angola bureau) will be faster. – *VE3GNM.* . . . Stations still requiring my EL9B QSLs should send cards with s.a.s.e. (or s.a.e. plus IRCs) to W8WRP who also takes care of my Holland QSLing for W/K QSOs. – *PAØWGS.* . . . As of February 1, 1971, I handle QSLs for 9J2s EA and RO of Ndola. Cards received without s.a.s.e., or s.a.e. and IRCs, will be answered via bureaus. – *WA1HAA.* . . . I manage FB8WW's QSLs as of January 1, 1970, requiring two IRCs for sea mail reply, three for air. There is a one- or two-month delay caused by relay of logs through military RTTY. – *F5QE.* . . . Correction regarding QSLs for FL8HM: They go via me, not via F9FN. – *W9FN.* . . . Starting March 1, 1971, 9J2GE logs will be on hand at W2GO. – *LIDXA.* . . . QSOs with 9J2BK and 9J2BK are now being confirmed through DXpedition of the Month. Ben's logs are on hand back through January 10, 1969. – *W2GHK.*

ST2SA's fine family is obviously quite at home among all the wireless machinery. Doctor Sid's new linear amplifier should keep the Sudan Extremely audible on DX bands. *(Photo via WA6AUD, West Coast* DX Bulletin*)*

5R8AB (JA3DYU) notched 2200 QSOs with 88 countries using TX599/JR599 gear during an extended Madagascar visit. Massa intends a return trip one of these days to complete his 5R8 DXCC.

ASIA — VU7US QSLs will be posted to *International Amateur Radio Union* QSL bureaus by our ARSI, and cards received with IRCs will also be mailed accordingly by the society. — *VU2CZ*, . . . XYL WN3NGS does VU2BEO's QSLs for me. — *W3BWZ*. . . . VS9OC QSLs are *no longer available through DXpedition of the* Month because we are unable to obtain logs. — *W2GHK*. . . . Some envelopes sent to the Box 3031 VU5KV address have been rifled. If after a reasonable time your QSL via that route has not *been answered try (if your call suffix begins with* A through H) 26 Jorbagh, New Delhi 3; (I through P) 102 Jorbagh, New Delhi 3; (Q through Z) 161 Jorbagh, New Delhi 3, India. — *WCDXB*. . . . Some specific mailing suggestions from the mailbag now, but be mindful that each datum is necessarily neither accurate, complete nor "official." . . .

DL3GJ/HK3, H. Jordans, Aptdo. Aereo 6811, Bogota, Colombia
DU1PB, P.O. Box 4045, *Manila*, P.I.
EP2s FB IL (to W3EMH)
FG7AA, M.F. Mouly, Gendarmerie, St. Claude, Guadeloupe, W.I.
FY7YI, P.O. Box 19, Cayenne, French Guiana
HC8RF, Box 15, Quito, Ecuador
HS3AEL, G. Whitehouse (K1DIK), Box 7035, APO, San Francisco, CA 96304
HS3AEM, H. Ward, Box 4766, 1998th Comm. Sqdn., APO, San Francisco, CA 96288 (or to K1USO, or via STAR)
JD1s AAZ ABS ABX (via JA1KSO or JH1EXV)
JD1AHB, Chichi Jima Weather Stn., Ogasawara, via *700-R27*, Tokyo, Japan
K1FUW/KH6, W. Ireland, 95-253 Kaopua Loop, Mililani Town, HI 96789
K4BZH/VP7, B. Johnson, AUTEC, Box 306, FPO, New York, NY, Z-09559
K4GAN/YV1, J. Hoffman, P.O. Box 172, Maracaibo, Venezuela
ex-KA2ID (to K1FUW/KH6)
KX6KS, Box 1535, APO, San Francisco, CA 96555
M1KY, P.O. Box 52, San Marino
MP4TDY, P.O. Box 421, Sharjah, Trucial States
ON6RN, Radionavagation School, P.O. Box 8, Leuven, Belgium (or via *UBA*)
TA1s RO RT (via K4EPI)
TA3s GB KE (via W2FXA)
TT8AD, P.O. Box 444, Fort Lamy, Tchad
TY1ABE, P.O. Box 29, Port-au-Nova, Dahomey
VK9s XK XX (via W2GHK)
VP2AHA, P.O. Box 397, St. Johns Antigua, W.I.
WA1ARF/KS4 (via WA6MWG)
WA4OVP/8R1, D. Harrison, Box 25, Georgetown, B.G.
WA9YXA/KH6 (to WA9YXA)
WC4SFF, Box 461, Lakewood, FL 33460
ZL1BKE, R. Beets, 34 Massey Dr., P.O. Box 71, Kawerau, N.Z.
4Z4JS, B. Dalfen (VE2DIC), P.O. Box 9184, Jerusalem, Israel
9J2s EA RO (via WA1HAA)
9M2DQ, J. Pershouse, 93 Tanjong Bungah pk., Penang, Malaysia

AX7GC (see text)
CR6CA (see text)
CT2BB (via WA3NRV)
CX3RP (via RCU)
FB8WW (see text)
FL8HM (via W9FN)
HV3SJ (see text)
HW6AW (see text)
IX1LIO (via WA2DWE)
JA6YAQ (to W1EJJ)
JW5NM (see text)
KG4EY (via WA2IRS)
ON4QJ/AP (via ON5KL)
ON6ZM (via ON5OJ)
OR4CR/AP (via ON5KL)
PAØWGS (see text)
PJ8RD (to WB8ABN)
PJ9AF (via W3KMV)
PY2DBN/MM (via K2QHT)
TT8AC (via DJ1LP)
TU2DD (via K2QHT)
VP2ABN (to WB8ABN)
VP2EEL (to WB8ABN)
VP2KX (via WA3IUV)
VP2VA, VP2VL (via WA
VP8LR (via WB4FIN)
ex-VR1V (to ZL1BKE)
VU2BEO (via W3BWZ)
VU5KT (see text)
VU7US (via ARSI)
W4AQW/MM (to W4AQ
WØEXD/KC4 (via W4OI
ZD7BB (via WAØWKW)
ZK2AG (via ZL4NH)
ZL5AX (see text)
ZS2MI (via ZS2PX)
3V8AL (see text)
4U1ITU (see text)
8P6DQ (via W2GQN)
9G1SS (via W2BHK)
9I2BK (via W2GHK)
9J2GE (see text)
9J2pm (via WA7ICK)
9N1JK (to DL9JK)

For the preceding catalog your thanks go to Ws 1BV 1RAN 1SWX 1YYM 2DY 4YOK 6GSV 7AMM 8SWN 9LNQ, Ks 2QHT 8LUH, WAs 2EAH 2HZR 3NHG 8VRB, WBs 4KZG 9CJS, VE6JW, F5QE, VU2CZ, ZL1BKE, *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich N.72 T., England), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4FRO), International Short Wave League *Monitor* (A. Miller, 62 Wardward In., Selly Oak, Birmingham 20, ENgland), Japan DX Radio Club *Bulletin* (JA3UI), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), UBA's *On the Air* (ONs 4AH 5VA), VERON's *DXpress* (PAØs FX LOU TO VDV WWP), West Coast *DX Bulletin* (WA6AUD) and 3KM *DX Bulletin* (JA1KSO, *JH1EXV*). *Mail strikes in various parts of the globe* had telling effect on literature delivery this month.

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Whence:

ASIA — VU2s CK HV KM QM and RK plan to sign VU7US from the Laccadives on the 10th-19th of this month, cw and ssb on 14 through 28 MHz with 150 watts. — *VU2CZ*. . . . Just received my license a few days ago and find conditions not too hot to the States. I'm on almost any Sunday starting about 0800 GMT near 21,275 kHz. As soon as my work schedule and band conditions settle down I'll pick a 20-meter spot. — *HS3AEM (K1USO)*. . . . I expect to be active on sideband and cw from Thailand through August.

VP2EE's stalwart Anguilla team (from Left) PJ7JC, K9RHN, W9IGW, W9ZRX and W9ZTD produced 3537 ssb contacts over a recent 48-hour DX sprint. *(Photo via W9ZRX)*

HS3AEL (K1DIK). . . . 9M2DQ and I have been corresponding since 1962. – *W8SWN.* . . . Within a short time I hope to be signing a 7Z call from Riyadh. – *W7AMM.* . . . I'm interested in contacting other WAJA award seekers to exchange info on stations in rare Japanese prefectures. My current score is 33/32 worked/confirmed. – *W7FCD.* . . . . W4BPD may be revisiting Bhutan, Nepal, etc., about now. – *WCDXB.* . . . New or renewed memberships are claimed by KAs 2BL (K9FOH), 2CR (SB8DPL), 2JG (WØLWC), 2MM (WB6AVG), 2ZD (WAØZZD), 7GM (KH6HHM) and 8AN (WA6RCX). This year's officers: KA2s QW pres., SF v.p., RJ secy., SB treas., WM awards mgr. and LL *News* ed. – *FEARL.* . . . Eighty-meter phone in Japan is 3525-3575 kHz with 3568 a favored calling frequency. Heavy QRM from mainland China point-to-point circuits makes 3.5-MHz DXing extremely difficult for JAs. Info from Radio Peking affirms that no amateurs are licensed in Red China although "experimental stations" are sometimes authorized to use ham frequencies. – *3KM-DXA.*

EUROPE – Ws 3ARK ØBMM 4HOS, K4BAI, W6s DGH and JPH achieved that scoring order among U.S. entries in the 1970 PACC DX Test sponsored by Holland's VERON. VE2IL led Canada while PAØs RCT TCA LOU DIN MIR FRI LV VB and TA paced Netherlands entrants in that sequence. – *PAØs LOU KOR via W1YYM.* . . . . I'm still looking for ex-ZB1s, ex-9H1s and any other amateurs of Maltese ancestry concerning formation of a Maltese Amateur Radio International Society. – *VE3GNM.* . . . Despite a busy schedule I managed to operate 4U1ITU and visit with IARC secretary F8RU while in Geneva. – *WA3NHG.* . . . I will be QRT in mid-June after four thousand QSOs on five bands from Svalbard. – *JW5NM.* . . . DL7FT's latest ZA2RPS encore plans point toward the last two weeks of June. – *WCDXB.* . . . IT1TAI urges DXers to send s.a.e. with IRCs to DX Old Timers Club, P.O. Box 143, Palermo, Sicily, for full info on their WII (Worked Italian Islands) certification. – *W4VPD.*

OCEANIA – K6NB, formerly WA6UNF, and I logged our 2000th 7023-kHz cw QSO at 0800 GMT last November 30th. We estimate the exchange of 1,800,000 words of enjoyable rag-chewing since we began our schedules in May of '63. – *VK2NS.* . . . K1FUW/KH6 (ex-KA2ID) expects to be on 14,280 kHz soon with a night-blooming 14AVQ vertical. –*FEARL.* . . . ZL1AA, NZART Auckland branch club station, will be active April 17th to May 2nd in conjunction with the city's centennial celebration. Operation will be on all DX bands, contacts will help qualify for NZART branch certifications, and special QSLs will go to all stations contacted. – *ZL1TB.*

AFRICA – F5ZZ guest-operated TU2AK briefly, then became active with his own call, TU2DD. – *K2AHT.* . . . I enjoyed my many contacts with the U.S.A. as EL9B from 1966 through 1970 while stationed at a remote mining camp in the Liberia bush. – *PAØWGS.* . . . 9J2s EA and RO are frequently heard on 28-MHz sideband. – *WA1HAA.* . . . ZS1MH is solid Statesward with only two watts (*and* a rhombic) on 14,130-up or 3805 kHz. – *LIDXA.* . . . ET3ZU and F5QQ are mentioned in Zugar island speculations, and next month could see 3B7DA's Rodriguez 3B9DA thing. – *WCDXB.*

HEREABOUTS – I plan to operate in FG-land April 9th-16th, as VP2EEL on Anguilla the 16th-22nd, PJ8RD Sint Maarten (possibly also French St. Martin) the 22nd-24th, and as VP2ABN on Antigua the 24th-25th with an HW-100 and 4BtV on 80 through 10 meters. – *WB8ABN.* . . . .I'm operating marine mobile aboard MS *Sagafjord* on a 'round-the-world cruise. Will hit rare spots when permission allows. – *W4AQW/MM.* . . . After working WAC and 58 countries on 160 cw I find a big discouragement to top-band DX in Stateside QRM in the 1822-1832-kHz DX range. At my location most DX signals are S3 or under when they come through at all. If this DX window could be left clear at 0300-0800 GMT, especially on week ends, 160-meter DX would be fun once more. – *W9PNE.* . . . Our Greater Lansing DX Group meets on 28,550 kHz at 0215 GMT each Monday night after W6TI's DX bulletins. – *WA8VRB.* . . . How's DX? Expensive. Paid six bucks for my Bahamas license sixteen days before all '70 tickets had to be renewed. Four Portable-VP7s are active at the moment on code and voice, 80 through 10 meters, and some of the mainland lads are missing out by not hanging around to hear the tail ends of our callsigns. – *K4BZH/VP7.* . . . FG7AA expects to be active at St. Claude for the rest of this year. – *W1RAN.* . . . KS6DH, KL7DHT/KG6, KW6AA, KX6BU and VS6DO are some recent goodies attracted to KP4AN's 3805-kHz net around 1000 GMT, a handy hangout for 5B-DXCCers. – *W3TV.* . . . VP2KX keeps active with a crystal-controlled 30-watt cw rig on 3510, 7020 and 14,040 kHz. – *WA3IUV.* . . . KG4EY (WB2MIC) sticks to 40 cw with a solid-state ten-watt transceiver built by WB2JXE/3. – *WA2IRS.* . . . Caught KV4FZ, W4BRB/VP7 and W9UCW/HKØ on 160 cw with 27 watts and a tree-shielded 100-ft. wire. *WB9BUV.* . . . After 225 countries in three years with a KWM-2 (217 on cw, 52 on ssb) I'm relocating to Washington, D.C. – *K2QBW/3.* . . . Closed down K9CVO/1 with 155/152 worked/confirmed running less than 150 watts to a piece-of-wire antenna. This takes lots of listening! – *W2EUO.* . . . Py2DBN/MM operates aboard *Nepco Advance* on the Barbados-Arabia run. – *LIDXA.* . . . International DX Association members now number more than 1100 in 65 countries, prospectus available through K3RLY. – *WCDXB.* . . . W6MAV acquired a repeater for our vhf DX net. – *NCDXC.* . . . W6EJJ takes over editorship of our *DX Bulletin* while awaiting his last few outstanding 80-meter QSLs for the club's seventh 5B-DXCC. – *SCDXC.* . . . Long-time amateurs are a lucky lot. They can buy oblivion from FCC for only 25 dollars. –*CARA (W8ZCQ).*

QST

Operating Events ..... de WIYYM

APRIL

2-5 The Old Old Timers' Club will hold its 1971 QSO Party starting and ending at 2300 these dates, rules page 103 March.

3-5 Conn. QSO Party from 2300Z Apr. 33 to 0400Z Apr. 5. Full info, page 103 March.

3-4 Florida QSO Party Sat. 1500-2000; Sun. 0000-0500 and 1400-2359, all times GMT. Additional details page 114 Feb.

3-4 SP DX Contest, 1500Z Apr. 3 to 2400Z Apr. 4. Further rules p. 114 Feb.

4 Worked All Britain 160-75-40 phone, see page 103 March for rules.

7 W6OWP Qualifying Run (W6ZRJ, alternate) at 0500 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PST the night of April 6. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

11 Worked All Britain, 160-80-40 cw, see rules p. 103 Mar.

13 WIAW Qualifying Run, 10-35 wpm, at 0230 GMT on 1805 3.41 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz. This is 2130 EST the night of April 12. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL.

17-18 Tidewater QSO Party, full info, p. 103 March.

17-18 Wyoming QSO Party, see p. 103 March.

17-19 CD Party, cw. This is a quarterly event for League appointees and officials, notified separately by bulletin. In this event, they exchange appointment designations and sections. Check with your SCM, page 6, to see if you can qualify for an appointment. The July parties are open to all members.

24-25 The Bedford RC of Bedford Mass. (WISS), is helping to observe the 70th anniversary of old "CC" the original Marconi station on Cape Cod, where the first wireless messages between England and the U. S. were exchanged by Pres. Teddy Roosevelt and King Edward VII. WISS will be active *on all bands from 160-2* meters (during DX hours) on the following frequencies: cw, 1.801 3.580 7.100 14.050 21.100 28.100; phone, 1.805 3.935 7.260 14.315 21.375 28.700 50.200 and 145.100. Operators in the area willing to help operate WISS during the period would be welcomed.

24-25 PACC, 1200Z April 24 to 1800Z April 25. All bands, cross-band and cross-mode not permitted. PA stations on 160 operate from 1825-1835 and will only use cw thereon. Exchange QSO number and a serial number starting with 001, Netherlands stations will, additionally, send a province abbreviation (GR OV NH ZL FR GD ZH NB UR UT LB). Three points per complete QSO, stations can only be worked once per band, either on cw or on phone. Non-PA stations multiply QSO points by the sum of all worked provinces on all bands (max. 88). Logs must include date/time in GMT, stations, provinces, numbers exchanged. Logs must be postmarked no later than June 14 and include the usual statement. Send to: PAØ LOU, L. v. d. Nadort, Bospolderstraat 15, Nieuwerkerk a/d Ijsel, Netherlands.

24-26 CD Party, phone. See the April 17-19 listing.

MAY

1-2 OZ4CCA cw, (single ops and multiops/club stations) from *1200Z May 1 to 2400Z May 2, 30 hours only permitted for single* ops (the rest period can not be divided into more than 2 periods). Work stations on all continents 80-10 meters. Exchange RST plus QSO number, starting with 001. QSOs with the same continent count 2 points, other continents 3 points, QSOs with OX/OY/OZ count double. Each DXCC country worked counts as a multiplier. The following districts will count as separate countries for this contest: W/K 1-Ø VE/VO 1-8, PY 1-9, LU1-9, YK 1-Ø, ZL 1-5, JA 1-9, OZ 1-9, OY 1-9, OX 3. Final score equals total QSO points times total multipliers all bands. Call CQ AW (CQ All World). Logs with usual statement must be postmarked no later than June 15, and sent to the FDR Contest Committee, Box 355, 9100 Aalborg, Denmark.

1-3 Georgia QSO Party, sponsored by the Columbus ARC, starts 2000Z May 1, ends 0200Z May 3. No time or power restrictions, contacts may be made once on phone and once on cw on each band with the same station. Ga.-to-Ga. contacts permitted. Exchange QSO nr., report and QTH (county for Ga. stations, state/province/country for others). Score 2 points per contact, Ga. stations multiply QSO points by the total number of different states/VE provinces worked. DX stations *may* be worked for QSO points but do not count as multipliers. Out-of-state stations use the nr. of Ga. counties for Multiplier (possible total of 159). Appropriate certificates/plaques. Suggested frequencies: cw, 1810 3590 7060 14060 21060 28060; ssb, 3975 7260 14290 21410 28600; novice, 3718 7175 and 21110. Try 160 at 0300Z. Try 10 on the hour and 15 on the half hour during daylight periods. Logs must show date/time in GMT, stations, exchanges, bands, omissions, multipliers claimed. Check lists would be appreciated. Include the usual declaration and mail by June 7 to the Columbus ARC, attention John T. Laney III, K4BAI, 1905 Iris Dr., Columbus, GA 31906. Enclose an s.a.s.e. for a copy of the results.

2 Tennessee QSO Party, sponsored by the Tenn. Council of ARCs, takes place during the full 24-hour GMT period. No power or time limits. The same station may be worked on different bands/modes. All modes combined as one entry. Exchange QSO nr., report and county (for Tenn. stations) or state/province/country. One point per QSO. Multiplier is the number of different Tennessee counties worked (for out-of-state stations). Tenn. stations use the nr. of states/provinces/countries AND Tenn. counties for their multiplier. Suggested frequencies: 3530 3930 7270 14070 14285 *21050 21375 28100* and *28600*. Any station disrupting a working Tenn. traffic net for the purpose of contest contacts will be disqualified automatically from any award. Logs must show date/time in GMT, stations, bands, modes, locations and computed final scores. They must be received no later than 30 days after the contest. Send your entry, with an s.a.s.e., to Dave Goggio, W4OGG, 1419 Ewell Dr., Memphis, Tenn. 38116.

6 W6OWP Qualifying Run (W6ZRJ, alternate) at 0400 GMT on 3590 and 7129 kHz, 10-35 wpm. This is 2100 PDST the night of May 5. Copies to ARRL for grading.

8-9 Russian Contest, cw only, from 2100Z May 8 to 2100Z May 9, 80-10 meters. Call CQM (CQ Peace). Contacts with stations in the same country do not count. Contacts with stations on the same continent count 1 point, between those on different continents 3 points. Multipliers are countries/territories on the RSGS country list (similar to the DXCC list). Final score is the sum of QSO points on all bands, multiplied by the sum of country multipliers. Logs must be sent to the Central Radio Club, P. O. Box 88, Moscow, USSR no later than June 1.

12 *WIAW Qualifying Run at 0130 GMT. This is 2130 EDST* the night of May 11. See the Apr. 13 listing for additional details.

15 Armed Forces Day.

15 Frequency Measuring Test, open to all, starts with a callup at 0130 and 0430 GMT May 15. (Remember this is the evening before, local time!) The periods for measurement start at 0137 (80 meters), 0145 (40 meters) and 0153 (20 meters); for the "late" run 0437, 0445 and 0453 respectively. Each measuring period lasts five minutes. Submit your average for each 5-minute period which will be compared with the umpire's average during the same period. The umpire is a professional frequency measuring laboratory. Tell how many readings you took to form the average. Approximate frequencies for the early run are 3523, 7084 and 14,062 kHz. Late run frequencies are 3526, 7014 and 14,060 kHz. We must receive your report by May 26 to qualify for the competition. WIAW will *transmit the official readings starting May 27. The next FMT* is scheduled for September 12.

21-23 YL-ISSB QSO Party, phone 3973 7273 14332 21374 28673. DX stations may transmit on 3773 7090 14332 Cw 3565 7065 14070 28070. Full details available from Marcia Guest, WB4SBK, 1351 Tanglewood Parkway, Ft. Myers, Florida 33901.

JUNE

2 W6OWP Qualifying Run

5-6 Jamboree-on-the-Air, the scout test with a theme of SOAR, Save Our American Resources. Starts 1400 GMT Sat., ends 0200 GMT Sun. Purpose is to exchange ideas/plans for unit, district, and council conservation projects. Approximate operating frequencies will be 3590 3940 7030 7290 14070 14290 21140 21360 28190 and 28990 kHz. K2BUW, at Scout Hq. (N.J.), nes for the BSA national net, will monitor the op. frequencies. No reports required, no special QSLs, etc., just a good turn to Scouting.

6 Minnesota QSO Party.

10 WIAW Qualifying Run.

12-13 *VHF QSO Party.*

15-19 Worked All Mass. Cities and Towns Contest. Mass. Amateur Radio Week contest begins June 13 runs through June 19.

20 Worked All Britain, vhf phone, see rules p. 103 March.

26-27 Field Day.

30 WIAW morning Qualifying Run.

SEPTEMBER

11-12 VHF QSO Party.

NOVEMBER

13-14 SS, phone.

20-21 SS, cw.

Operating News

GEORGE HART, W1NJM
Communications Manager

ELLEN WHITE, W1YYM
Deputy Comms Mgr.

DXCC: ROBERT L. WHITE, W1CW
Contests: ALBERT M. NOONE, WA1KQM

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Is There Point to Appointment? At a net meeting we attended not so long ago, one of the most active members announced that he did not hold an ARRL appointment. "Why should I?" he wanted to know. "Sure I belong to the League, *QST* is a good magazine – but hold an appointment? What for? What does it buy me?"

Nobody seemed able to give him a really good answer right off the bat. They sat gaping at him, as though he were some sort of freak. Imagine, their expressions said, somebody questioning the value of holding an appointment! Then someone pointed out that an appointment entitled him to take part in CD Parties. He shrugged in an attitude of "Big deal!" Someone else mentioned receipt of the quarterly *CD Bulletin*, and showed him a copy. That's what did it. He liked what he saw, found the contents interesting, finally decided it was worth applying for an appointment to get on the mailing list. We assume he is now an ORS or OPS.

The attitude of "what does it buy me?" is pretty prevalent nowadays. Perhaps it always has been. What was surprising was not so much that someone asked the question but that those asked seemed stunned to hear it. It simply doesn't occur to most appointment-holders who attend net meetings to wonder what they get out of their appointments. They hold them out of a sense of belonging to a highly-dedicated and highly-motivated group that sets the example for the rest of the fraternity. They hold them because an appointment gives them a certain amount of prestige and standing among amateur operators, because it gives them an opportunity to serve the public or the amateur service in one way or another, because it entitles them to wear a distinctive ARRL membership pin, because it gives them privileges to receive special supplies from headquarters and in some ways preferred treatment over non-appointee members.

Yes, there is point to appointment, but only depending on what you are after. Materialistic rewards may not be of the highest, but rewards of the subjective type are high. Are you a vhfer? Try an OVS appointment. Like traffic handling? OPS and ORS are for you. Interested in emergency preparedness? Join the AREC and consider taking on an EC appointment. Are you the altruistic type who wants to help his fellow amateur keep out of trouble? The OO appointment is designed just for this purpose. Want to help spread the word on latest new developments in the amateur world? That's what OBS appointees do. And for those more ambitious, once they have gotten their feet wet at "station" level, are the "leadership" appointments, of which EC is one, and of which RM, PAM and SEC are others. What do all these initials stand for? Most readers of this column will know. Those who don't, get a free copy of *Operating an Amateur Radio Station*, which will give you all the dope. Be part of the "elite" in amateur radio. Hold an SCM appointment!

W1AW Code Practice. W1AW started transmitting code practice on a regular schedule in 1940, when the code proficiency program was started. Today, we suspect thousands of hams and would-be hams copy the transmissions every day, often through difficulties which are apt to be a good reflection of what they will meet when they get their tickets. Almost daily we receive letters complaining about the deliberate interference and suggesting various things that might be done about it (all the way from gentle persuasion to wouff-honging). It has become the biggest and most-popular W1AW activity.

Several have expressed interest in how the code practice is sent. Even in our modern sophisticated amateur radio world we still get occasional inquiries as to *who* sends the code practice, and complimenting him on his excellent fist. Actually, of course, it is not sent by a person at all, but by a machine. No person can send code that perfectly over that length of time.

As far back as the W1MK days, a tape machine was used to send certain transmissions. Remember, for example, the "Copying Bee," a series of tricky words, with honorable mention to those who made perfect copy? This was a sending head donated by Western Union using a series of sized pulleys for changing speed, and the tape was Wheatstone 2-hole 15/32" as still used today in some installations. It was punched by hand. The same sending head was used at W1AW when that station opened in 1938, and a Kleinschmidt keyboard perforator was acquired to make the punching easier. The Klein was a casualty of the 1953 fire, and a new perforator was purchased from McElroy-Creed, along with a McElroy sending head and auxiliary equipment to replace the old WU head and drive pulleys which had seen such hard service through the years.

The Creed perf and the McElroy sending equipments are still at W1AW but both are now in reserve. The code practice and cw bulletins now use standard 5-hold teletype tape punched on a teletype perforator. This feeds into a teletype-to-Morse converter containing about 250 transistors which convert the teletype perforations into Morse Code. Thus, the same tape can be used both for

1971 FIELD DAY RULES

For many months the Contest Advisory Committee* has been hard at work on the FD. Changes are in the works, hopefully ready for the next issue. The CAC has already recommended the following modifications, all adopted by the Hq. Awards Committee. 1) The requirement for submission of log sheets is eliminated, unless specifically requested. Check sheets for each band, a summary and necessary proof(s) for bonuses will constitute the entry. 2) A signal report has been added to the exchange. 3) Emergency-powered transmitters and receivers are now a *requirement* for Class A and B entrants. *CAC members: W3GRF (chairman), K2KIR, W1AX (vice chairman), VE2NV, W3WJD, W4UQ, WØHP, W5QNY, KH6IJ.

RTTY (on the Model 28 machine) and for cw. The Fredericks converter is quite a gadget and interesting to watch as its "head" translates each 5-hold perforation into Morse Code and quickly passes over "non-printing" perforations, such as carriage returns, line feeds, shifts, etc. When you visit W1AW, take a look at it.

Tone Reports. Words are inadequate to describe some things, and tone reports fall in this category. For many years the T part of the RST reporting system has been subject to various criticisms from among the fraternity, to the effect that the definitions are inadequate and meaningless, using terminology that does not properly describe the "sound" of a signal.

Well, how do you describe a musical sound to a person who is tone deaf? CW tone ranges all the way from the typical 60-cycle (or less) rasp to the pure, completely-unmodulated tone which results from "adequate" filtering. In between is a wide range of variation subject to various descriptive terms.

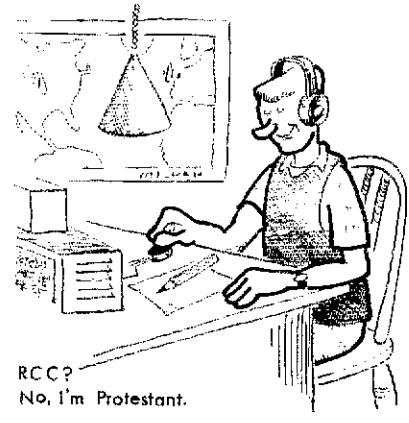
That hardly any two amateurs will agree on tone reports was demonstrated in a recent very interesting experiment among members of the headquarters staff. W1FBY was delegated to prepare a tape containing various signal and tone discrepancies, and licensed staff members were asked to assign a T report to each of them. To say that opinions varied would be putting it mildly! The session broke up into loud arguments and accusations of various kinds of auditory deficiencies. W1JMY was proclaimed the "champ" because his tone reports most closely agreed with those of the "umpire" (W1FBY), but there was considerable disinclination on the part of others to accept the umpire's decisions as gospel.

Let's face it, the T report is pretty much a matter of opinion. Some people are deaf to or tolerant of a certain amount of modulation on a cw signal and readily grant a T9 to a signal that his friend wouldn't rate above T7. Chirps, clicks, bloops, glurbs and other kinds of instability or transient deficiencies are likewise tolerated by some, condemned by others. And then there is always the factor of apparent signal deficiencies introduced by the receiver which are not really on the signal at all.

An attempt is being made to prepare a tape which will audibly illustrate all nine T reports, but we really don't have much hope that any degree of unanimity will be achieved. At most, it might make an interesting feature at a club meeting. Meanwhile, the various tone reports have been redefined in terms of a.c. hum, ripple and degree of filtering. These new definitions are included in a revised Operating Aid 14, and in the newly-revised booklet *Operating an Amateur Radio Station*, and in the inside front cover of the newly-revised ARRL Log Book. Sorry, it was overlooked in the 1971 *Handbook*, but we'll catch it next year. For those who don't have any of the above, here are the new definitions:

T1 – Sixty-cycle a.c. or less, very rough and broad.
T2 – Very rough a.c., very harsh and broad.
T3 – Rough a.c. tone, rectified but not filtered.
T4 – Rough note, some trace of filtering.
T5 – Filtered rectified a.c. but strongly ripple-modulated.
T6 – Filtered tone, definite trace of ripple modulation.
T7 – Near pure tone, trace of ripple modulation.
T8 – Near perfect tone, slight trace of modulation.
T9 – Perfect tone, no trace of ripple or modulation of any kind.

Note that T7, 8 and 9 are all pretty good tone reports and probably would not be considered citable by FCC monitors. However, we are sure that anyone who gets a T8 will continue to worry and probably importune his contact with questions regarding the deficiencies in his signal. — *W1NJM.*



This fine cartoon, courtesy of Jake Wible, depicts a true episode in the new ham life of WN2RFP. Doug, on the air for the first time, was asked the question RCC? He politely said, no, wondering what the heck the Roman Catholic Church had to do with the QSO. After an explanation by a friend, he was able to laugh at the whole episode and sign his letter as *WN2 Red Faced Protestant.*

Announcement is hereby made of the deletion of the Kuwait/Saudi Arabia Neutral Zone (9K3/8Z5) from the ARRL Countries List. Only contacts made before December 18, 1969 will be creditable toward that listing. DXCC Honor Roll listings will be affected by this deletion as of April 1, 1971. Honor Roll submissions made during the month of June will be based on deleted totals of 312 CW/F and 312 Phone.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

January 1 – 31, 1971

New Members

W2HII	312	K6BR	148	WB4CVT	116	W5OJZ	110	UB5KID	105	W9DU	101
W2AWK	268	UT5KIH	147	W2PSU	115	JA8BKI	108	W9GKJ	105	4X4MN	101
K5ZJK	231	UW9OP	147	JA4DWC	114	K1OME	108	W2LVP	104	DL8YD	100
WB2JGO	227	JA3AAW	145	K1DEK	114	ZS5SY	107	UB5WL	103	K6HTM	100
WB6KIG	205	DJ9TS	132	WB2NUU	113	OK3KWK	106	YU3LF	103	UB5KHQ	100
WA5WMK	201	UV3AB	124	WB2VXN	113	W1VPY	106	EG7TD	102	WA1KQM	100
W4BKP	201	K8NSA	122	WØKH	113	WB4GIG	106	K9ZPJ	102	WA9UCU	100
DL5GJ	200	EL2BZ	120	DJ6GW	112	W9KDX	106	WB2ERG	102	WA9VBG	100
UQ2KFG	172	UAØKKB	120	YU2QZ	112	DL2WR	105	UY5CW	102	WØEWN	100
VP9BK	150	VE7BLO	119	CEØAE	110	G3KTR/W2	105	KH6ELC	101	9Y4RP	100
W5KGX	300	WA5WMK	181	W2PSU	111	VE3EOX	106	K6UFT	103	VE2TZ	100
W3COR	243	HV3SJ	168	VE2JH	110	UD6BR	105	WØYVA/4	103	WA2ELA	100
W2AWK	239	W7GOC	160	UY5XS	109	W7SF	105	K6BAG	102	WB2GVE	100
HPHN	218	K4KYL	120	WA2MBF	108	K4IBJ	104	LA5QK	102	W3YG	100
XE1J	215	JA1RWE	113	DJ6IN	107	W8EQC	104	W1RYB	102	WA4LPM	100
W4BKP	201	WØKH	113	HC1RF	107	W9KDX	104	W3OJO	102	WA6CPY	100
K5ZJK	181	W6ZTJ	112					JA2KPR	100	WB9AOH	100

Endorsements

In the endorsement listings shown, totals from 120 through the 249 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W6HX	345	WAØCPX	290	W6GC	240	WB2HNO	200	KP4CRD	160	W4WRY	140
4X4DK	340	K4BVQ	280	W8GMX	240	W3POE	200	VE2DN	160	W4WWD	140
G3AAE	335	K4OCF	280	WA8EDC	240	W3QD	200	VE4ST	160	W5RUB	140
W6CAE	335	OH5VY	280	W9LAX	240	W4PGW	200	W2ECR	160	WA5VAQ	140
DL3BK	330	W1LQ	280	WAØDUB	240	W5DO	200	W2SZ	160	WA7MGK	140
K7GCM	330	W4ID	280	DL1LD	220	WA8TND	200	W2UBJ	160	W8KTG	140
PY1HX	325	W6MUR	280	G3IFB	220	WA8VEK	200	W4AST	160	WA8EDY	140
W6EZJ	325	W7LEA	280	K6UFT	220	WA9SLD	200	WA4UEW	160	WB8BTU	140
W6OME	325	XE1KS	280	OH1VA	220	WØSUU	200	W5DRW	160	W9IA	140
WØBK	325	K6ZE	270	WA3HGV	220	ZE3JJ	200	WA5UCT	160	WA9EWY	140
JA3UI	320	WA8ZDF	270	WB6APX	220	HK7UL	180	W8MXO	160	WA9YZN	140
K6EV	320	K4IR	260	WA8END	220	K4CG	180	W9EPZ	160	K4CDZ	120
SM5BCE	320	K8PYD	260	W9AG	220	UD6BW	180	WA9SVY	160	VE2ADZ	120
WB2CKS	320	PY1BTX	260	W9PVA	220	VE2BGJ	180	WØDIA	160	VE3CAA	120
WA6MWG	310	VE3AGC	260	W9YGN	220	W3CB	180	HI8LC	140	VU2VAF	120
UA3CT	305	W3HDZ	250	5H3LV	220	WB6WIM	180	K4CYU	140	UAØLH	120
K1HX	300	W6OUN	250	DL7CT	200	WB6WIW	180	LA9OI	140	W3ECW	120
OH2LA	300	WØAO	250	FP8CY	200	W7NYO	180	PAØMIB	140	W3SDV	120
W1OHA	300	DL1YA	240	JA1HRQ	200	W7PEZ	180	PY1MCZ	140	WA3MSU	120
HLAG	290	HWL	240	JA2TH	200	W7SF	180	UB5LS	140	WB6WQV	120
K4ADU	290	K3OTY	240	K2IBF	200	WA8QIY	180	UW3IN	140	WØIML	120
K4MPF	290	K6DYQ	240	K2KGB	200	WA9WXL	180	W1HV	140	WB8CCE	120
OE1HGW	290	OH2NF	240	K6BAG	200	DJ9AL	160	WA1CQW	140	WA8PRR	120
W1FTX	290	W2MOF	240	SP3PL	200	HCCZ	160	WB2NLM	140	W9ED	120
W4OEL	290	WA3IUV	240	UC2BF	200	JA8QN	160	WB2NYK	140	WØII	120
WA5JSI	290									WAØAAD	120
4X4DK	340	F5IA	270	W1WKO	240	DJ9ZB	180	W9LMH	160	WA9FWY	140
VE3QA	330	HSCA	270	K2SHU	220	DL7BP	180	W9PVA	160	ZL1AAP	140
ZL1KG	330	OH5VY	270	K7PXI	220	K6IPV	180	WA9SVY	160	GD3THU	120
OZ7FG	325	WA6MWG	270	VE3GNM	220	UC2BF	180	YU3OV	160	HB9ALE	120
K7GCM	320	W8JTD	270	JA1HRQ	200	W4HDK	180	CE6EQ	140	HK4AZX	120
W5SZ	310	W8LUZ	270	K4OCF	200	WB4KZG	180	FP8CY	140	K1IXP	120
JA3UI	305	DL3BK	260	K6OJO	200	WB6WIM	180	K2IBF	140	LA7AJ	120
KH6OR	305	K4BVQ	260	K8PYD	200	WB6WIW	180	K3BYV	140	W2EHB	120
K4YYL	300	K4BBF	260	WB2MMW	200	W8YFK	180	K4CG	140	WA4FZA	120
G3UML	290	WA5REB	260	W3CDL	200	W9YGN	180	K5VYT/4	140	WA4UEW	120
HKN	290	WA8ZDF	260	WA3IUV	200	DLØJK	160	UW3IN	140	WA4YVQ	120
HLAG	290	XE1EB	260	W5KYD	200	K4UAS	160	WB2EZU	140	WA5UCT	120
W1FXD	290	K2BK	250	W7VRO	200	KP4CRD	160	WA3GYY	140	WA8QIY	120
WB2WOU	290	UA3CT	250	WA8VEK	200	W1OHA	160	W4WRY	140	WA8PRR	120
W5QLG	280	WB6DXU	250	WA9SLD	200	WB2MOI	160	WA5VAQ	140	WAØYZN	120
W7LEA	280	K3OTY	240	WØUIM	200	W4AST	160	W7NYO	140	ZL1BDW	120
XE1KS	280	OA8V	240	5H3LV	200	W4PGW	160	W8KTG	140		

WWVH Moves to Kauai. Hawaii SCM KH6BZF reminds us that WWVH, now located at Puunene, Maui, is scheduled to be moved to the Pacific Missile Range Facility at Barking Sands, Kauai, between April 1 and July 1, 1971. It may become necessary to shorten their schedule from the present 24-hour-per-day continuous operation to a 12-hour daylight-only operation. WWVH is conducting a survey of users to determine what impact such a curtailment of broadcasts will have on their operations. Objective comments from hams should be sent to Mr. Sadami Katahara, KH6DK, Engineer-in-Charge, National Bureau of Standards, Radio Propagation Station WWVH, P. O. Box 578, Puunene, Maui, Hawaii 96784. – *WIYYM.*

FEBRUARY 14 FMT RESULTS

Hopefully, we now have all the "bugs" worked out of the new FMT reporting system! All those who measured the frequencies and saw to it that their reports were received at Hq. no later than Feb. 25 are shown below. W1AW carried the official readings starting Feb. 26 to aid those who just couldn't wait for these April results.

The umpire measured the frequencies for the early run at 3520.661 7010.976 and 14067.793 kHz. Due to 20 and 40 being poor copy in many parts of the country, the late readings on these bands wasn't considered. The reading for the late 80-meter run was 3526.286 kHz. In the February FMT, 158 participants reported (with a total of 1069 measurements!)

In the following tabulation, your error percentage can be determined by moving the parts-per-million decimal point (the figure shown in parentheses) 4 places to the left.

Class I ARRL Official Observers must demonstrate an average accuracy of less than 71.4 parts per million. Class II Observers must show 357.2 parts per million, or better. Interested in an OO appointment? Check with your SCM, see page 6. Plan to participate in the May 15 FMT, full details in the Operating Events section, this issue.

HONOR ROLL

This top listing is the standing of the Freq. Meas. leaders. In consideration of the minimum possible error due to doppler and other unavoidable factors, we accredit as of equal merit all those reports computing 4/10ths parts per million (or higher) accuracy. A participant must submit a minimum of 2 measurements to qualify for this listing.

W1BGW W1PLJ W1QYY W2AIQ W2BHH WB2FAR WA2KSB W3BFF W4AQD/2 W4FMW K4IAA W4NTO W4TOY W5FMO W5PXZ W5OLO W5TAD WB6AAL WA6JZZ W6MTJ K6QMT WA7DUY W7FJD W7FNA WA7MUW W7TX W7UXZ W8GRG W9BCY W9CAA W9MNY W0CFY.

(.5) K1GZH W4IRF W5UJF K6DM K6HV K6MZN W6RO, (.6) K9KRW R. Ireland, (.8) W5EHW W6CBX KØBRS, (.9) W8NWU, (1.1) WB2NYK, (1.2) WØSUD, (1.6) K6FW, (2.1) K3EVP, (2.2) WA7FHG, (3.0) WAØLJR, (3.1) W5RSZ, (3.5) W5GEL WA5ROU, (4.0) K1GAX, (4.1) W8DPW, (4.3) K9WMP, (4.4) K8JHA W9II, (4.7) W6ER, (4.8) W4IKB, (4.9) W5CQS, (5.1) K3KWN, (5.3) WA5RIO, (5.5) W3EU, (5.6) W7AGD VE5DP, (5.7) WØRAY, (6.3) W2EWK, (6.6) WA1LNF, (7.4) W3EYK, (7.6) W1AYG W8OMY, (8.0) K3HNP, (8.6) WA8ETX VE6HM, (10.4) W3CPU K6GG WBØABE, (10.7) WØBEJ, (11.2) K3PER, (11.9) K6CL K6EC, (12.1) W9RFC, (13.0) K5MAT, (13.2) W8REH, (13.3) W4MC K6ASK, (14.5) W3DUZ* (14.6) W9WYB, (15.1) K3DYU, (15.7) K6TR, (15.9) W1LQU, (17.0) WA2LDX VE6MJ, (17.3) W1JB, (17.4) K8ENQ, (17.7) WA8DUL W9UC, (18.3) W3YQ, (18.7) K9ORP, (21.3) WA3KSQ, (21.5) W5AO,, (21.8) KØPFV, (22.3) W1QV, (22.4) K9WGN, (22.9) WAØZQW, (24.2) WB9BGA, (24.9) WØNUZ, (25.7) W6CDF, (26.5) W6MSM, (26.7) W7MSY, (27.1) W2BHJ, (27.3) K8RXD, (27.8) W1DDO, (29.8) W9VVW, (29.9) K1KMV, (30.6) W4HU, (31.0) W3BWZ, (31.2) W7ENS, (33.1) W1YNE, (37.5) W6AEE, (38.1) WA1AIP, (39.5) W8FDU, WA3BGE oprs., (41.2) WB2SYR/3, (41.4) W1UWJ, (45.3) WA1EBE, (51.7) W2QFR, (53.3) K5ZVZ, (55.3) W1ATO, (55.6) WAØMKB, (57.0) WA2AIV, (57.7) WA9UOT, (59.7) W6HJP, (60.7) WAØSMM, (65.7) WA1LPJ, (67.1) WB9FLN, (68.7) WA3HIB, (71.9) K1WMQ, (73.3) W8BU, (77.7) J. Rice, (97.7) WA3MSU, (99.3) WR5CAV, (107.4) WØDGS, (114.5) W7HZL, (118.1) WB6FZN, (130.1) WØNMU, (157.6) W7CHI, (183.5) W2EHA, (187.2) W3PT, (213.7) WAØFLL, (334.8) WA2GBH.

Below the minimum qualifications for Class II: W4PKD WA2CCF WB9CTC W6FJA WØDTF W4ZBQ.

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license (Canadian Advanced Amateur Certificate) or higher and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to assure a valid petition.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . . ARRL Section of the . . . . . Division, hereby nominate . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*Current SCM*	*Present Term Ends*
MF	4/9/71	P.E. Sterling, K1TEV	6/9/71
TN	4/9/71	H.A. Phillips, K4RCT	6/14/71
EPA	4/9/71	G.S. Van Dyke, Jr., W3HK	6/15/71
OR	4/9/71	D.T. Justice, K7WWR	7/1/71
CZ	5/10/71	E.K. Johnson, KZ5DA	11/10/69
MAR	5/10/71	W.J. Gillis, VE1NR	3/11/70
AK	5/10/71	K.R. Klopf, KL7EVO	7/10/70
NC	5/10/71	C.M. Dempsey, WA4UQC	3/10/71
SDGO	5/10/71	R.E. Leffler, WA6COE	7/10/71
WMA	6/10/71	P.C. Noble, W1BVR	8/11/71
KS	6/10/71	R.M. Summers, KØBXF	8/18/71
EBAY	7/9/71	P.J. Parker, WB6DHH	9/2/71
SBAR	7/9/71	C.D. Hinson, WA6OKN	9/2/71
WV	7/9/71	D.B. Morris, W8JM	9/18/71

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections, completing their election in accordance with applicable rules, each term of office starting on the date given.

MS	W.J. Coffey, W5NCB	1/2/71
AR	J.N. Lowrey, WA5VWH	1/11/71
SASK	R. Ogden, VE5RO	1/11/71
AL	J.A. Brashear,Jr., WB4EKJ	1/28/71
CO	C.O. Penney, WAØHLQ	2/14/71
ND	H.E. Sheets, WØDM	3/8/71
SCV	A.F. Gaetano, W6VZT	3/10/71
MO	R.J. Peavler, WØBV	3/18/71

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule showing speeds, local times/days and GMT times/days. Frequencies are: 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

10-13-15	7:30 P.M. EST dy 4:30 P.M. PST	0030 dy
5-7½-10-13-20-25	9:30 P.M. EST SnTThS 6:30 P.M. PST	0230 MWFSn
5-7½-10-13-20-25	9:00 A.M. EST MWF 6:00 A.M. PST	1400 MWF
35-30-25-20-15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThS
35-30-25-20-15	9:00 A.M. EST TTh 6:00 A.M. PST	1400 TTh

***QST* for**

W1AW SPRING-SUMMER SCHEDULE

(April 25–October 31)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. 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 May 31, July 5 and September 6.

	Sunday	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	←		C.W.-OBS[1]			→
0020-0030[4]	.....	.....	3.700[5]	14.020	14.020	7.150[6]	14.020
0030	.....	.....	3.700[6]	14.100	14.100	7.150[6]	14.100
0100	.....	←		Phone-OBS[2]			→
0105-0130[4]	.....	.....	3.820	50.120	145.600	1.820	21.270
0130	←	**CODE PRACTICE DAILY[7] (35-15 wpm TThSat , 5-25 wpm MWFSn)**					→
0230-0300[4]	.....	.....	3.555	.....	1.805	.....	3.555
0300	RTTY-OBS[3]	.....	RTTY-OBS[8]	←	RTTY-OBS[8]		→
0310-0330[4]	.....	.....	3.625	14.095	7.095	14.095	3.625
0330	Phone-OBS[2]	.....	←		Phone-OBS[2]		→
0335-0400[4]	.....	.....	7.220	3.820	7.220	3.820	7.220
0400	CW-OBS[1]	.....	←		C.W.-OBS[1]		→
0420-0430	.....	.....	3.700[6]	7.020	3.945	7.150[6]	3.520
0430-0500	.....	.....	3.700[6]	7.080	3.945	7.150[6]	3.555
1300	.....	←	**CODE PRACTICE[1] (5-25 wpm MWF , 35-15 wpm TTh)**			→	.....
1700-1800	.....	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	.....	14.100	14.280	14.095	21/28[5]	7.080	.....
2200-2300	.....	21/28[5]	21.100[6]	21/28[5]	7.255	14.280	.....
2300-2330	.....	.....	.....	RTTY OBS[8,7]	.....	.....	.....
2330	←	**CODE PRACTICE DAILY[7] 10-13-15 w.p.m.**					→

[1]CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.
[2]Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.
[3]RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 28.095 MHz.
[4]Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5]Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
[6]W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
[7]Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
[8]Sent with 170-Hertz shift.
Maintenance Staff. W1s QIS WPR, WA1NEU. *Times-days in GMT. Operating frequencies are approximate.

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and February *QST* practice text to be sent in the 0230 GMT practice on the following dates.

Apr. 14: It Seems to Us
Apr. 20: Correspondence
Apr. 23: League Lines
Apr. 29: ARPS

The subject of practice text for the folllowing sessions is *Understanding Amateur Radio*, First Edition.

May 3: A Low-Cost Transmitter, p. 171
May 5: Power Supply, p. 174

JANUARY CD PARTIES

The following are high claimed scores; they read, from left to right: appointee, total score, number of QSOs, number of sections and number of hours of operation. Final adjusted scores will appear in the April CD Bulletin. – *WA1KQM*

CW		KITZD (WA1IQJ, opr.)	
WA6DKE	276,420-806-68-19		197,275-602-65-18
WA6SDC/9	273,700-805-68-20	W6DGH	195,975-596-65-13
K4BAI	263,360-816-64-20	W6KFH	169,920-531-64-17
K1VTM	262,080-814-64-20	W5KI	168,640-520-64-19
W2FZK	248,490-746-66-19	K6OZL	165,310-535-61-19
WA9RWY	226,525-693-65-18	WA8POS	164,450-501-65-15
K8UDJ (WA8VRB, opr.)		W3IN	163,200-538-60-13
	217,250-655-66-18	W5RL	162,825-494-65-14
K6AZJ	212,970-683-62-20	W4AQL (WB4JSK, opr.)	
W4UQ	203,205-582-69-17		156,860-506-62-19
W6BIP	197,925-602-65-20	WA8LVT	154,690-495-62-15

(Continued on page 148)

W1AX (vice chairman of the ARRL Contest Advisory Committee) held an impromptu grass-roots type meeting at his home Jan. 30, with discussions centering on the ARRL VHF contest program. Furnishing the CAC with lots of food for current and future thought were vhfers (L-R): rear, WA2KZV/WA1MJD, K9AQP/1; Front, K1AGB, W1QXX, W1OOP, K4GGI/1. (Photo by W1AX.)

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE — SCM, John L. Penrod, K3NYG – SEC/PAM: W3DKX. RM: W3EEB. Appointments renewed: W3TRC and W3HKS as ORSs; WA3DYG as EC; K3BBR, WA3KLF and K3MPZ as OBSs; W3BDP as OVS; W3DEO and WA3DUM as OVSs. Thanks to the members who participated in the successful SET this year. The First State ARC members and their families were guests of TV station Channel 8. After the tour, the group had dinner at a famous Dutch restaurant. W3URR made all arrangements. W3BDP made meteorite scatter contact with W0LCN, Minn. WA3BAO has a half gallon on 2-meters. The Maverick ARC 2-meter net (fm) operates Sat. and Sun. mornings on 146,940 MHz. W3EEB has his new five-band doublet up. WA3DYG hosts a new tri-bander antenna. WN3OVC worked 39 states and participated in the Novice Contest. Anyone interested in 2-meter rabbit hunts, please contact K3VWP. WA3LMY is a new ORS appointee. Traffic: W3EEB 109, WA3KZO 103, W3LRC 18, WA3DUM 15, K3NYG 15, WA3DYG 9, WA3LTA 3, WA3KFR 1.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3ICC. RMs: W3EML, W3MPX, K3MVO, WA3AFI. PAM: WA3GLI. VHF PAM: W3PGO. OO reports were received from K3RDT, W3KEK, K3EMA; OVS reports from WA3JZB, K3QCO/3, WA3MCK/3, K3WFU, K3VAX; OBS reports from WA3EML, WA3AFI, W3CBH, WA3JZB, WA3JKO, W3JD, K3EMA. BPLs: W3MPX, W3EML, WA3AFI, W3CDB. PSHR: WA3CKA, W3MPX, WA3EXW, W3EML, K3QIO.

Net	*freq.*	*Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610	6:45 P Dy	372	406	W3MPX
PTTN	3610	6:00 P Dy	319	318	WA3AFI
PSN	3960	5:30 P M-F	501	287	K3PSO
EPA/EP&TN	3917	6:00 P Dy	241	73	WA3GLI

WA3EXW let his license expire so will be on the sidelines for a while. SET results look like it was a success. W3ICC alerted all ECs in the recent rain and thaw for possible floods. WA3ATQ spoke on behalf of hams at the Valley Forge Lions Club meeting. WA3JZB says the SET showed that some of us need a little drilling! WA3IYC is pinch-hitting for WA3EXW. New officers for the RI Hill ARC are K3HTZ, pres.; WA3KLY, vice-pres.; WA3JIO, secy.; R. Sakautzki, treas. RI Hill had their annual banquet Feb. 13. W3AXA is back in full swing again. W3AIZ is loafing in Fla. K3WFU is getting ready for another visit to Jamaica. New officers for the Lafayette College ARC are WA3FEC, pres.; WA2BCP, vice-pres.; WA2HHY, secy.-treas. W3EEL reports high QRN and not much activity on 160. Many area VREC nets were activated during the SET and complained of little or no activity; problem — no liaison set up with the bt nets. The way VHF repeater activity is going we may see a VHF NTS some day! W3CUL and W3VR should be back home by now. Traffic: (Jan.) W3MPX 522, W3EML 519, K3BHU 401, K3PIE 344, WA3AFI 239, W3CDB 190, K3MVO 189, WA3LMO 180, WA3EML 136, K3PSO 107, K3QIO 101, WA3ATQ 90, W3ZJD 85, W3VAP 80, WA3JZB 70, WA3IYC 62, WA3CKA 60, WA3OGM 35, WA3JSX 32, W3ADF 27, W3HK 24, W3CBH 22, K3KTH 19, W3BUR 17, WA3MQP 17, K3VBA 17, K3MNT 16, W3BNR 13, W3AXA 12, W3VA 12, WA3EEC 11, WA3BSV 10, WA3JKO 8, W3JD 5, W3JKX 4, WA3BIQ 3, WA3LPM 3, WA3IAZ 3, K3EOB 2, WA3JRY 2, K3VAX 2, W3AIZ 1, K3EMA 1, W3EPI 1, W3GMK 1, W3KFK 1, W3OML 1, W3YPE 1, W3YR 1. (Dec.) W3ZJD 28.

MARYLAND - DISTRICT OF COLUMBIA — SCM, Kad R. Medrow, W3FA — BPLs: WA3LYS, W3TN. PSHR: WA3LYS, W3TN, W3ICS, W3OKN and W3LZ1. Nets: MDCTN — 16 sessions, QTC 46, QNI 15.7. MTMTN — 12 sessions, QTC 11, QNI 7.1. MDDS — 28 sessions, QTC 59, QNI 4.3. MDD — 37 sessions, QTC 420, QNI 11.1. New appointments: W3GLI as EC Baltimore City and county, K3RUQ as EC Dorchester, Wicomico, Somerset and Worcester counties; W3IN, W3PYW and WA3GVP as OOs; WA3CFK and W3GLI as ORSs; WA3CTK as OPS. Endorsements: K3ORW as EC Carroll county; WA3GVP as ORS, W3TN is becoming the iron man on MDD covering for absent NCS. K3LED is rearranging his shack and installing some accessories and a new vertical antenna goes up when it gets warmer. WA3EOP kept his troops in line for the SET. WA3MSW says the winds are murder on his antennas, but WA3GVP claims the winds blew his antennas back up straight. W3EOV says it is too cold to get in much operating. W3QCW is finding the 3.9 MHORM fierce these days. W3ZNW is maintaining a steady pace on MDDS, while WA3IIV keeps the MDCTN boys on their toes. W3WTP had a big time in the SET. WA3MMX is getting Harford County organized for emergencies. W3ABC is licensed as 5R8AP and returns stateside via a visit to ZS6AL and Nairobi. W3DRV passed his Extra Class exam and looks forward to becoming an OO. W3ZSR is working on the ham call auto tags and zoning for antenna towers. W3LQY is basking in the sunshine of her Certificate of Achievement award from the Army along with WA3HEN. The Maryland Two Meter Termite Net (MTMTN) meets at 0200Z on 145.206 MHz with W3ITW as mgr. Traffic: (Jan.) WA3IYS 502, W3TN 304, W3ICS 226, W3OKN 200, W3FA 168, K3GZK 150, WA3NYU 134, W3IQY 98, WA3LWT 97, W3FZV 86, K3LED 85, W3GFT 81, WA3EOP 74, WA3IIV 65, K3IYZ 65, WA3MSW 47, WA3MMX 39, W3FZT 38, W3FOV 22, W3QCW 16, W3ZNW 14, W3IXF 10, W3WTP 8, WA3GVP 3, K3QDC 1. (Dec.) W3OKN 104, WA3LIR 91, WA3GVP 4, W3CZ3, W3ZNW 2.

SOUTHERN NEW JERSEY — SCM, Charles F. Travers, W2LVW — PAM: WB2HJE.

Net	*kHz*	*Time(PM)*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3930	6:00 Su	5	102	75	WB2HJE
NJN	3695	7:00 Dy				WA2BAN
	3695	10:00 Dy				WA2BAN
NJEPTN	3980	6:00 M-S				WA2TAF

Jan. was a very busy month with great activity on the part of many stations. The SET was supported by more stations than in previous years. BPL honors for Jan. go to WA2FGS for the second consecutive month. We are happy to report that WB2VEJ remains at the head of activities in spite of a slight health setback. A newcomer to activities in SNJ is the Mercer County VHF Emergency and Traffic Net which meets each Fri. at 8:00 P.M. on 145.9 MHz. W2YPZ is Net Mgr. and W2KGM is Asst. Net Mgr. All stations are cordially invited to check in. The net also took part in the SET and passed traffic. Among those included are: WA2PAT, W2FDL, WB2FIZ, WA2TNS, W2ZQ, (K3CPD), WB2HMU, W2PNO, WB2IGJ, W2HCR. The RVARA reports election of officers as follows: WB2HIN, pres.; WB2PZT, vice-pres.; K2YBN, secy.; WB2LWZ, treas. Other election results are: GCARC — WB2HJE, pres.; WB2IZX, vice-pres.; WA2SFA, tre. secy.; WB2WAK, treas.; W2EZ, corr. secy. Congratulations to all newly-elected officers and a successful and profitable term. WB2JSS reports regularly from college in the Boston area. WA2KIP has been off the air because of wind destruction to the antenna system. WA2PAT (11 years old) is a General Class licensee. Traffic: (Jan.) WA2IGS 146, WB2VEJ 108, WA2KAP 64, W2ORS 53, WB2HJE 44, WB2HMU 35, W2YPZ 28, W2ZQ 21, K2RXB 15, WB2SFX 12, W2ZIS, WB2JSS 2. (Dec.) WB2JSS 4, WB2WHB 4.

WESTERN NEW YORK — SCM, Richard M. Pitzeruse, K2KTK — Asst. SCM: Rudy M. Ehrhardt, W2PVL. SEC: W2RUF. RMs: W2MTA, W2RUF, K2KIR, W2FR. PAMs: WA2CAL, WB2RIU.

Net	*Freq.*	*Local Time/Days*	*Mgr*
NYPON	3912	1645 Dy	K2KQC
NYPON	3697	1830 Dy	W2ROH
NYS	3675	1900 Dy 2200	W2MTA
FSS	3590	1800 Dy	WA2VYS
NYSCN	3677	1945 M Th F	W2RUF
NYSCN	3677	1000 Su	W2RUF
NYSPTEN	3925	1800 Dy	WB2HLV

Please check your appointments to see whether or not they are in need of endorsement. Many are overdue. I hope to hold an appointees meeting at the WNY Hamfest in Rochester, May 15.

Tickets for the affair are available from Box 1388, Rochester, N.Y. 14603. Tickets for the Syracuse Hamfest are available from RAGS, Box 88, Liverpool, N.Y. 13088. That affair is Apr. 17 and features several net meetings. Does your club sponsor a hamfest? I am sorry to report the passing of WA2AIL of Rochester. STARS elected WA2JLF, pres.; WA2IVY, vice-pres.; WB2HCL, secy.; WB2JPQ, treas.; WA2EZD, editor. WB2HCL and WA2JLF are teaching ham radio classes for the club. Sorry to report the loss of K2IT to Silent Keys. K2ICJ has a new antenna farm growing in Newark. W2REY scientifically proved that a 70-ft. mast is no match for a 60-mph wind. K2YJR promises the NYSPTEN fellers an FB newsletter. During 1970, ESS held 365 sessions, had 6601 QNI, and QTC 2615. K2CC has moved the club shack to a better location. WB2YFM has a new SB-303. WA2PZD back at college brings with him a QRP rig. W2FXA and WA2YQH are very near 5BDXCC. W2FR has the first WNY 5BDXCC with W2FXA glomming the first WNY 5BWAS. Your SCM, attacking things backward, has 80 pretty well sewed up for 5BDXCC but needs cards on 15 and 10. Congratulations to WA2MPC and WB2GTU who qualified for ESS certificates. BPL this month goes to ole faithful W2OE. Traffic for Jan. with * indicating a PSHR claimant: W2OE 411, W2FR 351*, WA2ICU 291*, W2RUF 190*, W2MTA 164*, WA2DHS 152, K2KTK 133*, WA2ICB 126, W2FEB 110, WB2HLV 98, K2DNN 61, W2RQF 49, WB2VND 45, WA2BEX 44*, WA2MPC 39, W2FZK 36, WB2LQP 34, WB2HLI 33, W2DBU 28, K2OFV 26, K2UIR 23, WA2ANE 17, W2PVI 17, WB2MZK 16, WB2RHJ 15, W2AFB 12, WB2YFM 11, WB2QAP 9, K2BWK 8, WA2PZD 8, W2EVH 7, WA2HSB 6, WA2AIV 5, WA2GLA 4, W2CFP 3, WB2JNW 2, W2WAM 2, WB2YFE 2. (Dec.) W2WAM 3, W2CGD 1.

WESTERN PENNSYLVANIA – SCM, Robert E. Gawryla, W3NEM – SEC: W3KPJ. PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M.; KSSN meets on 3585 kHz at 6:30 P.M. Mon. through Fri.; WPP meets daily on 3955 kHz ssb at 10:00 P.M., all local time. KSSN is finally under way after a slight delay with WA3IPU as RM. SET operation for Jan. 1971 was very active in WPA and from reports received, the operation was the best yet. Thanks to all. The South Hills Brasspounders and Modulators have elected the following officers for 1971: W3MML, pres.; WA3LVB, vice-pres.; K3VXV, secy.; K3WNZ, treas. The Uniontown ARC has new officers for 1971: K3CQP, pres.; K3RLB, vice-pres.; W3UUZ, secy.; W3YNI, treas. WA3NQW is a new General Class licensee. Steel City ARC reports the following new officers for 1971: W3ZPZ, pres.; W3HI, vice-pres.; WA3LJF, secy.; W3ZDW, treas.; W3SDV, corr. secy. K3UGD has graduated from college with a BS degree in electronics. QUA-RAE, Radio Assn., of Erie, paid homage to W3QN in their latest bulletin. Presque Isle ARC reports a raft of new novices such as WN3s PRC, PQI, PQJ, PQK, PSQ, PSS, PUI, PUT. PARC also reports the big ham family in Corry, Pa. as WN3s PES, PSG, PSH and PVC. Indiana County ARC reports W3AEN is their new prexy. Other officers will be listed next month. Etna Radio Club reports they honored W3UL for serving 25 consecutive years as treas. of the club. W3OVM made the presentation and read the original minutes of that 1945 meeting which declared the election results. Silent Key: It is with deep sorrow that we report the passing of W3YN, ex-W3LCI. WPA Traffic Net had 31 sessions, 465 stations QNI, 275 messages were handled. Traffic: W3NEM 310, WA3IPU 307, W3ATQ 252, K3HKK 230, W3LOS 216, W3KUN 182, K3ZNP 127, WA3NAZ 76, WA3LDA 43, K3HCT 40, K3VQV 36, W3SN 31, W3IDO 15, WA3KSA 14, K3SJN 14, W3LOD 11. Total 1909.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYU. PAMs: WA9CCP and WA9PDI (vhf). RM: WA9ZUE. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	15
ILN	3690	0030 Dy	222
NCPN	3915	1300/1800 M-S	75
Ill PON	3915	2245/1430 M-F	507
Ill PON	145.5	0200 MWF	36
Ill PON	50.28	0200 M	4

WB9BXX is now in the Navy at the Great Lakes Training Center. W9HRY, net mgr. reports the traffic count of the Ninth Region Net was 683. The new officers of the Society of Radio Operators (SRO) are K9PGN, W9OIG, W9GCI, W9YLB, WA9KWV and WA9KTT. This is their 31st anniversary. WB9EUW, a new General Class licensee from Wheaton made top score in the ARRL SS for Ill. His father, WB9GAZ, also is a new General Class licensee. WA9EBT has entered his second year at Ohio State University Law School. The Hines VA Hospital station K9WFN has moved to Building 8. W9LNQ has installed a much delayed phone patch. WN9FSU is a new Novice licensee in the Eldorado area. K9ORP, K9GRO, W9GXR, W9AUO and WA9BKC are the new officers of the Central Illinois Radio Club (Bloomington). Our deepest sympathy to the family and friends of WA9MPU who recently passed away. K9AWG was in the hospital and now is reported to be back in good health. W9JAU, W9GTV and Jon Abnaur were elected to guide the Steator Amateur Radio Club for the coming year. K9LFA, K9ORU, K9DGG, K9GZA, K9AMJ, WA9BLL, WA9VOV, WA9UNA, K9BWK, K9BHY, K9UTG, WN9EBY and WN9FGM received certificates of appreciation from the Mayor of Belvidere for their services during the 1970 Halloween Patrol. K9PAK, K9ORU, K9SAN, WN9ETH, W9FL, WN9CHU, WA9WJO, WA9PXO and K9LUX were elected as new officers for the Rockford Amateur Radio Association, Inc. (RARA). The CSRA group formed a 2-meter frequency of 147.12 that will be monitored 24 hours and will be open to all members. The Ninth Annual WCRA Mid-winter Swap and Shop sponsored by the Wheaton Community Amateurs had an FB turnout. WB9BXX and K9TXJ are BPL recipients for Jan. Traffic: (Jan.) WB9BXX 601, K9TXJ 299, WB9DPU 226, W9NXG 202, WA9ZUE 190, W9FLF 100, WA9ZLN 80, W9JXV 79, W9HOT 58, WA9LDC 54, W9FHJ 50, W9LNQ 48, W9DOQ 36, K9AVQ 31, WA9OBR 31, WA9NLF 17, WA9SFB 16, K9WFN 14, K9HSK 9, K9RAS 8. (Dec.) W9FLF 12, WA9OBP 4.

INDIANA – SCM, William C. Johnson, W9BUQ – SEC: W9FC. RMs: W9GC, W9HRY, WA9WMT. PAMs: K9CRS, WA9OHX, (vhf) W9PMT.

Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
IIfeN	3910	1330 Dy 2300 Dy 2130 M-S	449	WA9OHX
QIN	3656	0000 Dy 0400 Dy	193	WA9WMT
IFN	3740	0000 T-Th-S	38	WA9ZKX
PON	3910	1245 Su 1830 S-S	152	WA9UMH
PONVHF	50.7	0200 M-Th	12	WA9TJS
Hoosier VHF			35	W9PMT

WB9EAY passed his General Class exam. At the Jan. meeting of the Indiana ATV and UHF Club WA9BHV talked on repeaters. WA9AMZ showed slides on his recent European trip. W9MNY and W9HTK demonstrated 2-meters. New officers are W9AFV, pres.; WA9BXM, vice-pres.; W9HRO, treas.; WA9NZQ, secy.; W9NTP, pro. chmn.; W9JIY, tech. chmn. Laporte ARC officers for 1971 are K9WHF, pres.; WA9OCQ, vice-pres.; WA9ZDM, spec. asst.; W9LCH, secy.; WB9BSL, act. secy.; WA9GOP, comm. Michigan City ARC officers for 1971 are WA9ZIJ, pres.; WB9CEQ, vice-pres.; WA9EPU, secy.; WN9COD, treas.; WA9ZRA, dir. gen. class; WN9BSJ, tech. and novice. Tippecanoe County Amateur Radio Association, W9REG, officers are WA9SMO, pres.; K9KRE, vice-pres.; WA9ZDI, treas.; K9LQG, secy. Indianapolis Red Cross ARC, WA9LGQ: W9POF, pres.; WB9BWK, vice-pres.; WA9BVS, secy.; WA9VGY, treas.; WA9VBG, chief op. Bloomington ARC officers are WB9AKG, pres.; WA9KYG, vice-pres.; WN9CER, secy.-treas.; W9FPI, trustee; K9CGT, W9CGT, W9YYX, W9NZK, dir. Bloomington Amateur Television Society officers are WA9YJZ, pres.; W9NZK, vice-pres.; W9KAD, secy.-treas.; K9BCP, trustee; W9YAN, W9RPI, K9UOD, dir. SET was very good this year. I received over 50 messages. QIN Honor Roll: W9BDP 24, W9JBQ 22, W9QLW 21, WB9ANT 20/21, W9HS 20, W9EI 17/19, W9QXF 16, WA9VZM 16. Amateur radio exists because of the service it renders. BPL certificate went to W9JYO. Traffic: W9HRY 402, W9JBQ 359, WA9ZKX 306, K9FZX 283, W9JYO 228, WA9WJA 197, WA9VZM 181, W9ICU 180, W9QLW 125, WA9VMT 114, WA9OHX 106, W9RUQ 73, WA9QOQ 57, W9FWH 48, K9YBM 47, K9HYV 46, K9CBY 42, W9PMT 42, K9EFY 37, WB9BSL 34, W9IOH 32, K9RPZ 27, WA9BWY 25, WA9UMI 25, K9ILK 14, K9JQY 14, WB9BAQ 13, WA9BHG 11, WA9CHY 10, K9DIY 10, K9HZY 10, W9KWB 10, WA9MXG 10, WA9OAD 10, WA9AXF 9, WB9BAP 7, W9DZC 7, WA9VBG 6, W9YYX 6, W9BDP 5, W9CMT 5, WB9AMB 1.

WISCONSIN – SCM, S.M. Pokorny, W9NRP – Asst. SCM: Joseph A. Taylor, W9OMT. SEC: W9NGT. PAMs: WB9CKE, WA9IZK, WA9OAY, K9FHI, WA9QKP. RMs: WB9FFY, K9KSA.

Net	*Freq. Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
WSSN	3662 0030 TTS	67	12	K9KSA
WIN	3662 0115 Dy	444	249	WB9FFY
WRN	3620 0130 Su(RTTY)			K9GSC
SW2RN	145.35 0230 Dy	125		WA9IZK
SW6RN	50.4 0300 M-S	190		WB9CKE
BWN	3985 1245 M-S	443	207	WA9OAY
Wi-PON	3925 1801 M-F	313	98	W9EMC
BEN	3985 1800 Dy	872	125	WA9QKP
WSBN	3985 2300 Dy	1586	181	K9FHI

WB9BJR made BPL again. WN9FUY is a new Novice at Whitewater. WB9EMO received his General Class license. Yellow Thunder ARC started its novice class at Baraboo, Feb. 2. FLARC (Madison) officers for '71 are WA9KGO, pres.; WA9YRH, vice-pres.; W9VFD, secy.; W9LAA, treas. K9KSA was net control for the SET-CD drill using 146.94 fm and had 50 stations participating including 19 mobiles. The Wisc. Radio Amateur Herald (a new Wis Ham Sheet) is published every third week by K9KSA. The Racine Megacycle Club meets the 2nd and 4th Mon. Mark your calendar for July 11, the WNA Family Picnic at Hartford. W9HFL became a Silent Key Dec. 13. Our sympathy to his family. Traffic: WB9BJR 512, W9CXY 462, K9CPM 296, WB9EFY 286, WB9DXK 184, WA9YSD 114, W9ESJ 112, W9DND 81, WN9EZX 81, K9EHI 77, WB9ABF 67, WA9UNN 61, W9NRP 54, W9ZBD 46, K9KSA 36, W9JHW 35, K9JPS 32, WA9OAY 28, WA9QNI 27, W9KRO 26, W9WJH 21, WB9DAK 19, W9OMT 16, W9ZGQ 12, K9UFQ 11, W9DXV 10, WA9PKM 9.

DAKOTA DIVISION

MINNESOTA – SCM, John H. Halstead, KØMVF – Asst. SCM: Edna M. Thorson, WAØRRA. SEC: WAØMZW. RMs: WAØIAW, WØAAU. PAMs: WAØHRM, KØELT, WAØDWM, WAØMMV. KØELT has been appointed PAM MSPN, noon session. Keith has served as PAM before. WØUCV, WØEQO and WØTJA are Silent Keys. Fran had been active as NCS on the MSPN. Ott was very active in the Hand-I-HAM System of Minn. serving most recently as pres. WØEOO has been suggested as a proper call for the Camp Courage amateur radio station. WNØDOU and WNØDFI are newly-licensed amateurs.

Net	*MHz*	*Time (Z)/Days*
MSPN Noon	3.945	1805 Dy
		1500 Su, Holidays
MSPN Evening	3.942	2345 Dy
MSN	3.685	0030 Dy
MJN Slow Speed	3.685	0100 M-S
MSTN	50.400	0430 Dy
MINN RTTY	3.620	0200 Su
MINN AREC	3.912	2300 Su
PICONET	3.928	1900 Su
MPON	3.910	1380 S

Piconet All Day Watch monitors Mon. through Fri. from 1500 GMT to 1800 GMT and 1900 GMT to 2200 GMT on 3.925 MHz for emergencies, traffic, mobiles, informals. Traffic: (Jan.) WAØGRX 687, KØCSF 574, WØZHN 316, WAØVAS 175, WAØEPX 131, KØMVF 125, WAØVDG 125, WØBUC 114, WAØRRA 106, WBØBRG 84, WAØIAW 84, WAØWEZ 82, WØWFA 81, WAØYMU 69, WAØONE 64, WØISJ 58, WAØEBZ 55, WØAAU 52, WAØNQH 50, WAØOEJ 47, WAØTFC 41, WØWAS 38, WAØSGJ 34, WAØRKV 30, KØORK 29, KØELT 22, WAØMMV 21, WAØVUP 20, KØZRD 20, WBØAEM 19, WAØUAH 18, WØKNR 15, KØICG 14, KØZXE 14, WØBUO 13, WAØYJB 13, WØEQO 12, WAØJPY 12, WAØMNE 12, WAØYVT 12, WAØCGZ 11, WBØCNB 10, WAØYER 9, WAØYAH 7, KØJTA 6, WØKLG 6, WAØOEF 5, WAØEFU 4, KØIJL 4, WØPAN 4, WAØPSI 2, KØZBI 2, WØIYP 1, WØSZJ 1. (Dec.) WAØWEZ 183, KØIJL 25.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: WBØATJ. PAM: WØCAQ. RM: WAØRSR. OO: WØBE. It is nice to hear that WAØRSR is home from the hospital and on the business end of the mike and key. WAØAYL spent a few days in Bismarck visiting the legislature, MARS, and the Bismarck Radio Club. WAØBIN has a new linear. He and KØGGL have the Richland County Emergency Net going on 3910 kHz evenings. He also helps with the YL WX Net on week ends. The Sioux Amateur Radio Club of the UND organized and elected WAØAVE, pres. WØEFJ has been pinch hitting for WAØMND on the YL WX Net. WBØATJ is the new RO for RACES and will be assisted by WØGEK and WAØMSJ. WAØSDQ/M did a very nice job of reporting the 500-mile Winnipeg-St. Paul Snowmobile Race and was helped by two mobiles from Grand Forks, WAØAYL and KØRSA with WBØATJ on the first leg to Crookston. WAØGRX took over the main duties as NCS with help from KØGGL to relay from WAØSDQ/M to interested stations and the news media. WAØCYW/M got himself in a huge snowdrift west of Linton and through the RACES gang and others they were able to get a wrecker out to him. The Fox Amateur Radio Club had a dinner meeting in Feb. to which out of town hams were invited. I would appreciate some news from various clubs and any other news that would make it interesting to hams from NDAK living in other QTHs. Thanks a lot fellows for your past cooperation. It has been a pleasure to serve you as SCM.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*QTC*
Goose River	1990	0900 Su	5	69	6
NDPON	3996.5	1830 S-Su	17	431	178
		0900 Su			
NDCW	3640	2100 M-F	25	57	27
YL WX Net	3994	0730 S-Su	31	642	549
NDRACES	3996.5	1730 M-F	42	1235	84
		1830 M-F			

Traffic: (Jan.) WBØBIN 215, WØEFJ 141, WAØAYL 86, WAØMND 72, WØDM 70, WØDXC 62, WØWWL 60, WAØIKS 56, WAØSUF 55, WAØSJB 47, KØPVG 46, WAØREW 45, WAØRSR 41, WØHBR 39, WAØZPI 35, WØCDO 34, WØCAQ 14, WØNMV 13, WAØJPT 10. (Dec.) WBØBIN 87.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – The AREC Net now meets on 3.955 MHz at 2359Z every Sun. One of the popular features of the net is a swap-shop listing. Why not check in and take part in this. Two meter activity is growing very rapidly in the Brookings area. Your SCM would appreciate it if any group working with fm or repeaters would report their activities to him so he might help the groups contact each other and exchange information. Following is a listing of the South Dakota nets:

Net	*Freq.*	*Time(Z)/Days*
Morning Net	3.955	1400 M-S
NJQ	3.955	1815 M-S
Early Evening	3.955	2330 Dy
Late Net	3.955	0030 Dy
SDN	3.645	0100 M-F

Net reports: QNI average 20 per day on Morning WX Net. NJQ – QNI 500, QTC 16; Early Evening Net – QNI 809, QTC 10; Late Evening Net – QNI 1102, QTC 52; SDN – QNI 103, QTC 16. Traffic: WØZWL 429, WØHOJ 82, WAØFUZ 51, WØLG 40, KØAIE 25, WØCAS 20.

DELTA DIVISION

ARKANSAS – SCM, Jimmie N. Lowrey, WA5VWH – SEC: W5PBZ. RM: WA5TLS. PAM: WA5KJT. Congratulations to WA5IIS on getting 5BWAS award No. 40. There will be an amateur radio picnic on Apr. 18 from 11:00 A.M. to 5:00 P.M. CST at Pavilion No. 7 in Burns Park, North Little Rock, Ark., sponsored by OZK. All hams, their families and friends are invited. Everyone seemed to do a good job with the SET. WB5BFG has a new tower for his 20-meter quad. WA5KJT has a new SB-303 receiver. WA5WMD has a new Kenwood R-599 and T-599. W5MDP has a new Heathkit HM-102 Wattmeter. WA5AER has been working good DX with his new 2K-3. W5RXU has a new 2-meter mobile rig. WA5WMC has worked 100 countries with his SB-102. WA5WLJ and WA5VWH are working on 4-100A amplifiers. WA5WMD passed his Advanced Class exam. Net reports for Jan.:

Net	*Time(Z)/Day*	*Freq.*	*Ufc.*	*QNI*	*Mins.*	*Mgr.*
OZK	0100 Dy	3790	86	294	911	WA5TLS
RN	0030 Dy	3995	55	774	642	WA5KJT
PON	2130 M-F	3925	110	297		W5MJO
APN	1200 M-F	3937	10	595	1635	W5VFW
CAREN	0200 Th	146.94/.34				W5ODF
DX INFO	0045 M	3860				WA5EEL
EC Net	0000 Su	3995				W5PBZ

Traffic: W5NND 241, WA5TLS 120, WA5WMC 26, W5VFW 24, W5SOQ 11, WA5EVW 3.

LOUISIANA – SCM, J. Allen Swanson, Jr., W5PM – SEC: W5OB. RM: WA5VQE. My apologies to WA5VQE for twice fouling up his call! Our RM reports that LAN activity is picking up but needs additional stations to handle RNS. WA5QVN was busy in the SET. We had fine participation in this exercise from many clubs in La. WB5BUX is with the Military Sealift Command three months out of the year. The CLARC now meets with the CD group. The GNOARC still is running classes for generals who wish to become advanced class. W5OB still is chasing DX and active in club work. Incidentally, fellows, if's not that I don't want a schedule with you but I have no phone patch! Live too far in the country! W5CLZ complains of rig trouble and his only consistent mode is cw. WA5QCX is the new pres. at Ozone in Slidell, with W5PYJ, vice-pres.; WA5QXH, secy.-treas. The club has a fine motto "get it done in '71"! W5NGA, NCS reminds us that the Alligator Net meets Fri. nights at 0230Z on 3925 kHz. K5ARH reminds us that if you need Lafayette try 3940 kHz. WA5WBZ in addition to his LAN activities works the MARS nets. WA5OVX now is Advanced Class and is working on the Extra. Congrats! W5FMO, her OM, has built a typewriter keyer to entice the DX gang! The La. Tech. Radio Club has put up a TH-3. New officers of LATECH ARC are WB2UEG, pres.; WA5QXE, secy.-treas. WN5BGY now is WB5BGY. WA5AWM is now on fm. W5UCN is working on a dipole system. LARC recently welcomed W5NQR and W5NQQ on a visit from

(Continued on page 117)

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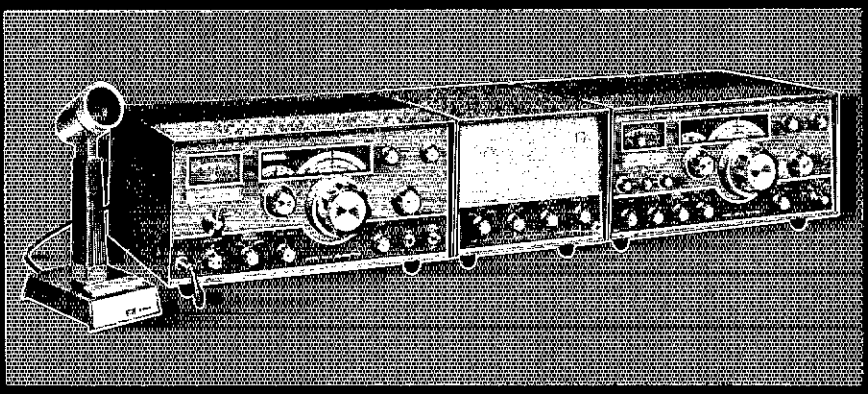

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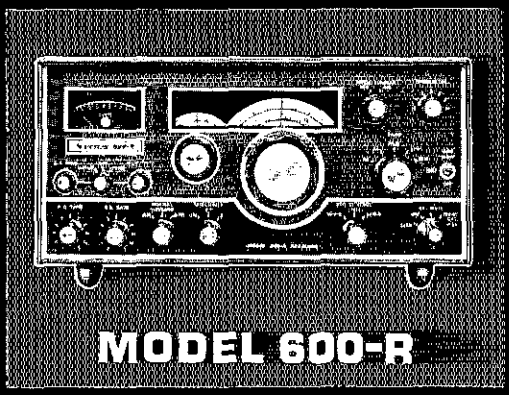

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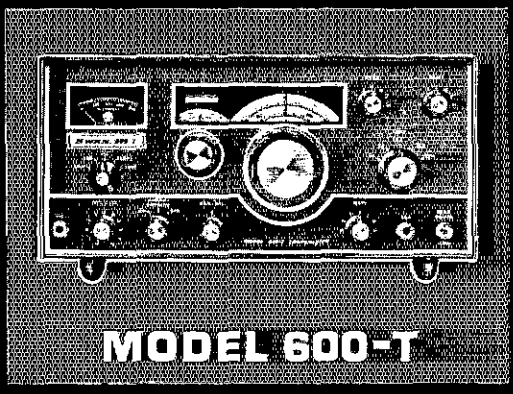

MODEL 600-T

Examine the list of features and specifications, and compare them with those of any other receiver and transmitter units on the market...then compare the prices. The amateur radio operator now has a new standard of performance, quality, reliability and value in transmitters and receivers.

The Swan 600T Transmitter and 600R Receiver!

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ELECTRONICS
A Subsidiary of Cubic Corporation

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P.O. Box 151
Freehold, N.J. 07728

FACTORY
305 Airport Road
Oceanside, CA. 92054

600-R SPECIFICATIONS:

- SSB, CW, AM and FSK superheterodyne receiver.
- Freq. Range: In addition to full coverage of 10, 15, 20, 40 and 80 meters, continuous coverage from 3 to 30 mc may be provided with an external oscillator, either tunable or crystal controlled.
- Ultra-smooth vernier tuning, with large knob and dial. The incomparable feel of the Swan tuning system.
- Sensitivity: ¼ microvolt at 50 ohms for 10 db signal plus noise-to-noise ratio.
- Selectivity: 2.7 Kc bandwidth with 1.7 shape factor is standard. Options include 0.5 Kc CW filter, 4 Kc AM filter, and SS-16 super selective filter.
- Crystal Calibrator with 25 and 100 kc selection.
- Hybrid Design: 7 tubes, 8 transistors, 12 diodes. Transistors used where they provide definite advantage. Tubes used where they still provide superior performance.
- Features Swan's exclusive Single Conversion design, with fewer spurious responses than multi-conversion designs.
- Fully compatible with 600-T transmitter, providing for transceive operation as well as separate frequency control. Also, CW sidetone, and genuine CW break-in operation.
- Built-in AC power supply.
- Dimensions: 15 in. wide, 6½ in. high, 12 in deep.

$395*

600-T SPECIFICATIONS:

- Freq. Range: Full coverage of 10, 15, 20, 40 and 80 meters. Extended frequency coverage for MARS operation with plug-in crystal oscillator accessory, Model 510X.
- Power Rating: 600 watts P.E.P. input. 500 watts CW. 150 watts AM. 100 watts continuous AFSK.
- Pi-Network output for 50 or 75 ohm coax.
- Suppression: Carrier 60 db, unwanted sideband 50 db. Third order distortion approx. 30 db.
- Audio response: Plus or minus 3 db from 300 to 3000 cycles.
- CW Keying: Grid block circuit, Full Break-in system. Includes sidetone to receiver.
- VOX accessory, plug-in.
- Internal AC Power Supply.
- Dimensions: 15 in. wide, 6½ in. high, 12 in. deep.

$495*

600-R ACCESSORIES:

Speaker in matching cabinet ..... **$18 ***

I.F. Noise Blanker. Installs internally ..... **$79 ***

Adjustable Audio Notcher. Installs internally ..... **$44 ***

*Factory price

Station Activities

(Continued from page 112)

Houston. K5UNZ has been working with 2- and 6-meter transistor converters. Traffic: WA5VQE 238, W5MI 205, WB2UFG/5 104, WA5QVN 64, WA5WBZ 54, W5CEZ 43, W5PM 11, WA5OVX 4, W5EA 2.

MISSISSIPPI – SCM, Walker J. Coffey, W5NCB – SEC: WA5JWD/WB5AHE. RM: W5SBM. PAMs: W5JHS, K5MDX. One of the outstanding DX men in this section has been appointed as PAM DX to lead our efforts in this activity. His call, K5MDX, is very appropriate. Appointments: WA5UIH, WB5CKJ as ECs; WA5YZW, WA5YJA as ORSs; WA5RMS as OVS. Endorsements: W5SBM as ORS and OPS. Welcome to new hams WN5DGM, WN5DGO, WN5DIV, WN5DKA, WB5DHG and WB5DHF. If a novice lives in your area, please let him know you are personally interested in his efforts to advance. W5KDM has a new beam on 6 and needs schedules. WA5RMS has FB antennas on 2 and worked 49 stations in the Jan. VHF SS on fm. WA5RCI at Marks has 42 states on 2. How about more news on vhf fellows? Regret to report K5BKU and K5SXM as Silent Keys.

Net	*QNI*	*QTC*	*Mgr.*
MTTN	244	120	W5SBM
MSBN	1162	99	WA5UYW
CGCHN	1311	31	W5OEB

Hats off to W5SBM and WA5TMC/5 for making PSHR. WA5TMC/5 also made BPL. Traffic: WA5TMC/5 387, W5SBM 342, WA5EIN 166, W5EDT 119, W5NCB 72, W5WZ 37, WB5AHE 44, W5BW 42, WA5YZW 26, WB5BUE 7, W5RUB 7, WA5SEG 6, WA5VOR 5, W5PDG 3, WA5KYB 2, WA5OKI 2.

TENNESSEE – SCM, Harry A. Phillips, K4RCT – SEC: WB4ANX. RM: K4AMC. PAMs: W4PFP, K4MQI, WA4FWW.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	2330 T-Su	26	1693	113	K4MQI
TPN	3980	1145 M-F	31	1478	107	W4PFP
		1300 S-Su				
ETPN	3980	1040 M-F	21	586	22	WA4EWW
TPON	3980	2330 Su	5	182	34	WB4BHZ
TN	3635	0000 Dy	31	117	47	K4AMC
ETVHF	145.2		8	48		WB4IOB
ETVHF	50.4		12	217	1	WB4IOB
ETTM	28.7	0200 W&F	8	80		WA4QXC
MTTM	28.8	0200 T&F	9	87		WA4GLS

The Murfreesboro Central High Radio Club is sponsoring license classes as is the MARA of Memphis, Bristol ARC and Oak Ridge Radio Operators. The SET was a great success in Tenn., thanks to the efforts of several hard working hams. The Delta ARC will sponsor a message service for patients at Le Bonheur Childrens Hospital in Memphis. W4ZJY moved to a new QTH in Concord. WN4PNE got his General and will be operating as WB4PNE. WA4QXC has been operating lots of 2-meter on a 7000-mile trip to 6-Land. The Quad City meeting will be hosted by the Johnson City Club. The Tenn. Council of Clubs will sponsor the Tn. QSO Party. Tentative date is May 2. Traffic: W4ZJY 248, W4OGG 210, K4VFY/4 204, WB4DAJ 130, W4WBK 108, WB4MYZ 102, WB4ANX 95, WA4FWW 79, WB4FVM 75, WB4DAJ 39, W4TYV 34, WA4TWL 28, W4PFP 27, WA4WVW 27, WA4YEM 27, WB4DYJ 20, WA4GLS 18, WB4HSS 17, WB4NCW 17, WA4ZXZ 13, W4MXF 12, K4UMW 12, WA4CGK 8, WB4MPJ 7, W4SGI 4.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – SEC: K4VZU. Appointed: WB4QYL as ORS. Endorsed: WA4FAF and WB4HTN as OPSs; WA4AGH, WB4FDK, WA4FMY, WB4HTN, WB4IBO, WA4WWA as ECs; WA4GHQ as OVS. BPL: W4OYI.

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
KRN	401	41	KYN	484	588
MKPN	595	91	KNTN	105	49
KTN	1737	752	FCATN	75	16

WB4MTT moved to Wis. and Ky. has lost a real fine traffic man. K4HY has a BC-610 on 80-meter RTTY. A Ky. RTTY net is being formed with frequencies to be announced soon. New officers of the Kentuckiana Radio Club are K4FXN, pres.; K4KZH, veep; WB4RLA, secy.; K4BAM, treas. WB4QMC received his Advanced and WA4WSW his Extra Class license. WA4AGH worked HC1NKH on 80-meter cw using 2 watts. The SET meeting Jan. 24 in Louisville was a big success with 40 attendees. WB4AXQ lost his 6-meter antenna to the winter winds. Traffic: WB4NQZ 342, WA4MKH 339, WA4VZZ 334, K4HY 239, K4CSH 216, W4BAZ 186, W4CID 171, WB4LIL 166, K4MAN 152, W4OYI 132, K4UNW 109, WA4DYL 73, WB4AUN 69, WA4GHQ 64, K4TRT 55, WB4QYL 55, WA4AGH 53, W4BTA 46, WA4MEX 44, WB4EOR 42, WB4RLA 40, WB4MTT 39, K4DZM 36, WN4PSJ 32, WB4AXQ 30, WA4HLW 29, WB4EQY 27, K4UMN 25, WB4MQR 23, W4NBZ

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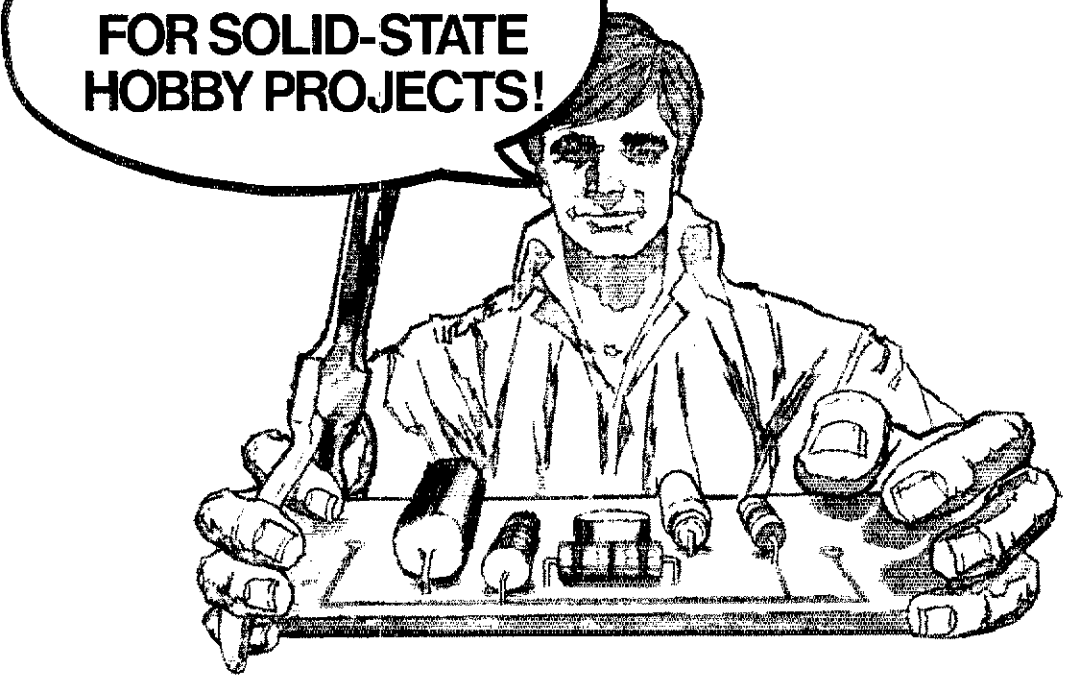
OVER 60 CIRCUITS FOR SOLID-STATE HOBBY PROJECTS!



Hobbyist? Experimenter? Teacher? The RCA Solid-State HOBBY CIRCUITS MANUAL, HM-91, is for you.

Complete construction information on 62 circuits is given, including detailed descriptions of circuit operation, construction layouts, photographs, schematic diagrams, and parts lists. Full-size drilling or printed-circuit-board templates are included for most circuits.

There are sections on theory and operation of solid-state devices, testing and troubleshooting, basic circuits, mechanical considerations, and suggested circuit uses.

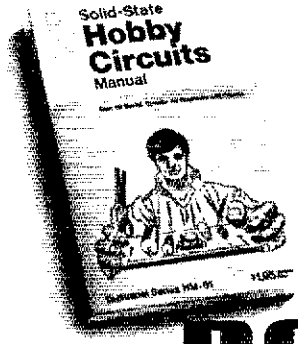
We've included suggestions for hams, motorists, photographers, music and hi-fi buffs, and others.

Build circuits for: Power Supplies . . . Shift Registers . . . Counting Circuits . . . Electronic Clocks . . . Audio Oscillators . . . Microphone Preamplifiers . . . Mixers and Line Amplifiers . . . Phonograph Preamplifier . . . Photoelectric Audio Attenuator . . . IC Wireless Microphone . . . Amplifiers . . . Telegraph Keyers . . . AF Operated Switch . . . Dip/Wave Meter . . . Variable-Frequency Oscillator . . . Calibrators . . . Metronome . . . Fuzz Box . . . Six-Octave Organ . . . Flasher . . . Enlarger Exposure Meter . . . Universal Timer . . . Lamp Dimmer . . . Temperature Alarm . . . Positive-Action Light-Operated Switch . . . Automobile Tachometer . . . Battery Chargers . . . Automobile Light Minder . . . Siren . . . Slot Machine . . . Dice . . . Metal Detector . . . Motor-Speed Control . . . Model Train and Race-Car Speed Control . . . Time Delay.

In addition, RCA has Integrated Circuit Project Kits that contain a complete package of parts for many of these circuits.

The Hobby Circuits Manual is available for only $1.95* from your RCA Distributor; or send check or money order to RCA, Commercial Engineering, Dept. 91/S46, Harrison, N.J. 07029.

*Optional Price



RCA

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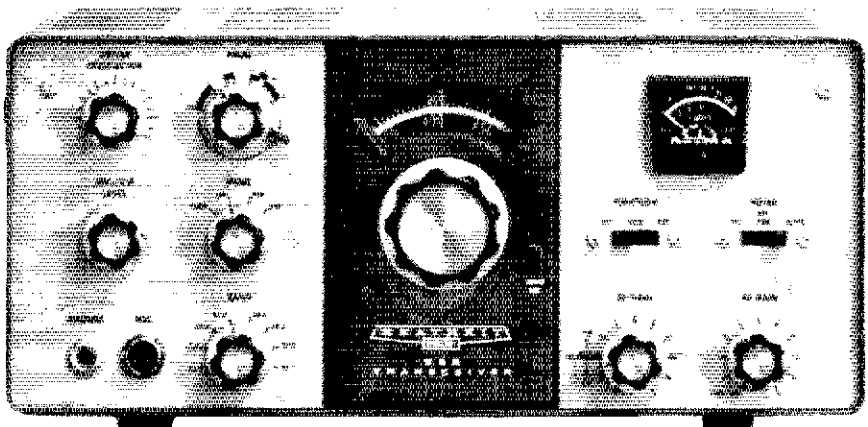


NEW Heathkit® HW-101... $249.95

World's best low cost rig is now even better. The Hams at Heath have done it again... by adding important new performance features to the famous HW-100... without adding to the price. That's Heathkit value... and this is the rig...

Improved receiver circuitry now delivers 0.35 uV sensitivity for 10 dB S+N/N.

Improved dial drive mechanism. New ball-bearing drive assembly provides a 36 to 1 knob to dial turning ratio... delivers 34 velvet-smooth knob revolutions per 500 kHz band segment.

Front panel switch selection of SSB or CW filters. Now choose the built-in 2.1 kHz or optional 400 Hz filter with just a flip of a switch.

Plus all the features that made the "100" the world's most popular transceiver. Add it all up and you've got the new HW-101... a lot more rig for a little less money. From the Hams at Heath, of course.

Kit HW-101, 23 lbs. **$249.95***

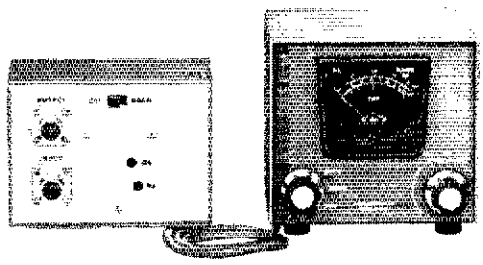
Kit HP-23A, AC supply, 19 lbs. **$51.95***

Kit HP-13A, DC supply, 7 lbs. **$69.95***

SBA-301-2, 400 Hz CW filter, 1 lb. **$21.95***

SBA-100-1, mobile mount, 6 lbs. **$14.95***

HW-101 SPECIFICATIONS — RECEIVER: Sensitivity: Less than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 dB down; 7 kHz maximum at 60 dB down (3.395 MHz filter). **CW selectivity:** (with optional SBA-301-2 CW crystal filter installed); 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. **Input:** Low impedance for un balanced coaxial input. **Output impedance:** 8 ohm speaker, and high impedance headphone. **Power output** 2 watts with less than 10% distortion. **Spurious response** Image and IF rejection better than 50 dB. **TRANSMITTER DC power input:** SSB, (A3J emission) 180 watt PEP (nor mal voice, continuous duty cycle). CW, (A1 emission) 17 watts (50% duty cycle). **RF power output:** 100 watts on 8 through 15 meters; 80 watts on 10 meters (50 ohm non reactive load). **Output impedance:** 50 ohm to 75 ohm wit less than 2:1 SWR. **Oscillator feed-through or mixer prod ucts:** 55 dB below rated output. **Harmonic radiation:** 4 dB below rated output. **Transmit-receive operation:** SSB PTT or VOX. CW: Provided by operating VOX from a keye tone, using grid-block keying. **CW side-tone:** Internall switched to speaker or headphone in CW mode. Approxi mately 1000 Hz tone. **Microphone input:** High impedanc with a rating of –45 to –55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband sup pression:** 45 dB down from single-tone output at 1000 H reference. **Third order distortion:** 30 dB down from two tone output. **RF compression (TALC*):** 10 dB or greater a .1 mA final grid current. **GENERAL: Frequency coverage** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Fre quency stability:** Less than 100 hertz per hour after 3 minutes warmup from normal ambient conditions. Les than 100 Hz for ±10% line voltage variations. **Modes o operation:** Selectable upper or lower sideband (sup pressed carrier) and CW. **Dial calibration:** 5 kHz. Cali bration: 100 kHz crystal. **Audio frequency response** 350 to 2450 Hz. **Transistors:** MPF105 FET-VFO; 2N3393 Voltage regulator. **Rear apron connections:** CW Key jack 8 ohm output; ALC input; Power and accessory plug; R output; Spare. **Power requirements:** 700 to 850 volts a 250 mA with 1% maximum ripple; 300 volts at 150 mA with .05% maximum ripple; –115 volts at 10 mA with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabine dimensions:** 14 1/16" W x 6 3/16" H x 13 3/8" D.
*Triple Action Level Control™



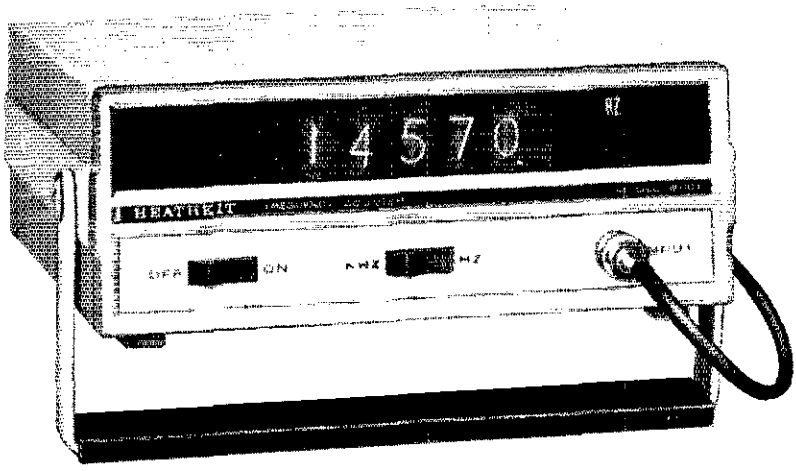
New Heathkit® Wattmeter... $29.95*

You asked for it ... a low cost high quality Heathki wattmeter. New HM-102 measures RF power out put from 10-200 W and 100-2000 W in two switch selected ranges. Built-in calibrator permits 10% accuracy throughout the 80-10 M bands. Built-in SWR capability. Negligible loss permits permanen insertion in any 50 ohm line. Exclusive remote detector allows placement of meter in any loca tion. Put the new HM-102 in your shack now... it' another powerful value from the Hams at Heath.

Kit HM-102, 3 lbs. **$29.95***

The only difference between the new Heathkit® Frequency Counter and those costing $400

...is the price $199.95*



Compare performance & features of the IB-101 to counters selling for twice the price! Counts from 1 Hz to over 15 MHz; advanced IC design eliminates blinking readout and divider chain adjustment.

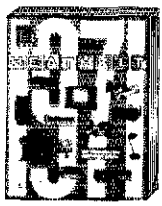
8-digit capability. Set the range switch to kHz and read to the nearest kHz... push the range switch to Hz and read down to the last Hz. Overrange & Hz/kHz indicators light up to give correct range at all times; do an 8-digit measurement with 5-digit readout.

Exclusive Heath-designed input circuit. Dual gate, diode-protected MOSFET design provides proper triggering without adjustment from less than 100 mV to over 200 V. Input Z is 1 megohm shunted by less than 20 pF to minimize circuit loading & error.

Other features include sockets for all 26 IC's and 5 display tubes... double-sided, plated-thru fiberglass circuit board... 120/240 VAC operation... convenient handle/tilt-stand. Compare the new Heathkit IB-101 to the $400 models... and discover that $199.95 buys more counter.

Kit IB-101, 7 lbs. **$199.95***

IB-101 SPECIFICATIONS: Frequency Range: 1 Hz to greater than 15 MHz. **Accuracy:** ±1 count ± time base stability. **Gate Times:** 1 millisecond or 1 second with automatic reset. **INPUT CHARACTERISTICS– Sensitivity:** 1 Hz to 1 MHz, less than 100 mV rms. 1 MHz to 15 MHz, less than 250 mV rms, after 30 minutes warmup. **Trigger Level:** Automatic. **Impedance:** 1 Megohm shunted by less than 20 pF. **Maximum Input:** 200 V rms. DC–1 kHz. Derate at 48 V per frequency decade. **TIME BASE: Frequency:** 1 MHz, crystal controlled. **Aging Rate:** Less than 1 PPM/month after 30 days. **Temperature:** Less than ±2 parts in 10^7/degree C. 20 to 35 degrees C after 30 minutes warmup. ±.002% from 0 to 40 degrees C. **GENERAL: Readout:** 5 digits plus overrange ambient. **Temperature Range:** Storage; –55 to 80 degrees C. Operating; 0 to 40 degrees C. **Power Requirements:** 105-125 or 210-250 VAC, 50/60 Hz, 8 watts. **Cabinet Dimensions:** 8¼" W x 3¾" H x 9" D not including handle. **Net Weight:** 4½ lbs.



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20, WA4FAF 17, WA4WWA 17, KØVDY/4 11, K4FPW 10, WB4GCV 9, WA4MXD 9, W4AQI 8, WA4WSW 8, WBØBDG/4 6, K4VDO2. Total traffic 3270, reports 39.

MICHIGAN – SCM, Ivory J. Olmghouse, W8ZBT – SEC: W8MPD. RMs: WA8PIM, W8RTN, W8WVL, K8KMQ, WB8DTT. PAMs: W8VXM, WA8TAN, K8PVC, K8MJK. VHF PAMs: W8CVQ, K8AEM.

Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300 Dy	1310	757	106	WA8PIM
WSSB	3935	0000 Dy	1010	195	31	W8VXM
BR/MEN	3930	2230 S-F	940	62	26	WA8TAN
UPEN	3920	2230 Dy	612	17	30	K8MJK
GLETN	3932	0230 Dy	824	53	31	K8PVC
PON	3953	1600 Dy	831	241	31	K8LNE
Mi.6M		– M-F	342	31	21	WA8VXE

Silent Keys: WA8MUY, W8LNE, WA8LHC. 1971 officers for CARS are WB8EKP, pres.; WA8SBR, vice-pres.; WA8QOY, secy.; WB8ADD, treas.; K8SMC, act. mgr. Motor City ARC elected for 1971 WA8VSQ, pres.; WN8IDU, vice-pres.; K8ZJU, secy.; K8HFN, treas. Red Bud ARC elected W8ZBT, pres.; WA8CLN, vice-pres.; WB8BVP, secy.; WA8BSL, treas.; W8JCU, act. mgr. Saginaw Valley ARA elected K8ILD, pres.; W8IZ, vice-pres.; K8BWC, secy.; K8LNR, treas. GRARA reports head count of 70 for initial code and theory class. WB4JEZ/8 and WA8TBQ are new Extra Class licensees. WN8EYE is waiting for the Advanced Class ticket. WN8IMD is new at Pentwater. WN8IRR and WN8IRS are new at Sturgis. WB8GZE just received his General Class license and is a new NC on the BR Net. WB8ETN (KA2NA) reports from Japan that he is active on 15- and 20-meter cw and wants some state-side ragchews. He also says "I am an ARRL member, and proud of it." WA8TOB got his new tower up with the help of a dozen CATALPA members. WN8EYE and WB8BYR joined W8SWN on a cold and windy Sat. for a spider-quad party. Don't forget the SEMARA swap-shop in Detroit Apr. 18. Mich. had a very good turnout for SET '71. GLET Net report for Dec., QNI 812, QTC 112. Traffic: (Jan.) K8MJK 625, W8NOH 385, WA8WZF 310, K8KMQ 273, WA8PIM 255, K8ZJU 194, W8MPD 182, WA8LXY 179, W8SH 163, WA8PII 146, W8ZAV 138, WA8QGI 133, WB8BPY 124, K8LNE 108, W8RTN 108, W8ZBT 105, W8ACW 96, WA8QNZ 96, W8KBZ 92, W8WVL 83, W8IZ 81, WB8DTT 79, W8MO 77, WA8GBG 56, WA8TAN 54, W8ZCO 52, WA8ZPH 50, K8PVC 45, W8DUK 41, W8FZ 41, W8VXM 38, WB8EEU 36, K8DYI 35, WA8VXE 29, W8DCN 27, K8JED 25, WA8VHA 25, WB8ETB 23, W8IUC 22, WB8BJY 21, W8FX 21, WA8FXR 21, W8VIZ 20, WB8BJP 19, W8EU 19, WA8UOP 18, K8HXW 17, WA8YIX 16, W8GDV 15, W8SCW 15, WB8DTK 13, W8TBP 13, W8UFS 13, K8UOQ 11, WA8ENW 10, WB8HUA 10, W8KSL 8, W8QBE 7, WA8SWM 7, K8ACO 6, WB8BFK 6, WA8IAQ 6, K8MXC 6, WB8ANR 5, W8GAI 5, W8LME 5, WA8OXL 5, W8LN 4, W8AGQ 3, K8PNZ 3, WA8VRB 3, WA8VQL 2, WA8ZDE 1. (Dec.) W8GAI 13, W8KBZ 12, WA8SWM 4, K8CKD 3.

OHIO – SCM, Richard A. Egbert, W8ETU – SEC: W8OUU. RM: W8IML. PAM: K8UBK. VHF PAM: WA8ADU.

Net	QNI	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBN	2791	1715	72	3972.5	1530/2345	K8UBK
BN	960	750	73	3580	0000/0300	W8IMI
O6MtrN	465	38	68	50.61	0000	WA8ADU
				50.16	0200	
OSN	184	58	29	3580	2325	WA8WAK
BN RTTY	137	93	22	3605	2300	WA8YUB

Jan. BPLs went to WA8ETX, WA8VYQ, WB8DSV, K8LMF/8, WA8IWL, WB8BPB, K8ONA and W8TEL. PSHR submittals for 1970 totaled 104 and represented the efforts of 26 stations. EC W8ARW reports that WA8KZR has been appointed Darke Co. CD coordinator. Northwest Ohio AREC boasts a membership of 170, with a staff of 30 assisting K8LFT. OO W8KAJ laments having his XYL's birthday and the arrival of their first child both on CD Party day. Congratulations to W8UPH and K8RXD on their recent marriages. W8TAJ has nightly 20-meter schedules with son K8PTM, stationed in Phoenix with the Air Force. W8AVB was awarded his 50-year QCWA certificate. OO WA8MCR lost his 70-ft. tower, beams on 20, 15, 10 and 6, a vertical and three wire antennas to a windstorm. We regret to report that WN8CON, W8ESN, W8KAH and W8SVB joined Silent Keys. WA8WKQ's 7-year old son is WN8ILU. Congratulations to new Extra Class licensees WA8YXI and WA8WNU, and to new Advanced Class WB8HRR. Piqua RCs new officers are WB8HSU, pres.; WB8ARG, vice-pres.; W8SEI, secy.; K8BLC, treas. Columbus ARA had famous antenna expert W8JK as guest speaker. New officers of the Greater Cleveland VHF RC are W8ANE, pres.; K8QNK, vice-pres.; K8JFX, secy.-treas. The Apricot

The DRAKE 4 LINE

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Ray Grenier, K9KHW, Mail Order Sales Manager at
AMATEUR ELECTRONIC SUPPLY, says:

"Operating all bands (160 thru 2 Meters) is a real pleasure with my DRAKE 4 LINE setup. You, too, can eliminate all of that extra gear and mess usually needed for that much frequency coverage. Let me help you go the same route. . . . .all the way, as I have done - or just one unit at a time.

Visit our store or write me at AMATEUR ELECTRONIC SUPPLY for the best Trade or No-Trade Deal on new DRAKE equipment. You will be surprised how little per month it would cost you to own new DRAKE equipment when you use our convenient Revolving Charge Plan.

Remember, too! When trading with AMATEUR ELECTRONIC SUPPLY you can use our STAY-ON-THE-AIR PLAN, which means you can keep your trade-ins until your new equipment arrives. – Lose no operating time! CU on the air!"

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Net handled 313 messages for attendees of Cleveland's Mid-America Boat Show, signing K8LMF. Inter City RC started its code and theory class for 1971 with W8EMK and WN8HJL officiating. Don't forget the Dayton Hamvention Apr. 24. The new RTTY section of Buckeye Net is off to a fine start and mgr. WA8YUB says NCS and liaison stations are still needed. Ohio Six Meter Net mgr. WA8ADU would like more low band liaison stations. The big activity in Jan. was, of course, the SET. SEC W8OUU still is buried in messages and reports. Messages were received from 17 ECs representing a total of 44 counties and 252 messages were received from individuals reporting participation in the SET. OSSBN, BN and O6MttrN all ran extra sessions, with OSSBN reporting 635 SET messages and BN racking up 269. Congratulations to all who participated. SEC W8OUU plans a bang-up ARPSC Forum at the Dayton Hamvention this year. Please check the expiration dates on your appointments and send them in for endorsement when due. Evandale ARS new officers are WA8STX, pres.; K8HBN, vice-pres.; WB8AMI, secy.; WA8OGO, treas. WA8STX has been sending congratulatory messages to hams winning Sohio license plate awards. Traffic: (Jan.) WA8ETX 896, WA8VYO 509, W8LT 469, WA8NOQ 398, W8LKY 333, WB8DSV 317, K8LMF/8 313, W8LAG 296, W8IMI 287, W8PMJ 276, WA8DWL 263, WB8BPB 260, WB8BIH 216, W0AVS/8 214, WA8ETW 201, W8OUU 199, WA8WAK 199, W8CHT 192, W8QCU 180, WB8ALU 177, K8ONA 174, W8CUT 162, W8TEL 158, WB8CWD 157, W8MOK 151, W8GVX 149, K8LGA 145, WB8BZX 144, WA8SED 143, W8ETU 140, WB8AKW 120, WA8UPI 107, WA8HGH 105, W8GNL 98, WA8TYF 94, W8JD 92, WA8COA 82, W8FGD 73, W8ERR 71, WB8AYC 67, W8BZX 67, WB8DHY 67, W8GRG 62, WA8STX 62, WA8AJZ 61, K8LFI 60, WB8AJC 58, WA8MIH 56, W8UDG 53, WB8FXD 48, W8OE 48, WA8VKF 45, WA8ZUK 44, WA8FSX 43, WA8QFK 42, K8BHE 40, WA8LVT 39, W8BHL 37, W8ERD 37, W8LZE 31, K8YDR 31, K8BYR 29, WA8ZTV 29, W8NAL 28, W8ARW 27, WA8RSP 27, WA8ADU 25, K8EHE 25, W8GOE 24, K8BXT 22, K8RXD 22, WA8LAM 21, K8DHJ 20, WA8CKI 18, WA8VNU 16, WA8ZNC 16, W8CXM 15, WA8YIB 14, W8BTW 12, W8WEG 12, WB8DNZ 10, WA8JEH 10, W8BU 8, K8CKY 8, W8ELF 7, K8IIF 7, W8MGC 7, WA8RUO 6, WA8WPQ 6, W8AJW 5, WA8EBS 5, WB8DEA 4, WA8GRR 4, WA8MCR 4, WA8VVP 4, WB8CQC 3, W8IO 2. (Dec.) WA8ZTV 65, W8RYP 5.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN. Asst. SCM/PAM: Kenneth Kroth, WB2VJB. SEC: W2KGC. RM WA2VYS. VHF PAM: WB2YOU. Section nets as listed in previous columns. Attention all repeater station licensees: Please advise frequencies of your equipment. I plan to list repeaters as part of column each month as soon as information is available. Thanks to all who participated in the Jan. SET and acknowledge receipt of many SET messages from the section and from outside. A particular thanks to WA2CRW for the net monitoring job and traffic relay to SEC and SCM during test. On the club circuit: All clubs note that K2SJO now is secy. of Hudson Council (HARC). Contact him about your club being part of the Division Council. The Schenectady Jan. meeting featured Roy Anderson on "Navigational Satellites." Albany featured WB2DXM and W2AWF in discussion of open-wire versus coaxial feedlines. Director W2TUK was at the Yonkers Club Jan. meeting. Harmonic Hills officers are WB2ZRC/1, pres.; WN2KXM, secy.; W2FWU, treas. The Communications Club of New Rochelle heard Lew Kahn on capacitors. HARC held their annual meeting and elections and voted to reactivate the Yonkers RC in membership. New members of the Albany ARA include WN2NXK, WN2JZG, WA2MRH and WA2BGB. Albany, Westchester Cty and New Rochelle Clubs are already planning for the next holiday dinner dates and program. From the nets: ESS Mgr. WA2VYS reports for '70–6, 601 QNI, 365 sessions, with 3 of top 10 checking in coming from ENY. NYS was very active in the SET, also with regular sessions nightly. Individual station activities: WN2LXF interested in starting a Novice traffic net. Get in touch with him for details. K2BK says he's supporting the Post Office QSLing to 5BDXCC and 5BWAS. WA2JLV racked up No. 50 for WAS and is working hard on DXCC. The NY State QSO Party rules are now available for May 1, 2 operation sponsored by LERA ARC; details from WA2FBI on request. At press time, many ENY stations were active in connection with Los Angeles earthquake traffic. K2KK legal council for Yonkers Antenna Support legislation fight; The Common Council passed permissive legislation (12 to 0) on 2/9/71. Traffic: (Jan.) WA2CRW 465, WA2FBI 181, WA2VYT 10, W2URP 114, K2SJN 74, WA2VYS 59, WB2IYO 54, WB2VJB 3, WA2FIQ 35, WA2JLV 33, WA2VLS 31, WN2LXF 27, W2UC 1, WB2JLR 16, W2ANV 15, WB2FUV 14, WN2KDC 13. (Dec.) WA2VYT 285, WA2FBI 200.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – SEC: K2OVN. RM: K2UAT. HF PAM: WA2UWA. VHF PAM: WB2RQF.

NLI*	3630 kHz	1919/2200 Nightly	WB2TUI Mgr.
NLI VHF*	145.8 MHz	1900 MTWTF	WB2RQF PAM
NLI Phone*	3925 kHz	1600 Dy	WA2UWA PAM
Clear House	3925 kHz	1100 Dy	WA2GPT Mgr.
Mic Farad	3925 kHz	1300 Ex.Su	K2AAS Mgr.
East U.S.	3685 kHz	0001 Nightly	
All Svc.	3925 kHz	1300 Dy	K2AAS Mgr.
NYSPTEN	3925 kHz	1800 Dy	WB2VJB Mgr.

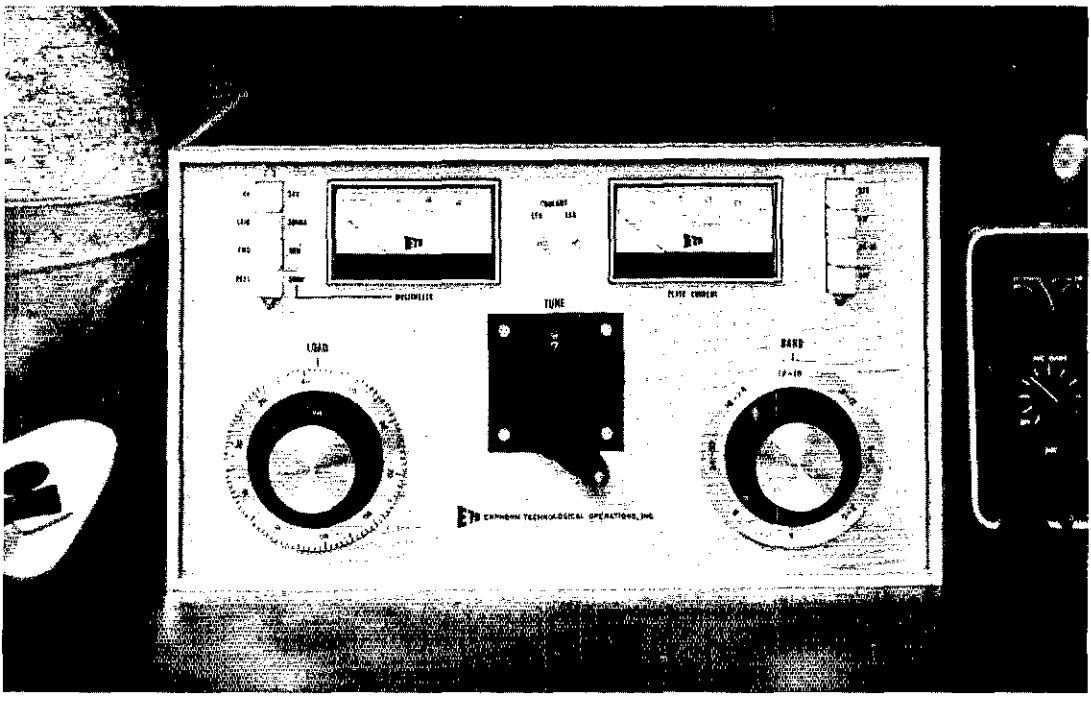
*Section nets: all times local EST. It is with regret that I report the passing of K2UBG into the realm of Silent Keys. He will be sorely missed by all in this section. WA2JZX is sporting a new SB-102, and reports having a lot of fun with the machine. A new twist to the VHF/SS contest by the Tu-Boro Radio Club; they sponsored an all RTTY contact contest. WA2BRF reports he had found a "null" in his antenna around the QTH so he moved the antenna. W2DBQ is now a new (or old?) member of the Old Old Timers Club. Congratulations! WN2MCS reports really having a go at this "ham radio" thing, just received his WAC award, and is just short of WAS also pushing for his 13th birthday. WB2JJW long time member of this section now in the NNJ section, reports his son, WB2JJU will be graduating from William and Mary, Williamsburg, Va. this year, and has been honored for listing in "Who's Who in American Colleges and Universities." The gang of NLI had a net meeting at the QTH of WB2LGA in Feb. K2DGI and W2TUK even showed up to partake of the festivities which were dampened by the absence of K2UBG. K2DW reports sporting a new Drake-4 lineup of equipment, even expects to break it in in proper fashion during the ARRL DX Contest. K2DDK, rumor has it, has just made a purchase of an SB-500. Same source of rumor has it that K2DGI also is putting an SB-500 on the air. K2SHU is giving up the great DX hunt for the new frontier of Slow-Scan TV. WB2WFJ had real dedication to the SFT! Seems his antenna was down on the roof and covered with ice, but despite the freezing cold and working in the dark, back on the air he was in tune for the tail end of the SET. Came up a little short this month on information! Where are all those news items and club bulletins? BPL: WB2LGA. Traffic: W2DSC 388, WB2LGA 236, WB2LZN 172, WB2WFJ 104, W2EW 52, K2AAS 32, WB2RBA 25, K2DGI 19, W2EC 19, WA2LJS 19, W2GP 14, W2LGK 12, W2PF 8, WA2KSB 6, WA2QJU 6, WA2BRF 4, W2DBQ 4.

NORTHERN NEW JERSEY – SCM, Louis J. Amoroso, W2ZZ – SEC: K2KDQ. RMs: WA2BAN and WA2TAF. PAMs: K2KDQ, K2SGX and WA2TAF.

Net	*kHz*	*Time(PM)/Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695	7:00 Dy	31	469	260	WA2BAN
NJN	3695	10:00 Dy	52	453	687	WA2BAN
NJSN	3740	8:00 Dy	26	77	41	WA2DRH
NJPON	3930	6:00 Su				WB2FJE
NJEPTN	3950	6:00 M-S	39	896	580	WA2TAF
NJAN	50425	8:00 M-F				K2SGX
PVETN	145710	7:30 Dy	36	197	896	WB2JNO
ECTN	145800	8:30 M-S				WB2YPQ

New appointments: K2RXQ and WA2JNQ as ORSs. Endorsements: WA2DRH as ORS and WA2DMF as EC for Jersey City and vicinity. Your SEC and SCM wish to thank all for a very FB job during the Jan. SET. The ECs, Net Mgrs. and NCSs turned in an outstanding job. We wish to welcome the following into ham radio: WN2RSK, North Bergen, WN2RSL, Jersey City, WN2RZX, Allenhurst, WN2SHT, Bayonne and WN2RIM, Murray Hill. Good luck and hope we have a QSO soon. WN2IHL passed his General Class exam. WA2CKU, WB2VFT and WN2KYB passed the Advanced Class exam. W2GT and WA2QPW passed the Extra Class exam. W2TP received his 5BWAS and I think he is the first in NNJ to receive this award. WA2LDX is trying 7 MHz QRP with 1 and 3/4 watts. W2YT applied for 5BDXCC. The W2LI auction is scheduled for Apr. 18 at the Arbor Inn in Plainfield. WA2UOO plans a Vermont trip for the Apr. CD Party. OO reports were received from W2BVE, W2TPJ and WB2NYK. K2CBG has a new SB-500 working with his Swan-500. New officers for the Wayne ARC are WA2HDG, pres.; WA2DYY, vice-pres.; WA2APG, corr. secy.; WB2JNU, rec. secy.; W2LVT, treas. WB2JNU was named to "Who's Who in American High Schools". WB2IWH's DXCC totals are now at 96/83 with his attic dipole. WA2EUX won third place in NJ in the Ga. QSO party. WB2NYK has DXCC totals of 153/160 and K2IEF received his 200 sticker for his DXCC. WB2ZCI is majoring in electronics at Monmouth College. W2EWZ on cw since 1935 finally tried phone. K2ZFI and K2KDQ attended the recent Southeastern Division Convention. WB2NOM is using the HW-16 with his 18-AVQ. WB2BCS is looking for additional asst. ECs for his area. Traffic: (Jan.) WA2BAN 718,

STRONG SILENT TYPE



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WB2TUL 565, WB2VPR 375, WA2JNO 369, WB2RKK 355, WA2DRH 254, WA2JIM 214, K2OOJ 165, WA2KHO 121, WA2FUI 102, WA2JNO 102, WB2JAE 94, WA2TAF 80, W2ZZ 78, WB2LTW 64, WA2CAK 47, WA2UOO 45, WB2NSV 44, WA2CCF 42, WA2FVH 35, W2EWZ 32, W2CU 30, WA2EUX 24, WB2BKC 23, WB2BCS 22, WB2WNZ 17, WA2JXE 15, WA2KVU 14, W2PEV 13, K2MFX/2 10, K2ZFI 9, K2MEF 7, K2CBG 6, K2LOP 6, WA2LDX 4, W2CVW 3, W2ABL 1. (Dec.) K2DFL/2 357, K2KDO 293, K2DFL 138, WA2CAK 19, W2CU 14, WB2BXK 1, WB2IHL 1.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: Gregg Miller, KØLVB, RR 4, Marshalltown, Iowa 50158. OBSs: WØJAQ, WØLCX, WØLR, WAØMIT, WØSFE. Initial reports seem to indicate that we had quite a successful SET this year. I hope that we may regain the standing which we held in the past. If you aren't an AREC member, drop the SEC a card at the above address. KØLVB has been working quite closely with the state civil defense office and I think these discussions will have some positive effect on our overall AREC organization in Iowa. It was a pleasure to work WØKUS and company on 75 and 160 ssb during their recent excursion to San Andres Island, where they operated /HKØ during the 160 Contest. WAØSDC is moving to Ames, where he will work on an advanced degree from ISU. A novice course is being taught at Postville with 10 students attending. WNØCHC is a new Novice at Elma. WAØPUJ has a new Drake line, but finds that studies at ISU keep the operating time rather low. Yours truly should be on the bands more often now that I have finished an instrument flying course. What gives, the QNIs for our nets keep climbing, but the QTCs keep falling?

Net	*GMT*	*MHz*	*QNI*	*QTC*
Iowa Fone	1830	3.970	1600	108
Iowa Fone	0000	3.970	1281	48
TLCN	0030	3.560	226	83

Traffic: WØLCX 758, WAØAUX 119, WAØVZH 111, WØMOQ 84, KØAZJ 79, KØDDA 50, WAØOTQ 33, WØKB 26, WAØRXR 25, WAØYIW 25, WBØAGP 18, WAØPUJ 17, KØJGI 16, WAØPOF 14, KØFVC 7, KØLKH 7, WNØAAM 6, WAØAIW 4, WAØEFN 2.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØLPF. PAMs: KØJMF, KØFNU. RMs: KØMRI, WAØTZK. VHF PAMs: WAØCCW, WAØTRO. I still am compiling and verifying AREC nets soon to be listed in this column. Any information will be greatly appreciated. I am very happy to see the Mid-States Mobile Monitor Service doing so well. NCS KØENU. It is hoped that all Kansas amateurs will monitor 3920 kHz every evening from approximately 0100Z to 0430Z. Operation will be along the line that Mid-Cars 7258 kHz uses. KØENU is PAM for MMM and reports activity in Jan. as follows: QNI fixed 544, QNI mobile 46 in 71 plus hours, 21 phone patch, 31 QTC with 32 states represented. Mid-States total hours was 120 with 931 fixed QNI, 86 mobiles, 37 patches and 61 third party messages handled. A good start for 1 month.

Net	*kHz*	*CST/Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
OKS	3610	1900 Dy 2200		539	280	KØMRI
QKN	3735	2000 Dy	127	23	30	WAØTZK
KPN	3920	0645 MWF 0800 Su	255	11	14	KØJMF
KSBN	3920	1830 M-S	1250	117	26	KØJMF
KWN	3920	1800 Dy	915	5	31	WAØLLC
KEC	7278	1300 Su	124	11	5	KØLPF
KPON	7255	1230 M-S 0830 Su	3955			WØLXA
HBN	7280	1205 M-F	646	88		WAØUPA
PI	145,350	2105 Su	19	7	4	WAØCCW

Traffic: WØINH 458, KØJMF 420, WØHI 378, KØLPF 339, KØMRI 240, WAØLBB 180, KØBXF 170, KØUVH 104, WØMA 100, WØGCT 73, WAØTZK 64, WAØOZP 57, WØCHJ 50, KØEMB 50, WAØJCF 47, WAØLLC 45, WAØSRO 44, WØBGX 35, KØJID 35, WØFCL 30, WØNXJ 27, WØNEE 22, WØMCH 15, KØFIG 11, WAØPCJ 11, WAØOWH 10, KØGII 8, WAØVRP 6, WØBLI 5, WAØTRO 5, KØAYO 3, WAØSXR 2.

MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW. New appointments: KØAHL as EC for Boone County, WAØHBX as EC for Andrew County, WØHH as EC for Barton County. Appointment renewed: WØ UCK as OPS. I am sorry to report the death of WØYHT.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MoPON	3933	2300 M-S	26	628	80	WAØTAA
MoSSB	3963	2400 M-S	26	1281	120	WØRTO

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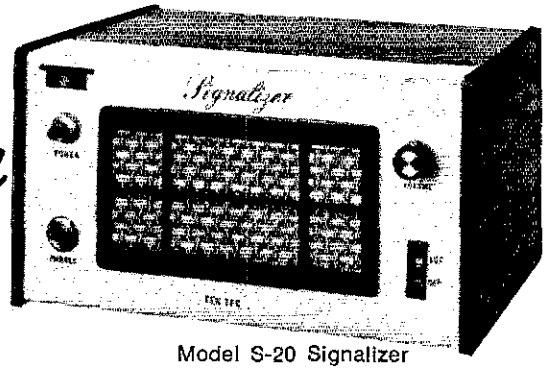
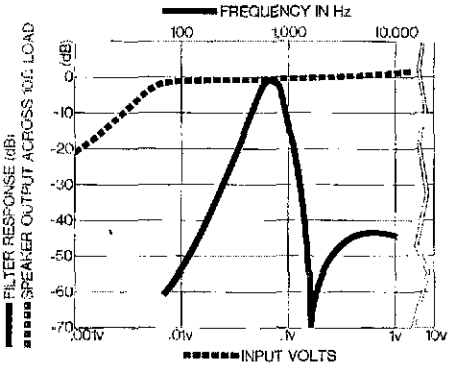


Model S-20 Signalizer



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MON	3585	0100 Dy	37	193	130	KØAEM
MON 2	3585	0345 Dy	32	124	48	WØHH
PHD	50.45	0130 f	4	122	9	WAØKUH

Note that most of these nets will meet one hour earlier GMT with the change to Daylight Saving Time. WØENW and KØONK appeared on a radio program (carried by KMMO and KMFL-FM) called "What do you Say?", in which amateur radio and the activities of the AREC were described. WAØWQA conducted the first formal test of amateur communications from the new CD Emergency Operations Center in Warrensburg during SET. WAØFKD is now practice teaching. WØYZS has a kilowatt going on 432 MHz. Congratulations to: WØGCL, who celebrated his 65th birthday and is looking forward to the next 65; and to KØSGJ and WNØZLL, who passed their General Class exam. My thanks to all who appeared at the committee hearings on the call-letter license plate bills. Traffic: (Jan.) KØONK 1471, KØAEM 278, WØHH 255, WØBV 213, WAØHTN 118, WØOUD 73, WAØWQA 55, WAØTAA 48, WØHVJ 42, WØGBJ 20, WAØKUH 10, WAØWFN 7, WAØLLL 2. (Dec.) WØGBJ 17.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. Appointment: WØWKP as EC. Renewed appointments: WØNIK, WAØJUF, WAØLOY and WAØGHZ as PAMs; WAØJIH and WAØJKN as OPSs; KØJFN, WØIRZ, WAØIBL, WAØFUM, WAØEEI, WØLFJ, WAØLLQ and WØCXH as ECs. Jan. net reports:

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	1415	86	WAØLOY
NSN II	3982	0130 Dy	989	43	WAØLOY
Nebr. 160	1995	0130 Dy	662	4	WAØCBJ
NEB	3590	0400 Dy	213	46	WAØWHR
NMN	3982	1330 Dy	1215	39	WAØJUI
WNN	3950	1400 M-Sa	555	68	WØNIK
AREC	3982	1430 Su	272	26	WØIRZ
CHN	3980	1830 Dy	1116	68	WAØGHZ

Officers of AK-SAR-BEN ARC for 1971 are WØYCP, pres.; WAØQLE, vice-pres.; WØWRT, secy.; KØCVA, treas. WAØIBB lost his antenna during a storm. WAØLRQ scored 40820 points during the Oct. CD party. ONI for Jan. indicates an increase on NEB. WAØHWR, RM of NEB invites all checkins. Many thanks to the operators of WØMAO for being on the air during the SET. Several more amateurs throughout Nebr. are getting the 2-meter bug. A few are: KØODH, KØODF, WØHOZ, WAØPIF and WAØPSN. WAØKPF recently discharged from the Navy is on the air in Valentine. KØWPF, Box Butte Co. EC reports 2-meter AREC Net QNI 21, QTC 6. Traffic: WAØSCP 121, KØKJP 79, KØUWK 49, WØNIK 40, WBØCAU 39, WAØROK 34, WAØCBJ 33, KØJFN 29, WØDMY 26, KØERU 25, WØHOP 25, WAØGHZ 23, KØHNT 21, WAØJAV 20, KØODF 20, WØAGK 19, WAØOKC 17, WAØSPF 16, WAØPCC 14, KØOAL 10, WØYFR 10, WAØJIH 9, WAØJKN 8, WAØQLE 8, WAØOOX 7, WAØYGL 7, WAØEEI 6, KØEJT 6, WAØIXD 6, KØJPP 6, WØBFN 5, WØGEQ 5, WAØJUF 5, WØUOV 5, WØINR 4, WØRJA 4, KØSFA 4, WØSGA 4, WAØVIT 4, WØZOU 4, WAØCHN 3, WØLJO 3, WAØLOY 3, WAØPIF 3, WAØPSN 3, WAØOGB 3, WØVEA 3, WØWZR 3, WNØBHT 2, WAØLRQ 2, WØRAM 2, KØECH 1.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John J. McNassor, WIGVT – SEC: WIHHR. RM: KIEIR. PAM: KIYGS. VHF PAM: KISXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1845 Dy	61	561	571
CPN	3965	1800 M-S 1000 Su	37	479	327
VHF 2	145.98	2200 M-S	23	101	44
VHF 6	50.6	2100 M-S	22	123	38

High QNI: CN – WA1GFB, WA1JVV, WA1MOW and K1HIR, CPN – W1DQJ, W1GVT, W1MPW, K1SXF and K1YGS. SEC W1HHR extends thanks to all who took part in the SET. Fine cooperation between all nets thanks to advance work by net mgrs. and dedication of the NCS and net members. Director W1QV is elated over the New England progress and improvement in ARRL membership and is eagerly looking forward to the Tri-City Hamfest Apr. 24. Apr. 3 to 5 is our opportunity to support Danbury CARA in their Conn. QSO Party. Make it a point to join. Southington ARA is well briefed on the Satellite program thanks to WA1INB and WA1IUQ. Contact ARRL for details. SET again proved to be a winter Field Day. Many clubs and individual stations had a ball. Note: The NE Novice Net is 6:30 P.M. Mon., Wed., Fri. on 3733 kHz. I would like the frequency of open repeaters in our section for listing here. Murphy's Marauders have new QSL cards. The Meriden ARC Net is on 2-meters every week. Congratulations to: WA1JVV

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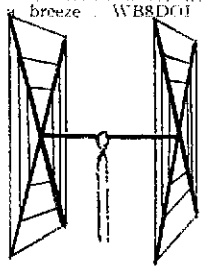
QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, HK7VB in few hours. Instructions a breeze. WB8DCO



CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-EL 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20.	$21	4 El 10.	$20
3 El 20.	27*	7 El 10.	34*
4 El 20.	34*	4 El 6.	20
2 El 15.	17	8 El 6.	30*
3 El 15.	21	12 El 2.	27*
4 El 15.	27*		
5 El 15.	30*		

*20-ft. 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, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

***FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN,FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!**

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

How to order: Send money order only (bank, store, or United States) in full.
We ship immediately by REA Express, charges collect. *DEALERS WRITE!*

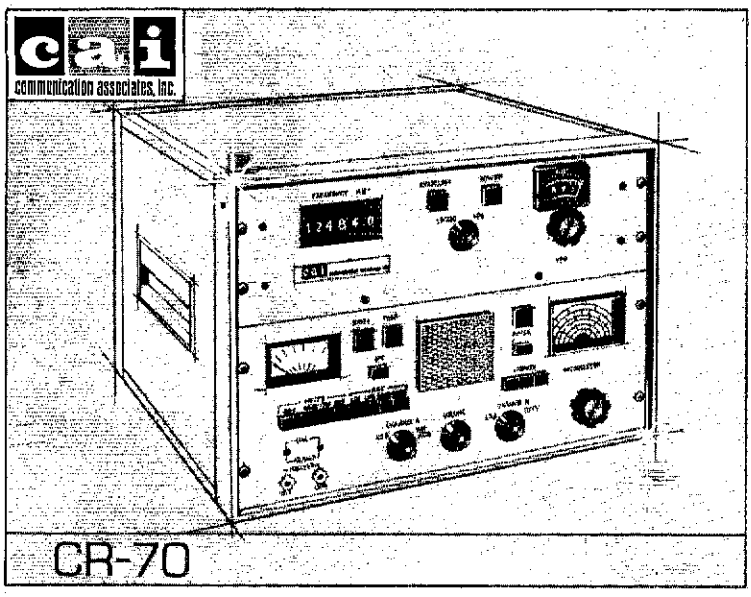
GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

for Jan. BPL, the hard way; WN1ODE, WN1NZP and WN1OAG fo new Novice and WN1MNZ for 20-wpm certificate! Now is the las chance to finish winter antenna building projects. Ideal weather fo installation will soon be here! Traffic: (Jan.) WA1JVV 591, WIEI 471, W1AW 229, W1MPW 203, WA3JSU/1 183, WA1HOL 16 WA1GFH 139, W1CTI 138, K1SXF 125, WA1HSN 104, W1GV 101, WA1JYT 94, K1YGS 88, W1BDI 60, WA1JMO 38, W1KR 38, WA1MOW 32, W1KAM 30, W1FWL 26, W1QV 20, W1DQJ 19 W1FUF 18, WA1JGA 16, WA1JGS 7, W1CUH 6, WA1JZC 6 W1YBH 6, W1YBI 4. (Dec.) W1KRG 26, (Oct.) W1KRG 9.

EASTERN MASSACHUSETTS – SCM, Frank L. Baker, W1AL – SEC W1AOG and your SCM say "thanks" for all the SI messages. W1FA, K1QOJ are Silent Keys. Our sympathy to W1GI on the death of his wife. W1BCN reports the Texas Tower Net ha its 45-40 daily session Jan. 14 and the Barnstable RC had a showin of "Hams Wide World". W1IW is the new state coordinator fo Army MARS. New YLs: WN1NZB, WA1NWF, WN1NWD. W1OE is working on his low-band rigs. W1ALT retired and moved t Brewster. The T-9 RC met at W1TYPs. The Barnyard Net had 71 QNIs, 26 sessions, 8 traffic. K1EPL reports the New Englan Emergency Net had 122 QNIs, 10 traffic, 5 sessions. W1NF now ha 4 schedules. K1CLM spends 50-hours a week on the Intruder Watch The South Shore Club held a meeting. New officers of the Sharo ARA, K1JNQ, are WA1LXE, pres.; WN1NRT, vice-pres.; WA1NDM secy.; WA1MYK, treas. K1MUC is on 2 and 6. K1MTH is on WIOJM,WIPEX made BPL. WN1LPM is on the air with the help WA1BYM and WN1MSB, a blind ham. W1MX was active in the SE The Framingham RC has two nets: 51.15 Mon. at 2000 and 2119 Sun. at 2000. WA1LXE has WAS, WAC and WAPUS. W1QYY mad BPL in Dec. New appointments: WA1LXE as OBS, OPS; WA1FA as OPS; K1DJG as OPS, OO. Endorsements: WIs YYZ, UJF, K WVW, NFW as ECs; W1HAU as OBS, OVS, EC; W1BHD as OVS, E OBS; W4YAC/1 as ORS; W1AX as OPS, ORS; WA1EYY as OP WA1FSI made PSHR in Dec. K4GGI/1 is on 2 ssb. WA1HFE building an SB-610 scope. The Waltham RC had an auction on f gear. The SET kept our 2-meter net busy; traffic 265, 24 station 24 sessions. WA1HPS reports that Navy MARS was active in th SET. WA1KOP has a Swan 350-C and schedules WA9SLL on Su The Norwood ARC's newsletter is "The K1JMR News Carrier WIPJ has joined the Intruder Watch. EMN had 31 sessions, ear QNIs 278, late QNIs 106, 272 traffic. K1UMP and W1IAU hav model-15 page printers and 1-D equipment, converters for RTT The 6-Meter Cross Band Net had 13 sessions, 47 QNIs, 3 traffi K1PNB graduated from the New England School of Broadcastin and now is combo Eng./Ann. W1QYY has new frequency measurin gear and EAN certificate. WA1NNT is on 75. K1IDU gave a talk c transistor repeater activities at the Massasoit ARA. W1WSN spoke the Framingham RC on fm repeaters. A simulated emergency dr was held at W1AEC using 40-6-and 2-meters. The Capeway RC he a dinner meeting with their XYLs present along with W1AL WA1BYM and WN1MSB are helping K1PNB with the New Englar Novice Net on 3733 kHz, which meets Mon., Wed., Fri. nights 2330 to 0000 GMT, code practice at 0130 GMT. W1HPV is on th air again. Traffic: (Jan.) W1OJM 559, W1PEX 506, WA1EYY 43 W1QYY 423, WA1FAD 298, W1DOM 205, W1UX 160, WA1IF 142, K1PRB 124, WA1BYM 114, W1MX 78, W1ATX 74, W1MN 74, K1PNB 69, W1DKD 66, WA1KOW/1 58, W1EMG 56, WA1MF 50, WA1IGL 46, WA1JUY 35, W1FJN 31, W1LE 24, W1PL I W1RQL 7, WA1DJC 6, K1LCQ 5, WA1LXE 4, WA1FNM K1OKE 1. (Dec.) W1QYY 508, WA1FSI 96, W1DKD 67.

MAINE – SCM, Peter F. Sterling, K1TEV – SEC: K1CL PAM: WA1FCM. RM: W1BJG. K1RSA has converted a DX-40 f 6-meters and is currently working on a crystal controlled 52 receiver. Thanks to all who participated in the 1971 SET handling traffic on the SGN. We hope to have more activity ne year. K8BGL is now living in Lincoln, Maine and has applied for W1 call. New hams in Maine are: WN1NYD, WA1NXR, WA1NX WN1NXM, WA1NXI. W1BHA is the new Net Mgr. for the Barnya Net and is looking for an assistant. W1VLU is building a new SB-2 and hopes to have it on soon. K9KIC and XYL WA7NDK are no active from the Charleston Maine Air Force station. He ex-KA9FD, and they are active on 20-and 15-and 2-meters. The S Gull Net meets on 3940 Mon. through Sat. at 1700. The Pine Tr Net meets at 1900 on 3596 Mon. through Sun. The New Englar Novice Net meets on 3733 Mon., Wed. and Fri. from 1830 to 190 W1LHA is now W1NV. Traffic: WA1FCM 225, K4BSS/1 15 W1YA 34, K1TEV 17.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SE W1LUD. RM: WA1GCE. Welcome to new hams: WN1s NUU, NU NVG, NVD, NVM and WA1NUO. Endorsements: K1BCS a W1RCC as ECs; W1JB and W1BUT as OOs; W1JB and W1ET



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OPSs; W1EVN, W1MHX and WA1GCE as ORSs; W1ALE, W1QKA W1CTW and W1IQD as OVSs. New appointee: WA1GCE as RM. W1OBH returned to 80-, 40-and 20-meters after an absence of 2 years. W1EVN is Calif. W1TES is OX5BT in Greenland. W1EEE enjoys the FMTs. W1MHX was in the Telephone Pioneers QSO Party. W1JB worked 24 sections in the 160 test. W1UBG reports the SET was quite a workout, while WA1JTM is glad its only once a year. The VTNHN reports 92 check-ins and 310 traffic while GSPN had 627 check-ins and 90 traffic. W1SWX and XYL enjoyed a visit by K1QES. Traffic: (Jan.) WA1JTM 1210, K1BCS 1169, WA1GCE 612, W1UBG 229, K1YMH 183, K1VXX/1 139, K1WQH/1 136, K1TMD 9. (Dec.) WA1JTM 664, WA1GCE 416, K1BCS 415, W1UBG 85, W1JB 15. (Nov.) WA1JTM 436, W1MHX 20.

RHODE ISLAND – SCM, John E. Johnson, K1AAV – SEC: W1YNF. RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK. RISPN report: 31 sessions, 583 QNI, 91 traffic. The Newport County Amateur Radio Club recently elected the following officers: W1WLG, pres.; WA1KUU, vice-pres.; WN1KWQ, rec. secy.; WA1KRP, corr. secy.; Norman Anderson, treas. Plans for the Annual Spring Auction were completed and the date is May 17, 1971 at the Seamans Institute in Newport. The film "The Wonderful World of Ham Radio" was shown at the meeting. WA1IQH still is enjoying the sunshine in Fla., operating portable 4 with the HA-410 on 10-meters and sends his best to the members of the IRN Net and hopes to be back operating with them soon. K1HZN is looking for RI hams on 160-meters. W1OP, Providence Radio Assn. is on 160-meters and during a recent contest could count only two other RI stations. The club recently has been painted red with white trim and has two new antenna masts and a small tower. The club also sponsors a Boy Scout Explorer Post in ham radio. Any interested scout may contact WN1LGD or K1HZN. Traffic: (Jan.) W1TXL 225, K1QFD 82, W1YNE 82, WA1HBW 14, WA1CXF 13, WA1JST 12, K1CEP 11, K1VYC 2. (Dec.) K1CEP 17. (Oct.) WA1IQH 3.

VERMONT – SCM, E. Reginald Murray, K1MPN –

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
Gr. Mt.	3932	2230 M-S	368	32	W1JL2
Vt. Fone	3955	1400 Su	126	6	W1KKM
Carrier	3945	1400 M-S	475	11	W1BLC
VTNH	3685	0000 Dy	92	310 (Dec.)	WA1GCE
VTSB	3909	2230 M-S 1300	475	133	WA1HSC

It is with regret that I report K1BJX of Bennington as a Silent Key. The Governor has proclaimed May 1 as Green Up Day. All amateurs are urged to assist in any way they can. Last year 74 assisted in communications throughout the state. Welcome to new General Class licensee WA1NXX (Brandon); Novices: WN1NWG (Bennington); WN1NWQ (Barton); WN1NYC (Jericho); WN1NYA (Rutland); WN1NYN (Newport) and to Technician WA1NZM (Bennington). Hope you all had a good time in the VT QSO Party. Traffic: K1BQB 215, WA1GKS 135, K1MPN 48.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVF – SEC: WA1DNB. CW RM: W1DVW. PAM: WA1MFB. Section AREC Net – Sun. 9:00 A.M. 3935. Section CW Net (WMN) – Dy 7:00 P.M. 3560. Section Phone Net – M-F 6:30 P.M., 3915. The Tri-County 10-meter AREC Net is shifting frequency from 28.7 to 28.985 Wed. at 8:00 P.M. Our section had a very successful SET with the section AREC net handling 340 messages. They had 6-QNIs in a total time of 14 hours, 55 minutes. They contacted 12 CD centers and 2 RC chapters. W1CSF was NCS most of the SET, aided by WA1DNB, WA1IZS and WA1DVE. The newly-organized WMEN had a QNI of 5 and handled 8 messages. The Conn. Valley 2-Meter Net had QNI of 18 and handled 24 messages. The regular monthly report for WMN gives a QNI of 177 and total traffic of 222. Top five in attendance were: W1BVR, WA1LPJ, WA1LNF, W1ZPB and W1DVW. We regret to report the passing of ex-W1DPY (?), formerly of Pittsfield. WA1LPJ made BPL. W1DVW has a new Drake T-4XB transmitter. The Amherst College ARC, W1JRA has been reactivated. WA1FBE is trustee. From CMARA: A net on 28.7 at 1830 is active most every night. From HCRA: The Jan. speaker was Ed Tilton from ARRL Hq. HCRA is now a member of AMSAT. The club commends W1KK and K1NJC for their assistance during the VHF SS. From MARC: Speaker of the month was WA1GCV. K1KBS and XYL are on vacation in Austria. W1GUI gave a novice code test to four boys from the Groton Boys' School. K1DP worked DL2AA on 6 meters. Traffic: (Jan.) WA1LPJ 427, K1SSI 343, W1ZPB 227, W1BVR 119, WA1LNF 93, WA1DNB 63, W1DVW 58, WA1IZS 54, W1EOB 41, WA1MFB 29, W1CSF 25, W1IHI 18, W1KZS 2. (Dec.) WA1IZS 13.

NORTHWESTERN DIVISION

IDAHO – SCM, Donald A. Crisp, W7ZNN – SEC: WA7EWV. RO: W7YON. W7WXB has been discharged from the hospital. The Idaho County CD has a new FTDX-560 which is being installed in the Court House Fallout Shelter. W7MGL has a battery powered emergency and portable rig in his camp trailer. K7NDX reports the repeater station at Orofino has been completed. The receiver frequency is 146.34 and the transmitter frequencies are 146.76 and 146.94. A telephone line is used to control the equipment. WA7JZJ has a big signal from his SR-220. W7WLV is recovering from an operation. The Eagle Rock Club members at Idaho Falls and hams from Rexburg and St. Anthony provided communications for a 101-mile snowmobile race from St. Anthony to West Yellowstone. Those who participated were W7VSS, W7UAA, K7ENE, W7DUP, WA7KMF, WA7JJC, W7DZH, WN7MIY, WA7CRF, WA7MPS, W7DQU and K7PGG. 2-meter battery powered fm units were used at the check stations and 75-meter rigs for the long-haul communications. FARM Net report: 31 sessions, 1340 check-ins, 87 traffic handled. Traffic: K7EBX 354, W7GHF 194, WA7BDD 114, W7IY 72, W7ZNN 65, WA7EWV 64, K7UBC 34, K7CSL 7.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. VHF PAM: W7IAC. Congratulations to W7TYN, K7EKB and WA7JOS on making BPL for Jan. WA7PZO has a new jr. op. K7MRZ retired from Anaconda Copper. WA7IZR operated from the fire dept. during the SET. Radio club officers of Laurel are W7SMY, pres.; Jim Foster, vice-pres.; K7ELW, act. mgr.; W7LBK, secy. The Great Falls club is working on a Montana callbook and Butte has their callbook finished. This covers the Butte – Anaconda area. Copy may be obtained from W7OIO. Send postage. Helena has their 2-meter repeater on test and waiting for the license. The Butte-Anaconda repeater is ready to go as is Missoula. SET got so realistic on the Butte-Anaconda set up that some helpful SWLer called the highway patrol. WA7IZR and XYL are busy with the WIMU Hamfest. W7CT and W7BXL have 60-watt 2-meter rigs. Anaconda held a valentine party and fun was had by all. My thanks to W7OIO for the help in the printing of letters for new hams. Traffic: W7EKB 1079, WA7JOS 924, W7TYN 704, W7RZY 169, W7LBK 100, K7EGJ 61, WA7IZR 46, K7CHA 15, WA7OBK 12, W7OIO 5.

WASHINGTON – SCM, Harry W. Lewis, W7JWJ – The annual Skagit Hamfest will be held at the Arlington Grange Hall Apr. 17. W7IEU is attempting to organize 2-meter fm for emergency work in the Everett area. The Tacoma club visited the North Seattle Radio Club this winter and presented the traveling trophy which the NSRC will in turn present during a visit to the Lake Washington Club. WA7KOB is back on the air again and has already blown out his final. (Got any used 6146 tubes? Send 'em to Bob). RN7 now has 4 stations (incl. W7s BQ, AXT) operating on RTTY to handle bulk traffic. W7DXQ of Glendive, Mont. is looking for the current address of W7BCE. New liaison to RN7 is WA7LMO. K7JRE is interested in organizing a contest oriented club in the SW Seattle area. The Northwest Single Sideband Net is active under an updated set of By-Laws and new officers consisting of stations W7VDR, K7KPC, K7OUV, W7IC, W7EQJ, WA7FKK. W7EQJ is now a full fledged member of ARRL. The North Seattle Radio Club is planning a no host dinner at Ivar's Salmon House May 21 at 7 P.M. The Pudget Sound Council of Radio Clubs again has sponsored the ham-of-the-year award (individual not known at time of this writing). The Clallam County ARC has joined the Council and the Mike and Key ARC now has been reactivated and reinstated in the council. The Bellingham CD office is activated weekly by K7VW and good use was made of the facility during recent flooding of the Nooksak river. Traffic: W7JWJ 831, W7BA 726, W7PI 514, WA7HKR 196, W7AXT 162, W7MCW 136, K7CTP 112, K7WTG 105, W7RXH 82, W7BQ 66, W7FQE 54, K7LRD 51, W7JEY 29, K7OKC 20, W7USO 17, WA7GIB 15, W7IEU 15, W7FKE 13, W7ZHZ 13, W7APS 9, W7AIB 8, WA7EDO 7, WA7KOB 3.

PACIFIC DIVISION

EAST BAY – SCM, Paul J. Parker, WB6DHH – RM: WA6DIL. Lots of activity this month as I review the activities of those in the section. W6CTS built himself a transistor oscillator for his transmitter. W6ZF is finding that the life of the retired isn't as slow as he thought it would be, building and operating have really been on the upswing. W6IPW was very active in the SET. W6CBF really was busy during the recent CD Party with a total of 9315 good contacts but not too many sections. I recently had a real FB eyeball QSO with W6UZX. K6PJ has been hunting that elusive DX again and also spent some time in the cw part of the CD Party. WB6VEW built a 1 (one)-watt transmitter and had an FB QSO on 40-meters

with WICIH in Cape Cod. How many more of you have been using the QRP mode recently? K6DMI recently got his new call, K6TX. Sounds like a good call for cw. Congratulations on the appointment to the DX Advisory Committee go to W6RGG. However, Bob's new son keeps him away from the wireless more than he would like. Thanks to K6OXK for the traffic during the SFT. That's about it for this month. 73. Traffic: W6IPW 736, WB6VFW 21, WB6IMT 17, W6ZF 8, K6TX 5.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: Vacant. RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. QSL Mgr.: KH6DQ. ECs: KH6s GPO, LP, BAS, GLU, GKD, KIHNO/KH6, KC6EI and W7UZH/KG6. RACES Nets coordinate with Dick Hamada, RO.

Net	*MHz*	*Time (GMT) /Days*
M-F World-Wide Boy Scout	21.360	1800 Sa
Confusion (Patches)	21.400	0130 All
Pacific Interisland	14.335	0830 M-W-F
MICRONESIA	14.335	0800 Tu-Th-Sa-Sun
S.E.Asia	14.320	1200 All
PUPUEE	7.290	0630 All
GECKO	14.290	0730 Tue.
Pacific Typhoon*	14.265	
Friendly	7.290	2030 M-F

*During typhoon alerts.

May I wish our Alohas to KH6GQW who had to give up his SEC Hawaii appointment. Pat and his wife are due to leave the islands upon his graduation. We hear that 9Y4CRV (KH6CRV) and his XYL are expecting their second child. Ex-KH6AK now signs K4QG. K2HBA/KH6 has been doing a bang-up job on the Intruder Watch and OO work. Ex-W4UAF/KH6 now signs W4UAF in Norfolk, Va. and announces the marriage of their daughter. In town recently was VE7AAA and his XYL VE7NW. Also from Clark AB P.I. was W8EDN/DU. The Honolulu DX Club gang met at WØDAD's QTH. One highlight was W7UXP/Kure Is. DXpeditions slides by Harley and Gary. WØDAD/KH6 is a new OO. KH6BB retired from his engineering job at USARPAC. Heard working DX was KH6TD. Now working for USASTRATCOM-PAC is KH6QV. Congratulations to KH6HCM who worked PJ2CC (W2EOS). First 160-meter SA Oceania QSO. Aloha and Pau for now.

NEVADA – SCM, Leonard M. Norman, W7PBV – SEC: L.L. "Mike" Blain, WA7BEU/W6OBS. W7SRM in the Reno area and K7ZOK in the Las Vegas area did an FB job on setting up the SFT and created a lot of activity. K7ICW reports a receiving problem. The SAROC had an FB Convention and plans are under way for the 1972 SAROC. Mobiling in Nevada check into WCARS-7255, WPSS-3952, 34/94 in the Reno area and 147.180/147.84 and 34/94 in the Las Vegas area. WA7DSP received an FB report in the Los Angeles Herald Examiner article by W6MLZ. We need more news of station activity in Nevada, so how about sending it in each month.

SACRAMENTO VALLEY – SCM, John F. Minke, III, W6KVA – W6NKR has been busy with his QRP transmitter (2.88 watts input) and plans to chase DX with it. W6VUZ is concerned about the increased amount of profanity heard on the air and wonders what can be done about it. WA6JVD is over half way to DXCC on 10- and 40-meters and has over 100 on 20- and 15-meters. WA6FIU has installed a 78 ft. tower with a 60-db gain (?) antenna on top. That's some antenna with a gain of one million! Maybe Rosie meant 6-db? New officers for the GEARS are WA6KVX, pres.; WN6COT, vice-pres.; K6HTM, secy.; Joe Davis, treas. All were reelected except for the vice-pres. K6KRL of Colusa has been busy checking into NCN/2 representing our section. NCN/2 is the second session of NCN (Northern California Net) which meets daily at 8:30 P.M. local time. This is a slow speed net. The RAMS have spruced up their newsletters with pictures to compliment the quips and cartoons by W6UEB. How about some news for this column? It sure is discouraging trying to scrape up enough stuff for a few lines. Traffic: W6NKR 17, W6VUZ 5.

SAN FRANCISCO – SCM, Kenneth S. McTaggart, K6SRM – W6UDL and XYL, WA6ALK, are now settled in Missouri, waiting for their WØ calls and send their 73s to all. The Jan. CD Party was the best turnout of appointees in some time, with the following heard: WB6FZN, W6RQ, W6BIP, W6KWE, W6WB, W6WLV, K6SRM and WB6KMI. WA6NZM now is K6FL; K6IR is the former W6VYI and K6TW is keyed by former W6WOC. New OPS appointees are WA6NAA, W6BWV, WA6KCB and W6RNL. WB6LFT, WB6JQP and W6PZE have new IC-2F 2-meter fm rigs. New amateurs in the Petaluma area are WN6PWW and WN6PXW. The Petaluma Club's station, WA6YNL, operated on 4 frequencies during the SFT. WA6QFP is pres. of PARK. W6KWC, W6FCL, WA6CBR, K6SRM and WB6HZZ are the new dir. of the Valley of the Moon Club. The new SEC is WB6KMI, "Foot", 596 2nd St., East, Sonoma, Calif. I'd like to express the thanks of all those

involved in ARRL to W6WLV, for the fine job he has done over the past three years as our SEC. WB6AQW, a P.G. and E. engineer, gave an interesting talk on sources of radio interference and noise at the Feb. meeting of the Marin Amateur Radio Club. The 2-meter repeater for the Eureka area is WB6DGJ; frequencies are 146 input and 146.94 output. The 2-meter repeater in the Petaluma area uses 145.98 input and 146.90 output. Northern California Emergency Net had 36 stations participating in the Jan. SET. Many County amateurs assisted various agencies with communications during the S.F. Bay oil spill by operating K6GWE and a number of mobiles on 75-meters. Traffic: W6WLV 193, W6KVQ 110, W6PT 72, W6BWV 52, W6FAX 40, K6SRM 28, WB6PZN 10, W6RNL

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU. This is the last reminder for you to send in your money to the Fresno ARC, P.O. Box 783, for your Hamfest tickets, which is to be held at the Tropicana Lodge, May 8, 9, 1971. WA6BU WB6RGU, WB6QWE, WA6APF and WA6FOC are on 2-me RTTY. WB6LLY has an SB-110 and SB-500. WB6URJ is 2-meters. WB6UKB is back on 2-meters. The Northern and Southe DX clubs held their joint DX convention in Fresno Jan. 28. Those attendance were: W6RPH, K6PKO, W6TUI, WA6WXP, W6KT W6JPU, W6BWM and W6GRV. W6GUZ won the grand prize at SAROC convention. K6OZL attended the DX convention and commended by W4BPD as a good operator. W6EYO and WA6F are on the Tulare Co. Grand Jury. The new officers of the K County Radio Club are K6APE, pres.; WN6BBE, vice-pr W6GRR, treas.; WB6ZWG and WB6WCY, board members. T meet on the 1st and 3rd Fri. in the ARC building in Bakersfi Code classes are conducted by WB6ZWG who is doing an excell job. WB6RZI checks into NCN. WB6HQU is on 6-meters WB6RYM and W6POW are on 6-meters cw. WB6JXQ is spendi month with VR2EK. WA6CPP made WAS on 20 ssb. NCN ne more check-ins at 0430Z on 3630 kHz nightly. W6EUA is on Sears Net, 3910 kHz at 10 P.M. Traffic: WA6JDB 61, WA6CPP 2

SANTA CLARA VALLEY – SCM, Albert P. Gaetano, W6V – RM: WA6LEA. W6AUC has accepted another term as secy. of Norcal Chapter QCWA. W6SCI now is W6TV. The new officers the Northern Calif. Contest Club are K6EBB, pres.; WA6DK vice-pres.; W6RGG, secy. WA6NHD has received his first ssb W6REF is rebuilding his operating position. We have just comple the Jan. 30 and 31 SET. Your SCM spent a lot of time listening the many guys who participated in this very important test and w gratified at the fine operating I heard from all. I would like to t this opportunity to extend my thanks for a job well done. K6K W6ZRJ and W6VZT are using some facsimile machines. W6H reports that MARS traffic through NTS has been picking Traffic: W6RSY 461, W6BVB 279, K6DYX 194, W6YBV 1 W6NW 123, W6VZT 96, W6DEF 89, WA6NHD 44, W6AUC WA6DKF 42, W6ZRJ 28, W6BPT 15, W6RFP 14, W6RXB K4BVD/6 4.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Calvin M. Dempsey, WA4UQC SEC: W4EVN. PAM: W4AJT. VHF PAM: W4HJZ. RM: W4W WB4JMG has worked all states on 14332 MHz only. FB Frank really hard way to get it. K4MPF received his endorsement for countries. He also is studying for his Extra Class ticket. W4PKS, station at Camp Lejeune, handled 1004 phone patches during D WA4KWC is mounting an equipment console. Don't forget League Officials meeting in Greensboro, N.C. on Apr. 10 and This is a well-planned meeting and all will get a lot out of it. nets were real busy during the SET and a lot of traffic was handl We do need more RN4 stations. W4WXZ would like to have as ma as possible to check in on 3573 kHz at 2345Z and 0300Z da W4EVN made BPL in Jan.

Net	*Freq.*	*Time(Z)/Days*	*QTC*	*M*
NCSSB	3938	0030 Dy	11	WB4A
THEN	3923	0030 Dy	50	WA4UC

Traffic: (Jan.) W4EVN 247, K4MC 147, WB4MTG 72, WB4BGL WN4PNY 52, WA4VNV 48, WB4HGT 47, WA4UQC 41, WB4J 37, WB4PWZ 32, K4VBG 29, W4RUH 13, W4AJT 12, WB4HGS WA4KWC 9, WB4QLP 8, K4EGF 7, WA6BJH/4 6, K4ZKQ W4TYE 1. (Dec.) W4TYE 7, WB4JMG 3.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A Martin, Jr., W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY. R WA4EDL, WB4NNO, W4SHJ. PAMs: W4OKN, WA4YXK. Bigg month yet for traffic. SET helped plus teaching us some thi BPLs: WB4NNO, W4SQO, WB4FDT and W4ZYT. OO W4HU c two stations with third harmonics! WB4FDT is home from sch and multi-opping; WB4DRB ditto mobiling on 6. The new vice-p of VCU ARC is WA4TNS. WB4EAE is at W9YB, Purdue, Hugue

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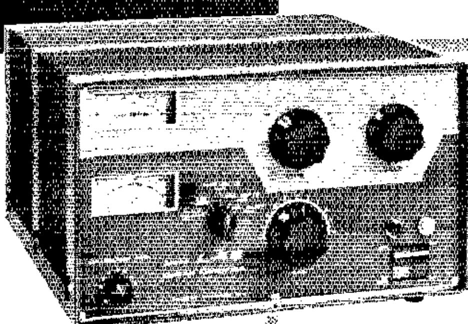

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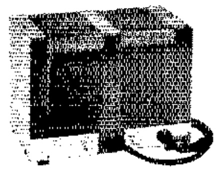

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High School ARC elected WB4NSF, pres.; WB4HRA, vice-pres.; WB4PUM, secy., WB4MGA, treas. New officers of the Virginia Century Club are W4IF, pres.; K4ISJ, secy. Director W4KFC is active on the air and at meetings and was visited by K4THQ, K1TKS, K4EZL, K4POD, WB4OSO and WA4BUR. WB4RMQ is building up traffic steam after fixing transmitter. WB4GMC tromped through boonies with CAP during the SET. The New River Community College in Dublin is forming an ARC. K4UFF hopes he is back to stay. W4DM joined MARS. W4VZR has an easy time RTTYing OBSs whose audience K4GCM, WA4EAG, W4NBC, K4OHW and K4KCX all have autostart! K4CG has a new three-element on 40 and new operators WA3HWW and WB4SFH (who ran 10 patches from KC4-Land the first day he was licensed). WB4FQR promises to fix flat on trailer before FDF. K4LMB keeps WB4GWG in close contact with his brother who was seriously injured in auto accident. New appointees: WB4GMC as OPS; W4RAF as ORS and OO (H). The two-element quad party at WA4KJR was successful. Nets: VSBN 3935 at 6 and 10 P.M.; VSN at 6:40 and VN at 7:00 P.M. on 3680; VFN at 7:40 on 3947. Traffic: (Jan.) WB4NNO 695, W4SOQ 541, W4NLC 473, WB4FDT 364, W4ZVT 269, WB4DRB 205, WB4HRA 203, WB4KSG 168, W4TF 146, WA4IJF 139, WB4GCM 108, WB4KCM 102, WB4EAE 99, WA4IQW 79, W4KFC 75, WB4KEI 70, K4JM 66, K4GR 54, W4THV 40, K4ESS 37, WB4JMD 33, W4SHJ 37, K4LMB 32, WB4RMQ 28, WA4NJG 20, WA4WOG 20, W4KAQ 17, K4FZL 15, K4VCY 14, WB4GMC 11, WA4YRH 9, W4MK 6, K4LEE 5, W4OP 4. (Dec.) WB4KSG 368, WA4RPI 25, K4LMB 21, WB4PCM 15, K4JM 6, WB4RNT 4. (Nov.) K4LMB 8.

WEST VIRGINIA – SCM, Donald B. Morris, W8IM – SEC: WA8NDY. RM: WB8RBG. PAMs: W8DUW, K8CHW, W8IYD. Phone Net Mgr.: WA8LFW. CW Net 3570 at 0000Z and 0300Z dy. RACES Net, Sun. on 3996.5 at 1300Z and 1800Z. WVN Phone Net 3995 at 2300Z dy. W8AFC appeared on a half-hour talk show on radio and fm in the Martinsburg area, discussing emergency communications. W8EV now is K4OI in Titusville, Fla. K8SQI/W2PR report 2-meter VHF fm repeater in operation, Weirton area. During the SET, WA8NDY, W8DUV, WA8LFW, WA8RQB, K8AON, WA8YIP reported a total of 10 sessions, 17 hours, 226 check-ins and 392 messages. Without SET, the Phone Net handled 115 messages with 614 stations and CW Net with 473 stations handling 348 messages. Complete total with VHF nets was 1931 messages. League Officials meeting, Greensboro, N.C. Easter week end with W8DUV, chmn. The state ARRL Convention Chmn, W8IYD, held a planning meeting in Parkersburg, in Mar. KERA ARC at Ravenswood adopted a new constitution. Greenbrier ARC officers are W8KEM, pres.; WB8DMS, vice-pres.; WA8PFB, secy. W8LBL is a new OPS and OO. Opequon Radio Society worked in the VHF contest, with K8KML, WA8YHE, WN8DOF, K8OYG, WA8DOY, WN8EKG and WN8GYY. Traffic: WB8RBG 315, WA8POS 193, WB8AKQ 174, WB8CYB 142, W8DUV 135, WA8NDY 114, W8AEK 108, WB8DXB 100, WA8ERO 94, W8JWX 74, W8JM 57, K8BCF 56, K8QFW 51, W8DHW 50, K8HOH 47, WB8DQX 45, WA8WCK 43, WA8LFW 28, K8CET 16, K8SDG 12, W8CKX 10, WA8ZNH 8, WA8BDM 6, W8FZP 5, WN8GYY 5, WA8OKG 5, WB4ORC/8 4, WB8BMW 3, WSDEC 3, WB8EKG 3, WB8EQH 3, WA8YCD 3, WN8DOF 2, WA8DOY 2, W8KBM 2, K8OYG 2, WA8YCG 2, WA8ZAF 2, W8AFB 1, WB8AKR 1, WB8AQF 1, WA8DHO 1, W8FTF 1, W8NYH 1, W8TGF 1, W8WPI 1, WA8YHE 1.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC: WAØQOY. RM: WØIRN. PAMs: WBØAWG, KØIGA, WØLRW, WØCXW. I am taking this opportunity to extend my thanks and appreciation to retiring SCM, WØSIN for his excellent services to the amateurs in Colorado. Congratulations and best wishes to Chic as he assumes the duties of newly-elected Director for the Rocky Mountain Division. Colorado enjoyed widespread participation in SET 1971 with excellent coordination and cooperation among all of the traffic and emergency nets. WØWYX again experienced extremely strong winds at his QTH atop 11500 ft. Squaw Mountain but happily with less antenna damage this time. WAØHLQ installed new Drake equipment at his home QTH. Net traffic for Jan. Hi-Noon QNI 1006, QTC 82, phone patches 18, time of 975 min. for 29 sessions. Colorado Code Net QNI 232, QTC 123, time of 877 min. for 44 sessions. Silver State QNI 254, QTC 98, informals 37, time of 844 min. for 30 sessions. Silver State Net SET reports 18 stations handled 122 messages, time of 900 min. with 5 different NCS, 5 TWN operators for total of 1113 NTS points. Traffic: (Jan.) KØZSQ 997, WØWYX 326, WØIRN 163, WØIRW 145, WØLG 125, WAØMNL 121, WØLO 117, KØJSP 91, KØECR 52, WAØZWA 41, WAØHLQ 36, WØSIN 35, KØDCW 30, WØLEK 23, KØIGA 10, WØLCE 8, K3TFZ/Ø 6, WØKFH 4, WAØQIY 2. (Dec.) WØIRN 78. (Nov.) WØIRN 55.

NEW MEXICO – SCM, James R. Prine, W5NUI – Welcome to OO K5MAT, who fills a vacancy because of W5QNY's transfer to France. WØAVX/5 has resumed as ORS and OPS in the section and soon will become an active OO. The Feb. 1 theft from Sandia Crest has adversely affected the WA5JDZ repeater. W5RE now is on 160-meters but finds operating time limited. W5QNQ has installed the SBF-34 as a mobile rig which will help the emergency coverage in the south Rio Grande. The SET had a low participation reflecting the absence of an SEC. Plans should be well along for the spring bean feed at La Mesa with K5ECQ as Mc. Any stations not familiar with the procedure required for call sign license plates will be provided necessary forms on request. K5MAT hears lots of signals on 80-meters since installing the new antenna. Traffic: W5RE 162, K5DAB 101, K5MAT 47, W5PDY 34, W5DMG 22, W5DAD 14, WA5UNO 11, WA5OHI 8, WA5JNC 5, WA5BLI 4, WA5MIY 4.

UTAH – SCM, Carroll F. Soper, K7SOT – SEC: W7WKF, RM: W7OCX. K7PFB has moved from Idaho to Salt Lake. WN7MSR lost another antenna because of the wind. W7WKF assisted the Salt Lake City police in capturing two thieves through the 2-meter repeater, another service rendered by amateurs. PSHR: W7OCX 49, K7HLR 50. BUN – QNI 860, QTC 535, average time 11.09. WA7BRB has been issued the Beehive Utah Net certificate No. 83. W7EN and W7EU are active on amateur TV. The SET activity was very gratifying. Traffic: (Jan.) W7HLR 309, W7EM 126, W7OCX 59, W7WKF 33, WA7HCQ 18, K7CLQ 14, K7PFB 5. (Dec.) W7WKF 24.

WYOMING – SCM, Wayne M. Moore, W7CQL – SEC: K7NQX. W7TVK is the new EC for Natrona County. WA7NNB is a newcomer to the air. K7PPC is an Extra Class licensee. W7GMT moved to Riverton and is teaching at Central Wyoming College. WA7DKZ spent part of his national guard training in Hawaii where he met some nice hams. WA7NHP also vacationed in Hawaii in Jan. Other sun lovers who left for more sunny spots in Jan. and Feb. are WA7BDI. K7KSA and K7ITH. Casper is getting more interest in 2-meter fm now that K7KMT and the group have put up the repeater. Start making plans now for the annual Field Day,compete for the SCM trophy. Had a suggestion that the trophy be made a perpetual traveling trophy with a certificate awarded each year – any comments? Traffic: K7NQX 431, WA7EUX 182, K7KSA 67, W7SDA 54, W7YWW 52, W7TZK 40, W7GMT 34, K7VWA 27, W7BHH 18, K7SLM 10, WA7LEA 2.

SOUTHEASTERN DIVISION

ALABAMA – SCM, Donald W. Bonner, W4WLG – SEC: W4DGH, RM: W4HFU. It has been interesting and enjoyable serving as your SCM the last two years, interesting because I have learned so much and enjoyable from meeting and working with such a great group of people, thank you. And now, its all yours Mr. Jim but we are all with you all the way. Would you believe a bunch of traffic was handled this month? – most of it during the two days of the SET. Totals are: Originated 786, received 1129, relayed 628, delivered 176, complete total 2719. WB4KDI, WB4OKT and WA4VEK made BPL. Congratulations. Several others had counts exceeding 100. The Birmingham Amateur Radio Emergency Services (BARES) recently provided communications for a teenage fund-raising march around town. The HARC also provided communications for a similar march in Huntsville. Both marches were about 25 miles in length and the help given was greatly appreciated. BARES also handled communications for a motorcycle cross-country endurance held recently in the magic city. Traffic: WB4KDI 541, WB4OKT 249, W4HFU 246, W4DGH 222, WB4LAL 214, WA4VEK 214, WB4FKJ 201, WB4KSL 140, WB4OJD 111, WB4JMH 100, WB4LAO 76, WB4OVR 71, W4WLG 63, K4AOZ 50, K4WHW 50, K4BTA 45, WB4POD 45, WN4SVX 43, WB4KHL 40, WB4NLK 30, K4HJM 26, WN4SBD 22, WB4MLV 9.

EASTERN FLORIDA – SCM, John F. Porter, W4KGJ – Asst. SCM: Albert Hamel, K4SJH. SEC: W4IYT. Asst. SEC: W4SMK. RMs: W4ILE, K4FHY. PAMs: W4OGX 75 and W4SDR 40. WB4PWD, WB4OMG, WB4MIQ, K4FAC and K4IEX made PSHR for Jan. Active fm repeaters in our section are: Miami WB4HAA 146.34/146.76. Boca Raton WB4KVV same frequency. Merrit Island WB4KNQ, Tampa WB4HAE same frequency and W. Palm Beach WB4AKH 146.28/146.88. All Fla. repeaters soon will go to touch tone access. The Hollywood ARC now has the call WB4TON. Brandon ARS received a donation of a 75-KW generator from W4CMC. This will be one club that will be in service if a hurricane hits. Our section nets played a big part in the annual SET and racked up real good scores. Lots of Fair traffic will be passed in the next few months so lets all do our part to help the boys out. K4TFS, Dade RACES station, was the key RTTY station in Miami during the SET. W4AKB was RTTY relay to the Western Fla.

section. W4IYT reports excellent SET state-wide with good ed ar ARFC cooperation. Any member of NHN, GN or QFN not receivi the monthly QFN bulletin should drop W4ILE a line or ARL Forty members attended the QFN breakfast at the Hamboree Jan. W4BNF is setting up an RTTY station. WB4HKP, K4BI WA4ABY, W4ZHG, W4IYT, WB4CBP, W4FFF were activ operators at the Miami District Red Cross station K4IWT during th SET. W4CUL/4, W3VR/4, K4IWT, WB4OMG and WA4ABY mad BPL for Jan. The Tropical Hamboree/Southeastern Convention ha a real good turnout this year. Had a lot of eyeball QSOs during th two days. We are looking forward to the Orlando Hamfest in Ma Mark your calendar for the 22nd and 23rd. A section meeting planned. Traffic: (Jan.) W3CUL/4 3128, W3VR/4 998, K4IWT 60 WB4AIW 476, WB4OMG 414, WA9QVT/4 410, WB4PWD 30 WB4SMA 302, WA4ABY 295, K4TES 268, K4EAC 228, W4IL 197, WA4OWG 190, WB4MIQ 184, WA4JHI 176, K4JWM 16 8R1Y/W4 153, WB4FGW 145, WB4LAA 135, W4DQS 13 W4AKB 131, WB4OPL 130, WA4FCK 113, WA4FJA 108, W4DE 104, W4EHW 99, W4TJM 92, W4OT 71, WA4IZZ 71, WB4FJY 6 K4IEX 65, W4IA 61, WA4NNB 60, K4EBF 54, WB4HKP 5 WB4GHD 49, WA4HDH 47, WB4IER 47, K4HS 45, WA4HAA 4 W4NGR 44, W4YPX 43, K4DAX 41, W4SMK 37, W4ZAK 3 W4BNF 33, W4ZHG 33, W4IYT 30, W4KGJ 29, K4BLM 2 W4LEP 27, WB4HNL 26, WA4UOQ 25, WB4ADL 24, W4IAD 1 K4LPS 17, WA4OHO 16, W4LK 6, W4GGQ 3. (Dec.) WB4SM 229, WB4HKP 64, WA4HAA 15, WA4UFO 10. (Nov.) W4IA 45.

GEORGIA – SCM, A.J. Garrison, WA4WQU – Asst. SCM: Joh T. Laney, III, K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4JX PAMs: K4HQI, W4LRR.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr
GSN	3595	0000/0300 Dy	992	534	K4BA
GRN	3975	0100 Dy			WA4VW
GTN	3718	2300 Dy	225	82	WB4JX
Ga. Cracker	3995	1300 Su	154	5	WA4JQU

The Southeastern DX Club elected the following officers for 1971 W4GTS, pres.; W4OJI, vice-pres.; K4EEK, secy.; W4TFL, treas k4EZ, act. mgr. Any DXCC member interested in joining this clu should contact W4GTS. Our condolences are extended to the famil of WA4GXZ. Art became a Silent Key on Feb. 6. He will be misse by not only the Atlanta Radio Club, but also in our traffic net This year's SET activity was considerably higher than last year. Ou thanks to all who participated. At this writing, a number of Georgi stations are engaged in handling health and welfare traffic for th disaster area of Southern Calif. Traffic: K4BAI 322, WA4WQU 251 WA4RAV 219, W4AMB 181, W4EEP 110, W4PIM 103, WB4RU 103, W4DOC 90, WB4JXO 84, K4NM 80, W4RNL 72, K4VHC/ 71, W4CZN 56, W4NSO 53, W4AQL 34, WA4IWO 30, W4REI 2 W4FDN 22, K4FLR 19, W4KRE 15, k4PSW 14, K4GVG 10.

WESTERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH SEC: W4IKB. RM: K4LAN. RTTY: W4WEB. PAM: W4NOG. HVF

Net	kHz	Time(Z)/Days	Sess.	QNI	QTC
WFPN	3957	2300 Dy	31	666	2
QFN	3651	0000/0300 Dy	62		

Pensacola: WN4THS and WN4TNL are new Novices. WB4LJH is General Class licensee. W4NOG had 159 phone patches in Jar Officers of the new Pensacola FM Repeater Assn. are: WB4DHL WB4DVM, WB4MUS and WB4JCV. WA4ECY operates 80- an 20-meter RTTY with an SRT-14. W4UUF completed a 500-watt ri for 144.1 MHz. W4JLW renewed as ORS. Fort Walton Beach W4VXV is active again with a Cygnet 270 and Regency HR- WN4TPR has his Novice ticket. W4UNV, W4RKH, WB4FQU K4UBR and WH6NJW provided communications for a Sports Ca tally. Defuniak Springs: W4FCM, active for many years, althoug blind, is a Silent Key. Panama City: WN4TKD, WB4TMJ an WB5ASO/4 are new local calls. Bonifay: WA4GTA was appointe EC for Holmes County. Chipley: W4IKB is installing 200-ft. of 7/8 gas-filled line for his 2 meter antenna. Mayo: WB4PAV complete an SB-102 and is active on 75-meter ssb. Traffic: WA4SSB 565 W4WEB 404, W4IKB 326, 8R1Y/W4 153, WB4JCV 111, W4RK 71, K4CFS 63, WA4ECY 44, WB4EQU 43, WB4DVM 31, WA4IZ 26, W4NOG 24, W4FDJ 18, W4UUF 3.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7OAF – SEC: K7GPZ RM: K7NHI. PAM: W7UXZ. The third annual Winter Hamfe sponsored by ARCA was held at Squaw Peak Park in Phoenix wit approximetly 200 attending. The Hamfest Chmn. was W7UXZ an some prize winners were W7KWB, K7IZR and W7PG. The Arizo VHF FM Amateur of the Year Award was presented to K7KEQ b K7OED. The award was an engraved plaque and an Inoue IC-2

from Varitronics, Hamfest transmitter hunt winners were K7PRS/K7PLR on 75-meters and WA7IOY/WA7AOH on 2-meters. The annual Ft. Tuthill Hamfest in Flagstaff will be July 30, 31 and Aug. 1, so mark your calendars. The spring softball game between the Old Pueblo ARC of Tucson and the Arizona ARC of Phoenix will be held in Casa Grande Apr. 18. The usual pot-luck lunch before the big game will be at 1:00 P.M. at the park in downtown Casa Grande and all are welcome. The Pima County SET exercise under the direction of K7CET and K7NTG was very successful with about 40 participants. The group was called out the following week end for a real search and rescue mission at Organ Pipe Park. ATEN held 10 sessions during the SET to handle the extra traffic. WA7NQA now has a Gonset Amplifier and Mosley TR-33 beam. KØUYN/7 recently was appointed as ORS. Public Service Honor Roll (PSHR): W7CAF 49, K7NHL 48, WA7MAD 37. Traffic: K7NHL 340, K7NTG 159, W7CAF 91, WA7MAD/7 80, WA7NQA 50, WA7JCK 29, W7LLO 10, K7ZMA 10.

LOS ANGELES – SCM, Harvey D.D. Hetland, WA6KZI – Asst. SCM: Donald R. Etheredge, K6UMV. Acting SEC: WA6QZY. Several of our section AREC groups activated for the quake disaster in the Newhall-Saugus area including San Fernando AREC, East San Gabriel Valley AREC, So. Metropolitan AREC and the Culver City AREC. The AREC effort was coordinated by WB6IXX, WA6QZY, K6UMV, WB6UZS, WB6VYX and others during the four day period AREC was activated. L.A. County RACES was active for the first day following the quake and public service nets such as WCARS and WPSS along with W6IN (San Fernando AREC) and other stations in the disaster area handled thousands of inquiries regarding health and welfare directly with the point of inquiry. Via SCN and the NTS, health and welfare was handled through the League's system of relays. Two-meter fm was very effective with handling of communications within the area of the disaster and in providing community agencies with relief of their far overloaded communications circuits. The list of amateurs working in the disaster area is still to be compiled at this writing and already exceeds 150. If you are not already affiliated with an AREC group the application forms are available from the SCM (see page 6 for address). K6VGH reports that the Culver City AREC meets Tue. 8 P.M. 146.61 input, 147.33 MHz output fm. WB6EWC noted improved DXing after installing a new coax. WB6WIT operated the CQWW 160-Meter Test from W6YRA. W6OEO installed the mobile in a new car. Members of the JPL ARC now have club QSLs. WB6ZTI added a new 75/40-meter dipole. WB6ZVC has tower and quad going up. WB6USZ reports that Standard has plans for producing a repeater package soon. WN6GLT added a new receiver. Artesia HS, La Canada HS by the JPL ARC, Inglewood HS, The Lockheed ARC and Pasadena HS all have code and theory classes. Regarding inquiries as to why a new Asst. SCM appears to be listed each month in my column, this is a result of the rule that each section may have only one appointed Asst. SCM. Therefore, I have been rotating them in order that you might know who they are. Section open, inband repeaters: WB6ZDI, 146.61 in, 147.33 MHz out, NBFM, carrier access. Repeater owners and users are invited to provide information on others. Net reports for Jan.: So. Cal. Net – 3600 kHz daily 6:30 P.M. QNI 611, QTC 431, Mgr. W6LYY. Traffic: (BPL/PSHR): K6ASK 2/0, W6BHG 50/0, K6CDW 1/0, K6CL 6/0, W6FD 7/0, W6FJT 12/30, WB6IWC 0/5, W7GAQ 10/10, WB6GGL 0/3, W6IVC 11/6, W6INH 271/42, WB6KGK 11/17, WA6KZI 2/5, WA6LSB 0/13, W6LYY 79/27, W6MYR 0/8, W6OEO 56/10, W6QAE 88/23, K6QPH 2/0, WB6SXY 355/49, W6USY 10/0, W6VIO 0/11, W6YRA 3/0, WB6ZTI 18/14, WB6ZVC 120/39.

ORANGE – SCM, Jerry L. VerDuft, W6MNY – Asst SCM: Richard W. Birbeck, K6CID. SEC: WB6CQR. RMs: W6BNX, W6LCP. PAM: open. WA6YWS is the new EC for Inyo County and is looking for more ARRL members. If you're in Inyo Co., write him at P.O. Box 65, Independence 93526. W6FB, W6LCP and WB6ZEC have been awarded Section Net Certificates for SCN participation. Kudos to WB6CQR and the ECs for an outstanding SET exercise with all counties active. Bill says 100% of our ECs filed annual reports with ARRL Hq. We regret the passing of W6FQG in Mountain Center and young WB6ZHS of Desert Hot Springs. OVS K6YNB operated VHF sweepstakes from Running Springs for 8,4K score and notes that Orange section activity in VHF broke all records this year. WB6AKR has reinstated his ORS appointment now that he is back on SCN with a Viking Ranger II. OO W6VOZ retired Jan. 22 and is now manning full time. W6FB was visited by W7MBW who worked him at TA3GVU 21 years ago. OPS W6GB is working early morning DX on 3.8 MHz ssb. The SCM, Asst. SCM and EC K6GGS visited the Victorville ARC and were presented honorary membership certificates. The SCM and SEC were guest speakers at the Jan. 22 meeting of Newport ARS. New officers of the Citrus Belt ARC are WB6ETE, pres.; WA6IYN, vice-pres.; WB6ZRU, secy.;

WA6PVZ, treas.; WB6PFD, activities; WN6HGG, custodian; WB6CZO, editor of "The Modulator". They are planning on a club booth at the Orange Show. Victorville ARC member W6EWF was awarded a letter of commendation for his work conducting code and theory classes. WB6CZO received his WAS certificate. A list of all affiliated clubs in the Orange section is available from the SCM upon request, address page 6. PSHR: W6BNX 67, W6MNY 51, WB6TYZ 8. (Dec.) WB6TYZ 15. Traffic: WA6FOO 270, W6MNY 209, WB6TYZ 54, W6LCP 36, WB6YXA 33, WB6ZEC 30, K6GGS 28, W6QBD 14, WA6YWS 14, W6VOZ 8, WB6ZOK 8, WB6QNU 6, W6FB 2.

SAN DIEGO – SCM, Richard F. Leffler, WA6COE – Asst. SCM: Art Smith, W6INI, S&C: K6HJA. Only 5 more months to go before the next ARRL So. Western Convention to be held in Anaheim Sept. 4, 6. Be sure to get your plans organized around these dates early so you may attend. Jan. saw 3 novice nets begin in the section and they all meet on 3725. Contact WB6LYG, WA6BJO or WB6RMG in El Centro for further information. A total of 123 out 300 ARFC members participated in the Jan. SET representing a 42% participation. Club activities: Imperial Valley ARA elected W6JHG as pres. WB6ODR was reelected to the top post in El Cajon ARC. WB6IKW was installed as head of No. Shores RC while WA6BDW holds the SOBARS gavel for 1971. Palomar RC had W6QJW present a tremendous demonstration-lecture program on antenna and RF measurements. SD DX Club held its Jan. meeting at the home of W6OME. SD QCWA meets on the air Wed. evening at 2000 on 28.6. Station activities: 25 reports were sent in for Jan. We're sorry to report the passing of WB6YHK, a member of the SOBARS Club. WA6BOI is a new General Class licensee. New OVS appointment went to W6DEY, Vista. PSHR: W6VNQ, W6BGF, W6LRU. Traffic: W6EOT 497, W6VNQ 448, W6BGF 374, W6LRU 259, K6HAV 95, W6YKF 44, WA6IXM 21, WA6MIW 21, W6INI 20, WA6COE 14, W6TAI 10, WB6RMG 8, WA6HGU 7, W6MI 6, W6SRS 6, W6JHG 3, WB6PMF 2, WN6FMJ 1, WN6END 1, WN6GCK 1, WN6PUM 1.

SANTA BARBARA – SCM, Cecil D. Hinson, WA6OKN – SEC: W6JTA. RM: W6OJ. New officers of the Conejo Valley ARC are W6SUN, pres.; WB6BOQ, vice-pres.; W6KCI, secy.; W6TRS, treas. The Conejo club reports 51 members and meet on the air each Wed. at 8:30 P.M. on 21.400 MHz. New Standard 2-meter fm rigs in Thousand Oaks belong to W6SUN, WB6QNL and WB6IWF. W6MQF recently moved to Camarillo. The Simi Valley ARC meets the 2nd and 4th Wed. of each month at 8:00 P.M. at the Security Bank in Simi. The Santa Barbara ARC has a request before the School Board to install a 12-AVQ vertical for the club station W6TOI. The Estero ARC put it all together with a good team and a good score for the SET. New appointment: W6MQF as OPS. WA6DEI has turned in a second month of traffic to qualify for BPL. Traffic: WA6DEI 515, W6JTA 168, WB6YCH 53, WB6IWF 32.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Gene Harrison, W5LR – Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOO. RM: W5QGZ. W5SER wishes to move his quad, tower and rotator. W0INH's ideas on how to become a net mgr. in four easy lessons makes good reading. W5LUD has a new tower. The Arlington RC is buying property for a clubhouse. Midland ARC pres., WA5RAG, reports a swapfest was held Mar. 21. K5HZR the new SCM of SoTex issued an EB NL. WA5KHE, net mgr., ETTN reports WB5BAM as the new NCS. DARC new officers are WA5SIR, pres.; WA5RSS, secy.; WA5GXP, tech. dir.; K5ZYZ, treas. A review of '70 ARRL appointees shows the following 100% reports: W5JSM, WA5PPF, W5PBN, W5LR. Most consistent appointees since signing up were W5HVF and WA5VJW. The Irving ARC visited the Braniff trainer unit. W5AVA says membership is on the increase. KC Club Ft.Worth reports former member Tex Benecke is back in town. They now have 3 Extra Class, 27 Advanced, 2 Generals, 3 Techs., 17 Novice licensees. W5JSM is a new ORS. W5IZU is in the hospital. The Dallas QCWA meets in Tyler State Park on June 12, 13. WA5JSI and W5ZYA organized a luncheon group for hams only and meet the 2nd Mon. of the month. W5EJ writes an excellent NL for the West Gulf QCWA group. The 1971 SET was well conducted by cw and phone nets. OO W5QPX is very active. The Lawton-Ft. Sill Hamfest was well attended. The Temple ARC has a new active group of officers with WA5ZYD as pres., plus 50 members and meets the 2nd Tue. each month. The Irving ARC has WA5RWO as pres. K5BOG, Arlington RC VHF expert, reports good openings Jan. 14, 15 and worked Tulsa, Enid, Oklahoma City and the Little Rock repeater. Remember your Director goes to Newington very soon so if you have some good solid "gripes" please let him know. Tascosa ARC (Rebel) submitted a fine report on the SET from

Amarillo, Tex. SEC W5JSM reports 276 AREC members. Traffic: WA5VIW 427, WA5PPF 272, W5JSM 188, W5QU 161, W5LR 45, W5NEO 32, W5PBN 25, W5JA 17, W5HVF 16, W5IZU 15, WA5VES 10, WB5BGL 6.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM: W.L. Smoky Stover, K5QOV. SEC: WA5FSN. RM: WA5YRO. PAMs: W5MFX, WA5WVH, K5DLF and WA5ZRU. QSL Bureau: W5QMJ. Repeaters: Enid, WA5QYF 146.34/146.94 (147Hz) – Oklahoma City WA5YTI and Tulsa, WA5LVT on 146.34/146.94. Information on Ardmore and Ponca City not available. The new officers of the Aeronautical Center ARC: W5UZX, pres.; W5FF, vice-pres.; W5KE, treas. Reports were received from the following clubs on the SET operation: Comanche County, K5VOZ, 10 members; Garfield County, W5HTK, 16 members; Muskogee County, W5EJK, 6 members; Oklahoma County, W5LOW, 20 members. W5LOW is a new memorial call of the Oklahoma Central VHF ARC. SEC WA5FSN and RM WA5YRO handled the bulk of the traffic. Congratulations to WA5ZOO on his recent appointment as net mgr. of the Oklahoma Post Office Net (OPON). Congratulations to two new General Class licensees WB5ANW and WB5BVH and a new Tech, WB5CKQ all of Tulsa. A new interstate teenage net now meets after school on 3981 kHz. More information can be obtained from WB5COK of Van Buren, Ark.

Net	*kHz*	*Local Time*	*Sess.*	*QNI*	*QTC*	*WX*
OPEN	3915	0800 Su	5	236	27	
OPON	3913	1700 M-F	20	464	278	
STN	3850	1730 M-S	26	504	40	
OWXTN	3913	1745 M-S	25	490	28	255
OLZ	3682.5	1900 M-S	24	71	15	
SSZ	3682.5	2145 M-S	8	25	6	

Traffic: K5IEY 1090, WA5YRO 516, WA5FSN 207, WA5LWD 124, W5FKL 73, W5MFX 44, WA5ZOO 39, K5WPP 36, WA5KFT 35, W5PML 17.

SOUTHERN TEXAS – SCM, E. Lee Ulrey, K5HZR – SEC: K5HXR. PAM: W5KLV. RM: W5EZY. Renewed appointments: W5VW as OO; W5KLV as PAM; WA5AUB and W5ZPJ as OBSs; K5EPH and W5YCK as ECs. New appointees: WA5IQV, W5LPO and W5QMH as OBSs. WA5RUE is the new EC for Colorado county. K5UYH has been recommended as EC for El Paso county. A new club in the area is the Highland Lakes ARC with W5PCN as pres. New officers of the San Antonio Chapter QCWA are W5EJT, chmn.; W5KJ, vice-chmn.; W5LPO, secy.-treas. The Handicappers on 7270 kHz are seeking receivers for handicapped novices and prospective amateurs. Anyone with a spare receiver not in use contact W5PCN. Orange ARC station W5ND has a new antenna system. New officers of the Austin ARC are WA5SPN, pres.; W7WAH/5, vice-pres.; W5RJA, secy.; W5PPQ, treas. 96 members attended the Austin ARC Annual Banquet. Congratulations to W5QJA on PSHR for Dec. and Jan. PAM W5KLV reports pre-planning meeting of STEN for the 1971 convention held at Kerrville. Most ECs reporting so far indicate SET participation improved over previous years. WA5OYS and K5CMU operated CD EOCs on emergency power during power outage in South Houston, Pasadena and La Porte. SEC K5HXR and EC WA5ABA assisted local hospitals and ambulance service in Pasadena. New OO K5TSR worked his first CD party and is looking forward to the DX test. RM W5EZY reports that liaison between RN5 and TEX during SET was especially good. Brazoria County ARC participated in the county wide March of Dimes drive. W5BUV and W5DGJ are Silent Keys. GAYLARCS manned (?) the EOC at CD in Houston during the SET. OO K5SBR reports he is attempting to get some traffic-handling activity going again at W5AC. Congratulations to new licensees WN5CEO, WN5CEP and WN5DNA. OBS schedules (times in GMT, frequencies in kHz): WA5LQV 0130M 50400, 0130T 146340, 0215T 50400, 0230T 145350, 0130W 28648; WA5AUB 1330Su 3955, 0030T 3955, several nights on 146940.

Net	*kHz*	*Sess.*	*QNI*	*QTC*
TEX*	3770	52**	367**	190**
TTN*	3961	50	1741	139
7290 Tfc	7290	25***	1142***	444***

*NTS, ** excludes SET, ***up to Jan. 22.

Traffic: (Jan.) W5QJA 146, W5EZY 132, K5HXR 128, K5HZR 119, WA5EJN 98, W5VW 90, K5ROZ 73, W5RBB 72, W5ABO 50, W7WAH/5 41, W5TFW 14, K5HUA 11, K5RVF 11, W5QMH 8, W5KLV 4. (Dec.) W5QJA 177, W5RBB 6.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – SEC: VE6XC. I regret to report the sudden passing of VE6AHA. The 1971 SET was badly hindered by very poor conditions on the hf bands. VE6AZU,

Calgary EC worked hard and got very nice support from the vhf group. VE6ASK found the SET generated a lot of interest among his Sea Cadet group and that the request for membership in the Sea Cadets has increased. I want to thank everyone who helped out during the SET. It must have been real frustrating monitoring the net frequency under such adverse conditions. PAM VE6ADS reports that the satellite tracking station at SAIT is receiving good pictures. A new antenna has been approved and should soon be installed. Southern area EC VE6AFQ is now in a convalescent hospital. The Calgary DX Club will enter the DX contest using the call VE6AO from the SAIT. July 17 and 18 is the date for the combined Alberta and Waterton-Glacier International Hamfests at the Belly River Campsite, Waterton Park. Traffic: (Jan.) VE6FK 14, VE6SC 6, VE6SS 6, VE6BL 4, VE6HF 4, VE6FV 3, VE6YW 3, VE6ALA 2, VE6AMO 2, VE6AOF 2, VE6CE 2, VE6TT 2, VE6UD 2. (Dec.) VE6ABC 4.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – The winter has its switch to safety that is not mentioned in ARRL. VE7AJM,VE7IQ and VE7BRP all had accidents resulting in injuries of one kind or another. The Powell River ARC elected VE7HG, pres., VE7BRL, vice-pres.; VE7BPH, secy. Royal City ARA: VE7NE, pres.; VE7AMS, vice-pres.; VE7YB, secy. Kamloop ARC: VE7BHJ, pres.; VE7BHP, secy. Penticton Civil Defense ARC: VE7BVD, pres.; VE7IW, vice-pres.; VE7BNO, secy. VE7AMW reports he was involved in a real mini eye-ball with VE7KM, VE6FG, VE7UM and VE7BWF. VE7AYI, chmn; for the B.C. Centennial Award, reports hundreds of logs arriving. Space won't permit my thanks to all the clubs and amateurs that kept this SCM informed during 1970 and hope they keep it up for the coming year. My thanks to all those that have kept the nets busy by checking-in and also to those occupying the frequencies. Traffic: (Jan.) WA7NXO/VE7 146, VE7AC 61, VE7BLO 60, K7LPZ/VE7 27, VE7LL 22, VE7QQ 11, VE7GG 6, VE7DH 5. (Dec.) VE7AXH 34, VE7GG 10, VE7AEJ 2.

MANITOBA – SCM, Keith C. Witney, VE4EI – RM VE4FQ reports that the MTN activity for the SET was good but band conditions were terrible. VE4UM should be back on the air soon. Plans are being made for the annual St. John's Boys School snow-shoe race. VE4SE's beam came down, VE4MP had rig trouble, VE4HI is building a new shack. VE4OJ reports the new phone net procedure is working out very well: 1st, the preamble; 2nd, emergency traffic, mobile check-in, formal traffic, which is handled immediately off the net frequency and bulletins; 3rd, the roll call in order of 4,3,5 and finally additional traffic is taken and the net closed at 0130Z. All in all it sounds like a very workable system. Traffic: VE4RO 61, VE4EQ 57, VE4KF 28, VE4DI 25, VE4CR 6, VE4QI 6, VE4LQ 5, VE4NE 5, VE4EO 4, VE4IA 4, VE4LM 4, VE4HR 3, VE4EJ 2, VE4YC 2, VE4DD 1, VE4EI 1, VE4WT 1, VE4XN 1.

MARITIME – SCM, William J. Gillis, VE1NR – Asst. SCM: Clarence Mitchell, VO1AW. SEC: VE1HJ. Our sincere sympathy is extended to the family of VO1BP, one of the real OTs who tragically lost his life in a fire which destroyed his home. Because of illness Canadian Director Eaton had to cut short his visit to the section. VO1CA has been appointed as EC for Newfoundlan d-Labrador. Congrats to VO1FX on his DXCC. VO1CV now is active at Port aux Basques. K2OJD is looking for 2-meter contacts from St. Pierre operating as FP/CA. VO1FF, another white caner, is active on 75. VO1FR conducts a 2-meter net each Sun. VO1JJ is on with a new SB-102. VO1FW and VO1AM are ready for their Advanced Class tickets. VO2AK, VO2AP and VO2AJ are active in Labrador. VO1CZ is a new call from St. John's. LCARC produces an EB bulletin. I understand that the Saint John Club is considering sponsorship of the 1971 Maritime Convention. VE1AAF, VE1CFW/1 and VE1ASC are new NCS for APN. The Jan. SET was very successful. APN reports sessions 29, QNI 137, QTC 880. Traffic: VE1AMR 138, VE1RO 107, VO1CA 45.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – By the time you read this column SET '71 will have faded into the shadowy area of all contests. I urge all participants in SET '71 to let the SEC or SCM have your suggestions for improving future SETs. A warm and sincere "happy birthday" to VE3FW, who will be 90-years young Apr. 12. VE3CGO, pres., Ottawa VMRC was active on 2-meter fm while recovering from surgery at the hospital. Windsor ARC moved their quarters to Scout Hq., after 6 years in the EMO building. New address is 3085 Marentette Street, Windsor. I will not be listing club officers in this column: they are covered adequately by the Ontario Amateur. Toronto FM Communications Society is now incorporated. The RSO 1971 Convention will be held at Hespeler Oct. 22 or 23. Commemorating their 25th anniversary the Scarborough ARC have organized a contest – confirmed contacts with 15 SARC members wins you a fine certificate but 25 confirmed contacts with

SARC members wins you a handsome tankard in addition to th certificate. Mail logs to VE3WE, 27 Flerimac Road, Scarborough Ont. Clubs, if they haven't already done so, should send the clu questionnaire to ARRL Hqs. VE3YT is the new Asst. Dir., Canadia Division, for Eastern Ontario area. VE3AVY, VE3ADX an VE3FOK are RTTY on 2-meters and looking for more stations. On of the most popular articles in recent months was put out b VE2BSQ and gave complete details on steps required to improve th Heath line TRs. VE3GNM is anxious to contact ex-ZBI or 9HI an people of Maltese ancestry with view to forming Maltese Amateu Radio International Society. VE3FRG, learning traffic-handling o the GBN, took time out to get his Advanced Class ticket. Traffi (Jan.) VE3DV 468, VE3GI 354, VE3ERU 320, VE3DPO 24 VE3ARS 206, VE3FXI 200, VE3GFN 196, VE3FXA 16 VE3EWD 157, VE3FL 84, VE3BUR 75, VE3DBG 55, VE3DH 3 VE3FBH 36, VE3CRW 33, VE3AC 22, VE3AUD 14, VE3GEQ VE3NO 8. (Dec.) VE3AYR 5.

QUEBEC – SCM, Joe Unsworth, VE2ALE – SEC: VE2BTZ VE2IB reports that VE2TA's antennas are about as big as telegrap poles this winter. No confirmed reports on the SEC SET. Lo interest showing in 3.740 net? VE2BFV is a Silent Key. VE2RM ha a solid state repeater and will slave for Mont Tremblant th summer. VE2MT is moving to Shawbridge. One report was receive for the PSHR? Le Radio Club de Quebec a participe activement au activities du Carnaval. Le reseau Meteo 18.30 a 3.770 continue s magnifique travail d'information. VE2APF aime bien le DX sur *metres. VE2AZC fait des transactions d'appraeils et* VE2DLG e actif comme NCS sur le RTQ. VE2APT is again active this year car rallies and VE2ZA is tinkering with VHF equipment. VE2M joins the PE net. VE2BG was reported at the MARC Christma party tripping the light fantastic. Ex-VE2AGQ and now VE2KV back in the Montreal area. VE2BZD is the new secy. for th Laurentian DX Club. '71 VE2RM Inc. officers are VE2DM, pres VE2HW, vice-pres.; VE2BQM, treas.; VE2AWO, secy.; VE2AL sales; VE2JO, VE2ZA, VE2BMO, dir.; VE2BU, tech. chmn VE2APT, net mgr.; VE2AOL, VE2GA, asst. DXers, watch th banned country list. VE2DCW made BPL for Jan. Traffic: VE2DC 301, VE2ALE 39, VE2EC 23, VE2APT 22, VE2BTZ 20, VE2C 13, VE2AP 10.

SASKATCHEWAN – SCM, Barry Ogden, VE5BO – The b "happening" for Jan. was our participation in a very successful S exercise under the guidance of SEC VE5CU. The improved RTT facilities was noted. The EMO Orientation Course at Fo QU'Appelle took place on Mar. 2nd to the 4th. The NT participation was extensive and efficient. FB! With several feet snow still piled up around the shacks it seems a poor time to wo on antennas, however several un-rotatables are again searching t DX, so some brave, well dressed and extremely well fortified peop have been ascending the tree-trunks, or whatever holds up th clotheslines! Remember Apr. 2 in Saskatoon is the date for o beloved RI's retirement party. After many years of service VE5I and XYL VE5YF, will be able to spend more time on the rig. Le hope we hear more of you on 75! PAM VE5HZ reports on traffi Let's have your reports fellas, as early as possible. Traffic: VE5C 237, VE5DN 10, VE5RO 7, VE5YR 1. QST

Operating News

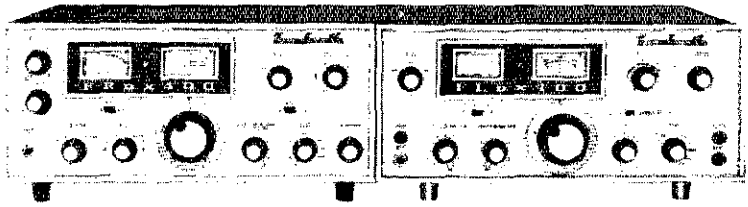
(Continued from page 109)

W8LR	101,100-337-60-14
K8CNC	100,980-368-54- 6
W1MX (2 opts.)	249,575-739-67-20
W1EOR (+W1AX)	101,430-315-63- 8

PHONE

W8SH (WA8VRB, opr.)	169,050-487-69-14
WA9KWY	167,050-510-65-18
W6WX	154,035-482-63-16
W6ASH	150,440-500-59-16
W1BUT	148,535-487-61-12
WA2UOO	147,315-478-61-14
W4ILF	140,220-485-57-17
K9PLI	140,100-463-60-17
WA6KZI	136,800-450-60-16
W1PL	135,470-437-62-15
K5MAT	133,575-405-65-11
W7GHT	131,355-411-63-18
K0ZXE	130,210-445-58-13
WA7ISP	128,340-409-62- 9
W0MOO	123,600-407-60- 9
WA6TOO	123,400-375-65-17
WA1IZC	120,950-404-59-15
K1QFD	120,330-378-63-17
W1YK (WA2BCL, opr.)	119,560-386-61- 8
W5RUB	113,680-388-58- 7
W0BM	111,600-365-60- 8
W4KFC	107,970-359-59- 5
WA5UEI	106,200-360-59-14
W2SZ (WA2FUX, opr.)	104,595-362-57-11
W1ERY	103,200-344-60- 7
K4BSS/1	102,785-330-61-10
K1IZD (WA1IOJ, opr.)	155,600-475-69-16
WA6DKF	135,240-385-69-10
WA2HND/2	117,920-368-63-10
K4BAI	93,300-304-60-11
WA2UOO	88,740-301-58-19
WA1ILD	83,265-273-61- 7
WA1IZC	66,640-232-56-11
W0INH	65,540-219-58- 6
W4KFC	61,040-211-56- 4
WB9ADO	59,130-214-54- 8
WA1IYY	55,080-200-54-12
WA8SDC/9	53,350-188-55-
W0YER	52,000-200-52-19
W6OQX	48,100-179-52- 3
W8NOH	47,500-185-50- 5
WA6CPP	46,540-175-52-12
W9YB (WB2RKK, opr.)	44,880-180-48- 5
W5RSZ	42,975-191-45- 6
W8DGH	38,540-157-47- 3
K4CU	37,895-136-53- 8
K9LGU	35,280-164-42-10
WB6EZN	34,500-150-46-15
W5RBB	33,300-143-45-
K9GEL	33,120-140-46- 9
WA1RY/1	31,490-127-47- 6
W5JSM	31,240-139-44-11
W6CPB	30,420-117-52- 8
W1YYM	30,150-127-45-
W3ECS	28,250-109-50- 7
W6NJU	26,520-117-44- 4
W5RF	26,180-112-44- 4
W5RUB	25,830-103-42- 1
WB4EDT (+WB4s DRB LOV)	63,000-246-50-10
W6MOF (3 oprs.)	35,260-147-47-11

Now you don't have to pay twice the price to get twice the rig.



Picture this pair in your shack. The Yaesu FLdx 400 transmitter and the FRdx 400 receiver. Loaded with power. Loaded with sensitivity. Loaded with features. Loaded with value. Read on, and discover how you can have the most up-to-date receiver-transmitter rig in the world . . . and at an unbelievably low price.

The FRdx 400 Receiver

Get a big ear on the world with complete amateur band coverage from 160 meters through 2 meters, including WWV and CB reception. Four mechanical filters do it — they provide CW, SSB, AM and FM selectivity. Separate AM-SSB-FM detectors are included, along with squelch and transmit monitor controls. Plus a noise limiter and a variable delay AGC. And a built-in notch filter with front panel adjust for notch depth.

The FRdx includes calibration markers at 100 KHz and 25 KHz, with accurate calibrator checks verified by WWV. A solid-state FET VFO for unshakable stability. And a direct-reading 1 KHz dial affords frequency read-out to less than 200 Hertz.

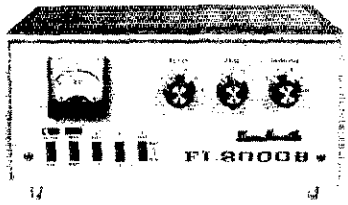
The FRdx 400 sells for $359.95.

The FLdx 400 Transmitter

Here's how to set yourself up with dual receive, transceive or split VFO operation. The FLdx 400 with its companion receiver brings you the ultimate in operational flexibility. Flexibility like frequency spotting, VOX, break-in CW, SSB, AM and even an optional FSK circuit.

The completely self-contained FLdx 400 features a built-in power supply, fully adjustable VOX, a mechanical SSB filter, metered ALC, IC and PO. A completely solid-state FET VFO provides rock-solid frequency stability.

We rate the FLdx 400 very conservatively. That rating guarantees you 240 W PEP input SSB, 120 W CW and 75 W AM. The FSK option will go all day at a continuous 75 W. And you get full frequency coverage on all amateur bands — 80 meters through 10 meters — with an optional provision for certain other bands that you can personally specify. For all that, you pay just $299.95.



FL2000 B Linear Amplifier.

Ideal companion to the Series 400, this hand-crafted linear is another example of Yaesu's unbeatable combination of high quality and low cost. Designed to operate at 1500 watts PEP SSB and 1000 watts CW, this unit provides superb regulation — achieved by a filter system with 28 UF effective capacity.

Other features include dual cooling fans (one for each tube), individual tuned input coils on each band for maximum efficiency and low distortion, and a final amplifier of the grounded grid type using two rugged carbon-plate 572 B tubes. Ready to operate at only $299.95.

SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

☐ Please send new color catalog of all Yaesu products.

☐ Enclosed find $_____

Please send model(s) _____

Name _____

Address _____

City _____ State _____ Zip _____

All prices F.O.B. Signal Hill, Ca.

The suitcase Yaesu.

Next time you hit the road, take the world with you.

That means taking the FT-101 with you. The solid-state portable rig that fits in a suitcase. 260 W PEP, 180 W CW and 80 W AM maximum input power, 0.3 microvolts receiving sensitivity for 10 db signal-to-noise ratio . . . in a thirty-pound package that even includes built-in 12 VDC and 117 VAC power supplies.

Whether you're cruising a turnpike or weekending in a mountain cabin, all you need is 12 VDC, or 117 VAC and an antenna to work the world via any band from 80 meters through 10 meters.

10 FET's, 3 IC's, 31 silicon transistors, and 38 silicon diodes and computer-type plug-in modules make it all happen. Add to that a built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band, a high Q permeability tuned RF stage, and a ±5 KHz clarifier. These considerations mean home base type operation no matter how far you are away from home.

For in-car operation, there's a built-in noise blanker — to pick out noise spikes, leaving behind only clean signal copy.

About those plug-in modules — if one of them ever should give you trouble, just send it in to us and we'll rush you a new card by return mail. The Yaesu FT-101 is guaranteed fully for one year.

Want to get away from it all? Get away with the FT-101. And keep the world in a suitcase. Only $499.95.*

SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

☐ Please send new color catalog of all Yaesu products.

☐ Enclosed find $ _____

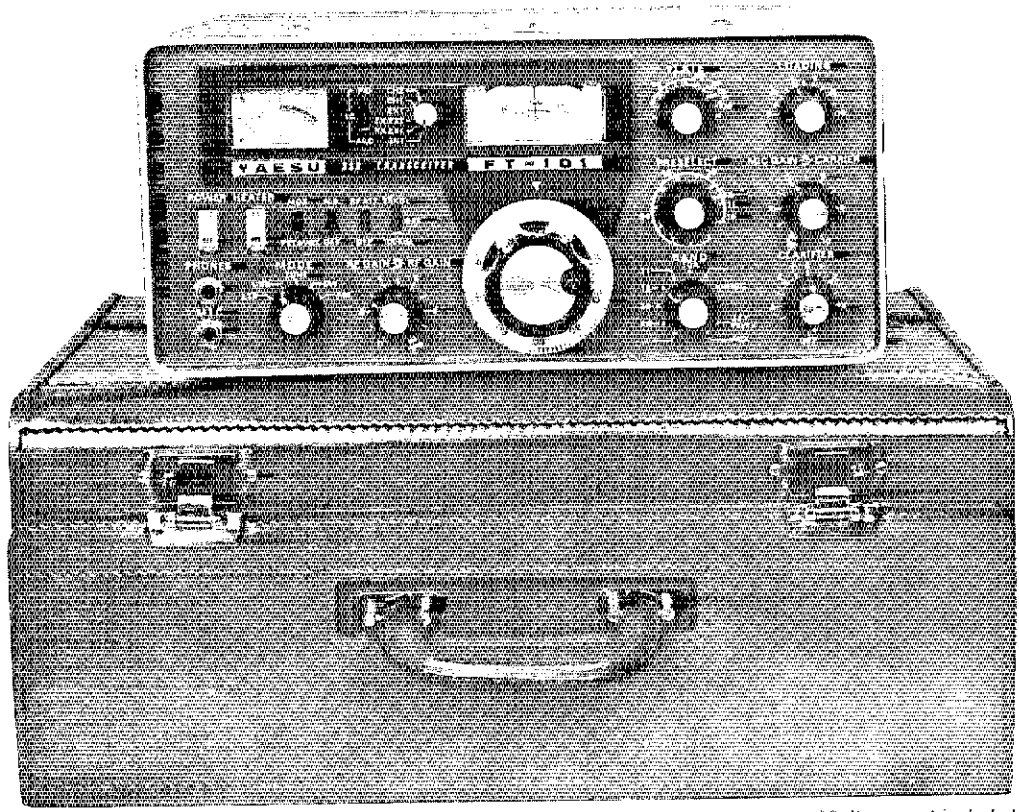
Please send model(s) _____

Name _____

Address _____

City _____ State _____ Zip _____

All prices F.O.B. Signal Hill, Ca.



*Suitcase not included

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) *Closing date for Ham-Ads is the 20th of the second* month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an *individual or apparatus offered for exchange* or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, *cancellation of a Ham-Ad already accepted cannot be* guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information, Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

AN INVITATION NYC area hams and SWLs are invited to attend NY Radio Club meetings — 2nd Monday of every month, George Washington Hotel, 23rd St & Lexington Av at 8 PM — New members wanted.

FREE sample copy Long Island DX Assn bulletin. Latest DX news. Business size sase to K2AFY Box 74 Massapequa LI NY 11762.

IMPORTANT — Rochester location for WNY Hamfest and VHF con ference May 15th has been changed. Send for map and program. Write WNY hamfest, Box 1388, Rochester NY 14603.

WABASH Co. Amateur Radio Club's third annual hamfest, Sunday May 23. Rain or shine. $1 donation for admission. For information write Bob Mitting 663 Spring, Wabash IN 46992

NEW JERSEY'S largest hamfest May 2. Sponsored by the Key Klickers of Stirling. Doors open 8 am. Admission $1. All the gear you can fit on an 8 ft. table for $3. Held at Passaic Township Youth Center, Stirling. For information, call or write Ron Mills, 413 Elm St., Stirling, NJ 07980. Tel. 201-647-1283.

VIRGINIA State ARRL Convention, May 22-23, War Memorial Building, Vinton, VA, Rt. 24 (off 460 in Roanoke County). Saturday 6 pm. registration & social. 8:30 pm. Firstnighter round & square dance. Figures by Andy Anderson, music by the Top Notches. Free western square dance demonstration. Casual or western dress please. Sunday 7 am. Registration & free continental breakfast. Largest flea market held in the Roanoke Division. All dealers invited. No Fees. Contest — homebrew — mobilerig — QSL — leftfoot sending. Picnic area — playground — lunch — displays — traffic session. Guest speaker: Joe Galeski, W4IMP.

SPRING auction of the Rockaway ARC will be held Friday evening, April 23, 1971, at 8:00 pm. at the American Irish Hall, Beach Channel Drive (at Beach 81st. St.), Rockaway Beach, N.Y. Come to the best Auction in the New York area. Doors open at 6:00 pm. to accept items for the sale. Further information, write to Auction Chairman: Al Smith, WA2TAQ, P. O. Box 341, Lynbrook, NY 11563.

SYRACUSE NY Hamfest — April 17, at Song Mountain off Interstate 81 Exit 14. Flea market, contests, speakers, net meetings. Tickets $5.50 in advance, $6.50 at door. R.A.G.S., Box 88, Liverpool, NY 13088.

INTER CONTINENTAL traffic net. — Every amateur who handles even occasional patch should have net's new directory available at $1.50. Several hundred U. S. plus over 100 foreign listings with telephone numbers. Order now from Tex Barbarite, 9 St. Ives Dr., Severna Park, MD 21146.

TRI COUNTY Radio Association will hold an auction sale on Sunday, April 18th at the Arbor Inn, West 7th and Rock Avenue, Plainfield, New Jersey. Equipment may be brought in starting at 12:00 noon. Sale will begin at 1:00 pm. All amateurs welcome. Further information may be obtained from George A. Diehl, W2IHA, Secretary, 20 Wilson Avenue, Chatham, New Jersey 07928. Tel. 201-635-8703.

QSL cards?? America's finest!! Personalized made-to-order! Samples 25c. Deluxe 35c. Religious 25c. (deductable). Sakkers W8DED Box 218 Holland MI 49423

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

FREE QSL samples. Designs cut catalog 25c. Ace Printing 7809 Lorain Ave Cleveland OH 44102.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

REVISED 1971 QSL catalog! 300 cuts. Stock and ink smaples, ten report forms, plus ten sample QSLs. 25c. Cornelison's Quality QSLs 321 Warren St., North Babylon LI NY 11704.

SAMPLES 10c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for $4.50, samples 10c. W9SKR, George Vesely, Rte.†1, 100 Wilson Rd., Ingleside, Ill. 60041.

RUBBER stamps $1.50 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSL, SWL cards that are different. Quality Card Stock Samples, 10c. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

QSLs. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield UT 84015.

GORGEOUS QSLs. Rainbows, etc. Top quality! Low prices! Samples, 10c. Refundable. Joe Harms, W4SLQ, Box 158, Edgewater Fla. 32032.

QSLs "Brownie." W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

QSL Print. Samples 25c. K1FF, Blaisdell, PO Box 33, Melrose MA 02177.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

100 two color glossy QSLs $3.25. Yutz Printing W3LXY Pottsville PA 17901.

FRAME Display, and protect your QSLs with 20 pocket plastic holders, 3 for $1, 10 for $3, prepaid and guaranteed. Tepabco Box 1987 Gallatin TN 37066.

CREATE a QSL with a "Sampler instruction kit" 25c. Samco, manufacturer of (Xtra Class) and regular printed QSLs. Write Samco Box 203 Wynantskill NY 12198

QSLs 100 3 color glossy $4; 200 $6; globe, eagle or straight key on front; report form on back; free samples. Rusprint Box 7575 Kansas City MO 64116

TWO color QSLs $1.95 per 100. Send check or M.O. to A. Cohen 2025 B North John Russell Circle, Elkins Park PA 19117

NEW! QSLs professionally designed and printed. Every card original, exclusively for you. Samples 25c (deductible). W1FLX QSL Designs 20 Britton St Pittsfield MA 01201

100 QSLs $1.50. Samples, dime. Holland R3 Box 649 Duluth MN 55803

3-D QSLs — the modern concept that makes all others old fashioned. Samples 25c (refundable). 3-D QSL Co., Monson 2, MA 01057.

QSLs. Unbeatable. 10c. Filmcrafters, Martins Ferry, OH 43935.

QSLs — Thin dime brings samples. Alkanprint, Box 3494, Papago Station, Scottsdale, AZ 85257.

WANTED: Complete station ssb or cw, preferably kw, any condition, working or not. Chas. Henry, 39 Beaconsfield Blvd., Beaconsfield, Quebec, Canada. Tel. 514-695-6442.

TRANSFORMERS rewound. W4CLJ, 411 Gunby, Orlando, Fla.

WANTED: Collins 800 cycle filter for 75A3. Burrows, VE3AGC, 4200 Mount Carmel, Windsor 22, Ontario, Canada

CANADIANS — For sale, Johnson Ranger II transmitter, good condition, best offer. VE6ANJ, 13703 58 St., Edmonton, Alberta.

WANTED: SB401, Jack Chambers, VE4JO, 39 Lenore St., Winnipeg 10, Manitoba. Tel. 204-772-2379.

WIRELESS sets, parts, catalogs, bought, traded. Lavery, 118 N. Wycombe, Lansdowne PA 19050.

NOVICE crystals: 40-15M $1.38, 80M $2.08. Free flyer. Nat Stinnette Electronics, Umatilla FL 32784.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Erv Rasmussen 164 Lowell, Redwood City CA 94062.

WANTED: An opportunity to quote your ham needs. 32 years a ham gear dealer. Collins, Signal/One, Drake, Galaxy and all others. Also $25,000 inventory used gear. Request list. Chuck Schecter, W8UGC, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441.

WANTED: Old engines from model airplanes. Will trade tubes, transistors, transformers, etc, etc. Frank Schwartz W4KFK 2400 W. End Av, Nashville TN 37203.

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

PROP Pitch Rotor, 10,000:1, unmodified, excellent $45. Safety belts, climbing, body portion $15. Counter 100 kc Berkley $80. Gertsch FM3/PS3 .001% 20-1000 Mc $350. 1W Handitalkies on 146.94 $55. FOB Link, 1081 Aron St. Cocoa FL 32922

WANTED HA2 transverter, 18" sheet metal steer and brake. W4UCH, Miskel Farm RFD 2, Sterling VA 22170.

WANT 238 early wireless magazines for W4AA historial library. Send for list. Wayne Nelson, Concord NC 28025.

MOTOROLA 2 meters; U43GGT, 40 watts output transistor supply, very clean with cables and control head, less crystals $145. 80D transmitter strip $15. Sensicon A Receiver $20. Complete 80D, dynamotor supply with cables and head $40. WA1INO Box 587 Manchester CT 06040

GREENE — center insulator, with or without Balun — a tough number to beat — free flier. Box 423 Wakefield RI 02880

COLLINS R390/URR digital readout receiver, 0.5-32MHz. Good working condition, $475. WRCV 1910 Longpoint, Pontiac MI 48053. Phone 313-FE5-1021

UPGRADE your license! You need Posi-check. Original, expertly devised, multiple-choice questions covering all areas tested in FCC exams. Same form as the FCC exams. Keyed answers, explanations, IBM sheets for self-testing. Over 300 questions and/or diagrams for each class. Each class complete in itself. Basic questions duplicated where they apply. Continuously updated and reprinted since 1964. New prices include first class mailing. General Class $4. Advanced Class $4.25. Extra Class $4.50. Add 30 cents each copy for air mail. Send check or money order to Posi-Check, PO Box 3564 Urbandale Station, Des Moines IA 50322.

QSTs before 1922 and amateur teletype publications wanted. Orville Magoon 1941 Oakdell Dr.Menlo Park CA 94025

WEST Coast Hams buy their gear from Amrad Supply, Inc., Send for flyer. 1025 Harrison St., Oakland CA 94607

RECEIVING & Industrial Tubes, Transistors, all brands — Biggest discounts, Technicians, Hobbyists, Experimenters — Request Free Giant Catalog and save! Zalytron 469 Jericho Turnpike, Mineola, NY 11501

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick, WSN 99336

WANTED. High power modulation transformer, and other high power components for new radio club. Also radio/electronics correspondence course. John Penter PO Box 501 Van Nuys CA

1896 - 1922 wireless equipment and catalogs wanted. Correspondence with collectors invited. Dick Sepic 1945 E. Orangegrove Blvd, Pasadena CA 91104

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Milley St., Elizabeth NJ 07207. Tel. 210-354-3141

TOROIDS & teletype. Lowest prices anywhere. 40/$10 post paid. 32KSR printer, reconditioned $225. Model 14, 15, 19, 28, 32, 33! Many more bargains. List, stamp please. Van W2DLT 30ZZ Passaic, Stirling NJ 07980

SELL: Galaxy GT-550, ac P.S., VOX with manuals $460. Will ship. Siefert, 4295 Waybourn Rd., Columbus OH 43220.

CAMPING in Europe this summer? Write now to DL4VA/WA4WME to plan eyeball QSO. Vandegrift, MATCOM-DSO, APO NY 09052

CAPACITORS — brand new 275ufd electrolytics at 500wvdc. Ten for $19.50. Mehaffey, K4IHP, P. O. Box 28951, Atlanta GA 30328.

WANTED: HF-33B linear. Sell: SB-401. Ray Crawford, W4VRO, P.O. Box 424, Royston GA 30662

HAM — Counselor, over 18, to instruct at a children's camp in the Pocono Countains of Penna. Own equipment required. Explain type equipment and further qualifications to Pocono Highland Camps, 6528 Castor Ave., Philadelphia PA 19149

RUBBER stamps: your call, ½-inch letters, $1. Ellis, 108 East Cook, Anchorage AK 99501

DERRICK Electronics has antennas. We'll give the best deal on Hy-Gain, Mosley, Cushcraft, Rohn, Tri-Ex, Easy-Way, Tristao. Box 457, Broken Arrow OK 74012

NOVICES: Need help for general ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk VA 23508

TELETYPEWRITER machines, parts, bought-sold. S.a.s.e. list Typetronics, Box 8873, Ft. Lauderdale FL 33310

SELL: Hammarlund HQ-170A-VHF receiver, 160 thru 2 meters $190. WB6SLT, John Myers, 1344 Orchid, Santa Barbara CA 93105

WANTED: Teletype machines, parts, Models No. 28, 32, 33, 35, 37. Cash or trade for Drake equipment. Alltronics-Howard Co., Box 19, Boston MA 02101. (Tel: day or night 617-742-0048)

1000 PIV @ 2 amp, new epoxy diodes includes disc bypass & bridging resistors. 10 for $4.50, Diodes only 10 for $3.50. New 490 MF @ 500 volt Electrolytic caps. $160 ea. Postpaid USA, East Coast Electronics, 123 St. Boniface Rd., Cheektowaga NY 14225

WE'RE trying to complete our collection of callbooks at Hq. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington CT 06111

WANTED — For personal collection. The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914. W1CUT, 18 Mohawk Dr., Unionville CT 06085

DIODES — 1000 PIV 1.5 A Epoxy 24 cents each ppd. Toroids 88MHY or 44 MHY 5 for $1.50 ppd. Weinschenker, Box 353, Irwin PA 15642

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info contact Al Marey, W4ID, Secy., 461 Third Ave., Eau Gallie FL 32927

2 KW toroid tank circuit kit †115 — kit contains special toroid core, end spacers, teflon sleeve and wire. Complete instruction for assembly. Update your old amplifier for cleaner more efficient operation. 3-30MHz core dimensions 2" dia x 1" thick. Kit price $16.95. 30 amp filament choke kit †214 — kit contains ferrite core wire & instructions 2.5-55MHz dimension 3"L x ¾" dia. Kit price $6.75, assembled $7.95. Amplifier plate choke †217 — 2.5-55MHz 1.5 amp rating dimensions 4"L x 7/8" dia. Price $7.95. Include 30c to cover postage. Make check payable: Redline Electronics, 3498 E. Fulton St., Columbus OH 43227.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York NY 10007.

WE BUY all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co. Box 516, Hempstead NY 11551.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway NY 10012. Tel. 212-925-7000.

INVADER 200: 200 watts ssb with vox. Perfect working order. $175. Randy Sigman, 27 Nassau Dr., Great Neck, NY 11021. (WB2KXY)

WANTED: Hallicrafters S-27 C receiver (130 to 210 MHz.). Also want early Hallicrafters receivers. Howard Hoagland, 639 N. Sierra Bonita, Los Angeles, CA 90036

SELLING: SB-100, HP-23 supply, $300. HR-10, DX-60B, HG-10B VFO, all cables, w/TR switch, $100. All mint, with manuals. You pay freight. WAØZJJ, 1022 S. 10th St., Fargo, ND 58102

FOR SALE: DX-40 $40; SX-99 $80; EV-664 $35; Eico scope $70; Wollensak T-1500 $60 or best offers. George Blount, K4RBT, 2614 Coolemee, Raleigh, NC 27608

LAMPKIN 205A fm modulation meter, good working condition. $175, postpaid. Norman Coltri, WA2UUP, Grove Road RD 1, Vineland, NJ 08360

LAMPKIN 105B $95. George A. Picha, Jr., 1901 Barcelona Dr., Muncie, IN 47304. Tel. 317-284-6887

Heath Shawnee 6m transceiver, ex. condx. $80; HD 10 electronic keyer $30, like new. Jim Kunde, WA9ZPD, Box 3512, Green Bay, WI 54303

HEATH SB101, ac, 400-cycle filter, A-1, $385; Tentec PM 2 $39; Heath metal locator $49; Mosley classic ant. $75; Heath phone patch $15; 641 EV mic. p.t.t. stand $20. All mint. Bob Sumption, K9VYE, 142 E. Murray St., South Bend, IN 46637. Tel. 272-4832

HEATH HW100 and HP23A. Factory aligned. Both absolutely perfect. $200. Montie Fisher, WA5TSL, 2520 SW 64th St., Oklahoma City, OK 73159

SQUIRES-SANDERS SS-1R balanced mixer front-end receiver. Good condition. $250. Professor Colton Tullen, K2PXQ, Department of Physics, County College of Morris, Dover, NJ 07801

HEATH SB-301, cw filter. Mint, expertly wired. $240. Brad Malt, WA1HUH, 10 Woodridge, Wellesley, MA 02181

APACHE TX-1 and SB-10, mint. Both $125, f.o.b. K8CVV, 4612 Woodland, Royal Oak, MI 48073. Tel. 313-549-2353

FOR SALE, going to college, SB-301 $275; SB-401 w/xtal package $275; SB-600 $10; HD-10 phone patch $12; Ameco SWR bridge $12; Tymeter digital clock $10; TR-44 rotor $40; Mosley classic 33 $80. Take all $600. Or make offer. Larry Dunville, 18205 Denslow, South Bend, IN 46614

HEATH SB-300 with cw/am filters $200; SB-400 $225; SB-200 kw linear $180. Or all for $600 or best offer. K8IFH, 29089 Kendallwood, Farmington, MI 48024. Tel. 313-476-7823

WANTED: Collins KW-1. Must be clean. No junk! State price and condition. Wanted: mechanical filters "A" and "C" for Collins 75A-4. W6IIP, 3341 Wimbleton Dr., Los Alamitos, CA 90720. Tel. 213-431-4001

HEATHKIT Apache TX1 transmitter with SB-10 Mohawk RX1 receiver all manuals $175. Fred Wunder, W2TDV, 136-21 Francis Lewis Blvd., Jamaica, NY 11413

JOHNSON Kilowatt matchbox in new condition $100. Can ship. W5IHD, 5839 Belmark, Houston, TX 77033

SELL or Trade: Eico 753 in very good condition for $165 or swap for Drake 2C receiver with 2-CQ speaker/Q-multi, also in very good condition. WA7NWL, 4634 E. Cypress, Phoenix, AZ 85008

YAESU transceiver bargain, new artested perfect FT200, 5-band 300 watts, loaded with features, includes power supply and speaker, $350 complete. Call W2SKE 914-234-3713

HALLICRAFTERS HT-44, PS 150-120 matching speaker $195 plus shipping. Wanted: Transcom SBD-3A dc power supply. Wendell Lewis, Box 128, Rockland, ME 04841. Tel. 207-594-4714

MANUALS: $6.50 each: R-390/URR, R-390A/URR, TS-497B/URR, URM-25D. Hundreds more. S. Consalvo, 4905 Roanne Dr., Washington, DC 20021

HQ 180AC, recent factory alignment, $250. WA3MXE, Harry Palmer, Box 572, RD1, Mohnton, PA 19540

WANTED: W2RUK would like to compile a list of Hams who are interested in model railroading. Card to 7 Charles, Auburn, NY 13021

DRAKE T4XB R4B AC4 MS4, new condition, original cartons $750. Van Peterson, WB4GQU, 505 Winthrop St., Fort Walton Beach, FL 32548

WANTED: FT560 $350; 500C & PS $325. Sell SB-200 kW $199.95. Ronald M. Nagata, 1330 Curtis, Berkeley, CA 94702. Tel. 418-526-7345

COLLINS KWM2 and ac power supply, excellent condition, never used mobile, $595. W5YUO, 1706 Parkridge, Arlington, TX 76012. Tel. 817-261-9853

SELL: HT-46 with vox $200; HQ-170-AC with speaker $200; HG-10 with power supply $25. Manuals included. WB2DTY, Bill Epperhart, 40 Orchard St., Glen Head, NY 11545

SELL: HW-100 $210; HQ-170A $140; Viking II plus vfo $65; TH3MK3 jr. beam $65; CDR-AR22 $20; SWR HM-11 $7; HM-15 $8; HP-13A mobile supply $50. Tom Reid, K8PVD/8, Box 65, Oxford, OH 45056

HEATHKITS professionally wired, tested. Send for quote. Parrish, 306 W. Amherst, Melbourne, FL 32901

CENTRAL Electronics 100V. Excellent physical & electrical condition. Unmodified, $275. Sorry, cannot ship. W9KFX, 519 S. Virginia, Belleville, IL 62221

FOR SALE: Squires-Sanders SS-1R, SS-1RS, SS-1S (all new), $550. 75S3-B No. 85, 399 $650. KWM2-A No. 18,922, Blanker, 516F-2 $950. 312B-5, $275. 351D-2, $100. 516F-1 (or 8P-1), $125. Viking Thunderbuilt, $225. 30L-1, $350. Mr. James W. Craig, 29 Sherburne Avenue, Portsmouth, NH 03801. Tel. 603-436-9062

SELL: RME 6900 Receiver like new condition with manual and crystals $150; Heathkit Seneca 6&2 transmitter with manual $75, Karl Rittinger, 54 Midland Dr., Dallas, PA 18612

DRAKE RV-4 remote vfo, recently factory-checked $75; Vibroplex vibro-keyer, standard model $11. Shipped postpaid. W8CXM, 7651 Normandy Lane, Dayton, OH 45459

CONTACT us for the best deal on new or reconditioned Collins, Kenwood, Tempo-One, Drake, Swan, Galaxy, Hallicrafters, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to beat any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio, Butler, MO 64730

DRAKE TR-3, mobile bracket, AC-3, century D.C. supply, MacEstes custom shielded ignition system 6-cyl Ford or Mercury — Hustler bumper mount, mast, 20 meter resonator $400, 610ZR, 40 Newton Ave., Lynn, MA 01905. Tel. 598-4138

MCCOY Golden Guardian 9 MHz ssb filter, never used, $25. QST and CQ, 1946 thru 1967, 35 cents per copy plus postage. W2TJZ, 101 Christie St., Tenafly, NJ 07670

NCX-5, NCX-A, VX-501, XCU-27 $499; NCL-2000 $265; KW matchbox $75; SB-610 scope $35; HD-23 keyer and key $30; HD-19 patch $12.50. You pay postage. WA3PCB, Herbert Novitsky, 13603 Avebury Dr. No. 22, Laurel, MD 20810

BEAM for Sale: 4EL 20-meter Hy-Gain 204BA full sized 9.7 db gain. Good shape. Practically all assembled. Best offer. Bill Senecabaugh, 434 Fulton St., Medford MA 02155

COLLEGE bound, sacrifice mint HW-100. Panel switch 400 Hz. filter, other mod. New SB-610, HM-15, HP-23, SB-600, mike, patch cords $375 firm. Will separate. Also DX-60 & TR switch $60; HG-10B $20; HD-10 fully modified paddle $25; Cantenna $5. You pay shipping. Dave Petreye, WB4HOJ, 8709 Higdon Dr., Vienna, VA 22180

SELL: Eico 720 transmitter, 722 vfo, homebrew modulator, Lafayette HE-30 receiver $110, Ken Usen, 900-19 Co-op City Blvd., Bronx, NY 10475

VARACTOR diodes — want to buy 1N4388, 1N5150, or similar. Ken Bell, W9OKB, 8267 Wisner, Niles, IL 60648

WANTED: Good used Johnson Ranger I or Navigator transmitter. J. M. Arnold, W3LOR, 116 Georgetown Ave., Pittsburgh, PA 15229

32S-1, 516F-2, 75S-3, 312B-4, SM-1 $900. Mint, original cartons & manuals. Transceive cables. Also TA-33 $60; Ham-M $60; 3-section Rohn 60' crank-up tower $100, or $200 for all 3. Leon Woodlock, W5PWU, 6779 E. 66th Place So., Tulsa, OK 74133

COLLINS receiver control C-975/URR, Teletype s.f.c. unit for R390/URR, in cabinet. Matches R390. Manual. Rare unit as new. $150. Want Hughes or other early telegraph printer. Spence, 106, Cherry Hill Circle, Branford, CT 06405

WANTED: Yaesu FTDX-560 transceiver, unmodified. I have only $200 cash. R. D. Kobel, 341 W. Branning Ave., Fort Wayne, IN 46807

UHF converters, blonder-tongue chan. 76 to 7, & 13, like new. Sell or trade. Ken Birman, K8YYC, Rt. No. 1, Box 216, Dowling, MI 49050

SWAN 500 vry gud. John C. Kroll, WA8TDY, 3528 Craig Dr., Flint, MI 48506. Tel: 313-742-1747

DX-60, $35; HG-10 vfo, $25; Novice crystals, HQ-110A, $100. All $150. WA9NAK, 109 S. Albert, Mt. Prospect, IL 60056. Tel: 312-259-3066

SECODE wanted: RPD674-5F 2805 CPS decoder. Alternates: RPD674-1F, SD30B, or equal. Send details. WA5WGO, 4911 Western, New Orleans, LA 70122

SWAN 350C transceiver 550 watts cw/ssb with calibrator, excellent condition, $400. Gary Jordan, WA6TKT, 629 Manhattan Ave., Hermosa Beach, CA 90254. Includes 117XC power supply!

HEATH Mohawk $110; Hw-32 $65; HD-15 patch never used $18; Tubes (all new), 4X150Bs $18, 4CX300A $24, 813 $14, 811As $6, 4E27s $9; RG-221 $39; new dynamic microphone $10; 455KC Collins mechanical filters, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, $15 each. William Hodson, W0HNF, 807 Dunston St., Colorado Springs CO 80907

WANTED: Transmitter to cover all MARS frequencies RTTY gear, 2-meter gear to cover 148.5 Mc, 2¼ x 3¼ or 4 x 5 speed graphic. John Waskowitz, 35-30 73rd St., Jackson Heights LI NY 11372

CLEAN Clegg Venus with 416AC $250, or swap for HF gear. Also Roberts 1719 stereo recorder $125. Make offer! WA7CXM/9, Elder 405, 2400 Sheridan, Evanston, IL 60201

DRAKE T4 reciter, mint condition $185; National NCX5 MK-11 with ac $395; SB101 HP23 $385; Hallicrafter HT41 linear $175. Johnson invader 200 ssb xmtr. List available. John Kakstys, 18 Hillcrest Terr., Linden, NJ 07036. Tel. 201-486-6917

WILL swap latest Nikon Photomic FTN with Nikkor-S 55 mm F1.2, 135 mm F2.8 and Toshiba Royal 7 electron flash. For best: ssb transmitter offered. W2JEJ, 1903 Sunset Ave., Wanamassa, NJ 07712. Tel. 201-774-4053

WANTED: SB-200, no junk. Fred Roberts, 222 Shady Hollow, Casselberry, FL 32707

BUILD for me 600-meter adapter QST page 18, Sept., 1968, Fishback suitable use with Hallicrafters SX-122A. Quote delivered price and date. Willis K. Wing, Falls Village CT 06031

HEATHKIT SB-301, excellent condition, 2.1 kHz filter $225. HB-15 SWR meter $10. Both shipped prepaid. Cline WB6LXI, Box 4475, Santa Barbara, CA 93103

FOR SALE: Hallicrafters SX 100, Excellent condition, $100 firm. Have new transceiver. WA2OQB, 2 Forest Ave., Old Tappan, NJ 07675

WANTED: Manual and complete schematic diagrams for Gonset G66-B receiver. State condition and price. Gene Bowman, Box 992, Garland, TX 75040

WANTED: 75A4 Mechanical filter 2.1. J. E. Shutt, W4JBN, P.O. Box 96, Sturgis, KY 42459

BACK issues of IRE, Electronics, and B.S.T.J. Mostly bound in books. Bargain. E. M. Shook, W5IT, 227 West Woodin Blvd., Dallas, TX 75224

TRI-EX THD-354 54-foot crank-up tower. $50. Dick Yeran, WB8HTA/4, 6709 Greendale Rd., Alexandria, VA 22310

SELL: Viking Valiant $110. Wanted: 30L1. Gordon Girton, WB6AMG, 1192 Ayala, Sunnyvale, CA 94086

DRAKE T4X & ac supply $350 or T4X $300. Shipped in orig. cartons. Mint condx. WA9QWO, 1032 Brentwood Rd., Morton, IL 61550. Tel. 309-266-9528

COLLEGE expenses coming up. Must sell Heath SB-101/400 Hz cw filter $325; HP-23A $40; SB-600 spkr $12; HM-15 SWR meter $12; also Laf. HA-460 6M transceiver $80. Or give me your offer. David Rehrig, Box 135, Ashfield, PA 18212

NOVICES and Generals! Must sell Ameco TX-86 transmitter and supply, Lafayette SWR and strength meter, key, 40 meter dipole antenna, fifteen 40-meter crystals, cables, $105. You pay shipping. Mike Schwarzchild, WN2NBV, 543 Old Country Rd., Huntington Station, NY 11746

DRAKE TR-3 for sale $275. T. Sowden, RFD No. 3, Arkansas City, KS 67005. Tel. 316-442-5717

SALE or trade, BC 610 D. You pay shipping. W6YQY, Rudy W. Martens, 1170 Huntington Dr., South Pasadena, CA 91030. Tel. 213-254-3667

FOR SALE: HW-100 factory aligned in excellent condition, HP23 power supply also in good condition. Best offer. Call or write WA1JAO, Mark Radding, 53 Longlane Rd., West Hartford, CT 06117. Tel. 203-232-7176

COLLINS noise blanker 136A1 $49.50; Mercury color TV analyzer (model 900) $15; Waters CL1 preamp. $12.50; KWM1 speaker $15; Heathkit AM1 SWR bridge $7.50. Ed Flynn, 3118 N. Francisco Ave., Chicago, IL 60618

LABORATORY test equipment: L20 spectrum analyser plug-in, $450; Boonton 250-A RX meter, $550; 202F fm generator, $175; 170-A Q meter, $75; G-R 1001-A signal generator, $250; 1303-A two-tone power oscillator, $150; 1800-B VTVM, $50; VR-6000 video tape recorder, new head, four tapes, interchange tapes, $700; TS-186C, 0.1-10 GHz, $75; PRD 650-A power meter, $60; Scope plug-ins: L, $40; G, $35; Nems-Clarke 1670J 55-260 MHz receiver, $90; 6N2 transmitter, $50; Motorola HT-200, 2-freq., on 34-76 and 94, ni-cad, $250; T43DEN 10-watt Dispatcher, completely transistorized, $225; BO3ANC-H13NBC pocket pair, on 146.34-76, $75. Greenlee, K4GYO, 430 Island Beach, Merritt Island, FL 32952

NEED: manual for HQ129X Hammarlund revr. Sam Seybold, Beavercreek, OR 97004

HEATH HW-100 and HP-13A, excellent condition $260. Terry R. Appleton, W4GSM, P.O. Box 1383, Newport News, VA 23601

SELL: W1VG's complete 1 kW station. Collins 75S-3B with 2 cw filters, 32S-3 with 516F-2, Henry 2K, Bird Thruline RF Wattmeter with carrying case, B & W filter, B & W Matchmaster, EV 630 mike, Speedex 50L, all connecting cables, instruction books. (315 countries confirmed.) Can ship but prefer that equipment be picked up. $2000 FOB West Hartford. Will sell complete station only, no partials. L. A. Morrow, W1VG, 99 Bentwood Rd., West Hartford, CT 06107. Tel. 203-521-0416

SELL: Drake 2B improved 2B Q spkr/multiplier. Excellent $175 or best offer. Wanted: Collins basic line complete. J. Kreger, 449 Grand St., Brooklyn, NY 11211. Tel. 384-1465

FOR SALE: Eico 720 transmitter, excellent, (new final) $40. 100 through 5 KHz frequency marker, excellent. Best offer. Babb, WA3ODD/4, Box 211, Eminence, KY 40019

COLLECTORS: Have old electronic tubes for sale. Send self-addressed envelope for list. Physics Department, Middletown High, 601 N. Breiel, Middletown, OH 45042

WANTED: Tektronix plug-in units 10A1, 10A2A, 11B1, 11B2A. K6KRS, 1672 Herndon Rd., Ceres, CA 95307

MOTOROLA T51G, on 52.525, crystal ovens, cables, head, Motrac mike. All clean. $150; SX-25 $30. K4FAC, 5821 Dickson Rd., Jacksonville, FL 32211

DRAKE 2-B receiver with Q-multipher $200; DX-60 with vfo $100; Heath SWR meter $10. Paul Grant, 4440 Stoltwood Dr., Carmichael, CA 95608

HEATH HW-100, HP-13A, little used. Excellent condition. With manuals. $320 plus shipping. WA1KZU

JOHNSON Ranger 2 (160-6 m) excellent condx $120 plus shipping. R. Walls, 305 Caroldale Ln., Middletown, KY 40243

NO time to operate. Central electronics 200 V, Hallicrafters SX-101A, speaker, national 2-meter converter, clean low time units, $450. All Clean Narco VHT-3 $110. Trade all for 0-320 aircraft engine. Allan Lurie, W9KCB, 605 E. Armstrong, Peoria, IL 61603

HOOSIER Electronics, authorized dealers for Drake, Hy-Gain, Ten-Tec, Galaxy, Regency, Hallicrafters. All equipment new and fully guaranteed. Write today for our low quote. Hoosier Electronics, R.R. 26, Box 403, Terre Haute, IN 47802

FOR SALE: HQ170 serial No. 2485. W3GNG, 104 Quaker Ln., Villanova, PA 19085

HE45B 6 meter XCVR Nuvister preamp, vfo, squelch, Saturn six antenna $65.K2JLO, 10 Irene Ln., Commack, NY 11725. Tel. 516-864-7751

SAVE on all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd., Swampscott, MA 01907. Tel. 617-598-9700/617-598-2530

HEATHKIT — SB301 $240; SB401 $260; SB610 $55; SB630 $55; SB600 $10. Microphone, key, all cables. Firm. Arnie, WA2DAM, 752 E. 231 St., Bronx, NY 10466

EICO 753 Triband 200 watt transceiver. Solid state VFO. 751 power supply. All factory wired. Excellent condition. $125. C. W. Carter, W4LLD, Kenwood Rd., Charlottesville, VA 22901

TA36 1 yr old $80; SX101A mint $150; amp 20m pair of 4-1000 $325; large prop pitch with indicator box $50; 6EL 20m ant. 46 foot boom $75. 12940 Durham, Warren, MI 48093. Tel. 313-268-1489

COLLINS: KWM2 & PWRSPL $650; Collins E.X.T. vfo $125; Collins station cont $125; 75S-3C $550; W51 tower, Ham-M, TM-300 Telrex, Tri-Band beam, over 300 feet coax, two sets of traps $575; 8TI-LK-2000, two finals $450; Comdel, pre-amp (Ameco) combination $140. Special price for entire package. Many extras, all excellent cond. WA2HSX. Tel. 516-724-8723. (Make offer.)

DRAKE R4B and MS4 $320; T4XB and AC4 $400. Mint condition, original cartons, D-104 mike, homebrew transmatch, keyer, SWR bridge. Bill Lynott, K3DCY, 1044 Highland Ave., Abington, PA 19001. Tel. 215-886-5912. Pickup only.

HALLICRAFTERS HT-37, Xmtr in original carton $180. K2UFM, Warren Hager, 120 Highview Pl., Bogota, NJ 07603

R390A with manual, excellent condx, best offer. W3FPP, 1622 19 St., Washington DC-20009

MOVING to medical school apartment: Hallicrafters SX-146, cw filter, xtal calibrator $190; Mosley TA-33 senior beam $85; 50-ft. Spaulding tower $75. Will consider nearby delivery. WA3AHQ, Box 244, Lehigh University, Bethlehem, PA 18015

VERY in-ter-est-ing! Next 6 issues $1. "The Ham Trader," Sycamore, IL 60178

SELL: Drake 2-NT xmtr, excl, A-1 condx. $100. WA2EWC, Bob Kaefer, 177 Clinton, Cowlesville, NY 14037

COLLINS KWM-2, 30L-1, 62S-1, 312 B-4, 351D-2 mobile mount, 180S-1 antenna tuner, MP-1 power supply CC-2 suitcase, 302 C wattmeter PM-2, MM-1, 516F-2, Hy-Gain reel portable TO-1 and 6 & 2 meter 64B 4 element antenna, Mosley portable 10-15-20 antenna. All in excellent condition. Best offer. Kamboryan, Wheeler Rd., Lincoln, MA, 01773. Tel. 617-259-9214. W1USP

WANTED: power supply for navy type LM21 frequency meter. Wallace A. Ritchie, W7AXT, 3622 D St., Bremerton, WA 98310

SELL: HR-10B $50; DX-60B $50; HG-10B $20; all $100. For details write Ben Ballard, 216 York Rd., Sparks, MD 21152

CRYSTALS airmailed: Novice-FT-243, 80M $1.75, 40M - 15M $1.50. 15% discount five or more. Postage/crystal, Airmail 12c, 1st-cl, 8c. General purpose FT-243 crystals, .01% 3500 - 8600 Kilocycles, $1.90, (minimum five same or mixed $1.75), (crystalize your net, ten same frequency $1.45), .005% add 50c/crystal. MARS a specialty. Free general frequency order-bulletin. Bob Woods, W9LPS, C-W Crystals, Marshfield, MO 65706

WORLD-RADIO has used gear with trial-terms-guarantee! KWM2 - $649; TR4 — $599.95; SB34 - $249.95; FM210 (2 meters) $159.95; Galaxy 300 - $139.95; Drake 2NT - $119.95; R4 - $299.95; Ranger $99.95; HT40 - $69.95; SB400 - $229.95; SR21A - $149.95; HQ180C - $309.95; 75s1 - $279.95; R4B - $329.95. Free "blue book" list for more. 3415 West Broadway, Council Bluffs, Iowa 51501

KWM-2 plug-in relays, 312B-5 vfo console, 516E1 dc supply, 516F2 ac supply, 351D2 mobile mount, Hammarlund HXL, one amplifier, one package. All equipment perfect, no scratches. $1600. K4TG 5648 NE 5th Ave Ft. Lauderdale FL 33308.

BEAT corrosion! Ham Hardware Headquarters fine stainless, other, threaded, washer, hardware. Guying accessories, Insulators. Lists '20c! W8BIR, 29716 Briarbank, Southfield, Mich. 48075

NEW: Signal-One, Kirk quads, Yagis. Trade for Collins, Drake. Late: KWM-2, 75S-3C. Don Payne, Box 525, Springfield, TN 37172

WANTED: Heathkit SB-640 external vfo. Top dollar for unassembled kit. Assembled unit must be perfect. Write WA9ZXR, 2501 West 67th St., Shawnee-Misson, KS 66208

COLLINS 75S1 and 32S1 and 516F2; Hunter Bandit 2000A; Johnson kilowatt match box; Jones micromatch; Criterion converter, model 50-6 meters & crystals in 75-S1; Globe patcher and D104 microphone. Excellent condition, complete lot. Firm $750. K9MIL, Jerry Mahoney, 900 Black St., Pekin, IL 61554. Tel: 346-8739

QST for sale January 1931 to December 1970 fob complete all good condition. Will sell to the highest offer. Max Ortelt, RFD 3, Rehoboth, MA 02769

FOR SALE: Heath keyer. Needs some work. $25; DX150 revr $70; R5 revr $40. You ship. WB2IWH, 213 Dayton Ave., Clifton, NJ 07011

SELL: Allied model A-2516 ham bands receiver, featured in Jan. 1970 QST. Mint condition. $75. Thomas Cann, 1565 Black Rd., Joliet, IL 60435

TELETYPE equipment; reconditioned and set up for Ham RTTY. Details: C. H. Plummer, Cherrybrook Dr., RD 5, Princeton, NJ 08540

HEATH HW-32 with mike, HP-13 dc supply, Hustler RM-20 M. ant. Like new $125. Jim Lollar, K5GKR, 418 W. 18th, Ada, OK 74820. Tel: 405-332-4734

COLLINS PM-2 power supply and CC-2 carrying case. Both mint condition. $140. K9EGD, 5963 N. Nina Ave., Chicago, IL 60631

HEATH SB500 two meter transverter, excellent, $135. Sell or trade. Jim Cox, K4JAF, Rt. 2, Harrison, TN 37341

TWO meter am xcvr HW-30 $45. J. N. Nuzzi, 230 Lane St., Hamden, CT 06514

TRADE HRO 60 with 80 40 20 15 10 coils for good 6 M transceiver. Will ship. E. Daniels, 230 W. Patt St., Lansford, PA 18232

WANTED: Dayco DR-30 receiver. Robert M. Paine, 1118 9th Ave., Seattle, WA 98101

SIGNAL One — including deluxe cw filter — latest model — warranty — will ship in original carton — best offer. Harry Burhans, RD1, Box 103, Malvern, PA 19355. Tel: 215-827-7374

SELL SBE 34, mike, extra tubes. $250. John Kersten, 717 Crest, Fort Dodge, IA 50501

FOR SALE: Two 15 type KSR TTY machines including table, power supply, keyboards, and relays. Valiant 1, CE10R, RC458, VHF 152. SX 101-A which is now at Hallicrafters factory for a complete checkup and RF-IF alignment. New Johnson TR switch never unpacked, RCA CR17B Conelrad receiver, 14AVQ with 14RMQ and other miscellaneous parts such as Xformers, Condensers, etc. L. C. Verhyden, W5OHL, RR 1, Box 119, Magazine, AR 72943

"HOSS Trader Ed Moory" says he will not be undersold on Cash deals! Shop around for your best price and then call or write the "Hoss" before you buy! New Equipment: New display Galaxy GT-550, factory warranty, $379; New Swan 260 Cygnet, $315; New Swan 270B Cygnet, $389; New Rohn 50 ft. foldover tower, prepaid, $219; New Mosley Classic 33 and Demo Ham-M rotor, $199. Reconditioned Equipment: Drake TR-4, (late serial), $519; T4-XB, $369; R4-B, $349; Ham-M, $79; Perfect 75A-4, $375. Two Meter FM transceiver sales are booming! In stock, New Drake, Regency, Varitronics. Write for prices and trades. Moory Electronics Co., P.O. Box 506, Dewittm AR 72042. Tel: 501-946-2820

DRAKE 2B receiver with 2BQ speaker/QMult., calibrator, $175. B.C. 342 (A.C.) Receiver $45, Heath Twoer $30, B.C. 221 frequency meter $45, Heath HD-20 calibrator $8. Heath HX-20 xmtr. with H.B. A.C. P.S. $120. All excellent. Want SB-101 or 102. A.S. Gillespie, W4VON, 618 Hillcrest Ave., Gastonia, NC 28052

WANTED for amateur museum: Marconi 106, rotary spark gap, National FB 7, 1/4 kw open core spark transformer, L. Whitlock, WA1INN, Box 104, Bridgewater, CT 06752

WANTED: Paragon RD-5 and DA-2, West. RE tuner, Grebe CR-9 rheostats, DeForest D-10 coils, other old radios, misc. parts. Joe Horvath, 522-Third St., San Rafael, CA 94901

WILL trade Model 28 typing unit for Model 28 keyboard or model 28 cabinet and lesn. George Cherney, 4986 Leavitt Rd., Lorain, OH 44053

WANTED: Collins receiver-transmitter. McCool, 301-77 St., N. Bergen, NJ 07047

HAMMARLUND HQ 180 AC $225 like new. K. Kearby, 437 Johnston Dr., Watchung, NJ 07060. Tel: 201-756-8121

HALLICRAFTERS SX-140 receiver $47, Johnson Viking Challenger transmitter $40. Norman Megill, 3 Ames St., Cambridge, MA 02139

HALLICRAFTERS SX-101 receiver $125. Richard Luebke, Box 585 Tarkington Hall, West Lafayette, IN 47906

SB-301, Excellent condition, $250. K3MNJ, 8361 Langdon St., Philadelphia, PA 19152

SELL: QSTs 1952-1970. Any offer accepted. W5OD, 2009 Oak Ave., Port Arthur, TX 77640

LOWEST discount prices! We guarantee to beat any legitimate written price quote submitted to us. Factory-sealed cartons. Full warranty. New equipment. Drake R4B (Regularly $475) $390; T4XB ($495) $415; AC-4 ($99.95) $85; TR-4 ($699.95) $590; TR-6 ($650) $550; C4 ($299.95) $255; Marker Luxury ($329.95) $278. Galaxy FM-210 ($229.50) $184, Mosley antennas! CL-36 ($171.92) $135; CL-33 ($145.15) $115; TA-36 ($167.85) $134; TA-33 ($133.10) $106. Hy-Gain 400 Rotator ($189.95) $149.95; TH6DXX ($179.95) $140; 204BA ($149.95) $129. Ham-m Rotators ($129.95) $99.95. Tri-Ex Towers W-51 prepaid ($393.40) $333; MW-65 prepaid ($359.65) $306. Package prices too! Discount Radio Sales, Box 6044, Lubbock, TX 79413

PHONE patch, with 2.5 kc. filter, for Telco coupler or direct if not required, no tricky adjustments, Kit $6.95; wired, add $4. Ham Kits, Box 175, Cranford, NJ 07016

HARDBOUND QSTs, 1961-1970. K2GBH, RD 2, Bx 223-23, Kingston, NY 12401

ESTATE of W1DZT: QST complete volumes 1948, 1949, 1951 thru 1969, 1950: J, F, M, O, N, D. 22 other issues 1945, 1946, 1947, 1970. CQ: 1949 complete, 16 issues 1948, 50, 53. Popular Electronics: complete 1955-59, 63, $5. Make offer to W1ESN, 31 Seward Rd., Stoneham, MA 02180

$500 cash for good R390A receiver. R. E. Brown, W9EXR, 25352 Martindale Rd., North Liberty, IN 46554

SB-300 and SB-400 w/CW filter: $500. SB-630 console: $65. Built by Heath Tech. Beautiful. W2ERV, 14 Bernice Dr., Freehold, NJ

COLLEGE bound. Sell Swan 500, 117XC, fan, D 104, SWR bridge, keyer, $375. Buzz Muscat, Sherwood Ave., Greenwich, CT 06830. Tel: 203-869-1990

EICO 720/730, National NC-57B, H.B. vfo/station control. Complete Novice-AM station, $120 plus shipping. K7ITM, c/o V. F. Bruhns, 728 G St., Centralia, WA 98531

"DON and Bob" new guaranteed buys. Monarch kw SWR-relative power dualmeter bridge $14.95; Swan 500CX transceiver, sealed, $439; AC $89; Hy-Gain TH6DXX $139; Hyquad $104; 18AVT/WB vertical $55; Mosley Classic 36 $134; Ham-M $99; TR44 $59.95; Regency HR2meter im $195; Motorola HEP170 epoxy diode 2.5A/1000PIV 39c; Amperex 8802/3500UZ $32; 6146B $4.45; Triex W51 $329 prepaid; B&W 650 dummy load/wattmeter $49.95; Tentec RX10 $69.95; Quotes new gear discontinued tubes. Prices to6 Houston, GECC, Mastercharge, Bankamericard. Madison Electronics, 1508 McKinney, Houston, TX 77002. Tel: 713-224-2668

COLLINS 30-K/310-A in good condition wanted. Tomm Shockey, 52 Hansen Dr., Vernon, CT 06086

SX101A $175; GSB100 $125; Vibro presentation unused $25. WB2PZX, 20 Weeks Rd., Pat, 6, Glens Falls, NY 12801

HALLICRAFTER HT37 transmitter and Hallicrafter SX101A receiver plus Dow-Key relay and mike. Perfect. For sale, $300. Cash and carry. W2GIE, 620 West 141st St., NYC 10031. Tel: 926-8961

OSCILLATOR, HP200CR, $75; Precision wheatstone bridge, $45; VTVM, DC-150MHZ, $35; Simpson No. 260, $28. K2DA, J. Boer, 449 Hill St., Boonton, NJ 07005

RECEIVER: Heath HR10B, calibrator $65 or best offer. Boston area only. WA1MCH, 11 Demar Rd., Lexington, MA 02173

FOUR Navy TCS transmitters. One or all. Dave Christel, 219 Shady Lane Ct., La Crosse, WI 54601

EICO 1030 regulated power supply (wired). Tested but never used. Best offer over $50. K3BZK, 200 Elmwood Blvd., York, PA 17403

KWM-2, 516F2 just like new $800, K5GGB, 11141 Forest Hill, Corpus Christi, TX 78410

FLORIDA QTH for sale; details, send s.a.s.e. to Box 1294, Jupiter, FL 33458

WORLD QSL Bureau. See display ad elsewhere in this issue.

HT-37 like new in perfect condition, $150. Bob Ensminger, 11388 Campus, Loma Linda, CA 92354

EICO 722 VFO, perfect condition $35; Eico 710 GDO $15. Rich, 1440 E. 52 St., Brooklyn, NY 11234 or Tel: 212-241-8877

WANTED: National SOJ-3 selectoject. State price and condition. K3MAW, O. Smith, 566 Buttonwood Farm Rd., Millersville, PA 17551

SB-34, perfect, condx, w/mic and mobile bracket. Factory carton. $299. Will ship. WA7NLE, 1848 Wasatch, S.L.C., UT 84108. Tel: 801-484-4671

FOR SALE: HW12 HP13A bumper mount mast speaker turner mike $140. Eight used Skylane fiberglass spreaders $20. W3HZ

SELL: C.F.S.(1) Comdel speech processor new tried out $95 pre-paid. P & H D1-1 Monitor scope, new C.R. tube $40. Vic Chamberlain, W9BBC, RR 3, Morgantown, IN 46160

HALLICRAFTERS SR-150 all band 150 watt transceiver, AC and DC power supplies and mobile mounting bracket $275. Jim Stockwell, WA6GDS, 3622 Keystone Ave., Los Angeles, CA 90034

MUST sell: Vibroplex original deluxe bug. Chrome plated and jeweled movement. New condx — make room for new keyer. $30. Shpd. in U.S. Gary, WB4LBU, Bowling Green, FL 33834

WANTED: Collins 312B4 and Johnson match box only if in clean mint condition. K2DS/W2OZD, 3 Elizabeth Ln., West Paterson, NJ 07424, Tel: 201-274-0146

HEATH SB-301 excellent, unused, stored due to Vietnam, $200. Eico 722 F/W VFO, xlot, $25. Both w/manuals. C. C. Entwistle, 2226 Missouri, San Diego, CA 92109. Tel: 714-274-4017

SALE: HW-100, recently factory-serviced, $225; HP-23, $35; HW-32A / HP-13, $125; Lafayette HA-700 revr, spkr, Heath Q-mult., $75; Mosley RV-4 vertical, $20; Hustler bumper mast, 20/40 resonators, $20. Rev. M. F. Burt, WA1MCQ, Old Bridge Rd., New Fairfield, CT 06810 Tel: 203-746-9022

SB-401, 301 with all crystals, cw filter, $600 pair. Will split. Also much RTTY and other equipment including very nice TU/L-2. S.a.s.e. for descriptions. WB4RKA, R. Wanat, 443 Atlas Dr., Madison, AL 35758

FOR SALE: Marauder Hx-10 $150. Hammerlund HQ 170 A $200. Both now on the air. K2AHJ, Tel: 516-825-3545

WANTED: National receivers SW-5, SW-3, SW-58, FB-7, FBX-A. State condition, price, and coils available. Also other makes prior 1939. Jim Geras, 108-12 227th St., Queens Village, NY 11429

WANTED: 2.1KC filter for 75A-4. W1EVL, Robert Hall, Henniker, NH 03242

RV-4 vfo, like new $75. WA8ZJO, Rt. 1, Box 455, Winfield, WV 25213

HT-46, 180-watt ssb-cw transmitter, 80-10 meters, five months old, $175. James Cain, WA9AUM, 5713C Port Irving, Indianapolis, IN 46224. Tel: 317-247-8963

HEATH SB-310, immaculate, 6 months old, with 21 MHz option. Will ship, $220 or best offer. WN3QER, 116 Crestwood, Irwin, PA 15642. Tel: 412-863-7077

IMMACULATE Drake TR-3 w/RV-3, AC-3. Factory cartons ES many accessories. Make offer. WB2TBP, Don Perlstein, 90-08 153 Ave., Howard Beach, N.Y.C., NY 11414. Tel: 212-848-5164

FOR SALE: Heath 10-18 oscilloscope in absolutely perfect condition. Used once for school demonstration. Contact Todd Rodgers, 120 East End Ave., New York, NY 10028

CLEGG 99'er with manual and 6 & 2 VFO. Both are in like new condition, $80 or offer. Will ship. Birnab Gould, 2830 Marsh St., Los Angeles, CA 90039

HQ 180AC. Excellent with S200 speaker $245. SBE 34. Excellent with SB2 MIC $195. Eico 723 mint $30. You ship. R. E. Allison, WA3HYO, RD 2, Franklin, PA 16323

SB-34, 100KC Cal., mike $240; Gonset 2 mtr Sidewinder & AC supply $175; HW-32 $45; 3.1KC filter for 75A1 $25. Collins Stiteler, WB6EUW 6141 Roosevelt Ave., South Gate, CA 90280. Tel: 213-633-4845

FOR SALE or Trade: Heights 64 ft aluminum crankup, 14 sq ft capacity, like new, half price $500 or trade for good transceiver ps, etc. TH6-DXX, $95. Berkeley 7350R EPUT counter, $95 W5LNL, 5205 Stonewall, Greenville, TX 75401. Tel: 214-455-0368

RTTY: List free. Variable-speed No. 28 drive kit $100. Gears $3.50. Telecom, Box 4117, Alexandria, VA 22303

WANTED: The following coax connectors of the HN series, 6 — UG 495A, C, or D. 4 — UG 333, A or B. $ — UG 60 A, B, or D State condition and price. W3HNQ, 413 Johnston Rd., Penn Hills, PA 15235

SALE: Hammarlund HQ140X with speaker and manual. Good condition $95 Lampkin 105B frequency meter with manual and carrying case, excellent condition $185. J. H. Dufton K3VJP, Box 219, Rock Hall, MD 21661

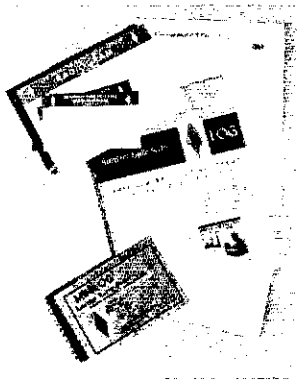
WANTED: HW-16. No modifications. S. Meadow, WN1PIO, Box 248, Catskill, NY 12414

DRAKE R4 receiver, mint condition $250. A.M. Magagna W3RWW, 3922 Mac Alpine Rd., Ellicott City, MD 21043

COLLINS 75A4, $350, 32V3, $130, KW linear in floor console needs work, $60. C. Jackson, WB6PTW, Miramonte, CA 9364

R390, $550; Telrex 4el 10 mtr beam, $30; EV635 mike, $12; 5 DuMont 304 scope, $38; Key #36, $7; Eico 950B cap ckr, $6, Berger, 8519 Braiburn Dr., Annandale, VA 22003

OPERATING NECESSITIES



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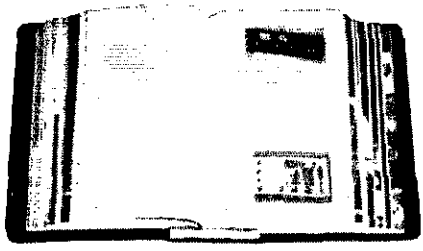

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Everything you've always wanted to know about Slow Scan amateur television

Do I need a special license, or any unusual technical knowledge to operate SSTV?

No. Any licensed amateur operator can easily set up and operate an SSTV station, (you even tune your Robot Slow Scan equipment the same way you tune for voice). The impression that SSTV required advanced technical knowledge was due to the fact, that until now, amateurs operating SSTV had to build their own sets.

What kind of radio equipment is required for SSTV?

The SSB or VHF/UHF radio set and antenna you now use for phone contacts are all that are required. To install the Robot Monitor, simply plug in the cord, furnished with the monitor, into the earphone jack on your receiver.

To install the Robot Camera, plug the cord furnished with the camera into the microphone jack. The station microphone then plugs into the Robot slow scan set.

On what bands is SSTV authorized?

The FCC has authorized SSTV operation on all phone bands except 160 meters, and the General Class portion of the phone band on 80, 40, 20 and 15 meters. With the exception of the General Class portion, a licensed amateur can operate SSTV on the same frequencies he operates phone.

Presently, slow scan activity can be frequently found on 3845 KHz, 14230, 21340 and 26800 KHz. Call-ins with or without SSTV gear are welcome, and you'll find that slow scanners are happy to answer any questions you may have.

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, California 92111

How many SSTV stations are now on the air?

We're not sure of the exact number, but it is substantial, and growing very rapidly. Slow scanners are among the most active group of amateurs on the air. They are located in the United States and practically all continents. The DX capability of SSTV is being demonstrated daily by picture exchange between US and foreign amateurs.

Can I record SSTV pictures?

Yes. An inexpensive *audio* tape recorder running at 3¾ IPS is more than adequate. Present SSTV stations practice includes use of tape for preserving off-the-air contacts as well as preparing an interesting program to be transmitted.

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See us at the Dayton "Hamvention."

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Gentlemen:
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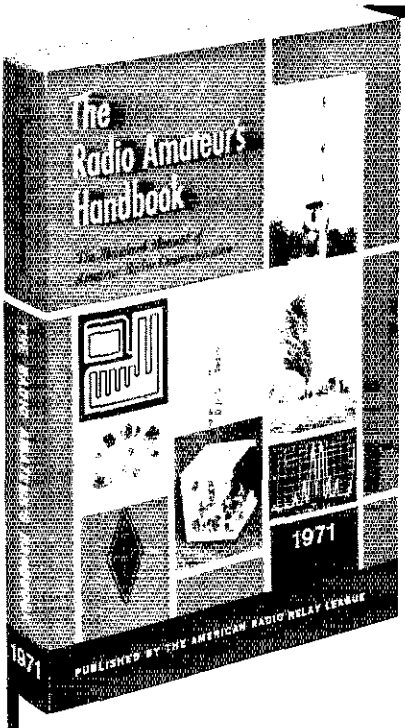

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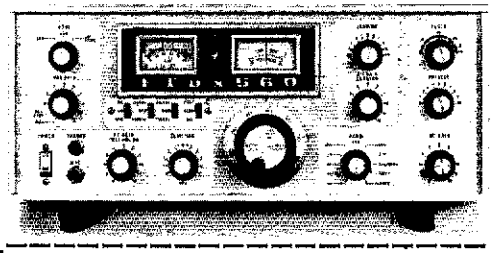

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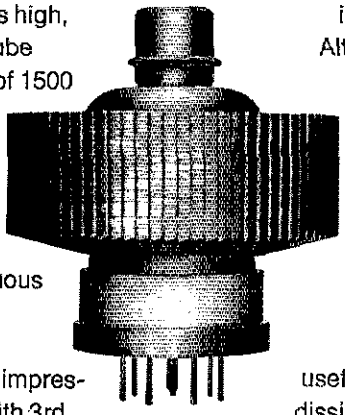
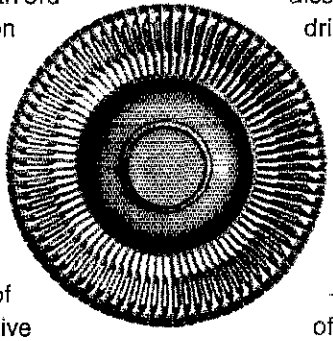
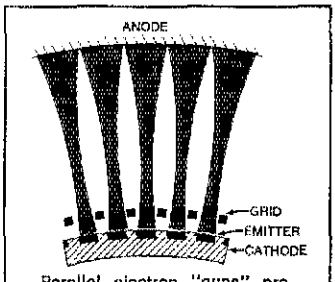


This magnificent power triode is rated at full input to 250 MHz. The low impedance grid structure is terminated in a contact ring about the base of the tube, permitting very effective intrastage isolation to be achieved up to the outer frequency limit of operation. The close tolerance grid, moreover, is composed of aligned, rectangular bars to achieve maximum grid dissipation and controlled transconductance. This aligned grid, plus the EIMAC segmented, self-focusing cathode provide low grid interception and the low grid drive requirement; both of paramount importance in the VHF region. Although primarily designed for superlative linear amplifier service demanding low intermodulation distortion, the 8877's high efficiency permits effective operation as a class C power amplifier or oscillator, or as a plate modulated amplifier. The zero bias characteristic is useful for these services, as plate dissipation is held to a safe level if drive power fails, up to an anode potential of 3 kV.



The sophisticated circuit connoisseur will appreciate the many advantages of this newly developed power tube. Write for detailed information. And remember —the 8877 is another example of EIMAC's ability to provide tomorrow's power tube today. For additional information on this or other products, contact EIMAC, 301 Industrial Way, San Carlos, California 94070. Phone (415) 592-1221 (or call the nearest Varian/EIMAC Electron Tube and Device Group Sales Office.)



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