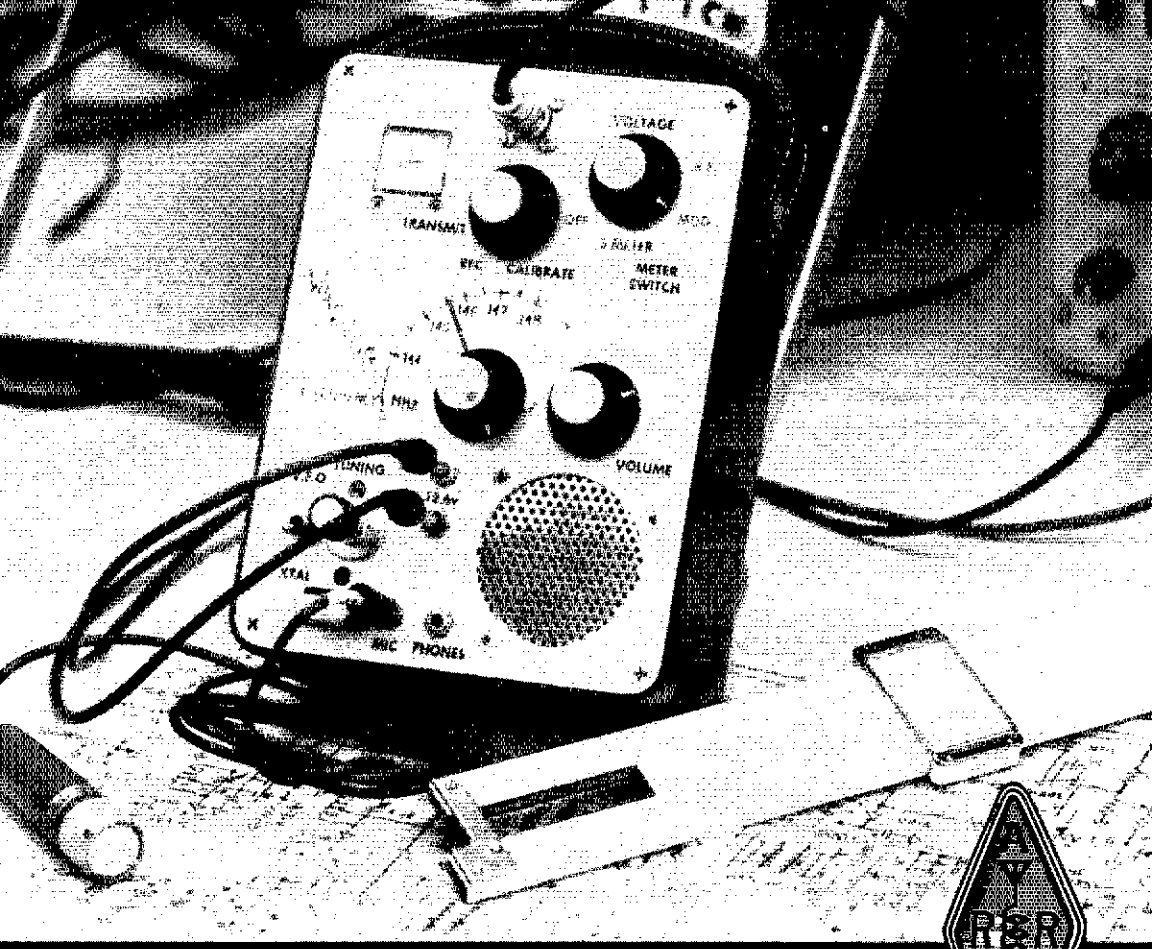


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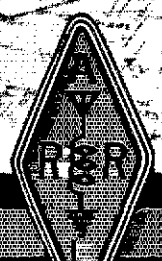
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# gang busters.

new short-wave receivers from hallicrafters. brand new the SX-133. the SX-122A. exclusively for the sophisticated amateur. the real gang busters.

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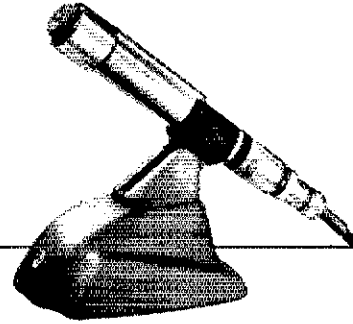
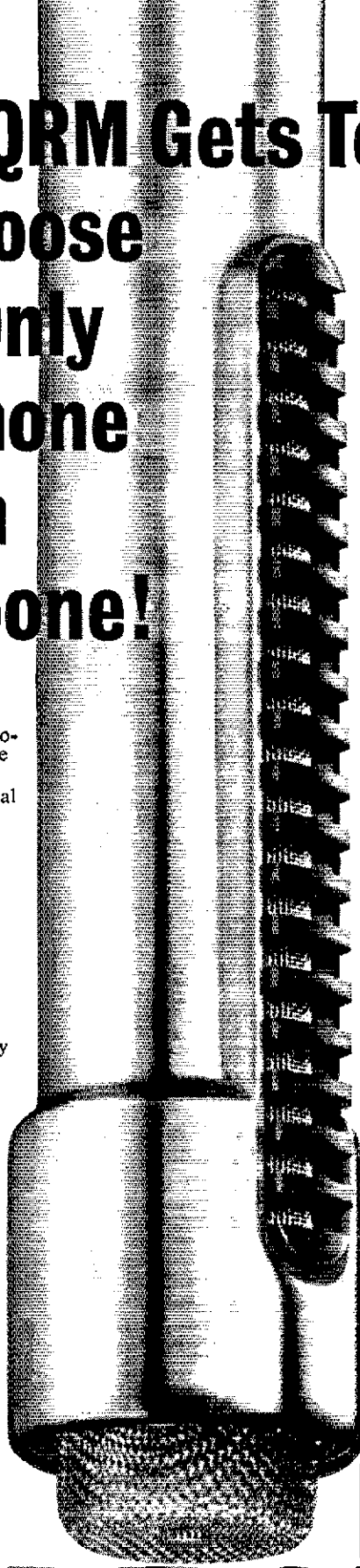
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MODEL 676  
DYNAMIC CARDIOID**

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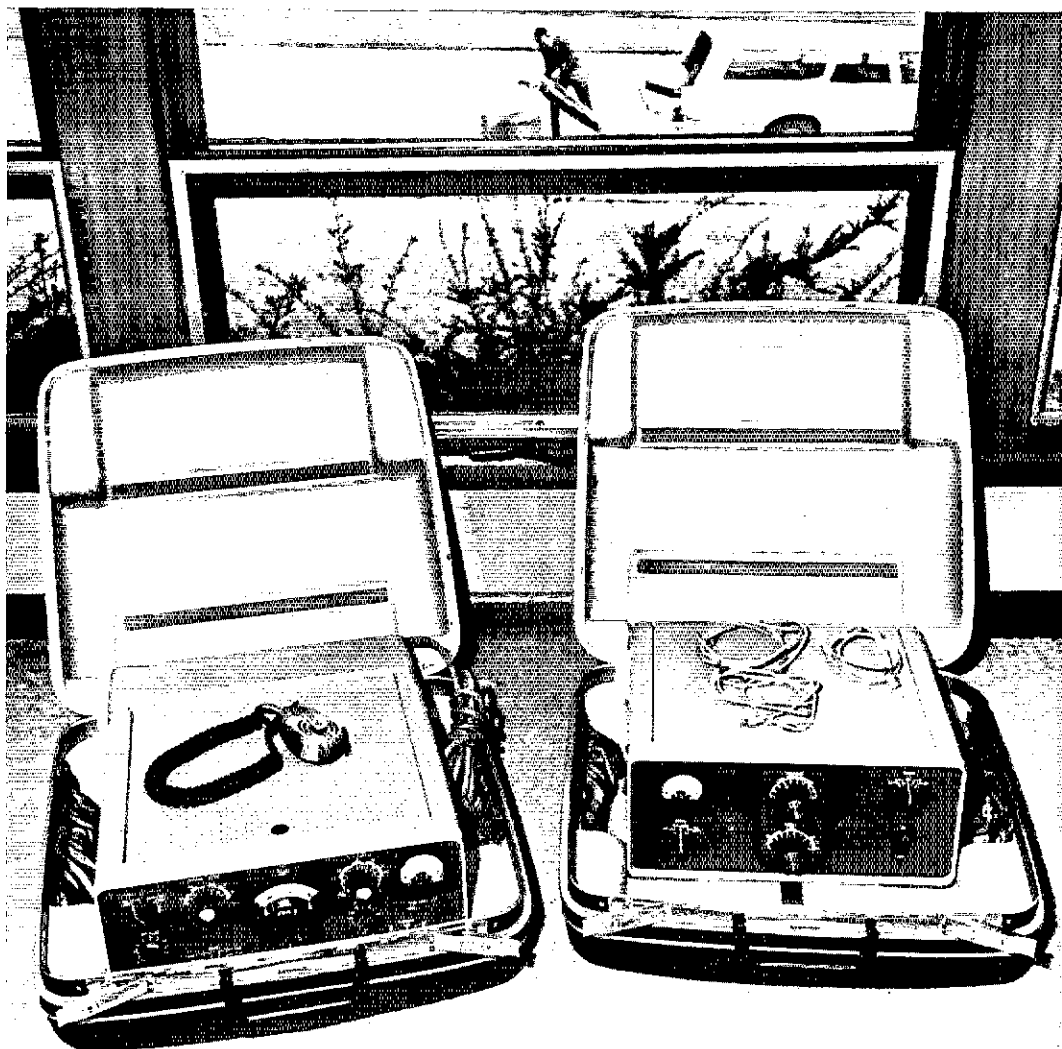
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**OUR COVER**

ICs and MOS-FETs form the electrical foundation for the equipment pictured on this month's cover. Full details on this 2-meter 4-m transmitter are given in the story on page 11.

# QST

**MAY 1970**

VOLUME LIV NUMBER 5

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# The **HAMMARLUND** Manufacturing Company Incorporated

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February 24, 1970

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Attn: B.F. Woods

Ref: SP-600JX21A

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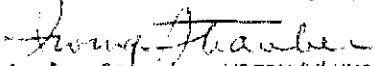
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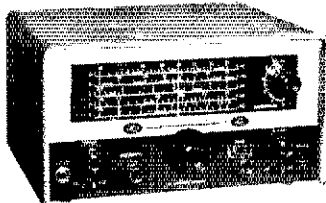
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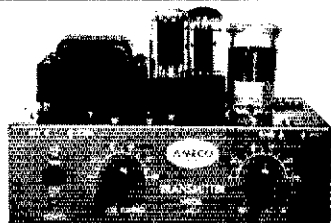
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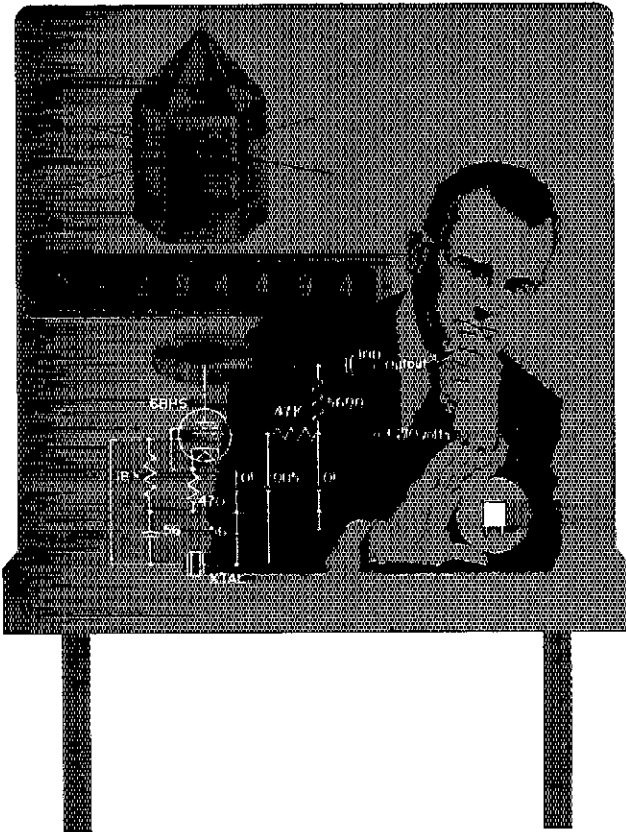
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\* Member Executive Committee

## "It Seems to Us..."

IT CAN . . . GET WORSE, THAT IS!

**I**N ANSWER to our own question leading off last month's editorial discussing postal delays in delivery of *QST*, and simultaneously with the appearance of the April issue, postal clerks in major cities went on strike! Even after a fairly-rapid settlement, an embargo remained on post office acceptance of second-class mail (magazines of all kinds) to certain major metropolitan areas.

But meanwhile we have obtained some additional information on the current mechanics of Post Office Department handling of magazine mail, particularly to the west coast. (See "Correspondence" this month.) It appears that the *target* elapsed time from placing copies in the mail at Concord, New Hampshire (almost invariably the 20th of the month) to Los Angeles and San Francisco is 7 or 8 days. According to correspondence and complaints from members, this is largely a Utopian objective, seldom attained. And apparently it does not apply to the entire west coast. Two irate members in Washington, very critical of the League for *QST* delays, inquired through official post office channels and were told it requires 20 days to get the magazine to Seattle!

The Post Office Department does have its problems, certainly, and some are not of its own making. Until recently, airmail went by air and first-class by train. The traditional mail car was a part of almost every passenger train (often with postal personnel sorting mail enroute), plus an additional car or cars containing other classes of mail. The train schedules were fixed and dependable, and one could predict the delivery not only of first-class mail but also mail of other classes (including magazines) with reasonable accuracy.

The rise of airlines as a basic means of transportation and the deterioration of passenger train service has caused a great change in the pattern of mail distribution. Airlines are handling the bulk of first-class mail, and so the mail cars have come off whatever trains are still running.

Much of the second-class mail such as *QST* now moves by truck, although a lot of it is piggy-back on railroad cars. But it

appears that few of the cars run direct from, say, Boston to San Francisco. Instead, there are a number of transfer or switching points, and delays are introduced at each one. So, up to 20 days may elapse between the time *QST* leaves N. H. and the time it arrives at a west coast area terminal. Then, the truckload has to be broken down into deliveries for the various cities.

Whereupon we run into a second problem. The postal service is inundated with mail. First-class mail, advertising circulars, newspapers and magazines. And the way this mail is handled at a local level varies greatly. If a local carrier has a heavy load of first-class mail on a particular day, some of the magazines may, at his discretion, get left behind for another day. Or, if a distribution center gets loaded down, the magazines may be held up for a day or more, before even being sorted. A day here, a day there, and pretty soon your *QST* is two weeks late, or more.

What to do about it? Well, first you're going to complain to us. We know that! We'll check your membership record and the Addressograph file, to make sure that a copy was indeed mailed to you at a correct address. In many cases we will have to duplicate the shipment, on the assumption a copy has gone astray. (We are getting so many complaints currently that it takes the entire time of one girl to process each day's complaints about *QST* delays.)

What else to do? Complain to your postmaster. And complain to your Congressman. The subject is "hot" in Washington right now. Perhaps a corporation will be formed to handle the mail, taking it out of political hands. Perhaps postal employees will get a much-deserved raise, hopefully increasing performance. Perhaps new equipment and techniques will speed the process. But in our view there will be little real improvement until the public in sufficient quantity gets angry enough to *demand* better service. As one small-town postmaster told an unhappy ARRL member, "if this *QST* magazine is as popular as you claim, howcum none of the other 35 recipients in this town have ever complained about the same late delivery?"

Food for thought . . .

**QST**

## League Lines . . .

International amateur radio continues to organize and plan for the future. Region II (North and South American) IARU society officials will meet in Jamaica during the week of May 17, with much of the discussion centering around preparations for the space conference which will take place in the early summer of 1971.

When appearing for an FCC exam, to avoid suspicion take along any writing implement you wish except a yellow lead pencil. We're not entirely kidding; seems some enterprising character got access to commercial exam questions and devised a system of scribing coded answers on the sides of two yellow pencils. Price for a set: \$300. FCC's staff has long been wise, switched the order of the questions; flunk-outs didn't get a refund, we understand!

Some reminders of recent rule changes: Ex-amateurs are eligible for Novice licenses if they've been away a year or more. . . . No dual holding of Novice and Technician, where the Tech license was issued since January a year ago. . . . The first hundred kHz of the 144 Meg band is now for A-1 only. . . . Ten-meter RTTY is now on frequencies between 28.0 and 28.5 MHz. . . . Amateurs living near airports can now have antennas twice as high as formerly, and more if a taller structure lies between them and the runway. . . . Visiting DX armed with reciprocal operating permits may borrow your equipment but not your call, or your club's call either. . . . Canadians have rules on a case by case basis for repeaters, and for beacons, applying in each case through the Regional Office of DOC. . . . New citizens who were hams in "the old country" can count their longevity toward the two years needed for Extra Class eligibility, and if Extra Class, toward the 25 years needed for a two-letter call. . . . Deadline for commenting on FCC's rulemaking proceeding for repeaters is May 15. . . . Watch "Happenings of the Month" regularly for news on the amateur scene.

We invited a number of political and scientific figures to a briefing at the Talcott Mountain Science Center on the performance of Australis-Oscar 5 -- and later read in another ham magazine that it was a "victory party" for the press hosted by ARRL Hq. "at the expense of (League) membership." This was quite a surprise, since we don't recall any martinis or caviar. For some editors, perhaps by comparison the simple fare of coffee and doughnuts (supplied by WAIUO, not the League) is a "party."

Planning to run for director or SCM? A new informational pamphlet produced by Hq. at Board direction acquaints potential candidates with the various duties and responsibilities of the League's elective offices. Yours for the asking.

Quote-of-the-month, from the bulletin of the Motor City Radio Club: "Do we really have the right to gripe about ARRL activities or FCC actions when we don't take an active part in activities designed to provide the radio amateur with a voice in these matters? The next time before you start griping on the air, think about this: Have you brought the matter up at the radio club? Have you bothered to write your opinion down on paper and send it to your ARRL director?"

In the early days of our recent expansion of the incentive licensing structure, there was considerable comment that the higher class segments weren't being used. Have you checked there recently? We find plenty of activity. During the cw DX contest we had to go above the 025 kHz points to get out of QRM!

# The "2-Meter QRP Mountain Topper"

A Solid-State Transceiver for 144 MHz

BY RICHARD PREISS,\* W7HCV

LIKE MOST people, hams have hobbies other than amateur radio to keep them occupied. For years, the author has enjoyed mountaineering and photography, as well as his major past-time, radio. During mountain trips, while taking pictures from summits in the Sierra Nevada, his companions were often subjected to the comment, "Sure do wish I had a vhf rig here now." This article describes the planning and effort that finally provided that long-awaited 2-meter "mountain-topper."

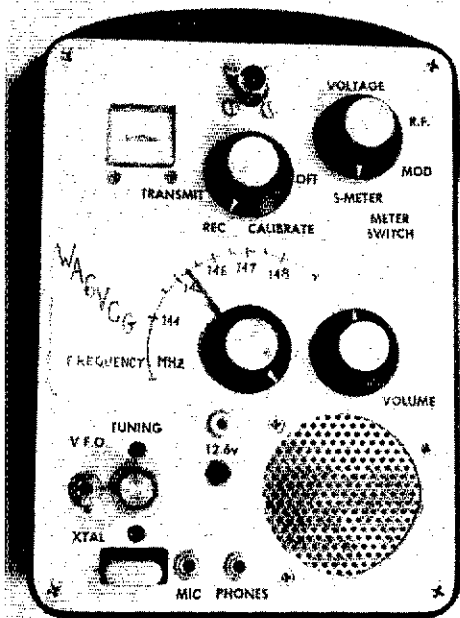
Various geographic areas reflect different operating practices. These conditions usually dictate the nature of the 2-meter equipment built for use in that region. For example, some areas abound with a-m operation, while fm dominates other locales. Usually ssb and cw are used only by the DX-seeking vhf men in most regions, rendering these modes less popular for any casual, unscheduled communications. The above variations are further complicated by geographic conventions in antenna polarization and regional area propagation conditions. The equipment described in this paper was intended for use in Southern California where a-m operation is used predominantly by the casual vhf enthusiast, and with vertical polarization.

The rig was designed to provide satisfactory communications at a range up to 200 miles with a portable 5-element Yagi antenna, and weight and size were constrained to fit a small mountain rucksack complete with battery pack and accessories.

The transceiver described is the third of a series, the first being in general, more elaborate than necessary. The receiver was a multiconversion affair with cross-modulation and overload problems. The transmitter ran 2-watts output, which was found to be more than adequate. The six-

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Whether the vhf portable station is being used for civil-defense operations, or for just plain hamming, the measure of its effectiveness can be related almost entirely to how well it is designed. The equipment described here was designed and built by W7HCV, a seasoned vhf operator. Both his design philosophy and workmanship point the way to effective 2-meter portable QRP operation. Plenty of up-to-date circuits have been used in this transceiver, and many of the author's ideas can be applied to equipment for use in other amateur bands. Though this is basically an idea article, the experienced vhf builder should have no trouble duplicating this circuit.



Front-panel view of the W7HCV 2-meter solid-state transceiver. The entire circuit is housed in a Simpson Model 260-style meter case. A home-made dial plate provides a frequency readout of 144 to 148 MHz.

pound battery pack required by the rig was a further disadvantage.

The second rig was similar to the "Connecticut Bond Box" described by DeMaw.<sup>1</sup> Its 100 mW power output was surprisingly effective with several 100-mile QSOs made. The superregenerative receiver was sensitive, but totally inadequate when many strong signals were present; the typical condition in Southern California.

The characteristics chosen for the final unit include: (1) ½-to 1-watt output, (2) VXO to allow some frequency excursion, (3) 40 hours of operation from 10 D-size NICAD batteries, (4) total weight including batteries less than 5 pounds, and (5) single-conversion, MOS front-end, receiver for superior "cross-mod" and overload performance.

These desired characteristics have been realized, but only with the aid of some special transistors and integrated circuits. Reasonably low-cost substitutes are now available (refer to parts list) but

<sup>1</sup>DeMaw, "The Connecticut Bond Box," *QST*, August, 1968.

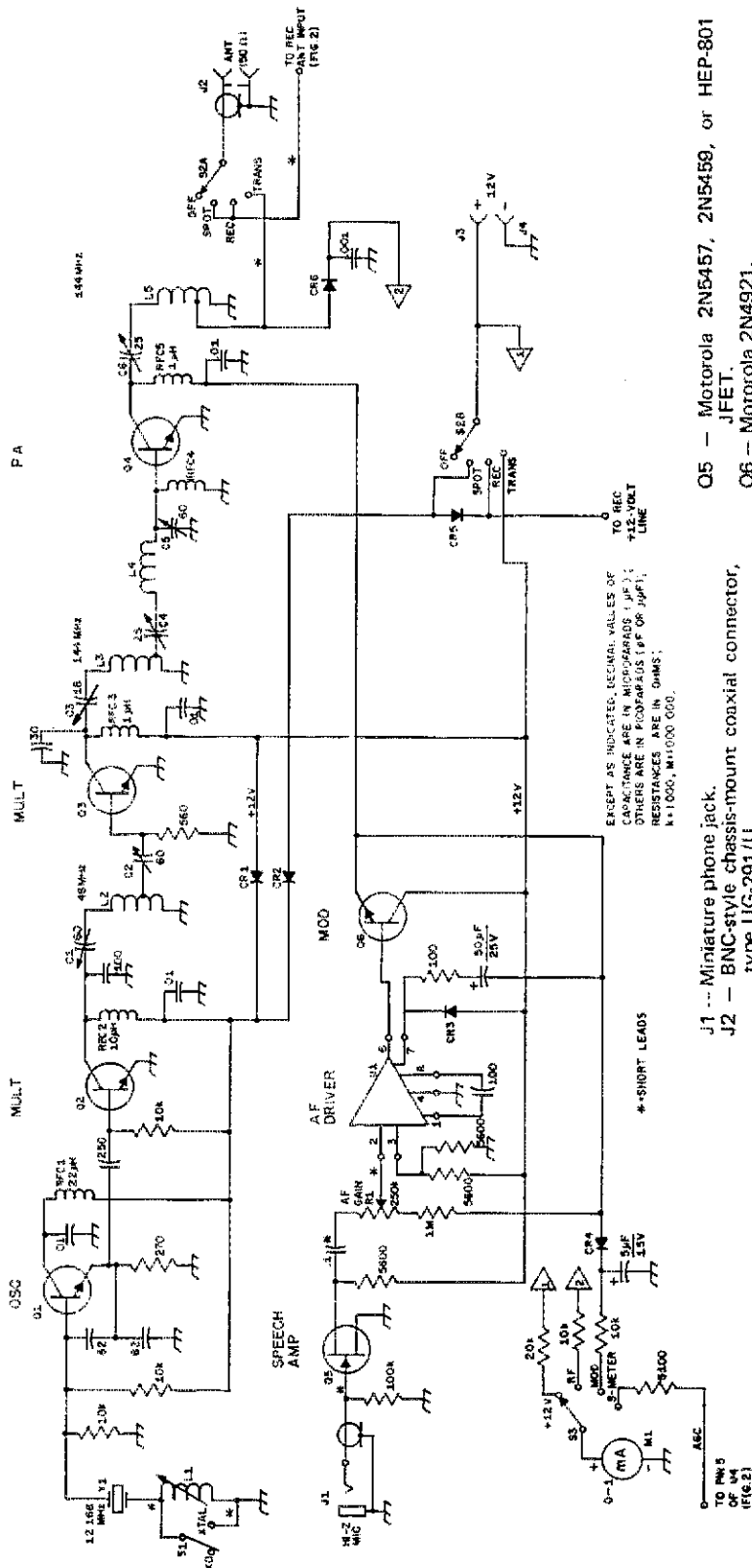
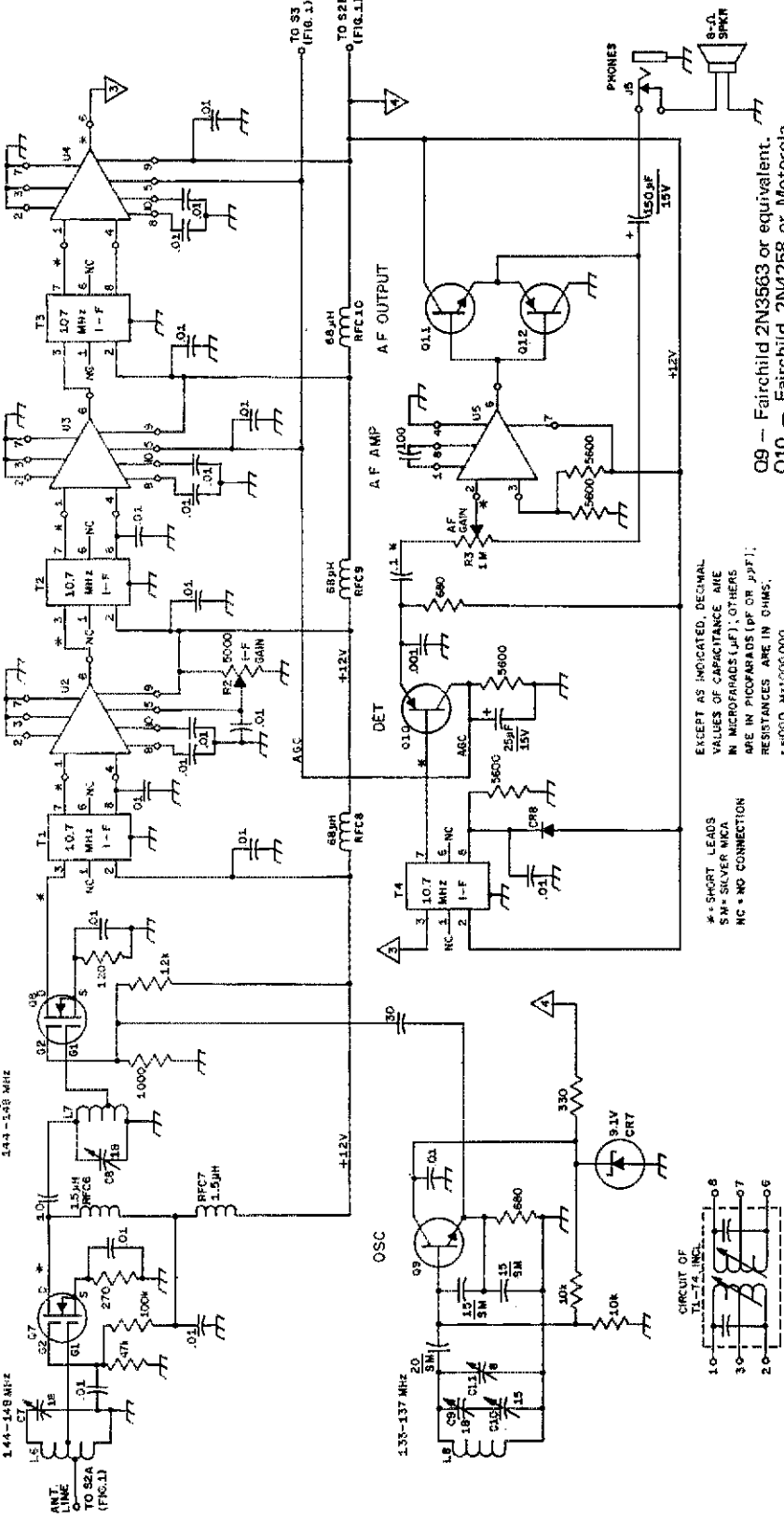


Fig. 1 - Schematic diagram showing the transmitter section of the W7HCV transmitter. Fixed-value capacitors are disk ceramic. Fixed-value resistors are 1/2-watt composition unless otherwise indicated. Capacitors with polarity marking are electrolytic. Connections marked with an asterisk must be kept very short to assure stability.

- C1, C2, C5 - 15-to-60-pF ceramic trimmer (Erie 538-P3PO-112R or similar).
- C3 - 5.5-to-18-pF ceramic trimmer (Erie 538-COPO-92-R or equivalent).
- C4, C6 - 8-to-25-pF ceramic trimmer (Erie 538-D2PO-99R or equivalent).
- CR1, CR2, CR5 - 1-ampere, 60-PRV silicon diode
- J1 - Miniature phone jack.
- J2 - BNC-style chassis-mount coaxial connector, type UG-291/U.
- J3, J4 - Insulated tip jacks or similar.
- L1 - 45 turns No. 34 enam. wire, close-wound on 3/8-inch dia. slug-tuned form (J. W. Miller 64A024-2 form suitable).
- L2 - 10 turns No. 16 bare wire, 3/8-inch O.D., 1 inch long. Tap 1 turn from ground end.
- L3 - 3 turns No. 16 bare wire, 3/8-inch O.D., 1/2 inch long.
- L4 - 4 turns No. 16 bare wire, 3/8-inch O.D., 1/2 inch long.
- L5 - 5 turns No. 16 bare wire, 3/8-inch O.D., 3/4 inch long.
- M1 - 1-mA miniature dc meter, scale recalibrated to read 0 to 20.
- Q1 - 2N3563 (Fairchild used in this equipment).
- Q2, Q3 - PT-3500 (TRW Co.) preferred. Motorola's
- Q5 - Motorola 2N5457, 2N5459, or HEP-801 JFET.
- Q6 - Motorola 2N4921.
- R1 - 250,000-ohm linear-taper carbon control.
- RFC1 - 22-μH moulded choke (J. W. Miller 9320-52).
- RFC2 - 10-μH moulded choke (J. W. Miller RFC3, RFC5 - 1-μH moulded choke (J. W. Miller 9310-12).
- RFC4 - 1.5-μH moulded choke (J. W. Miller 9230-24).
- S1 - Spst miniature toggle or slide switch.
- S2 - 2-pole, 4-position, single-wafer rotary (Centrab 2011 or similar).
- S3 - Single-pole, 4-position, single-wafer rotary (Centrab 2007 or equivalent).
- U1 - National Semiconductor LM301A or equivalent (Motorola MC1741CG can be used).



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR pP.F.); RESISTANCES ARE IN OHMS.  
 \* = SHORT LEADS  
 SM = SILVER MICA  
 NC = NO CONNECTION  
 † = 0.00, W-1000000

- C9 - Fairchild 2N3563 or equivalent.
- C10 - Fairchild 2N4258 or Motorola 2N3905 or 2N3906.
- C11 - Motorola 2N4921.
- C12 - Motorola 2N4918.
- R2 - 5000-ohm linear-taper carbon control.
- R3 - 1-megohm, audio-taper carbon control.
- RFC6, RFC7 - 1.5-uH moulded choke (J. W. Miller 9230-24)
- RFC8-RFC10, incl. - 68-uH moulded choke (J. W. Miller 9230-64).
- T1-T4, incl. - 10.7-MHz i-f transformer (J. W. Miller 8851A).
- U2-U4, incl. - Motorola IC MC1550G.
- U5 - National Semiconductor IC LM301A or equiv. (Motorola MC1741CG suitable).

- CR7 - 9.1-volt reference Zener diode, 1N936 or equivalent.
- J5 - Miniature phone jack.
- L6 - 3 turns No. 16 bare wire, 3/8-inch O.D., 1/2 inch long. Tap at 1 and 2 turns from ground end.
- L7 - 3 turns No. 16 bare wire, 3/8-inch O. D., 1/2 inch long. Tap at 1-1/2 turns from ground end.
- L8 - 3 turns No. 16 bare wire, 3/8-inch O.D., 1/2 inch long.
- Q7 - RCA dual-gate MOSFET, 3N140.
- Q8 - RCA dual-gate MOSFET, 3N141.

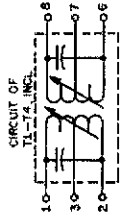
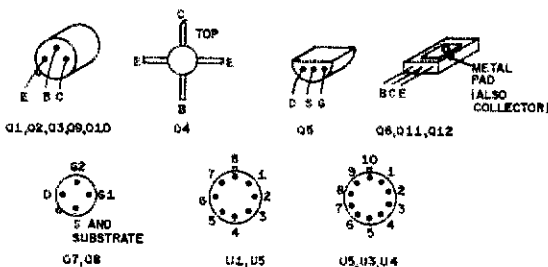


Fig. 2 - Schematic diagram of the receiver portion of the 2-meter transceiver. Fixed-value capacitors are disk ceramic unless otherwise noted. Fixed-value resistors are 1/4-watt composition unless otherwise indicated. Circuit leads marked with an asterisk should be kept very short to insure stability. Polarized capacitors are electrolytic. C7, C8, C9 - 5.5-to-18-pF ceramic trimmer (Ene 538-COPO-92R or equivalent). C10 - 15-pF variable (Johnson 167-1, or similar, suitable). C11 - 2-to-8-pF ceramic trimmer (Ene 538-COPO -889R or similar).



Base connections for the semiconductors used in the 2-meter transceiver. These layouts apply only to those transistors specified as first choices, and not necessarily to those listed as substitutes.

this article should not be considered a construction article, as successful results are very dependent upon proper test equipment and procedures. It is the author's hope, however, that many circuit ideas are contained herein to benefit the experimenter.

### Receiver Circuit

The receiver, shown schematically in Fig. 1, is designed with an overall clean response as the major criterion. For this reason, a single-conversion, superhet approach was chosen<sup>2</sup>, with an i-f of 10.7 MHz. To keep the design simple, integrated circuits are used in the i-f and audio channels.

The front end utilizes a 3N140 rf amplifier, and a 3N141 mixer. These dual-gate MOSFET devices feature excellent overload and cross-modulation rejection characteristics while offering a fairly low noise figure, and a high un-neutralized gain.

The rf amplifier is operated in common-source mode, and the mixer is operated in a similar configuration, but with the LO signal injected on gate 2. Other workers have shown<sup>3</sup> that both mixer conversion gain and cross-modulation immunity are strongly dependent upon LO injection level. In this receiver, the injection is 1.5 to 2.0 volts peak-to-peak, as measured with a high-frequency oscilloscope and appropriate probe. This provides a good compromise between cross-mod and gain.

The local oscillator runs on 133 to 137 MHz and is a modification of the familiar Colpitts circuit known as the Seifer Oscillator<sup>4</sup>. No drift has been encountered with this oscillator, even in severe mountain environments.

The heart of the receiver is the intermediate-frequency amplifier. Because a high-frequency tunable local oscillator is used, extremely narrow i-f bandwidth is not desired. However, good skirt selectivity is needed along with good age capability. In this receiver, the gain and age are provided by three Motorola MC1550G integrated circuits, while the selectivity is provided by the use of double-tuned interstage transformers. The J.W.

Miller 8851A units used by the author are inexpensive and yield a 3-dB selectivity of 25 kHz, with steep skirts. The i-f gain is 60 dB with 90-dB age capability.

It is significant to note that the 1550s operate as cascode amplifier. This has the advantage that the input and output impedances are independent of age voltage, thus preserving the selectivity of the i-f regardless of signal level. The 1550s operate with forward age voltage. That is, as the age voltage is increased from zero to plus 5 volts, the gain drops. Since the i-f amplifier has more than the necessary gain, the first stage is manually adjusted to a low gain. A prospective builder might eliminate this stage and use cascaded i-f transformers.

A-m detection and age voltage generation are done by the 2N4258, Q10 (Fig. 2), at the i-f output. The emitter-base diode is the a-m detector with the audio taken off the emitter. Current generated by detection action is amplified in the base-collector circuit and changed into age voltage across the 5600-ohm emitter resistor. The age has fast attack, with decay determined by the 25- $\mu$ f filter capacitor.

Audio amplification is provided by another integrated circuit, U5, and complementary push-pull output stage, Q11-Q12. Distortion is minimized by negative feedback which also controls the audio gain. Idling current is less than 5 mA, and the amplifier can deliver 1-watt rms into an 8-ohm load.

### Transmitter Circuit

The rf chain consists of only four stages. A 12-MHz oscillator, a quadrupler, a tripler, and a collector-modulated final.

The chain starts with a variable crystal oscillator (VXO). The circuit of Fig. 1 yields a  $f$  of 50 kHz at 12 MHz when using plated crystals. This gives a  $f$  of 600 kHz at 144 MHz. The VXO used here differs slightly from the classic Shall circuit<sup>5</sup> in that the crystal operates in the series-resonant mode. The frequency is pulled down (from the marked frequency) by adding inductance. Because no external capacitor is added, stray resonances are avoided which normally limit the excursion. Even at maximum pull, stability has been sufficient for 2-meter a-m work.

Frequency multiplication is done in only two stages. It is interesting to note that high-order multiplication with transistors is achieved more easily than might be thought possible. This is probably a result of both the nonlinear emitter-base characteristic and parasitic capacitance effects of the collector-base junction. The method used for interstage impedance matching leads to stability by providing a high-Q tank circuit with a tapped capacitance instead of the more common tapped inductance. This eliminates any need for bypassing the cold end of the tank circuit. Drive to the following stage could be taken directly off a tap near the cold end of the tank inductor.

The final amplifier uses a T.R.W. PT-3534 which delivers 10 dB gain with only 6 volts Vcc. Such a

<sup>5</sup>Shall, "VXO — A Variable Crystal Oscillator," *QST*, January, 1958.

<sup>2</sup>Goodman, "What's Wrong with our Present Receivers?" *QST*, January, 1957.

<sup>3</sup>Kleinman, "Application of Dual-Gate MOSFETs in Practical Radio Receivers," RCA Publication ST-3486.

<sup>4</sup>Fisk, "Stable Transistor VFOs," *Ham Radio*, June, 1968.



microwave device is expensive, but the RCA 2N5109 or Motorola 2N3866 are also possible output devices in the \$3.00 price class. Input and output impedance matching is similar to that used by Schlesinger<sup>6</sup> in his 2-meter transmitter. The emitter should be grounded with as short a lead as possible.

The transmitter modulator starts with an MPF103 speech amplifier intended for high-impedance microphones. The JFET drives an operational-amplifier integrated circuit which drives the output emitter follower. As in the receiver audio, negative feedback is used to minimize distortion and to control the gain. A diode and *R-C* network is used to "bootstrap" the operational-amplifier supply voltage, which allows full power supply swing on the modulator transistor. Bootstrapping could also be applied in the negative direction. The modulator will swing from 1 volt to 12 volts with loads as low as 25 ohms.

Four significant items were metered in the "mountain topper" using a miniature 1-mA meter. Battery voltage monitoring is vital when NICADs are used, to prevent destructive extended discharge. Relative rf output and peak modulation voltage are monitored by switching S3. Another position monitors the agc voltage, which serves as a tuning indicator, or so-called S meter, for lack of a better name.

### *Mechanical Layout and Constructional Details*

All the circuit was laid out on copper clad (one side) Vector board with holes on 0.200-inch centers in a square grid pattern. Vector type T-28 pins were used for component mounting<sup>7</sup>. Fig. 3 is a photograph of the circuit board, and shows the relative placement of the components: modulator across the top, receiver down the left side, LO in the center, and transmitter along the right side, with the VXO at the bottom. The PA is to the right of the antenna switch wafer. The board is mounted about one inch behind the front panel to allow clearance for the meter, meter switch, function switch, tuning capacitor, speaker, and various controls. Power interconnections, speaker, volume control, microphone, and i-f transformer wiring was done on the copper side of the board. The local-oscillator tuning capacitor and coil were deliberately placed between the board and front panel to take advantage of the shielding thereby provided.

Note that no heat sinks are used on the audio output or modulator transistors. Power types were chosen only to get good high-current beta which is required under peak output conditions. Idling currents are low enough that heat sinks are not normally necessary.

### *Adjustment and Operation*

Receiver alignment is conventional in every respect. If a signal generator is available, first peak all of the i-f transformers to 10.7 MHz. The agc

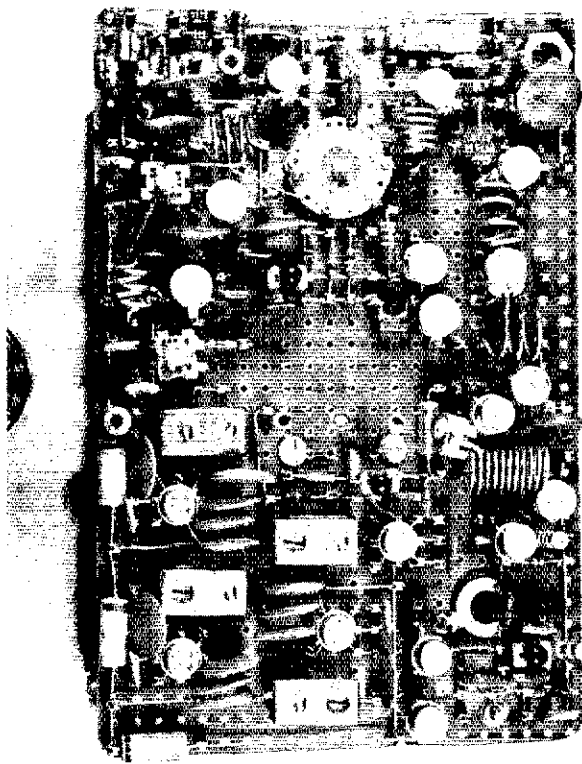


Fig. 3 — Interior view of the 2-meter transceiver. The components are neatly mounted on insulating perforated board, and push-in terminals serve as tie points. Short leads are the keynote for good circuit stability.

meter can be used as an indicator. The manual i-f gain control may have to be backed off to prevent oscillation in the strip. Next, if a grid-dip meter is available, use the absorption mode and try to get the LO to oscillate in the 133-to 137-MHz range. Once this is accomplished, hook up to an antenna or vhf signal generator and hunt for a signal. The rf amplifier can be peaked at 145 MHz, and the mixer at 146 MHz. The author's receiver can detect a 0.5- $\mu$ V signal with 30-percent 400-Hz modulation when using the same tuning procedures. The local oscillator should be "rocked-in" using the C9 and C11 until the band is centered in the tuning-capacitor range.

Transmitter alignment is not as easy, and requires a grid-dip meter, general-coverage receiver, and another 2-meter receiver as a minimum of test equipment. The transmitter was built and tuned one stage at a time. The VXO was built and checked with the general-coverage receiver to assure a clean signal which could be pulled over the range of interest. Next the quadrupler was built, the coil dipped for 48 MHz, and the power turned on. Some adjustment of the 10,000-ohm base resistor may be necessary to optimize stage gain. Values between 5000 and 30,000 ohms will work best, depending upon the transistor type used and its beta. The output is peaked using the GDO in

<sup>6</sup>Schlesinger, "The 2T/2M," *QST*, September, 1968.

<sup>7</sup>Preiss, "Simplified Circuit-Board Construction," *QST*, November, 1969.

# A Nearly Full Size, Rotatable, Two-Element Quad for 80 Meters

BY JOE HERTZBERG,\* K3JH

We don't expect readers to rush right out and duplicate this antenna system — but this doesn't mean a lot of hams wouldn't like to!

WITH THE advent of 5-Band DXCC many hams have been thinking about new 80-meter antennas to improve their DX capabilities. On the higher amateur frequencies, antenna gain is relatively easy to acquire with a compact Yagi or quad. It is much harder in this respect on 40 meters. On 80 meters, however, the problem of securing any increase in antenna gain over a conventional dipole or ground plane is very difficult indeed, particularly where space is limited. Rhombics, vees, or multielement collinear arrays become completely impractical on the normal urban or suburban lot. Even a phased vertical array is hard to handle on a city lot, and too often, performance is marginal because it is impossible to install an optimum ground system at such a location.

The author solved this problem at his QTH by constructing an almost full size two-element quad for 80 meters. A unique tuning arrangement permits this antenna to be operated at any frequency within the 80-meter band with an SWR of close to 1. While certainly not adaptable to every individual's situation or pocketbook, a description of this antenna should be of interest to many amateurs. As far as it is known, this is the first and only set of beams, on one rotatable tower, covering all bands from 2 to 80 meters. By connecting the two quad elements in series to form a rotatable, bidirectional loop, the frequency coverage has been extended to 160 meters.

At this point, a few comments might be in order on the circumstances which led to this sizeable 80-meter antenna project. In June 1965, the writer

returned to ham radio activity after a QRT of almost 30 years. During the first year of operation, the antennas of K3JH were a conventional commercial tribander for 10, 15 and 20 meters mounted on a 60-foot tilt-over tower, and a trapped, inverted V for 40 and 80 meters. A bit of DX chasing soon led to the conclusion that better antennas were needed. Since the QTH is on a suburban lot about 175-foot square, and heavily wooded, a "Christmas tree" array seemed the best alternative. Consequently, in the summer of 1966, with a great deal of help from Bob Scully, W2FXN, a 115-foot rotary tower was installed along with full-size monoband beams for all bands from 2 through 40 meters.

This rotary steel tower is 16 inches OD at the base with 1-inch thick walls. The tower rests in a 1/2-inch thick steel bearing-tube 15 feet long and 20-inches OD. The bearing tube is imbedded in a block of concrete 8 x 8 x 16 feet which weighs 70 tons. The tower tapers to 5 1/2 inches at the top, and was designed to carry nine full size monoband beams through 125-mph winds.

Initially, the antenna complement was as follows:

2/6 meters	— Vert. ground plane
	at 115 feet
6 "	— 6 el at 113 feet
2 "	— 15 el at 109 feet
20 "	— 5 el at 104 feet
15 "	— 8 el at 96 feet
10 "	— 6 el at 86 feet
40 "	— 3 el at 77 feet

A rotary ball-bearing ring and clamp at the 70-foot level on the tower was used to support one end of an inverted L for 80 meters. This long wire, which could be used also on the higher frequencies, was fed through a Matchbox at the base.

Performance on 40 through 2 meters with this antenna system was generally excellent. The L and inverted vee on 80, however, left much to be desired, especially when compared to the antenna performance on the other bands.

In attempts to improve this situation, several different 80-meter antennas were installed at various times between 1966 and the spring of 1969. Included in this effort was a top-loaded ground plane and a pair of phased verticals. None of these antennas provided sufficient improvement in DX performance on 80 to be considered satisfactory.

In this view, the bottom support of the quad elements is shown, along with the tuning-network box, which is mounted on the mast.



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With the advent of the 5-Band DXCC, the question of how to do better on 80 meters again became a matter of concern. It was at this time that the concept of a quad of some sort, to be mounted on the rotary tower, began to emerge. Since 40-meter quads had been constructed previously, and were mechanically feasible, the thought at first was to build a half-size quad for 80 meters, using loading coils. Preliminary calculations indicated the possibility of achieving some gain over a dipole in addition to the obvious advantage of being able to rotate the array.

It was quickly determined that a half-size quad mounted at 57 feet would fit underneath the 40-meter Yagi. Construction could be quite conventional using fiberglass X frames in each element, and a spacing of 0.15 wavelength.

### Design Considerations

The proposed design was discussed with a number of amateurs including Jim Lindsay, W0HL, Dunc Carter, W5IOU, and Claus Moeller, DL7CM, who were most helpful with advice and suggestions. A search of the literature disclosed that a number of loaded antennas of various types had been built. In most cases, however, performance had been judged empirically, and there was little in the way of specific comparative data on the performance of loaded versus unloaded configurations, or versus a reference dipole. Because of this, the decision was made to build and test a 14-MHz model of a half-size quad. This would enable a direct comparison between the performance of a miniaturized quad and other antennas. Of particular interest was a comparison with a dipole, since this was the more normal antenna used by amateurs on 80 meters.

Henry Pemberton, W3PN, who had become interested in the project, provided the X frames and supports from an old 20-meter quad, for use in the test model. Tom Consalvi, W3EOZ, provided some suitable coil stock for the test design. With this help, the 14-MHz model was quickly constructed. No trouble was experienced in pruning the coils and resonating the loops. Except for one bad piece of insulation on one coil, which promptly burst into flame when rf power was applied to the antenna, the driven element could be fed with a full kilowatt at an SWR of 1. The SWR, however, would rise sharply when the coils, which had no protection from the weather, became wet from rain. All testing, therefore, had to be done on dry days.

Since the 80-meter version was to be mounted on the tower one-quarter wavelength above ground, the 14-MHz model was mounted for the tests at the same relative height. Standard procedures for tuning up the quad were used, and will not be detailed here. Impedance of the loaded loop was measured at 60 ohms, so it could be driven nicely with a 50-ohm line. The bandwidth was 125 kHz, measured between frequencies each side of the resonant frequency where the SWR was 3:1. This was the result expected, due to the heavy loading.

Extensive on-the-air comparisons were made between the model and various other antennas.

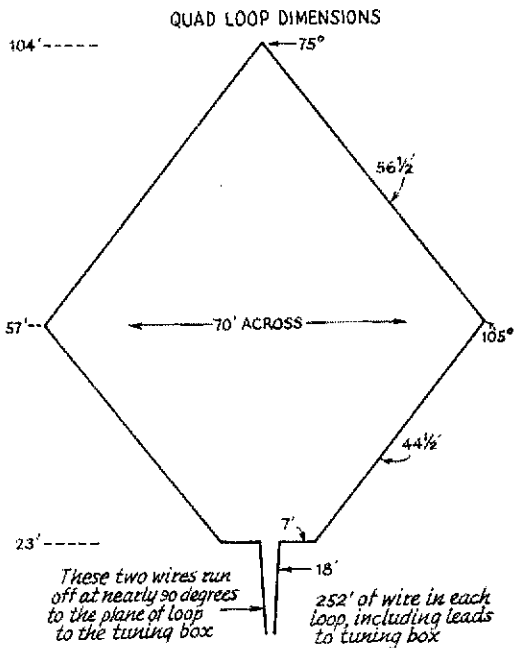


Fig. 1 — Dimensions of one of the quad loops.

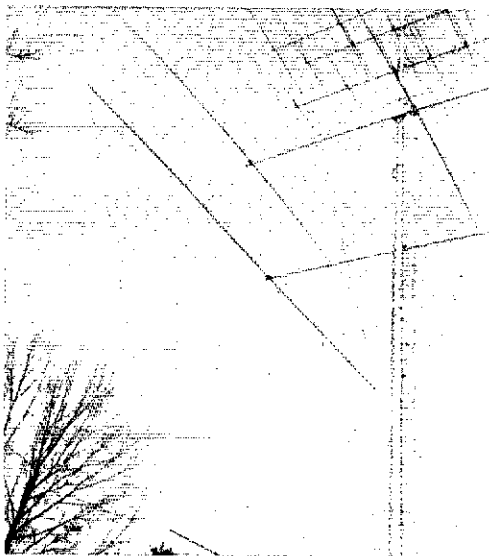
These included a dipole at the same height above ground as the model, a 3-element tribander at 60 feet, two different inverted vees at 50 feet and a 5-element monoband Yagi at 104 feet. The regular antenna switching arrangements in the station were such that almost instantaneous comparisons could be made between the different antennas, minimizing QSB differences in the receiver. In the transmit mode, many amateurs compared signal differences between the test model and the other antennas. It is impossible to list the calls of all those who helped in this way.

After considerable testing, adjustment, readjustment, and minor configuration changes in the model, the results were found to be quite discouraging. The simple conclusion was that a loaded half-size quad had insufficient gain compared to a dipole to warrant proceeding any further with an 80-meter version.

### Further Exploration

Before abandoning the 80-meter project, however, we decided to explore some practical ways to increase the size of the elements, preferably without using the normal-type quad X frames, which would be difficult if not impossible to handle when the antenna grew too large. This thinking developed the concept of using the 14-MHz boom at 104 feet to support diamond-shaped elements at the top, and using a boom and spreaders rather than an X frame to hold the elements at the center. The bottom of the quad elements could be supported easily with a relatively light boom and spreaders near the base of the tower.

In order to reduce the size of the center boom and spreaders, the first model was kite-shaped with



This is a detailed view of one of the quad elements, showing the method of supporting the loop.

an included angle at the top of about 50 degrees. Unfortunately, the results were poor, and compared to a dipole there was no gain. We concluded that this configuration was so squashed together that the antenna was acting like a dipole instead of a quad. A series of configurations was then drawn up on paper. The boom and spreader sizes were varied, but the included angle at the top of each diamond element was kept at 75 degrees or more. This helped to pin down a configuration which would be mechanically feasible, and which would be a reasonable compromise among the various considerations to be taken into account. The one selected is shown in Fig. 1.

Because these elements are almost full size at 4 MHz, making a 20-meter model quite large, it was decided to build and test a model of this configuration on 15 meters. The test procedures for this model were the same as those previously described for the 20-meter model of the half-size quad. This model showed substantial gain compared to the reference dipole at the same height. Also, the model mounted only 15 feet above the ground compared favorably in performance with the tri-bander at 60 feet. The 5-element monobander at 96 feet consistently provided better gain as was to be expected. The impedance of the driven element was about 80 ohms. Bandwidth between SWR points of 3:1 was 250 kHz, or about twice what was measured on the half-size model.

#### *Mechanical Considerations*

After a lengthy test period, during which many on-the-air comparisons were made, the results were good enough to make the decision to build an 80-meter version of this antenna. Because of the size of the proposed antenna, considerable thought had to be given to the mechanical design to assure longevity comparable to the other beams which are

rated for 125-mph winds. The wire in the quad elements is No. 12 stranded copperweld. All other metal in the antenna is aluminum or stainless steel. The two quad elements are suspended from the 20-meter boom at 104 feet. The insulators are five glazed porcelain knobs. Spacing is one-eighth wavelength, 36 feet. The 20-meter boom is 46 feet long, and is made from 4-inch OD, 1/4-inch wall T-6 aluminum tubing at the center, and similar material tapering from 3 1/2 inches to 3-inch OD at the ends. A 1/4-inch stainless steel cable supports the boom 18 feet out from each side of the tower. Originally, the plan was to slide the quad elements down this cable from the tower. Unfortunately, the steel plates holding the Yagi elements to the boom on the other beams were found to be rusting because of poor plating. Rather than dismantle the beams, a crane was brought in so that these plates could be cleaned and painted by a man carried up in a boatswain's chair. At the same time, the elements were hung from the 20-meter beam, and the center boom and spreaders for the quad were installed with relative ease.

#### *Dimensions*

The 36-foot center boom at the 57-foot level of the tower is made of a single 24-foot section of 3 1/2-inch, 1/4-inch wall, T-6 tubing with 7-foot sections of 3-inch OD pipe telescoped and bolted at each end. The boom is supported from the tower with a 3/16-inch stainless-steel cable. The spreaders at each end of this boom are 70 feet long. Each consists of a 24-foot piece of 2 1/2-inch OD, 1/8-inch wall, T-6 tubing at the center, with two short pieces of 2 1/8 x 1/8-inch tubing telescoped and bolted at each end to make up a length of 30 feet. To complete the spreaders, 20-foot sections of 1 1/2- and 1 1/4-inch fiberglass poles are attached to each end of the aluminum centerpiece. Use of the fiberglass reduces weight, and eliminates a one-quarter wavelength piece of metal from the middle of the quad element. A 1/8-inch cable and strut supports each spreader to minimize sag, which is very slight as may be noted in the photograph. A welded aluminum T structure and stainless steel clamps are used to hold the spreaders on to the ends of the boom. A stainless-steel clamp and Teflon grommet is attached to the ends of each spreader to hold the element wires in place. The only function of the spreaders is to hold the two opposite sides of each quad element apart without too much fore and aft flopping around when the antenna is rotated. The length of the spreaders, wind loading, and safety factor dictates the heavy mechanical design.

The lower boom, which is 23 feet off the ground, is made of a 24-foot section of 2 1/4 x 1/4-inch T-6 tubing with shorter 2- x 1/4-inch pieces telescoped and bolted at each end to make the total length of 36 feet. To maintain symmetry, 17-foot spreaders are attached to each end of the lower boom. These spreaders are made of 1 1/2-inch fiberglass. They are attached to the boom with aluminum angles and stainless-steel clamps. A light stainless-steel cable and strut holds the lower spreaders firm against the pull of the quad-element

wires, which are attached to each end of the lower spreaders with stainless-steel clamps. The wires are taped along the fiberglass almost to the center of the spreaders, and then go off at right angles to the tuning box, which is mounted on the tower 13 feet above ground. The distance from the end of the lower boom to the tower is about 18 feet, and the 36 feet of wire which connects the quad proper to the tuning box represents loading.

### Tuning

Each element, including the 36 feet of connecting wire just mentioned, resonates at 4050 kHz. Thus a small amount of additional inductive loading is required to tune the antenna to resonance within the 80-meter band. This is accomplished by putting two relatively small motor-driven coils in series with each loop of the antenna. The reversible motor for each pair of coils in each loop is controlled by a two-way toggle switch mounted on the antenna control panel in the shack. In the case of the driven element, tuning is accomplished simply by applying power to the antenna and then adjusting the loading inductances by the motor-control switch to the point where the SWR is minimum, usually very close to 1. Tuning the reflector can be accomplished by turning the back of the quad toward a distant signal, and adjusting the reflector loading coils for minimum received signal. This seemed a bit cumbersome to do each time the operating frequency was changed from cw to ssb and vice-versa, so a microswitch was added to the reflector coils and motor assembly.

Each revolution of the coils flicks the microswitch which actuates a light on the control panel in the shack. By counting the blinks of the light, and referring to a chart which shows the resonant frequency of the reflector versus the number of turns of inductance in the loop, the reflector can be tuned to any desired frequency. With this tuning scheme, it is quite easy to tune the quad for best performance at any point in the 80-meter band. The bandwidth between the 3:1 SWR points is close to 200 kHz, so retuning is required only for large frequency changes within the band. Frequency flexibility otherwise is quite good.

The impedance of the driven element measures about 75 ohms. The antenna is coupled to the transmitter through a balun and 50-ohm line. The difference between the resonant frequency of the driven element and the reflector, when the latter is tuned for maximum front-to-back ratio, is in the order of only 1 1/2 percent. This probably results from the quad being only a one-quarter wavelength above the ground. The front-to-back ratio is about 20 dB, and the front-to-side, 50 dB. All measurements have an indicated gain over a dipole in the order of 6 to 7 dB. No degradation in performance, or SWR, has been observed during heavy rain. The small loading coils are protected from the weather, of course, in their aluminum tuner box, so the problem, which was encountered with unprotected load coils in the 20-meter test model, has been eliminated.

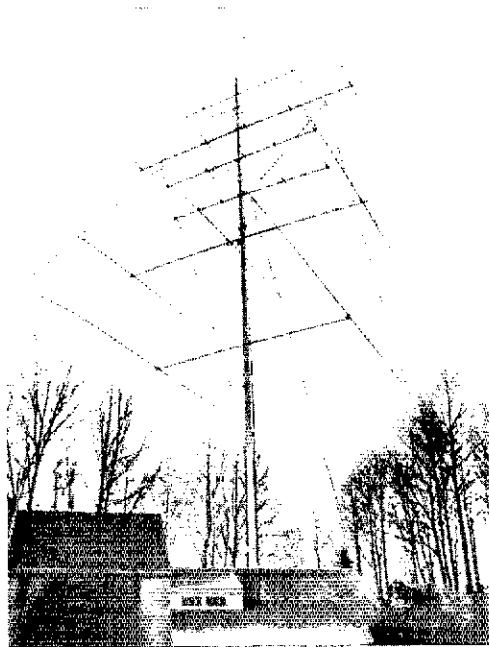
Tests were conducted with the second element tuned as a director instead of a reflector; there was no noticeable improvement in gain, whereas the front-to-back ratio was diminished. It is felt that the best results are obtained with the reflector.

Some thought was given to driving both elements at a 135-degree phase difference to obtain a cardioid pattern. It is felt, however, that the conventional quad pattern, with deep nulls on each side, and a reasonably good front-to-back ratio, is more desirable for DX. So, nothing further has been done with such a phasing arrangement.

### Results

DX results on 80 meters have improved considerably since the new antenna was put on the air. On cw, the gain seems to drop off somewhat as compared to the phone end of the band. Probably this is due to the fact that the relative size of the antenna is smaller at the cw operating frequencies. Nevertheless, reports usually are from one to several S units higher than other U.S. stations with comparable power input, and conventional antennas. In most instances during pile-ups in a recent cw contest, it took only a call or two to get through, whereas, previously, the station was usually last. It was found also that contacts could be made earlier, as the band opened. In several instances like this, it was amazing to get a response from a DX station, and then to hear other U.S. stations calling without success.

Reports from overseas on ssb are outstanding. During a recent phone contest, several dozen DX contacts were made in just a few hours — everyone on the first call.



Here is the complete antenna system, 2 through 160 meters, all rotatable, directional arrays.

During the day, on 80 meters, it is quite easy to work into Canada or the Carolinas with good signals at both ends of the circuit. On a dipole, very often the other station is completely unreadable, if not inaudible. This points up the fact that one notices great improvement in reception with the quad compared to a dipole, which on 80 is just as important as being able to transmit a better signal.

Once it was determined that the quad worked well on 80 meters, the possibility of operating the antenna on 160 meters was explored. Since the loops independently resonated at 4050 kHz, and there was considerable inductive loading available in the coils, it was felt that it might be possible to resonate the antenna on 1.8 MHz by putting the two loops in series. Actually, with the load coils tuned to minimum, the series-connected loops resonated at 1775 kHz because of the mutual coupling. By shortening out the coils entirely, the pair of loops were resonated at 1805 kHz. Therefore, the SWR at the low end of the 160-meter band is very low.

Domestic reports on 160 meters have been excellent. Consistent directional effects have been noted by several observers when the two-turn loop is rotated. The pattern is the typical figure eight, with deep nulls off each side of the loop. It remains to evaluate how well the antenna works on 160-meter DX.

In the near future, with the help of Walt Maxwell, W2DU, a series of careful measurements will be made with laboratory test equipment to determine the electrical characteristics of the two element 80-meter quad and the 2-turn 160-meter loop. Any significant results will be written for a subsequent article.

Following completion of the antenna in September, there have been several severe storms, with winds gusting as high as 65 mph. These velocities barely moved the wires and spreaders around. It is apparent that the heavy construction is adequate to handle the winds of much higher velocity for which the antenna was designed. Although it is probably one of the largest quads in existence, it certainly appears as though it will stay up a long time, even through rough weather.

In conclusion, this project could never have been completed successfully without the help of many domestic and overseas amateurs. Their reports, advice, and assistance will always be appreciated. Although this has been a sizeable and difficult antenna task, a great deal of satisfaction has been derived from carrying it through from concept to on-the-air operation. The simple lesson has been relearned with regard to antennas — that one cannot get something for nothing. Mini-size antennas are better than no antennas, but there is no substitute for full-size antennas if one wants "full-size" results. QST

## The "2-Meter QRP Mountain Topper"

(Continued from page 15)

the absorption mode. Similarly, the tripler is built and tuned to 144 MHz. Some adjustment of the coil taps may be necessary to get maximum output without spurious oscillations. Spurious oscillations will show up on the 2-meter monitor receiver as a louder-than-normal rushing noise. The final is tuned in a similar manner.

### Results

From the author's former location near Pomona, California, contacts were made throughout all of Southern California with many reports of S9 and greater. Admittedly, a 40-element array was used, but the 700-milliwatt rig is so much fun to operate, that the main station rig is now unused. When in the mountains with the 5-element Yagi, 100-mile-plus contacts were common. Notable contacts have been: (1) San Jose, California from Giant Forest in Sequoia National Park (185 miles), and (2) Santa Barbara, California from the 8000 ft. level of Mt. San Jacinto near Palm Springs, California (190 miles). The reports were S7 to S8.

Now that the author resides in the Pacific Northwest, clearly another "mountain-topper" is required, for all the operating conventions and conditions are different. This one will have to be cw with 5 to 10 watts output, a VXO-controlled, limited-coverage, direct-conversion receiver, with low temperature compatibility.

So, the long process starts over again . . .

The author wishes to credit Gene, W6TFS, for his technical assistance and leadership in southern California, and wishes to thank Wes Hayward, W7ZOI, and his XYL, Shon, for their help in preparing the manuscript for this article. QST

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## Strays

### Ham Of The Year Award for 1970

The Federation of Eastern Massachusetts Amateur Radio Associations are now requesting nominations for the "Ham of the Year" award for 1970. Only amateurs in the 1st call district are eligible and the ham selected will be the top "good neighbor" among hams — the one who has performed an outstanding public service.

Anyone may nominate a ham for the honor. Winner of the award will be chosen for the ham activity which brings the greatest benefit to an individual or group and for the amount of ingenuity and personal sacrifice displayed in performing the service.

Nominating letters should include the candidate's name, address, call letters and complete description of the service performed. Letters must be sent to the Chairman of the FEMARA Awards Committee, Eli Nannis W1HKG, 37 Lowell St. Malden, Mass. 02148, before September 1, 1970.

The winner will be presented with a plaque and a cash award at the ARRL National Convention Statler-Hilton Hotel, Boston, Mass. on September 26, 1970.

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# SWITCH TO SAFETY!

# The IC-TT Generator

With Notes  
on Testing  
SSB Transmitters

BY DOUGLAS A. BLAKESLEE,\* W1K1K

THE introduction of two new IC kits by RCA, the KC-4002 oscillator and KC-2001 audio mixer, prompted the building of a two-tone integrated-circuit generator — the IC-TT. Having etched-circuit boards and most of the components available in low-cost packages certainly makes the project attractive. Hard-to-get parts are the scourge of today's home constructor.

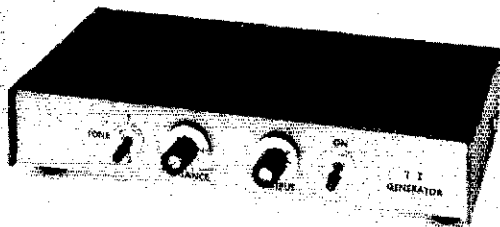
A two-tone generator is used in checking ssb equipment. A sideband voice signal fluctuates continually. It is neither steady or repetitive, so it is difficult to get much of an idea as to how a rig is working while watching meters, oscilloscopes, or other indicating devices. The use of a two-tone test signal has become an accepted method of checking transmitter performance, even though the test signal has no relation to the human voice. With such a test, however, the output of a transceiver or transmitter can be displayed on an oscilloscope and examined.

A pair of RCA KC-4002 audio-oscillator modules are used in the circuit of Fig. 1. The output of these oscillators should be as free from harmonics as possible, and the tone frequencies used should not be harmonically related. A mixer combines the output of the two oscillators, and this mixing process must also be distortion free. One major objective of two-tone testing is to check the amount of distortion produced in the transmitter. So, you need a "clean" signal from the generator to start with. Otherwise, harmonics from the generator will be indistinguishable from those produced in the transmitter, and you may think you have a problem in the rig, when actually it does not exist.

Assembling the RCA kits is easy, requiring only an hour in the workshop. Making integrated circuits behave is another problem, however. It took two modifications to tame the oscillators.

\*Assistant Technical Editor, QST

Commercial integrated circuit kits are used in this easy-to-build two-tone generator. Oscilloscope patterns obtained from the generator are also included.



Subminiature controls and switches are used on the front panel. The box is homemade; it consists of two U-shaped pieces of sheet aluminum. One forms the chassis, and the other the cover. Overall size is 7½ X 4½ X 1½ inches. For appearance sake, the top cover "overhangs" the front panel by ½ inch. The controls adjust the output level, and balance the relative tone levels.

The circuit is shown in Fig. 1; parts not supplied by RCA are marked with an asterisk.

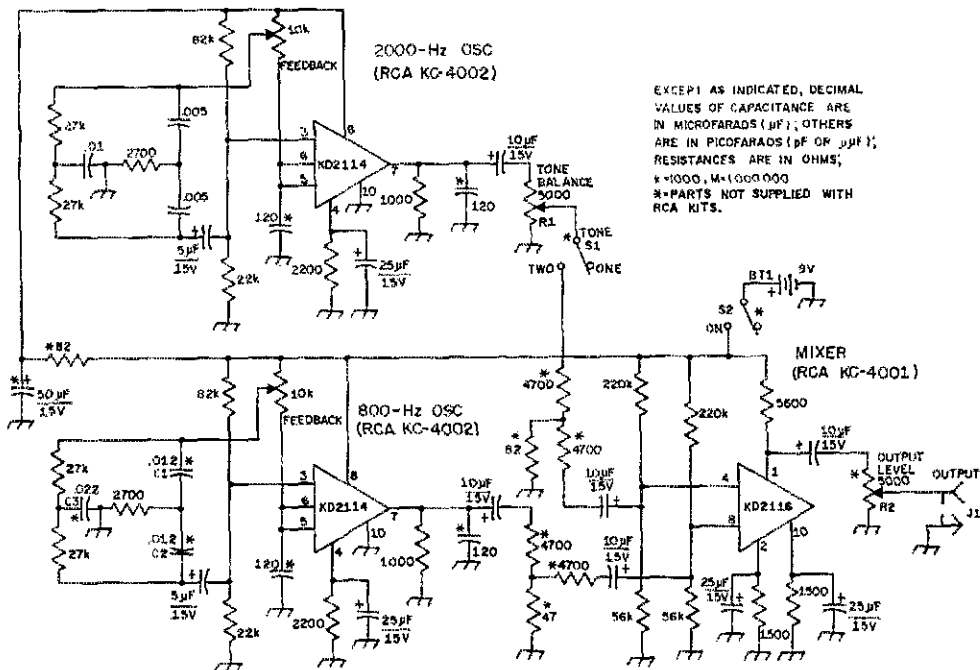
The capacitors supplied with the K-4002 provide an output frequency of 2000 Hz. One oscillator is used on this frequency, and the other shifted down to 800 Hz by changing C1, C2, and C3. The capacitor values required are not standard, so two capacitors are used in parallel in each case.

Both oscillators produced very healthy outputs on about 5 MHz in addition to the desired audio tones. A 120-pF capacitor across the input killed this oscillation, but then a weaker output at 50 MHz appeared. Another 120-pF capacitor was added, this time across the output terminal, and stable operation resulted. Both capacitors must have their leads cut very short to be effective. With these modifications, the ICs operate satisfactorily.

The mixer showed no signs of rf oscillations. The output of the K-4002s is far in excess of what the mixer can handle. So, an attenuator was added on the output of each oscillator to reduce the level to a suitable value. Control R1 allows the output level of one oscillator to be matched to the other — both tones must be of equal amplitude to produce the desired oscilloscope patterns. The mixer is an additive device (the output with two-tones is twice what you get using either tone alone). Thus, checking the output of the generator with two- and one-tone output, alternately, for a 2 to 1 voltage relationship, is one way of determining that the BALANCE control is set correctly.

## Alignment

Fig. 2A shows the proper scope pattern for single-tone output, while 2B indicates distortion of the waveform resulting from too much feedback. The adjustment of the FEEDBACK control in each oscillator is critical. Too little feedback and the oscillator quits; too much feedback and the harmonic content of the output goes up. The best setting for the FEEDBACK control is at a point where oscillation just starts. The oscillator modules



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu\text{F}$ ); OTHERS ARE IN PICO FARADS ( $\text{pF}$  OR  $\mu\text{P}$ ); RESISTANCES ARE IN OHMS; \* = 1000, M = 1000000; \*\* PARTS NOT SUPPLIED WITH RCA KITS.

Fig. 1 — Schematic diagram of IC-TT. Resistors are 1/2-watt composition; capacitors with polarity marked are electrolytic, others are disk ceramic. All parts are supplied with the RCA kits, except those marked with an asterisk.

- B1 — 9-volt transistor-radio type
- C1, C2 — 0.01 and 0.002 disk ceramic (in parallel)
- C3 — 0.02 and 0.002 disk ceramic (in parallel)
- J1 — Phono type
- R1, R2 — Miniature control (Mallory MLC53L)
- S1, S2 — Spdt miniature toggle (Radio Shack 275-376).

are voltage sensitive. If the battery voltage goes down during extended use, the oscillators may stop working, and the feedback must be increased to get them going again. A little experimentation will show the best point at which to set the FEEDBACK control. Both oscillators should be set up and checked separately, and then connected to the mixer module.

The final alignment of the generator is as follows: Switch to two-tone output (S1 closed) and adjust the FEEDBACK control on the 2000-Hz oscillator until oscillation ceases. At this point you should have output from the 800-Hz oscillator alone. With the BALANCE control set at mid range, connect an oscilloscope to the output of the generator and note the height of the output pattern. S1 should then be set for single-tone output, and the FEEDBACK control reset so that the 2000-Hz oscillator starts. The FEEDBACK control should be adjusted so that the pattern height produced on the scope is close to that of the 800-Hz oscillator. Minor differences can be corrected with the BALANCE control.

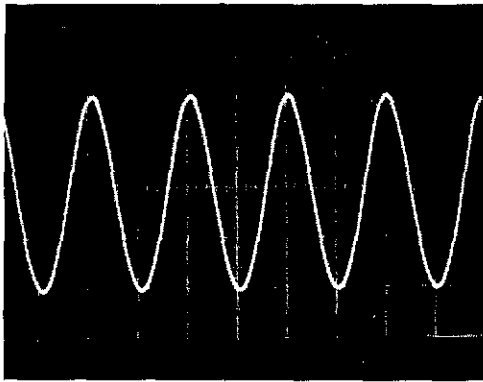
Switching to two-tone output, you should get a pattern similar to Fig. 2C. The two-tone pattern will be difficult to sync on an average oscilloscope because of the different frequency components in the signal. The pattern height of the two-tone output on the scope should be double that obtained with a single tone, as stated earlier.

Fig. 3A is a photo of the single-tone output, as taken from the spectrum-analyzer display. It shows the second harmonic as being approximately 35 dB down from the fundamental, and there are no signs of the third harmonic. Commercial two-tone generators often have better reduction of the second-harmonic energy, but the level shown here should not be a hindrance in amateur radio applications. A series trap, tuned to the second harmonic, can be added to each oscillator's output if greater reduction of the second-harmonic level is desired. The two-tone pattern is shown in Fig. 3B. Here the second harmonic of the 800-Hz tone appears between the two main tones. The second harmonic of the 2000-Hz oscillator will be off to the left out of the picture (and probably out of the audio bandpass of any ssb transmitter).

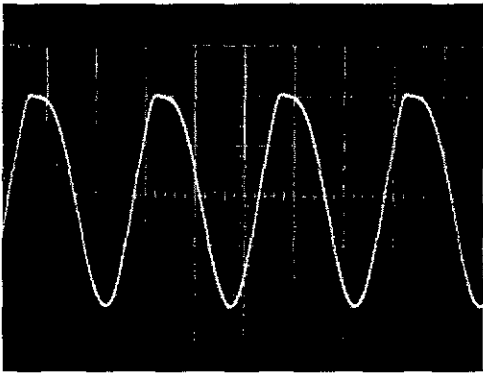
### Using the Generator

Several friends who have tried TT-IC have learned — to their chagrin — that all was not right with their rigs. The comment is always the same; "Gee, I get good reports on the air." Because of the nature of ssb signals, and the number of operators around who have "tin" ears, asking for on-the-air reports is not always a good way of checking your transmitter. A much better approach is to use a set up similar to that shown in Fig. 4.

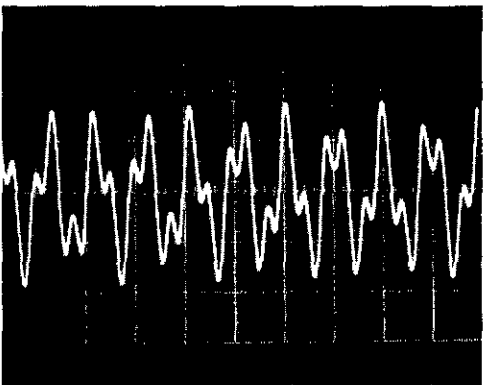




(A)

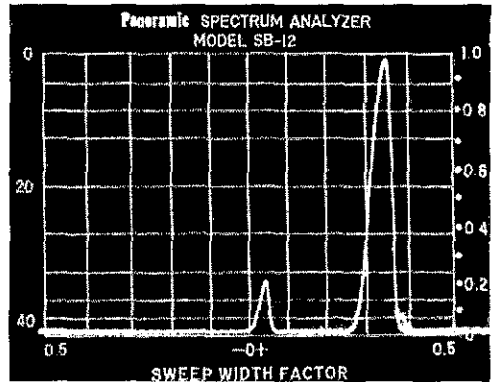


(B)

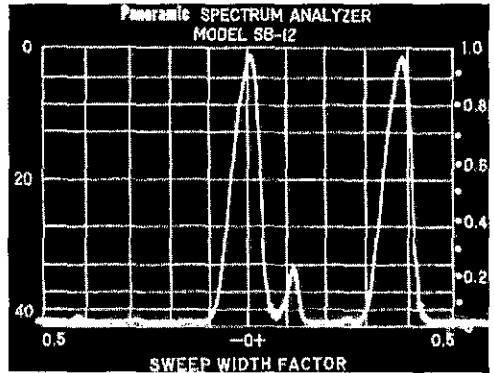


(C)

Fig. 2 - Output waveforms from the generator: (A) proper sine wave, indicating correct adjustment of the FEEDBACK control; (B) distorted output caused by excessive feedback; (C) two-tone output.



(A)



(B)

Fig. 3 - Spectrum output with a (A) single tone and (B) two tones from IC-TT.

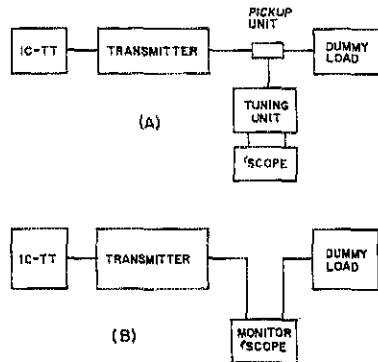
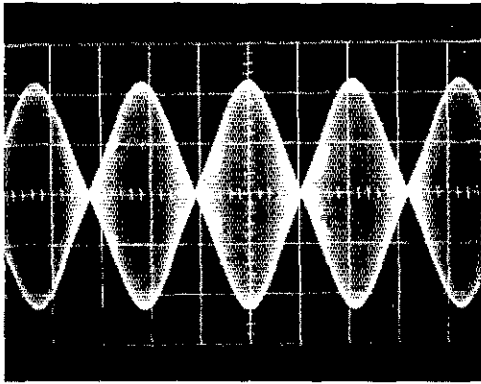
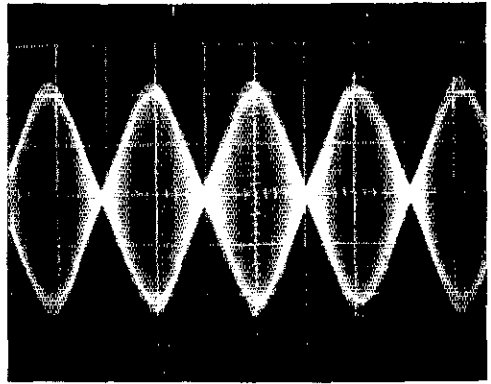


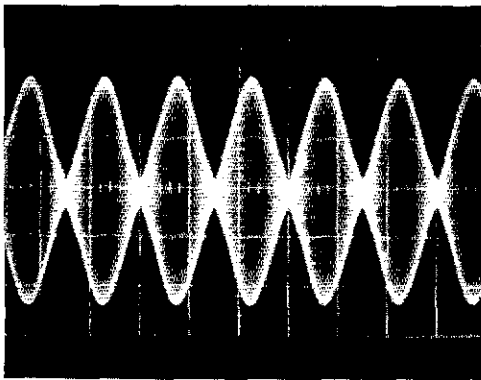
Fig. 4 - Set up for testing an ssb transmitter using (A) a general-purpose oscilloscope (see *QST*, September 1965, or Chap. 8 in *The Radio Amateur's Handbook* for information on connecting up the scope) or (B) a commercially-made monitor scope, such as the Heath SB-610.



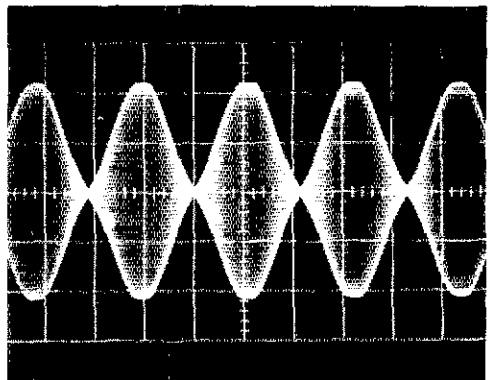
(A)



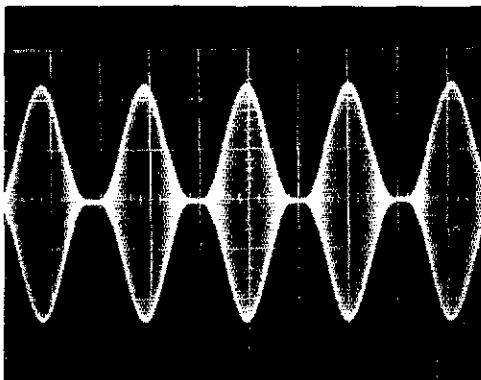
(B)



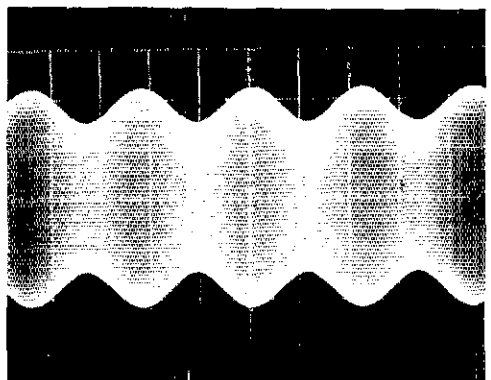
(C)



(D)



(E)



(F)

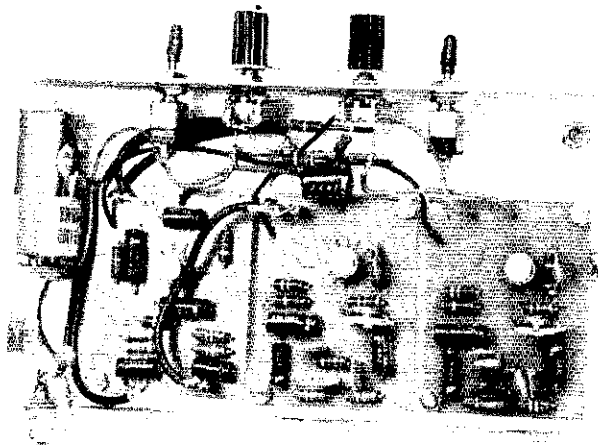
Fig. 5 — Patterns obtained using the two-tone generator. (A) Output pattern of a properly-adjusted transmitter. (B) A similar pattern to A, but showing hum on the signal. (C) Unequal tones (see text). (D) Excessive drive, causing flat-topping and distortion. (E) Final amplifier incorrectly biased. (F) Single-tone showing modulation pattern caused by a partially-suppressed carrier

A two-tone signal has a peak-to-average ratio of 2 to 1, producing less heating of a final tube than a cw carrier. But, it can still provide too much dc input for some sweep-tube rigs. To start with, keep any tests short unless you know your rig can take

extended two-tone operation at full input. Of course, all testing should be done into a dummy load.

The photographs in Fig. 5 show some of the possible patterns. Fig. 5A is the pattern you are

Interior view. Interconnections carrying audio signals use subminiature coax to prevent hum pickup. A homemade clip holds the battery in place. Feedback adjustment of each oscillator is made with the controls on the K-4002 boards.



looking for 5B results when you have hum on the signal, which can be caused by improper grounding, hum in the audio stages of the transmitter, or when setting the microphone gain too high. If you have unequal tone levels, you get a pattern similar to that of 5C. If the two-tone generator is at fault, readjusting the BALANCE control will produce the pattern in Fig. 5A. If you have checked the generator, and know that the tone outputs are equal, the problem will most-probably be an incorrectly-set carrier oscillator in your transmitter. This is a common problem in transceivers and transmitters using high-frequency filters. The manufacturer's instruction book should be consulted for the proper method of resetting the carrier oscillator.

The pattern of Fig. 5D shows the signal from a transmitter that is overdriven to the point where flat-topping occurs. Some distortion is evident on the sides of the wave envelope, and is caused by heavy ale action. It can be surmised from this picture that the ale did not prevent distortion (causing splatter) when the gain control was turned up. Simply reducing the gain control setting will produce the pattern in 5A. Fig. 5E is a pattern produced by incorrect biasing on the final amplifier. If you have this problem, readjust the bias in accordance the manufacturer's instructions.

When using a single-tone input, the pattern of Fig. 5F results if the carrier is not sufficiently suppressed. Readjustment of the carrier-balance control will remove the modulation from the waveform, leaving the top and bottom of the envelope as straight lines.

Every amateur has the responsibility to insure that his signal is clean. When the cost of modern ssb equipment is considered, only a moderate investment is required for simple test apparatus to check a rig's performance.

QST

## NEW BOOKS

**How To Use Grid-Dip Oscillators**, by Rufus P. Turner. Published by Hayden Book Company, Inc., 116 West 14th St., New York, N.Y. 10011. Cat. No. 0790. 2nd Ed. 5 3/8 by 8 1/4 inches, 111 pages, including index, illustrated. Price, \$2.95.

Rufus Turner has been writing easy-to-read books on the use of test equipment, and other subjects in electronics, for a number of years. His latest effort on grid-dip meters (GDOs) is intended for the novice or beginner. The book is profusely illustrated with photographs and drawings, and the text is written in simple terms with only a hint of mathematics. All of the popular grid-dip oscillator circuits, homemade and commercial, are shown. The circuits presented aren't intended to be construction projects, but anyone with some building experience should be able to work successfully from the information given.

One interesting chapter is devoted to the construction of grid-dip adaptors for use with signal generators. The generator provides the rf source to operate the device. Three possible circuits are shown. The advantage of such an adaptor is that it will have the stability and bandwidth of the signal generator used, which is often much better than the grid-dip oscillators sold commercially.

Most of the book is devoted to explanations of how to use a grid dipper. Everything from checking the resonate frequency of tuned circuits to uses as a wavemeter, signal generator, Q meter, and crystal checker are covered. If you own a GDO, or plan to purchase one in the near future, Turner's book will show you all the ways that this versatile test instrument can be put to work around the ham shack. - W1K1K

# Some Tips on Solid-State VFO Design

CURING SOME COMMON ILLS

BY DOUG DeMAW, \*WICER

SOLID-State VFOs are superior to tube versions in many respects. Certainly they are more compact, generate less drift-causing heat, and require a less massive power supply than their tube brothers do. But, they do present a few problems that aren't encountered when working with tubes. Among these peculiarities is the problem of low rms output voltage, and the matter of low output impedance. Additional problems arise because of a tendency toward low-frequency oscillations and parasitics. Fortunately, however, all of these faults can be resolved by observing a few simple guidelines when taking drafting pencil in hand, prior to starting assembly. This article outlines the practical way to deal with most of the problems that are common to solid-state VFO design and application.

## The Matter of Stability

When we speak of frequency stability there are several factors to be considered — the stability of the operating frequency, and the overall circuit stability. The latter concerns low-frequency oscillations, low-frequency parasitics, and vhf parasitics. The stability of the operating frequency of a transistorized VFO can generally be treated in the same way that one would if using tubes — temperature-compensated capacitors, mechanically rigid wires and components, and proper thermal precautions. Because these procedures are pretty much a matter of common practice in VFO design, and have been treated in *QST*,<sup>1</sup> a weighty discussion of that design facet will not be given here.

Let us examine the transistor characteristics that contribute to the generation of spurious oscillations. For the most part, the VFO designer should select a semiconductor that has both high beta and  $f_T$  rating.<sup>2</sup> A reasonably high beta will assure the builder that the oscillator will start easily, and with the least amount of empirical effort when establishing the feedback-network values. The higher-beta transistors (bipolar) will require less driving signal when used as buffers and amplifiers, which is not true of such low-beta devices as the popular 2N706A. The  $f_T$  rating should be based on the operating frequency, and as a rule of thumb it is wise to let that be at least 10 times the proposed operating frequency to assure reasonable effi-

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<sup>1</sup>Grammer, "VFO Stability — Recap & Postscript," *QST*, September and October, 1966.

<sup>2</sup>Beta is the forward-current transfer ratio (common-emitter) of the transistor. (If 1  $\mu$ A of base current causes 90  $\mu$ A of collector current to flow, the beta is 90, etc.) The  $f_T$  is the gain-bandwidth product or frequency at which the forward-current transfer ratio (beta) (common-emitter) is unity, or 1.

Transistorized VFOs aren't difficult to build and get operating, but they do differ in many ways from those that use tubes. Here are a few practical suggestions on basic design, showing how to lessen harmonic output, improve stability, and increase the rms output.

ciency. That is, if the VFO or amplifier stage is to operate at, say, 7 MHz, the  $f_T$  should be at least 70 MHz. Another matter of concern in choosing the transistor for the job is its maximum safe  $V_{CEO}$  (collector-to-emitter voltage, base open). This rating should allow for a swing that is equal to at least *twice* the supply voltage for oscillators and amplifiers, or four times the supply voltage for stages that are to be amplitude modulated.

Now that we've chosen a high-gain, high-frequency transistor, let's see what can happen in a practical circuit. First, if the constants are such that the desired frequency range is being covered, and assuming that the oscillator and buffer stages are doing their intended jobs, what else might be happening? We could have strong oscillations at some frequency above or below the desired frequency! Because we have employed a device, or devices, that exhibit high beta at 7 MHz, the effective gain at frequencies below 7 MHz will be even higher because of the high  $f_T$  rating of the semiconductors. In engineering jargon, the circuit can become extremely "hairy." Some forms of low-frequency oscillation manifest themselves as "hash" (similar to that heard in the output of a superregenerative receiver). The hash becomes superimposed on the fundamental VFO signal, and we've got problems. Or, the combination of circuit and transistor junction capacitances, in combination with lead inductances and rf chokes, can establish a resonance at some unwanted frequency. The high-gain transistor may like what it sees, and produce output where it is neither needed or wanted. Similarly, high-frequency oscillations can occur above the operating frequency, depending upon circuit values. The latter condition becomes more pronounced as the  $f_T$  of the transistor is increased. That is, the closer we get to the actual  $f_T$  the less will be the likelihood of spurious vhf or uhf oscillations, because the transistor no longer has significant gain. So, if we use a device whose  $f_T$  is 500 MHz, it could produce oscillations in the uhf region if conditions were right.

Looking at the circuit of Fig. 1, a 100-ohm resistor, R1, is used in series with the collector supply to Q1. Low-value resistances, often as low as 10 ohms, can be used as shown to stop parasitic oscillations in VFOs and amplifiers. They should be placed as close to the collector terminal as

possible. Alternatively, two or three ferrite beads<sup>3</sup> can be slipped over the collector-leads of Q1 and Q2 for the purpose of preventing vhf parasitics. Since no dc resistance is involved when using the beads, the full operating voltage will reach the transistors, often a design consideration if the transistor draws considerable collector current. Proper bypassing is essential to the elimination of spurious oscillations, and it can be seen from the previous discussion that such bypassing should be effective at both the high and low ends of the frequency spectrum. Transistor Q2, Fig. 1, operates as an emitter-follower. Its collector is at ac ground by virtue of C4 and C5. A quick reactance calculation shows that for reasonably-effective bypassing at 3.5 MHz we need approximately 0.05 uF of capacitance. Since that value might be a bit marginal a 0.1-uF capacitor is used. At some lower frequency, say, 1000 kHz, 1 uF is needed. To play it safe, a 5-uF value is used. Bypass capacitors, ideally, should be disk ceramic or mica, not paper or mylar. (The latter two types are usually inductive and can actually contribute to circuit instability.) Similar treatment should be given to emitter bypassing, where called for,<sup>4</sup> to dc supply lines, and to decoupling networks between stages. Always bypass rf for both low and high frequencies.

### Stabilizing the Operating Voltage

In all of the circuits shown in this article it will be seen that a Zener-diode regulator is used for supply-voltage stabilization. CR1 holds the collector (or drain, if an FET is used) at a constant dc potential despite variations in supply voltage. Semiconductors exhibit a marked change in junction capacitance if the supply voltage varies. Therefore, significant changes in the supply voltage can shift the operating frequency of oscillators. The Zener diode safeguards against such changes in voltage.

Referring again to Fig. 1, bias resistors R1 and R2 must be chosen to provide optimum oscillator stability. It is an unfortunate fact that like transistors, from a given production run, differ substantially in their operating characteristics. Therefore, the actual bias-resistor values should be established in the working circuit. By monitoring the VFO signal on a stable receiver, the drift can be noted as different values are tried at R1 and R2. For a given supply voltage, a specific value of bias will be found that will enhance the stability. Careful attention should be paid to this part of the design procedure. In Fig. 2, the Zener regulator also guards against changes in bias voltage at the base of Q2, thus minimizing pulling of the oscillator with

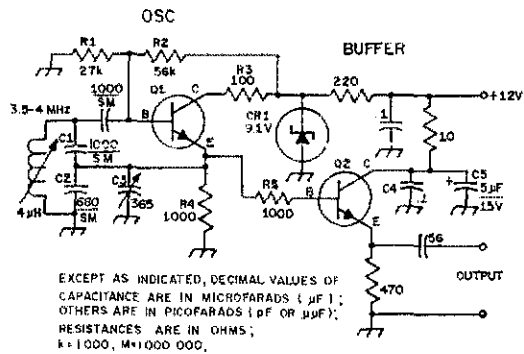


Fig. 1 - Representative circuit for a simple solid-state VFO. For good stability, C1 and C2 should be silver mica. C3 is a broadcast-set variable. R4 keeps the emitter above rf ground to provide a low-impedance takeoff point for feeding the base of Q2. The value of R5 is selected to provide the correct bias for Q2. The remainder of the numbered parts are discussed in the text.

changes in the operating point of Q2 as its bias shifts, as it might if regulation were not used.

Another safeguard against frequency shift brought about by changes in supply voltage is the matter of proper rf isolation of the VFO assembly. It should be carefully shielded, preferably in a rugged metal housing, and incoming dc leads should be well filtered for rf. Feedthrough capacitors and rf chokes are recommended for this. Should rf voltage reach the transistors, along the supply leads, instability will surely be noted.

### How to Reduce "Pulling"

Most oscillators, tube or transistor, will show a shift in operating frequency as the load they look into changes. This can be a serious problem in receivers and transmitters. Many low-cost receivers exhibit this pulling effect as the rf and mixer stages are peaked by a preselector control. Or, in some receivers it can happen in the presence of a strong signal, or when the rf-gain control is adjusted. It usually means that the local oscillator is connected to the mixer stage without benefit of a buffer stage. In a transmitter, the same condition is often noted as the stages succeeding the VFO are keyed or tuned. There are two practical ways to attack the problem - employ one or more buffer stages after the oscillator, or operate the oscillator at half the desired VFO output frequency. For half-frequency operation, the oscillator is usually followed by a frequency doubler; or by a buffer, and then a frequency doubler. By combining the two techniques it is possible to virtually eliminate pulling, and this is the method the writer recommends. Quality transistors are cheap these days, and it seldom costs more than a dollar or two to add an extra buffer stage to a VFO. The rewards are well worth the extra effort and cost. Fig. 3 shows a dual-gate MOSFET VFO followed by two buffer stages. The first buffer, Q2, operates at low power level, Q3 acts as a second buffer, but is designed to amplify the VFO signal to a practical level. Proper

<sup>3</sup>When ferrite beads are slipped over a short piece of wire, that portion of the wire becomes more inductive, thus forming a vhf choke. Normally, three or four ferrite beads on a 1/2-inch length of wire will provide a low-Q inductance of 2 or 3 uH. The beads are available from Amidon Associates, 12033 Otsego St., N. Hollywood, Ca. 91607.

<sup>4</sup>In some instances it is helpful to not bypass the emitter of the amplifier for low-frequencies, but only for the higher signal frequency. By not bypassing for lf, degeneration will take place, thus reducing the amplifier's gain at lf. This can aid stability.

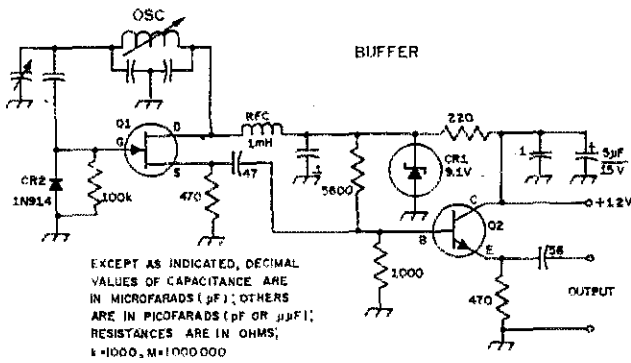


Fig. 2 - Typical circuit of a JFET VFO and buffer stage. Operation is similar to the circuit of Fig. 1.

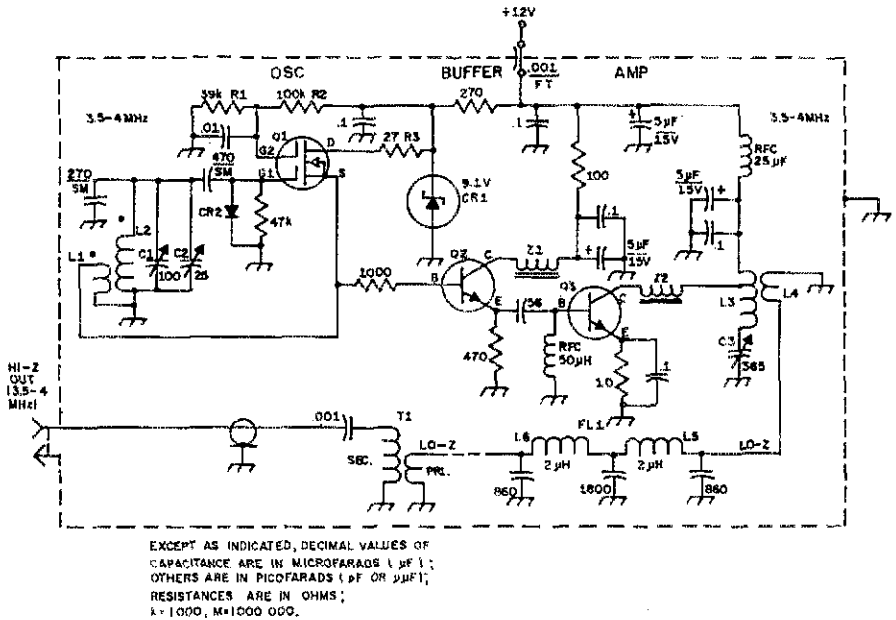


Fig. 3 - Circuit for a dual-gate MOSFET VFO showing two buffer stages, harmonic-suppression measures, and output-impedance matching. Parts values shown are typical for operation from 3.5 to 4 MHz. L1 and L2 are wound on a small toroid core. L2 should be approximately 5  $\mu$ H, and L1 should have about 25 percent of the turns used for L2. SM = silver mica. CR1 is a 9.1-volt, 1-watt Zener. Z1 and Z2 are parasitic chokes, each consisting of three Amidon ferrite beads slipped over the collector leads of the transistors. Q2 can be a 300-milliwatt NPN transistor with high beta and high  $f_T$  (see text), typically a Motorola MPS3563. Q3 should be a 2- or 3-watt NPN with reasonable beta and high  $f_T$ . A Motorola HEP-75 would work well here. Other numbered components are discussed in the text.

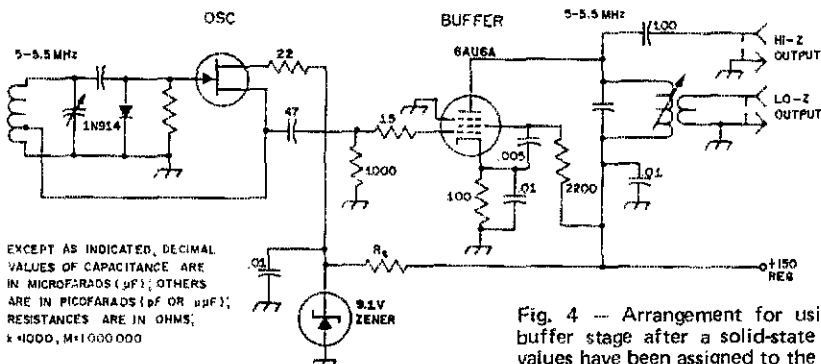


Fig. 4 - Arrangement for using a vacuum-tube buffer stage after a solid-state oscillator. Typical values have been assigned to the parts.

rf bypassing, as outlined earlier, is used in the circuit. Q2 operates Class A. Q3 operates essentially Class C. Q1, the oscillator, has high transconductance - up to 18,000 micromhos - thus assuring that it will oscillate readily. It can be an RCA 3N141 or a Motorola MFE3008.

### *Reducing Harmonic Outputs.*

It is no secret to most transistor experimenters that transistors generate more harmonics than tubes do. This is caused by the nonlinear change in junction capacitance during the sine-wave excursion. (We mentioned earlier that the junction capacitance changes markedly with changes in voltage.) Therefore, we get not only the more normal envelope-distortion harmonic generation, but the transistor also lends itself to parametric frequency generation. There is no way to eliminate this characteristic at the device, so steps must be taken to assure that the output signal from the composite VFO is clean. If not, "birdies" will be heard in the receiver, or spurious signals can be radiated by the transmitter. Harmonic energy also contributes to the drive reaching the succeeding stages of the VFO, and this impairs their efficiency by causing them to dissipate more power than if the driving signal were clean.

Examination of Fig. 3 will show that a diode, CR2, is connected between the signal gate of Q1 and ground. This diode should be designed for high-speed switching - a 1N914 works fine - and should be connected with its anode toward gate 1. It clamps on the positive-going half of the cycle to prevent Q1 from reaching high peak transconductance, the time period when the output from the oscillator is rich in harmonic energy. This technique should be applied to any JFET or MOSFET oscillator, but does not work with bipolar-transistor oscillators. CR2 does not impair the performance of the VFO. Additional harmonics can be generated at Q2 and Q3, so attention must be given to that part of the circuit as well. Note that the collector of Q3 is tapped well down on L3. The tap provides an impedance match for the circuit, but still represents a high impedance at the harmonic frequencies, if not located too near the cold end of L3, thus contributing to a cleaner output signal. However, even though these precautions are taken, it is not uncommon to find that the second and third harmonics from a transistor output stage are only down some 10 to 15 decibels in level from the fundamental signal. By taking the VFO output at low impedance, L4, a low-pass, double-section filter can be used to diminish the harmonic to a level that is some 30 decibels or more below that of the desired output signal. FL1 is designed for 3.5 to 4-MHz use, and assures a clean output signal from the VFO.

### *VFO Output Level and Impedance*

One of the things that perplexes many first-time users of transistorized VFOs is the matter of sufficient signal output to properly excite a transmitter input stage, or to supply adequate injection voltage to a receiver or transmitter mixer. The rms

output of a solid-state VFO is limited by its low-impedance output port. In the circuits of Figs. 1 and 2 the output is taken across the emitter resistor of Q2, the buffer. Typically, the rms output voltage at that point in the circuit will be on the order of 0.5 to 2 volts, which is scarcely enough to excite much of anything we might use it with. Tube mixers can require up to several volts of

oscillator signal in order to function properly. Most solid-state transmitters need from 3 to 10 volts of drive on the base of the first power stage, and a reasonable amount of driving power is needed to satisfy this requirement. Driving power is generally required by the grid of the first stage of a tube transmitter. The VFO should, therefore, be capable of supplying from 0.5 to 1 watt of power output. The Class-C amplifier, Q3, of Fig. 3, can provide the needed power output. Should the driven stage present a low-impedance to the VFO, output can be taken directly from the side of FL1 opposite Q3. If, however, the driven stage of the transmitter or receiver has a high input impedance, some method must be used to provide the required impedance transformation, low to high. A broadband toroidal step-up transformer, T1, is used for this purpose in Fig. 3. The secondary of the transformer is resonant somewhere in the operating range of the VFO, and takes advantage of the stray circuit capacitance, normally around 10 pF, to establish resonance. The impedance-transformation ratio is set by adjusting the number of turns on the primary winding. Alternatively, T1 can be replaced by a tuned circuit of conventional design. It can be equipped with a fixed-value capacitor and a slug-tuned inductor, or a fixed-value inductor can be used with a variable capacitor to permit peaking the output at the operating frequency. The use of a tuned circuit will assure somewhat better efficiency than will the broadband transformer, T1. Thus, it can be seen that the circuit must be tailored to the need.

### *Some Final Remarks*

If the solid-state VFO is to be a part of a tube-type transmitter or receiver, it might be worthwhile to consider using a vacuum-tube buffer stage, operated Class-A, between the oscillator and the stage being excited. Figure 4 shows a typical arrangement for doing this. Since most transmitters and receivers require a 150-volt regulated supply at some point in the circuit, operating voltage for the transistors can be taken from that line through a dropping resistor, then Zener-diode regulated as shown. There is no reason why that next oscillator you're planning to build cannot be transistorized. Some of the suggestions given here may save you a few headaches during the debugging stage of the project.

QST-

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# SWITCH TO SAFETY!

## A Solid-State Selectoroid

*Audio Selectivity With a Simple Device*

BY LEWIS G. McCOY,\* W1ICP

ONE OF the more serious problems the Novice has to contend with is QRM. The Novice bands, particularly 80 and 40 meters, can become very congested at times, and trying to copy a desired station can sometimes be very difficult. To make the problem even worse, many Novices start out in amateur radio using low-priced receivers that are lacking in selectivity. While it is possible to rework a receiver to improve the selectivity, most Novices are reluctant to dig into a receiver to make changes. This is understandable because it does take a certain amount of know-how and experience to modify equipment.

On the other hand, it can be very difficult to separate stations in a congested band if the receiver has poor selectivity. Many newcomers have the mistaken notion that the answer is to have more bandspread on their receivers. However, this is rarely the case.

Basically, bandspread is the ability of a receiver to cover a given frequency range by "spreading" the band out on the tuning dial. However, it doesn't mean that two stations that are operating close together are more separated. It just means that you can tune across the two stations at a slower rate. The ability of a receiver to separate stations that are close together is called *selectivity*, or the ability to select the *desired* signal, and discriminate against others.

There are many methods by which the selectivity of a receiver can be improved. One of the

\*Novice Editor

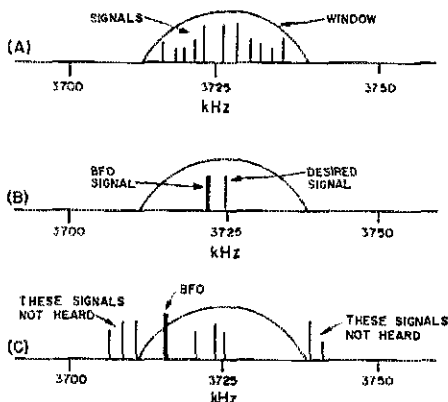
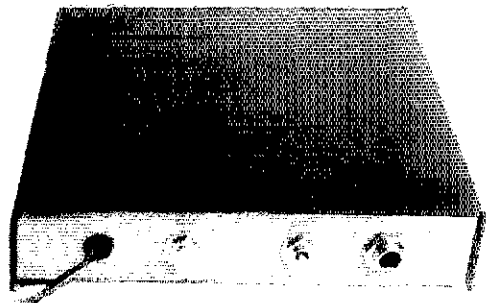


Fig. 1 — This drawing illustrates the discussion in the text.



The Selectoroid is housed in a homemade aluminum box. Two aluminum U-shaped channels are used for the case.

simplest, because it doesn't necessarily require any internal modifications to the receiver, is called audio selectivity. The Selectoroid, described in this article, is a device that will provide such selectivity. It is easy to build and get working, and can prove a real boon under QRM conditions.

### *How It Works*

Let's take a moment to visualize how a receiver works as far as selectivity is concerned. Also, let's suppose we are going to tune the Novice portion of the 80-meter band, 3700 to 3750 kHz. Just for an illustration, let's assume our tuning dial is a window that we can move up and down the band as we operate the tuning dial. Our window has a certain width, and this width can be called the *bandwidth* of the receiver. Any signals that appear in the window, can be heard. Fig. 1, at A, is an illustration of this window and represents the Novice portion of the band.

In order to hear cw signals, we need a beat-frequency oscillator signal in our window. As we move our window, the BFO signal moves right along with the window. Now, let's suppose there is a signal at 3725 kHz, as in Fig. 1 at B. As our BFO signal approaches the other signal, the two signals beat against one other, resulting in a signal that is the audio difference between the two. If our BFO is 3000 Hz away from the desired signal, we would

In December 1966 *QST* we described a tube version of a selective audio filter. The unit was called a Selectoroid. Here is a transistorized version of the same unit.



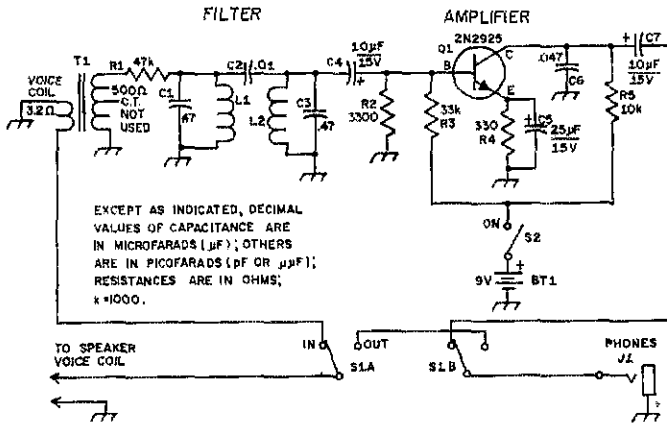


Fig. 2 - Circuit diagram of the solid-state Selectoroid. Capacitances are in  $\mu\text{F}$ , resistances are in ohms, and all resistors are  $\frac{1}{2}$  watt. Circuit designations not given below are for parts placement reference.

BT1 - 9-volt battery.

C1, C3 - 0.47- $\mu\text{F}$  paper.

C2 - 0.01- $\mu\text{F}$  disk ceramic.

C4, C7 - 10- $\mu\text{F}$  electrolytic, 15 working volts or higher.

C5 - 25- $\mu\text{F}$  electrolytic, 15 working volts or higher.

J1 - Headphone jack.

L1, L2 - 88-mH toroid. See text.

Q1 - 2N2925.

S1 - 2pdt toggle (See text).

S2 - Spst toggle.

T1 - Transistor output transformer, 3-ohm voice coil, 500-ohm primary, primary center tap not used, (Lafayette Radio catalog No. 99 H 6123).

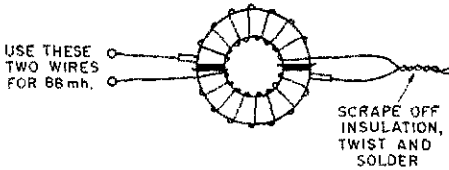
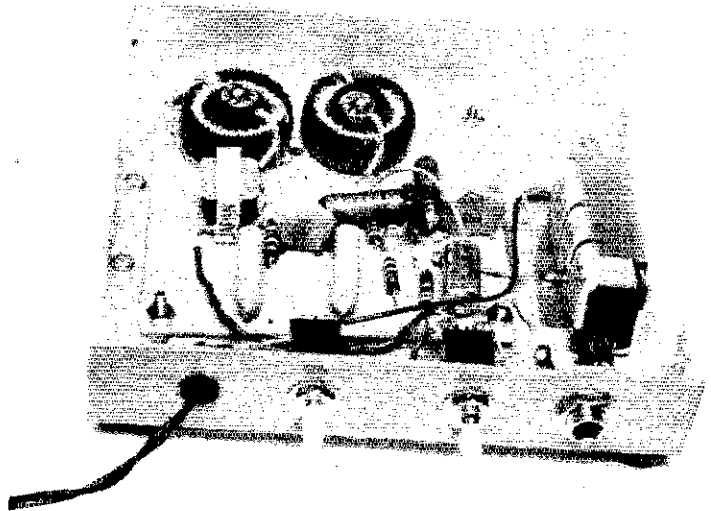


Fig. 3 - This drawing shows the method for connecting the toroid windings to obtain the required 88-mH inductance.

*Inside view of the audio filter.* Most of the parts are mounted on an etched-circuit board (left). L brackets are shown on the left and right edges of the bottom cover. These are used as anchor points for the top cover when it is attached. Sheet-metal screws hold the top cover to the brackets.



hear a 3000-Hz tone in our headphones. As the BFO signal is moved closer to the desired signal, the difference decreases, and the resulting tone gets lower and lower in pitch. When the two signals are on the same frequency, they are said to be *zero beat* and there will be no tone in our headphones.

As we continue to tune the BFO signal in the same direction, past the other signal, the difference between the two increases and the audio note also rises in pitch. The side of the signal we *are not* listening to is called the *audio image signal*.

Let's assume that our window is 16,000 Hz wide (16 kHz). If our desired signal was at the edge of the window, and our BFO at the exact center, we would start hearing an 8000-Hz tone, gradually decreasing in pitch until we reached zero beat, and then increasing as the window was moved past the desired signal.

From the example just given, it should be apparent that if we had two signals in the window, at opposite sides of the BFO, we would hear both signals because the BFO would beat against both. In the ideal setup, the BFO signal should be set near the edge of the window, as in Fig. 1 at C. Under these conditions, the BFO can *only* beat against signals that are to one side of the BFO and inside the window. This type of selectivity is called *single-signal selectivity*, because the audio image of

the signal is not heard. Also, it follows that the narrower the window, the more the undesired signals will be rejected.

If the Novice is shopping for a new receiver, he'll find that most of the better receivers have built-in filters that usually provide a "window" of about 2100 Hz (2.1 kHz). The reason that this figure is chosen is because 2100 Hz is about as narrow as one can get and still provide good intelligibility of phone signals. With the BFO set on the edge of such a passband, *only* signals within the passband will be heard. In some receivers, the purchaser may have the option of buying an additional filter for cw. These are usually on the order of 500 Hz, and some are as sharp as 200 Hz.

Naturally, the question many newcomers would ask is, "Can I install such a filter in my present receiver?" The answer is yes, but as pointed out earlier, it isn't an easy task for a newcomer who doesn't have the know-how. This leads us up to the Selectoroid — a method for improving the selectivity in the audio channel, or at the output end of the receiver.

Fig. 2 is the circuit diagram of the Selectoroid. The important parts of the unit are the two tuned circuits, C1L1, and C3L2. These are sharply-resonant circuits tuned to approximately 800 Hz. When our window and BFO are tuned across a

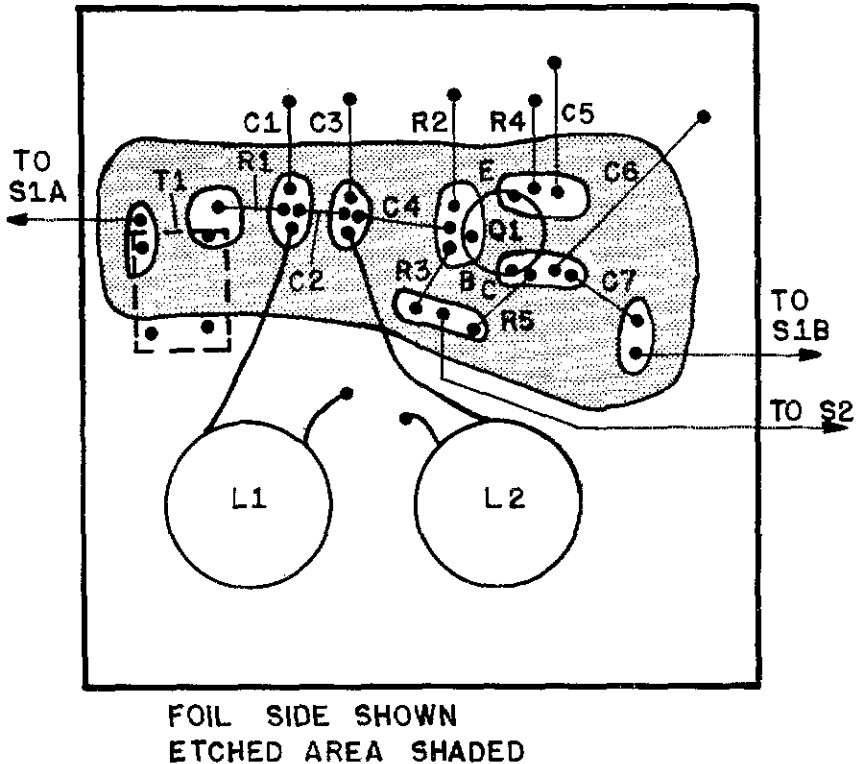


Fig. 4 — Layout of the etched-circuit board. The etched, or foil side is shown. (Ready-made circuit boards can be purchased from Stafford Electronics, 427 S. Benbow Rd., Greensboro, N.C. 24701.)

signal, all the audio range of the signal will be attenuated with the exception of a very narrow portion of the signal around 800 Hz. The listening effect is that when the receiver is tuned to 800 Hz, the cw note will peak quite sharply. Or in other words, the filter will "select" that portion of the signal around 800 Hz and attenuate everything else. No modifications of the receiver are required, and the only connections needed are to the speaker terminals on the receiver.

Because there is some audio loss through the Selectoroid, an audio amplifier stage, Q1, was added to the unit. The unit is powered by a 9-volt battery. The drain on the battery is only a couple of milliamperes, so B1 should last almost as long as its normal shelf life. S1 is a double-pole, double-throw toggle switch that is used to switch the Selectoroid in or out.

### Construction Information

The inductors used for L1 and L2 are types made, for teletype units and you'll find them advertised in *QST* Ham Ads every month. The prices vary, but the toroids can usually be obtained for about 50 cents each. As they come, the toroids have two windings on them. These windings must be connected in series in order to obtain the required 88-mH inductance. Fig. 3 is a sketch that shows how the windings should be connected. Be sure to scrape the enamel covering from the wires before soldering them together.

In the unit shown, an etched-circuit board is used for mounting the components. Fig. 4 shows the etched side of the board with the various components marked off as lines to show their placement on the board. All the components are mounted on the unetched side of the board. A recent article in *QST*<sup>1</sup> covered the construction of etched-circuit boards in considerable detail, so the subject won't be treated here. Layout of the circuit is not at all critical, and any arrangement of the parts will work.


When mounting the transistor on the etched-circuit board, be sure to use a heat sink on the leads being soldered. This will prevent damage to the transistor. We mounted the completed board in a homemade low-profile cabinet, as shown in the photograph. The dimensions for the box, made from cookie-sheet aluminum, are 5 x 5 inches, with a 1-inch high lip on the front and back. The toggle switches used are of the miniature type, and if the normal-size toggles are used, the back and front lip of the box should be 1 1/2 inches high. You don't have to build the unit exactly as shown, as any size box that will hold the parts will work. However, we like the low-profile enclosure because it takes up less desk space than a larger cabinet would.

In order to keep the bottom side of the etched board from shorting to the metal chassis, a piece of stiff cardboard is mounted between the metal chassis and the bottom of the board. Make sure, however, that there is a good connection from the metal chassis ground to the copper-foil ground on the etched-circuit board.

<sup>1</sup>Schiebold, "Fast'n' Easy Printed Circuits," *QST*, August, 1969.

### Using The Selectoroid

After the unit is completed it should be hooked up to the station receiver. The two leads from the Selectoroid can be connected to the voice coil terminals on the receiver, or at the speaker. The input of the Selectoroid is designed for 3- to 8-ohm impedance, which should be in the range of your speaker's impedance. The leads from the Selectoroid can be connected directly in parallel with the speaker leads if desired. However, some users might like to have the speaker shut off while listening with the headphones. All that is necessary in such a case is a single-pole switch to open one of the speaker leads when the Selectoroid is in use. Be sure you connect the Selectoroid leads on the receiver side of the switch, otherwise you'll be shutting off the input to both the speaker and the Selectoroid.

All you need do to use the Selectoroid is tune in a cw signal. As you tune across the signal you'll hear a sharp peak around the 800-Hz region. Switching the Selectoroid in and out of the receiver output will quickly show you just how much the unit eliminates QRM. As was said earlier, this is an easy and cheap method for improving your receiver's performance. 



### Ham Radio at AFCEA - 1970

On-the air ham radio facilities will be provided by the U.S. Navy's Washington voice in the amateur radio fraternity, K4NAA, operating daily from the Sheraton Park Hotel in Washington, D.C. during the three days of the Armed Forces Communication and Electronics Association Convention in June. AFCEA convention delegates with amateur radio licenses are invited to take advantage of the Navy's ham radio station to contact friends during the convention on June 2, 3, and 4.

The K4NAA fixed portable station will be operational from 0900 to 2200 EDST with two available positions for cw, ssb, and RTTY on the 10-, 15-, 20-, 40-, and 80-meter bands.

A specially designed QSL card has been prepared to acknowledge contacts with licensed amateurs throughout the world who are invited to make contact during the AFCEA convention.

The Navy and AFCEA invite all amateur radio enthusiasts to visit K4NAA on June 2, 3, and 4.

### Feedback

There is a dimensional discrepancy in the drawing of the 2-meter repeater antenna shown in January, 1970 *QST* page 24. The 18 1/2-inch dimension is the length of the pipe insert. The 19 3/4-inch dimension is correct for the stub length. Thanks to W9OFL for calling this to our attention.

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

# A Lightweight 10- and 15-Meter Beam with 5 Elements on Each Band

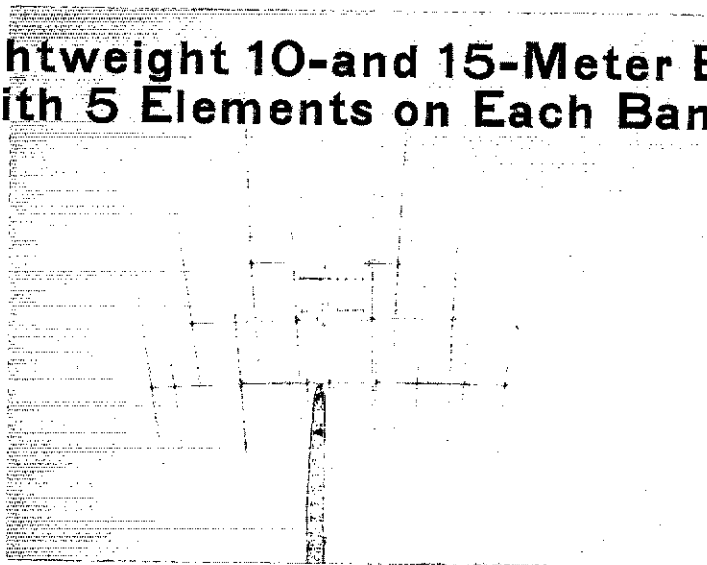


Fig. 1—W5KTR's antenna system for 40 through 10 meters. Minimum wind loading is a feature of the design. The beam closest to the top of the tower is the 10/15-meter Yagi described in the article.

BY RICHARD C. FENWICK,\* W5KTR

THE DX contest operator is faced with more-stringent antenna requirements than most other amateur-radio specialists, primarily because a good signal is a must on all bands. The ubiquitous triband beam is the simplest solution, but more than this is required to rise above the multitude in the pileups, or to get pileups of DX stations to call you. Eventually, the serious DX contester faces two alternatives. Either he becomes resigned to using a tribander and, perhaps, a small 40-meter beam, or he puts up separate beams on each band. The latter is a major step, often requiring larger or additional towers, heavy-duty rotators, and exotic mast material. The extent to which these will be required depends primarily on the design of the beams themselves. If the beams are designed for low weight and drag (wind area), the requirements placed upon the supporting structure are reduced. Fortunately, such beams are available commercially, with 2 elements on 40 meters and up to 4 elements on 20, 15, and 10.

In order to reduce the support requirements even further, it becomes desirable to interlace some of the beams on a single boom. The most logical candidates for this approach are the 10- and 15-meter beams. Commercial 3-element dual-banders for 10 and 15 meters are available, but performance is likely to be the same as a tribander. Thus, if better performance is desired on these bands, separate beams must be used, or one must resort to building his own.

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The author has been, as you might suspect, caught up in the syndrome described above. The result is shown in Fig. 1. The beams are, from top to bottom, a Hy-Gain 402BA 2-element 40-meter beam at 92 feet, a Hy-Gain 204BA 4-element 20-meter beam at 82 feet, and a homemade beam for 10 and 15 meters with 5 active elements on each band, at 72 feet. The mast is 24 feet of "normalized" 4130 alloy-steel tubing, 2 inches OD with  $\frac{1}{4}$ -inch wall. A Ham-M rotator successfully turns the arrays, but not without some difficulty in winds above 15 mph. The tower is a Tristao TWS 771, a 71-foot, self-supporting, crank-up type. The tower, mast, and beams are rated to withstand 80-mph winds, and have seen winds of at least 70 mph.

Beams were selected that had small (2-inch) diameter booms with tapered wall thickness and taper-swaged elements, which result in minimum weight and drag. The 10- and 15-meter beam was constructed using the driven element, beta match, boom-to-mast bracket, and part of the reflector from a Hy-Gain DB-1015 beam. Separate parasitic elements are used for each band. Total weight of the beam is just under 60 pounds, much lighter than commercially-made 3-element 15-meter beams.

Fewer amateurs are building their own hf beams these days, and for some very good reasons. First, obtaining the material can be a very frustrating experience. Second, complete commercial beams can be purchased for little more than the amateur would have to pay for

the aluminum tubing to build his own. However, since nothing was available commercially which remotely resembled the antenna which we wanted, the expenditure of a reasonable amount of effort and money on the 10- and 15-meter beam project seemed justified.

### Electrical Design

A 5-element beam was decided upon because of boom length and diameter considerations. Less than 1 dB additional gain would be obtained with 6 elements, which would require an increase in boom length of about 16 feet.<sup>1</sup> Of equal importance was the desire to base the design on that of an existing antenna to eliminate the necessity for a cut-and-try tune-up procedure. Fortunately, the author had built a 5-element 6-meter beam a few years back which turned out to be ideal as a scale model upon which to base the design of the 10- and 15-meter beam. The 6-meter beam was in turn based on a handbook design,<sup>2</sup> with one important difference — tapered elements were used, in steps of  $\frac{1}{2}$ ,  $\frac{3}{8}$ , and  $\frac{1}{4}$  inch. The author found out (the hard way, of course) that because of the taper the element lengths had to be increased by nearly 10 percent over the handbook values. This phenomenon renders most element-length graphs, tables, and formulas useless when severely-tapered elements are desired.

The 6-meter beam was evaluated on the Collins Radio Company antenna-pattern range, and

found to give an E-plane beamwidth of 50 degrees and H-plane beamwidth of about 64 degrees at a frequency where the front-to-back ratio was in the 20-dB region. Calculated gain for these beamwidths is 9 dB over a half-wave dipole, about 0.8 dB less than that expected with an optimum-length boom. Narrower beamwidths were observed at higher frequencies, but the front-to-back ratio degraded quite rapidly as frequency was increased. The design of the 10- and 15-meter beam was optimized for the low end of the phone bands, with element lengths scaled so that maximum front-to-back ratio occurred near or slightly below the low-frequency edge of the phone band. These lengths are shown in Fig. 2. A 32-foot boom was selected as a compromise between the scaled value (28 feet) and the recommended optimum value (37 feet).<sup>2</sup> It was found in the 6-meter beam tests that the radiation patterns are relatively insensitive to boom-length variations of at least 10 percent, but there was some evidence that the back-lobe levels were lower with the longer boom. It is also noted that the commercially-available 5-element 15-meter beams use about 32-foot booms. Another difference between the final design dimensions and the scaled dimensions is greater space between the second and third 10-meter directors, for aesthetic reasons as much as any other.

The "beta match" from the DB-1015 beam was used in its entirety, as shown in Fig. 3. A

<sup>1</sup> *The ARRL Antenna Book*, Tenth Edition, p. 165.

<sup>2</sup> *Ibid.*, p. 226.

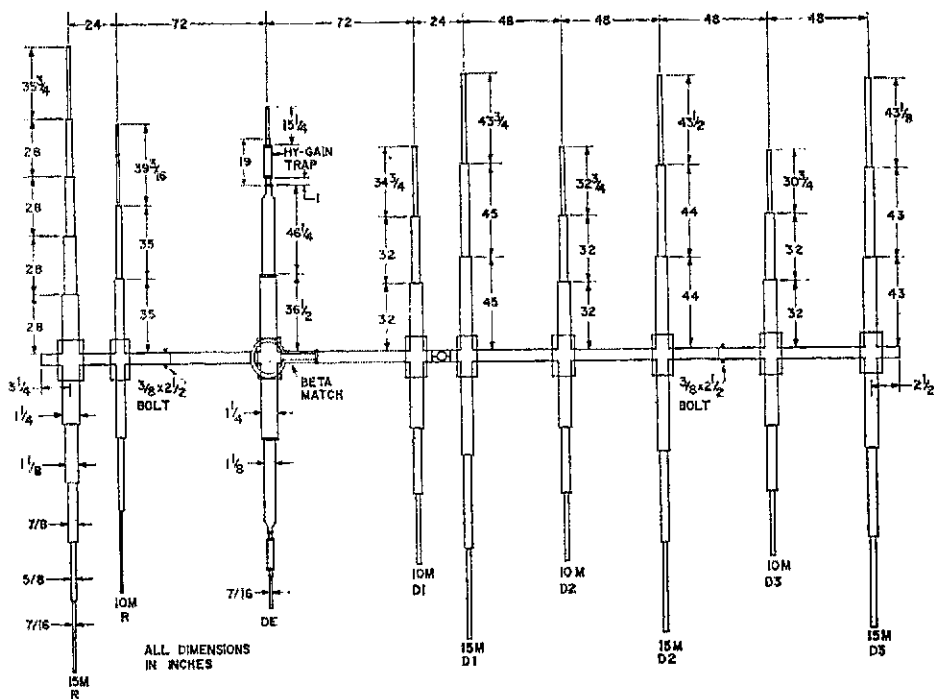
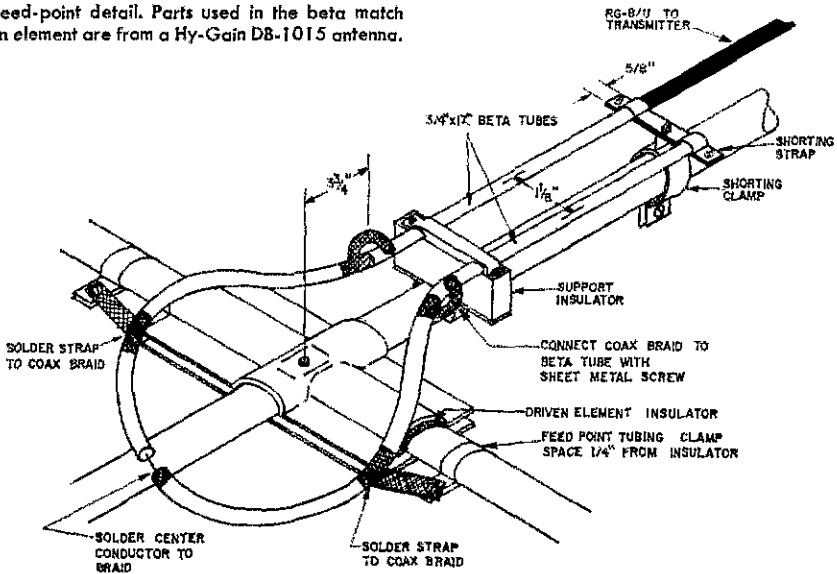


Fig. 2—Element lengths and diameters for the interlaced Yagis. All element diameters are in  $\frac{7}{8}$ -,  $\frac{3}{8}$ -, and  $\frac{7}{16}$ -inch steps, except as noted. A Tri-Ex H-13  $1\frac{1}{2}$ - to 2-inch mast adapter is attached between the 10- and 15-meter first directors.

Fig. 3—Feed-point detail. Parts used in the beta match and driven element are from a Hy-Gain DB-1015 antenna.



perfect match was obtained at resonance on 15 meters, but the minimum SWR on 10 meters is about 1.6:1. The low-SWR fetishist should try longer beta tubes. The dimensions shown in Fig. 2 give resonances at 21.2 MHz and 28.45 MHz. Ten-meter resonance may be altered by changing the length of the driven element inboard of the traps.

There is no reason why any type of 10-meter trap could not be used in the driven element. The trap does not have to be the one used on a DB-1015 beam. In fact, separate driven elements for each hand tied to the same beta match would probably be better from the standpoint of bandwidth and losses than a single driven element with traps. However, it is not believed that the loss in the traps is of consequence.

Fig. 3 also shows a balun built into the matching system. This balun was described in a previous article.<sup>3</sup> As can be seen, the coax cable is simply fed through one beta tube, looped

<sup>3</sup> Fenwick, "Matching with Homemade Baluns," *QST*, October, 1968, pp. 46-48.

around, and fed into the other tube. The braid is connected to each half element using a short strap and tubing clamp. The feed point of the antenna is effectively at the center of the coax loop, between the two halves of the driven element. At this point the braid of the coax is cut and soldered to the center conductor on the side away from the transmitter. The feed point, element and beta-match attachment points should be weatherproofed with silicone-rubber compound and plastic tape.

### Mechanical Design

Boom construction detail is shown in Fig. 4. A material list is given in Table I, not including miscellaneous hardware items. The boom braces used are the only material in the antenna not likely to be generally available (to say the least). They are alloy-steel wing struts from a Stearman Biplane, of elliptical cross section. These were used because they are ideally suited for this application without modification, and because they were available, courtesy of W5MVK.

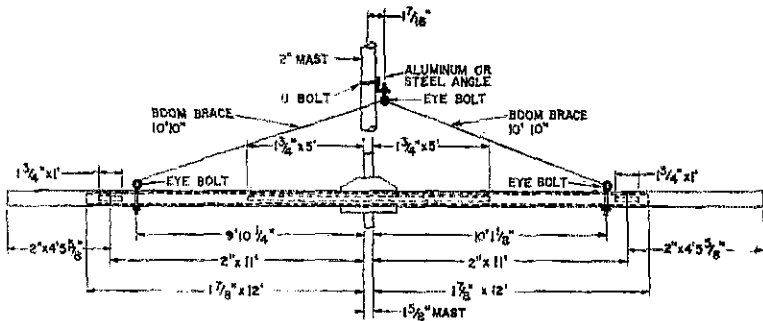


Fig. 4—Boom assembly. See text for details on the boom brace.

**Table I**

## List of Material

(Hy-Gain part numbers in parentheses)

*Boom*

- 3 2-in. OD x 12-ft. 6061-T6 aluminum tubing, .058-in. wall.
- 2 1 $\frac{7}{8}$ -in. OD x 12-ft. 6061-T6 aluminum tubing, .058-in. wall.
- 1 1 $\frac{3}{4}$ -in. OD x 12-ft. 6061-T6 aluminum tubing, .058-in. wall.
- 2 Boom-to-mast bracket (164645).
- 1 Set of boom braces (see text).

*\*Driven Element*

- 2 Element-to-boom bracket (165107).
- 2 Driven-element insulator (465833).
- 2 Feed-point tubing clamp (168695).
- 2 1 $\frac{1}{4}$  x 36 $\frac{1}{2}$ -in. aluminum tubing (190903).
- 2 1 $\frac{1}{8}$  x 52-in. aluminum tubing, swaged to  $\frac{3}{8}$ -in. ID. (190303).
- 2 10-meter trap (872804).
- 2 7/16 x 17 $\frac{1}{4}$ -in. aluminum tubing (171937).
- 2 Beta tubes,  $\frac{5}{8}$  x 17 in. (171938).
- 1 Shorting clamp, boom to beta, 2-in. ID (171077).
- 1 Beta sleeve, 5/16 x 11/16 in. (171131).
- 2 Beta-match shorting strap (171162).
- 1 Clamp for beta-match support (177888).
- 1 Beta-match support insulator (465595).
- 1 Beta-match top insulator (465600).

*Parasitic Elements*

- 16  $\frac{7}{8}$  x 48-in. aluminum tubing, swaged to  $\frac{5}{8}$ -in. ID.
- 16  $\frac{5}{8}$  x 48-in. aluminum tubing, swaged to 7/16-in. ID.
- 16 7/16 x 48-in. aluminum tubing.
- 14 Element-to-boom bracket (163764) for  $\frac{7}{8}$ -in. tubing.
- 2\*1 $\frac{1}{4}$  x 46-in. aluminum tubing (190904).
- 2\*1 $\frac{1}{8}$  x 55-in. aluminum tubing, swaged to  $\frac{3}{8}$ -in. ID (190305).
- 2\*Element-to-boom bracket (163766) for 1 $\frac{1}{4}$ -in. tubing.

\*From DB-1015 beam.

are recommended for connecting the tubing sections.

As an alternative to taper-swaged tubing, ordinary tubing of the same diameters (with shims between the sections) could be used. The builder who does not require minimum wind load may use telescoping tubing with .058-inch wall thickness. Diameters of  $\frac{7}{8}$ ,  $\frac{3}{4}$ , and  $\frac{5}{8}$  inch could be used, for example. The boom described appears to be strong enough to handle the increased load imposed by larger-diameter elements. The elements must be shortened by probably at least 5 percent from Fig. 2 lengths if elements with less taper are used.

The cost of materials for the 10- and 15-meter beam can be as low as \$110 or more than \$200, plus the cost of DB-1015 parts, depending on where the builder obtains his material.<sup>1</sup> The author's cost was near the lower figure. The tubing for the boom weighs 28 pounds, for which an average price of \$1.55 per pound was paid. However, quotations for the tubing ranged all the way from \$1.30 to over \$4 per pound. The wide variation in prices of tubing from one supplier to another is truly beyond comprehension. The antenna builder will be well rewarded if he obtains quotations from numerous metals suppliers before purchasing his aluminum. Such suppliers are listed in the Yellow Pages under "Aluminum" and "Tubing." Only the largest warehouses are likely to have all of the material for the boom in stock, however. Prices are also generally lower at the larger suppliers, but these companies tend to be less hospitable to individuals than to industrial buyers.

Eight complete 15-meter beam elements, including mounting hardware, were purchased from Hy-Gain for \$8 per element. Kirk Electronics, Dayton, Ohio, is the only other known source for taper-swaged elements.

**Performance**

The beam appears to perform as expected on both bands, with no evidence of interaction. E-plane beamwidths are about 50 degrees and front-to-back ratios are in the 15- to 17-dB range at the low end of the phone bands. Greater than 20-dB front-to-back has been observed in the 15-meter cw band. No gain measurements have been made, but results on 15 meters in particular seem noticeably superior to those obtained with the DB-1015. Such observations are highly subjective, to be sure, but based on contest results, the project must be considered worthwhile.

**QST**

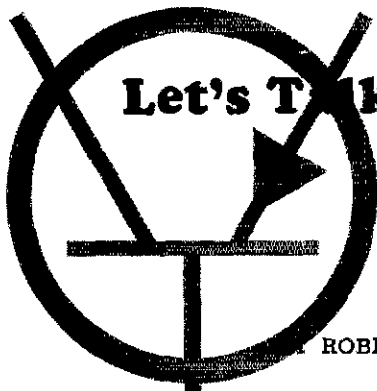
<sup>1</sup>Hy-Gain's price for DB-1015 parts listed in Table I is \$57.55.

**SWITCH  
TO SAFETY!**



Aircraft cable should work nearly as well for the boom braces, although no lateral bracing would be provided and less vibration damping would be obtained.

All of the parasitic elements of the beam are constructed of three standard 4-foot lengths of taper-swaged tubing available from Hy-Gain with diameters of  $\frac{7}{8}$ ,  $\frac{5}{8}$ , and  $\frac{1}{2}$  inch. Hy-Gain boom-to-element brackets are also used. The 15-meter reflector, in addition, requires tubing sections from the DB-1015. The length of each section of tubing is cut to provide a minimum of 3 inches of overlap with the larger-diameter section. Hose clamps, sheet-metal screws, or Hy-Gain tube clamps of the most recent design



# Let's Talk Transistors

## Part 7—Transistor Biasing Circuits

ROBERT E. STOFFELS\*

**I**N Part 6 our discussion centered about the *load line*—that line which shows the operating characteristics of a transistor in a particular circuit. We found that by plotting the current in the emitter-collector circuit vs. the voltage across the emitter-collector portion of the transistor, we obtained a straight line for any particular circuit. At the one extreme of this line was a point of zero current, and voltage equal to the supply voltage. At the other end of this line was a point of zero voltage, and current equal to the supply voltage divided by any external resistance in the emitter-collector circuit.

We found that no matter how much current was drawn from the base-emitter circuit (and thus no matter how much the resistance of the emitter-collector changed) a point depicting the current in and the voltage across the transistor would always fall on this load line.

Thus, if we take a particular transistor, with a particular beta, in a particular circuit, and (a) plot the load line, (b) measure or calculate the base current, (c) multiply this base current by beta to obtain collector current, and (d) plot this collector current on the curve showing the load line, we can immediately determine the voltage across the emitter-collector circuit from the load line and the plotted operating point. Normally, we will find that this operating point is designed to be about midway between the saturation point and the cutoff point. This makes it possible to introduce an ac signal (which adds to and subtracts from the dc bias current) and to cause changes in the emitter-collector circuit which in turn cause excursions in each direction along the load line.

We shall find this month that the exact means of providing this dc bias current is not nearly so simple as we would like it to be. Variations in

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*The effect of bias voltage and power dissipation within the transistor on the stability of an amplifier is discussed.*

circuit parameters (which is another way of saying differences of resistance, beta, voltage, etc.) make it necessary to utilize certain circuit tricks in order to establish and maintain a specific operating point.

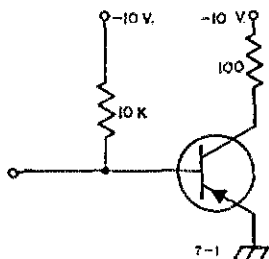


Fig. 7-1—Bias circuit with 10,000-ohm resistor to negative battery.

A circuit we used previously is shown again in Fig. 7-1, and the load line for this circuit is shown in Fig. 7-2. Notice that point *A* is located at the point of supply voltage and zero current. Point *B* is located at the point of zero voltage, and a current equal to the 10 volts divided by the 100 ohms external resistance. The bias circuit in Fig. 7-1 is a simple 10kΩ resistor to negative battery. Thus the base current in this circuit is  $10V/10k\Omega = 1$  mA. Now if the collector current is equal the base current times beta (and for all practical purposes this is quite satisfactory) and if beta of this particular transistor is 50, then the collector current will be 50 mA. This is shown as point *C* on the curve of Fig. 7-2.

Unfortunately, however, all transistors of a given type do not have a constant beta. That is, although the 2N1303 has a guaranteed beta of at least 20, more than likely the beta will vary from 20 to 200. Let's assume in our particular circuit that the beta of the transistor is 20; in this case the 1-mA base current times the beta of 20 gives us a collector current of 20 mA. This is shown as point *D*. If the next 2N1303 has a beta of 80, we will get a collector current of 1 mA times 80, or 80 mA. This is shown as point *E* on Fig. 7-2. If we really go to an extreme, and find a 2N1303 with a beta of 100, then we end up with our transistor biased at point *B*. Naturally this



is the saturation point, and increasing the beta of the transistor beyond this point will not result in a larger current.

(Caution: This circuit and these values were chosen because they are easy to work with. You will note that at point C the power dissipation in the transistor is 50 mA times 5 volts, or 250 mW. Since the 2N1303 is only rated at 150 mW, this circuit, using this transistor and these resistors, should not be assembled.)

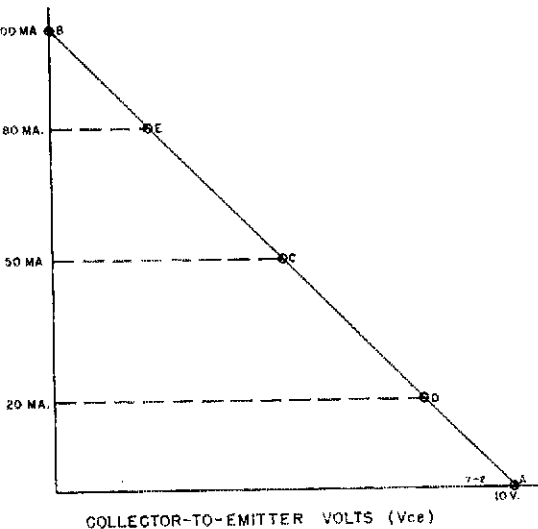


Fig. 7-2—Load line for circuit shown in Fig. 7-1.

Obviously the above method of biasing is not satisfactory; the current in the transistor is completely dependent upon the beta of the transistor, and we simply cannot get the same beta in all transistors of a particular type. Therefore we must find some method of biasing which overcomes this difficulty—a method that will result in a constant collector current regardless of the beta of the transistor.

Such a method is shown in the circuit of Fig. 7-3. You will note that we have added two additional resistors— $R_2$  and  $R_3$ —and have not specified the resistance of the  $R_1$  resistor. For this resistor and for resistor  $R_2$ , let us choose values that will give us a voltage at point X of about -3 volts. (This is, of course, nothing more than a simple voltage-divider circuit.) Now let us examine what happens in this circuit instant by instant.

Initially there is no current in resistor  $R_3$  nor in  $R_1$ , nor in the transistor. Thus the voltage at point Y is ground, or zero volts. Since the voltage at point X is -3 volts, and since the emitter-base junction of a transistor is little more than a diode, current will start to flow from point Y to point X. This current will create a voltage drop across resistor  $R_3$ , and current will start to flow in the transistor. The voltage at point Y is now, say, -1 volt. Thus the difference in

potential between point Y and point X is still present, although it is no longer as great as it was.

So in our second step a little more current starts to flow in the emitter-base junction, and this, of course, turns the transistor on a little harder, resulting in a somewhat larger collector current. There is also a larger emitter current, resulting in a larger voltage drop across resistor  $R_3$ , making the voltage at point Y more negative. Let us say that this voltage is now -2 volts.

For our third and final step, assume that the voltage across the emitter-base junction of the transistor is approximately zero volts (actually, of course, it will be several tenths of a volt). Since the potential at point X is still more negative than the potential at point Y, still more current starts to flow in the emitter-base junction of the transistor, resulting in more collector current, and in more emitter current. This increased emitter current causes a larger voltage drop to appear across resistor  $R_3$ , and in a very short time the potential at point Y will be -3 volts. Since this is exactly the same as the potential at point X, this action stops, and we have reached "steady state" condition. Notice that if we had somehow obtained a still larger current in the emitter circuit (I don't know where you would get it, but let's see what happens), then the potential at point Y would have become more negative than the potential at point X; the emitter-base junction of the transistor would have been back-biased (remember it is similar to a diode) and the transistor would have turned off. This would have cut down the current in the emitter, and this would have caused the potential at point Y to move in a positive direction.

Please note that the characteristics of the transistor, and the value of the collector resistor, are almost immaterial. We simply adjust the circuit parameters so that the resistance of emitter resistor  $R_3$  times the emitter current (which is the potential at point Y) is equal to the resistance of  $R_2$  times the current in this resistor (which is the potential at point X). This results in a constant collector current.

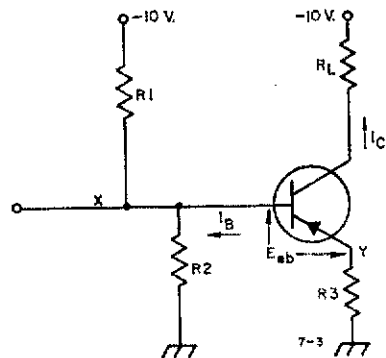


Fig. 7-3—Method of biasing to overcome variations in beta of transistor.

There are, of course, several factors which must be kept in mind when performing such an analysis. In the first place, the emitter current and the collector current are not exactly the same. They differ by the amount of base current, and this, of course, brings in beta. But for all practical purposes the beta of a transistor is so high that the difference between the emitter current and the collector current is negligible. Secondly, the base current, flowing in resistor  $R_1$  (where else can it go?), will somewhat affect the voltage at point X. This can be taken care of by making resistors  $R_1$  and  $R_2$  sufficiently small so that the current in these resistors is large with respect to the base current. (Don't make them so small, however, that they get hot and the battery runs down!) A good rule of thumb is that if one current is ten times the smaller current, then the smaller current can be completely ignored.

Thirdly, as mentioned above, there will be some voltage drop across the emitter-base junction of the transistor, and this should be taken into account when determining the operating point. And fourth, the resistance of  $R_3$  must be taken into account when analyzing the ac portion of the circuit. For if we drop 3 volts across this resistor (as we did in the example) then we only have 7 volts to be divided up between the transistor and the load resistor. This cuts down on the amplifying capabilities of the circuit. We will find that if  $R_3$  is made quite small, then  $R_1$  and  $R_2$  should be similarly small, and this results in excessive battery drain. So we must at all times compromise. "You pay your money and you get your choice" — and sometimes you just don't get much choice.

So it is not possible to say that a circuit must be designed in such or so a way — there are just too many variables, and too many compromises which must be effected.

Let us now go through the formulas which tell us just how big a certain resistor should be, and just what current will flow in the transistor (this of course is equivalent to saying what the steady-state operating characteristics will be).

Equation (5) is an expression for the collector current in terms of the supply voltage, the two bias resistors, and the emitter resistor (notice that the load resistor isn't even involved). This equation (which really isn't too complicated to solve) is very valuable for determining just where on the load line a transistor is supposed to be operating. You will note that the "approximately equal" sign covers those points brought out previously.

Equation (6) is useful in the design of circuits. That is, when we know the supply voltage and the collector and emitter resistors we can draw the load line. Then we can choose an operating point. If, now, we had a value for resistor  $R_3$  we could use this equation and determine what resistor  $R_1$  should be. In order to simplify things we can say that, as a general rule, resistor  $R_2$  is made between five and ten times as big as resistor  $R_3$ . Thus if resistor  $R_3$  is 68 ohms, we

Letting  $I_e$  = emitter current  
 $I_c$  = collector current  
 $E$  = supply voltage

then in the circuit of Fig. 7-3:

$$(1) I_c = \frac{E R_3}{R_3} \therefore (2) I_c = \frac{E R_3}{R_3}$$

Since  $E_{cb} = 0$  Then:

$$(3) E R_3 = E R_2 \quad (\text{i.e. } E Y = E X)$$

Let  $I_T = \frac{E}{R_1 + R_2}$  (where  $E = 10 \text{ v.}$ ) Then:

$$(4) E R_3 = I_T \times R_2 = \frac{E}{R_1 + R_2} \times R_2 = \frac{R_2}{R_1 + R_2} \times E$$

From equations (2), (3), and (4):

$$(5) I_c = \frac{E \times R_3}{(R_1 + R_2) \times R_3}$$

Then from equation (5):

$$\begin{aligned} I_c \times (R_1 + R_2) \times R_3 &\approx E \times R_2 \\ I_c \times [R_1 \times R_3 + R_2 \times R_3] &= E \times R_2 \\ I_c \times R_1 \times R_3 + I_c \times R_2 \times R_3 &= E \times R_2 \\ I_c \times R_1 \times R_3 &\approx E \times R_2 - I_c \times R_2 \times R_3 \end{aligned}$$

Therefore:

$$\begin{aligned} R_1 &= \frac{E \times R_2 - I_c \times R_2 \times R_3}{I_c \times R_3} \\ &= \frac{E \times R_2}{I_c \times R_3} - \frac{I_c \times R_2 \times R_3}{I_c \times R_3} \end{aligned}$$

and:

$$(6) R_1 \approx \frac{E \times R_2}{I_c \times R_3} - R_2$$

Note:

( $\therefore$  means "therefore")

( $\approx$  means "approximately equal to")

would normally make resistor  $R_2$  somewhere between 340 ohms and 680 ohms. When  $R_2$  is made to be 340 ohms we often draw an excessive amount of current in the bias resistors  $R_1$  and  $R_2$ , but we can stabilize our collector current to a very fine degree. On the other hand when resistor  $R_2$  is 680 ohms, we save current drain in the bias network, but our collector current will shift some.

Thus we have both a graphical means and an arithmetical means for determining the operating characteristics of a transistor in a particular circuit. We have learned how we can provide a bias network that will maintain a chosen collector current regardless of the beta of the particular transistor. There are, of course, other methods for biasing a transistor so that it will maintain a steady, chosen collector current, but without question this is the most popular, and certainly it is very effective. Because this method requires only a single battery it is sometimes known as "single-battery biasing stabilization."

When a transistor is so biased — that is, when the collector current is maintained in such a manner that the incoming ac signal will cause the operating point to move up and down the

load line, but never to the point of saturation or cutoff, then we have what is known as "Class A" operation. Other "classes" of operation simply define the point of steady-state biasing, and the amplitude of the incoming signal.

#### Questions:

1. When is the bias circuit of Fig. 7-1 completely satisfactory?
2. How much does the beta of, say, a 2N1303 vary from one transistor to another?
3. Can transistors be obtained which have a very "tight" beta spread?
4. In the circuit of Fig. 7-3, if the collector resistor is 220 ohms, the emitter resistor is 68 ohms,  $R_2$  is made to bias the transistor so that the collector current is about half the saturation current, find the value of resistor  $R_1$ , and draw the load line.
5. What power will be dissipated in this transistor at the operating point?

6. When we operate a transistor in "Class A" operation, do we ever reach saturation or cutoff?

#### Answers:

1. Only when the beta of the transistor used is known.
2. From about 20 to as high as 200.
3. Yes, but you really pay for them!
4. Using these values the cutoff point on the load line will be at 10 volts, the saturation point will be at 34.5 mA, the operating point will be chosen at 17 mA (and therefore at 5 volts), and  $R_1$  will become 2120 ohms.
5. 17 (mA) times 5 (volts) gives 85 (mW). This is within the safe operating range of the 2N1303, for instance, so the circuit may be assembled without fear.
6. No, by definition of "Class A" operation.

**QST**

## NEW BOOKS

**VHF-UHF MANUAL**, published by the Radio Society of Great Britain, 35 Doughty Street, London W.C. 1, 6½ X 9¼ inches, 241 pages, excluding index, soft-cover. Price: \$3.75, from Comtec, Box 592, Amherst, N.H. 03031.

The *RSGB VHF-UHF Manual* is what some readers might call a "meaty" publication. It covers a wide field in vhf and uhf design and application, and provides an equitable balance between tube and semiconductor techniques.

A good deal of the practical material is similar to that found in comparable publications, but, there is also a substantial amount of fresh, new subject matter for the reader's perusal and edification. Line-drawing illustrations are offered copiously, and should serve as an aid to those wishing to duplicate any of the numerous construction projects that are offered. Since few photographs of completed equipment appear in the book, this writer suspects that some of the projects are more theoretical, than practical, in nature. The line drawings show parts placement in greater detail than would normally be possible with photographic illustrations.

Chapter 1 deals with frequency allocations in the vhf and uhf spectrum peculiar to the United Kingdom. Suggestions are made for vhf and uhf band planning, to serve as an aid to DX operating, and to reduce interference in other parts of the bands that are not being used for DX work.

A 16-page treatment of propagation phenomena is given in Chapter 2, and covers the gamut in a concise manner. This section of the book should be of particular interest to the newcomer to the bands above 30 MHz.

Chapters 4 and 5 deal with coaxial bandpass filters and their design — 3 pages — and with receivers and converters for use from 50 MHz to 2300 MHz. There are 82 pages of information devoted to receiver theory and application. Among those themes covered are: parametric amplifiers, diode multipliers, VXOs, preamplifiers, and diode switching. Examples are given for the use of tubes, bipolar transistors, and FETs.

The chapter on transmitters contains 68 pages of design data for tube and semiconductor enthusiasts. Detailed information is given on the design of tank circuits and matching networks for use in transistorized transmitters. Varactor multipliers are discussed, and two practical examples of varactor circuits are given. Several pages of the book are devoted to amplitude-modulation techniques, and an additional few pages treat the matter of frequency modulation. Most of the transmitters described in this chapter are for low-power operation, both tube and transistor types. Included in this section, however, is a 5894 amplifier for 144 MHz, and also a cavity-type amplifier for 432 MHz. It uses a 4CX250 tube.

The remainder of the book deals with mobile equipment, antenna theory and fabrication, and provides an extensive discussion of antenna testing and measuring techniques. Numerous pieces of antenna test gear are given practical treatment. Among the hardware items described are dummy loads, SWR indicators, rf power meters, a solid-state dip oscillator, and a noise generator. Other vhf and uhf accessories are also described in that section of the manual — regulated low-voltage power supplies, a 100-kHz marker, coaxial relays, and diode attenuators.

The book is put together in logical sequence, and all of the illustrations are well drawn and clearly labeled. Most of the tubes and semiconductors called out in the manual are of European origin, meaning that a cross-reference file will be needed by those wishing to duplicate the circuits contained therein. However, the more experienced amateur should be able to select substitute parts for the construction projects if he knows the requirements for a particular tube or transistor in a given application. Whatever the situation, the *RSGB VHF-UHF MANUAL* should make a worthwhile addition to any vhf man's technical library. — *WICER*

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Full size (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$1.50 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order — we do not bill nor ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless *specifically* mentioned in the article.



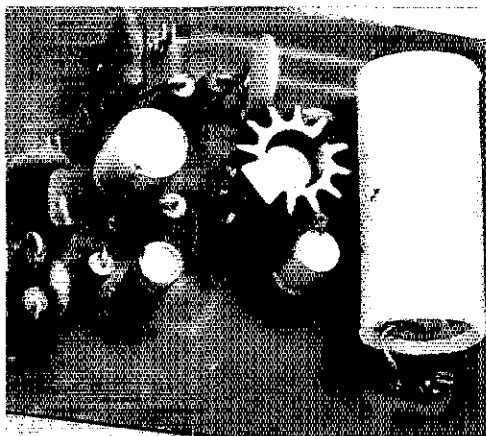
# Gimmicks and Gadgets

## A 1-Watt Solid-State Audio Module

**T**HERE are all kinds of applications in which a simple 1-watt audio amplifier can be used. Perhaps the most common need for such a unit is seen in the output section of home-built ham-band receivers. Other uses include drivers for higher-power audio stages, and modulators for solid-state transmitters. This transformerless audio module will work nicely in any of the foregoing applications. It operates from a 12-volt dc supply, is built on an etched-circuit board, and does not require that the builder seek out a source of supply for those sometimes-expensive (and elusive) input and output transformers.

A Motorola HEP-593 integrated circuit (similar to an MC 1554), an "op amp" (operational amplifier), serves as the heart of the unit. Its output is taken at low impedance — 16 ohms — to feed a loudspeaker directly. In order for the HEP-593 to develop its full rated output power of 1 watt, approximately 40 mV of audio input must appear at pin 1, U1 of Fig. 1. Since few receivers have that level of output from their detectors, a low-noise bipolar transistor preamplifier, Q1, is used ahead of the IC to provide the desired audio voltage. The input impedance of Q1 is on the order of a few thousand ohms, and Q1 will work fine with most hi-Z microphones, or when connected to the detector output of most receivers.

Integrated circuit U1 has an input impedance of 10,000 ohms, a voltage gain of 18, and a harmonic distortion level of 0.75 percent at one-watt output (16-ohm load). Peak-signal current drain for the IC



View of the completed board. All components except C9 are installed in a vertical format.

is less than 400 MA at 12 volts. For normal room-volume listening, using the module as a receiver af amplifier, the peak-signal drain will be less than 200 mA.

The entire circuit is built on an etched circuit board which measures 2½ X 3¼ inches. If a more compact module is desired, those wanting one may plan their own layout. Alternatively, a ready-made

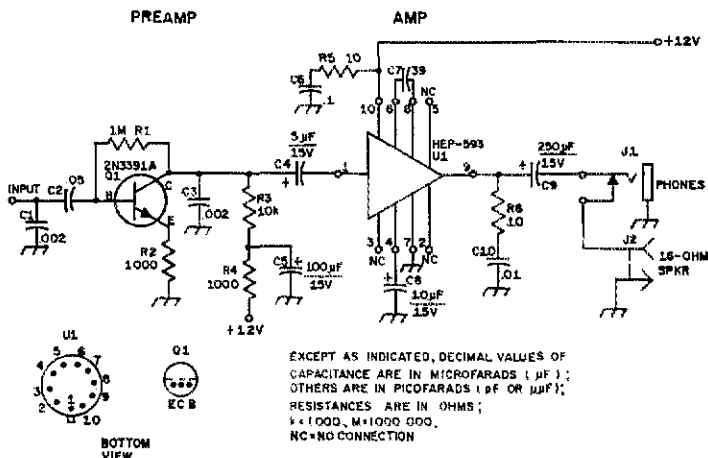


Fig. 1 -- Schematic diagram of the audio amplifier. Resistors are ½-watt composition. Capacitors are disk ceramic or dipped polyester types except those with polarity marks, which are electrolytic. Component numbers have been assigned to aid in assembly. J1 and J2 can be phone or phono jacks.

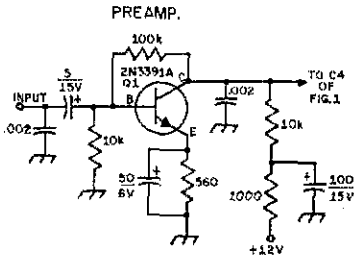


Fig. 2 -- Circuit changes for lowering the input impedance of the preamplifier. These changes will increase the gain of the stage somewhat. Resistors are 1/2-watt composition. Resistances are in ohms, k=1000. Capacitors are disk ceramic or dipped polyester types except those with polarity marks, which are electrolytic. Capacitance values are in  $\mu$ F.

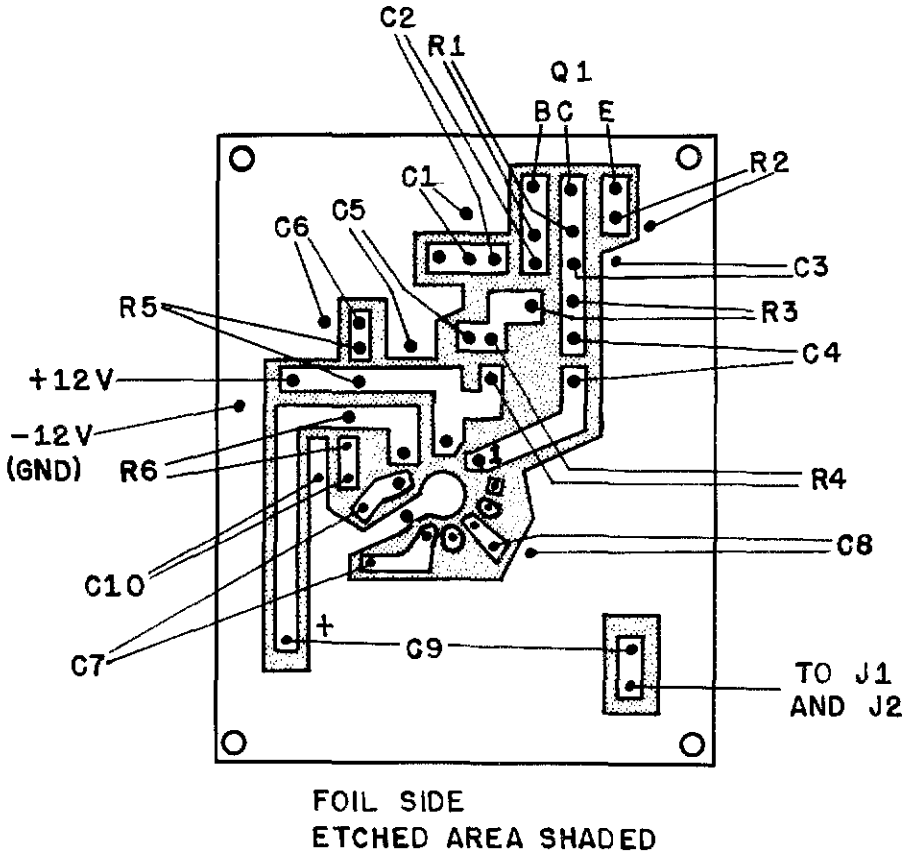


Fig. 3 -- Scale template of the amplifier circuit board. Parts placement is given. (Etched boards are available from the source given in footnote 1.)

board can be purchased from a commercial supplier.<sup>1</sup>

This amplifier can be used with an 8-ohm speaker at a slight sacrifice in performance. The output level with acceptable distortion will drop to approximately 0.75 watt if this is done. Also, high-impedance headphones can be connected as shown in Fig. 1, and will provide adequate volume, even though a mismatch will result.

RC network R6C10 suppresses vhf instability which might otherwise be caused by inductance in

the leads to the output terminals of the amplifier. A similar network is used from pin 10 to ground to prevent hf instability.

A Motorola IC socket, an HEP-45L, is attached to the circuit board, and contains U1. An HEP-502 heat sink is used on the case of the IC to prevent damage from operational heating. The IC is packaged in a TO-5 case.

Those who may desire a low input impedance for Q1 can modify the circuit as shown in Fig. 2 to provide a match to signal sources in the 500- to 1000-ohm range. The gain of the preamplifier will be increased by making the changes shown. The same circuit-board pattern can be used. - WICER.

# Technical Correspondence

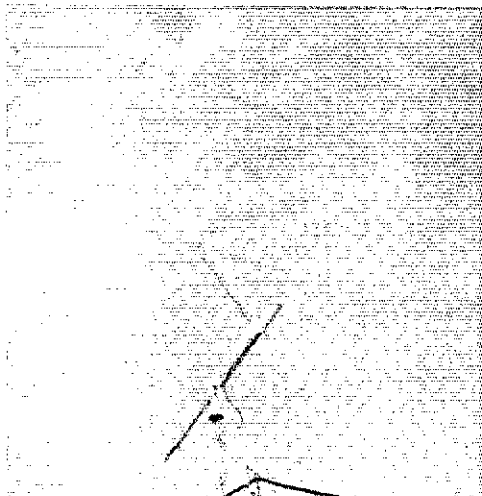
## DELTA-LOOP BEAM FROM ALUMINUM, BAMBOO, AND WIRE

Technical Editor, *QST*:

While I was licensed as W5RHN in Miami, Oklahoma, I constructed a delta-loop beam for 15 meters.<sup>1</sup> For the beam elements I used 12-ft lengths of 1-in. aluminum tubing obtained from a local tin shop. I was skeptical about the ability of the antenna to withstand the persistent Oklahoma winds, since the tubing was softer than the type specified in the article, and also because my elements were 1-inch diameter all the way up, rather than tapered to a smaller diameter. After five days I had to take the antenna down, as it had rotated around the boom, and the elements were quite distorted. I was then determined to make it work mechanically.

The delta-loop antenna I now have uses a combination of aluminum tubing, and bamboo poles with wire elements. The aluminum tubes serve as "out-riggers" to hold the bamboo poles, and also provide a means of supporting the gamma matching system. The boom is a 12-ft length of 1 3/4-inch hard aluminum tubing with the 75-degree holes drilled nine feet apart. For the outriggers, I cut one of the old aluminum elements into four 3-ft lengths. One end of each of these pieces was flattened with a hammer, and the pieces were then inserted into the boom. The flattened ends at the bottom, and the hose clamps at the top, hold these supporting elements to the boom. A 14-ft bamboo pole is joined to each aluminum element with a 12-inch sleeve made from 1 1/4-inch aluminum tubing. The sleeves are slotted at each end, and hose clamps secure the aluminum and bamboo elements. (Before inserting the bamboo poles into the sleeve, I wrapped each end with 1/16-inch-

<sup>1</sup>McCoy, "The Delta-Loop Beam on 15," *QST*, January, 1969.



thick rubber gasket material to assure a tight grip without cracking the bamboo. I painted the bamboo poles with aluminum paint, and then completed the elements by fastening copper wire to the aluminum element supports and taping it to the bamboo poles. For a good electrical connection, I joined the elements to the boom with copper wire. The completed beam is shown in Fig. 1. It looks neat, and weights under seven pounds. If I were to start from scratch, the total cost, I'm sure, would be under \$10.

I have found that the formulas given in the January 1969 *QST* article for element lengths do not apply very well to wire elements. I had to increase the perimeter of the reflector so that the total length was about two feet greater than the driven element. This was necessary in order to get a decent front-to-back ratio.

With this antenna, I can hear and work stations that I never heard with a dipole. All in all, I think the "hybrid" loop is doing real well. — Gordon E. Ziesing, W7HBM, ex-W5RHN, 301 West Second, Whitehall, MT 59759

## AUDIO HUM WITH SSB TRANSMITTERS

Technical Editor, *QST*:

When I was an active official observer, I used to hear signals with "hum-on-carrier feedthrough." Of course, I could not tell feedthrough hum from hum modulation.

Not long ago I worked with a local amateur on his problem of this nature. He has a Heath SB400. He could not get a good null because of this bubbling hum. I had him pull out V1, the audio amplifier and cathode follower, and the hum and carrier cleaned up to a T-9 tone. Then, he could null the signal out completely. When any of several 6E8 tubes were inserted, however, the bubbling hum and carrier returned.

Further checks indicated that the trouble, in this case, was not due to heater-cathode leakage in the tube, although it could have been. Instead, it was hum pickup elsewhere, apparently in the grid of the audio stage. The hum was unaffected by shorting out the phone-patch input, but varied with things done to the microphone and cord. Whatever the final cause, the problem was really coming through the audio system into the balanced modulator, not the balancing. Because of hearing this on the air frequently, and the variety of ways by which hum can get through the audio amplifier, I thought this information might help some *QST* reader. — Elmer H. Conklin, K6KA, Box 1, La Canada, CA 91011.

## SUNLIGHT INTENSITY DURING ECLIPSE

Technical Editor, *QST*:

During the solar eclipse on March 7, 1970, I positioned a silicon solar cell outside, directly facing the sun. To this cell I had attached a 0-50-mA meter, from which I took a reading every five minutes between 1700 and 2000 hours GMT. Fig. 2 is a graph of this information.

I thought that since the DX contest was in operation at this time, and during this three-hour

Fig. 1 — W7HBM's delta-loop beam constructed from aluminum, bamboo, and copper wire. (The photograph has been retouched slightly to show the outline of the antenna in more detail.) The copper wire is secured to the bamboo poles with tape, wrapped at approximately 2-foot intervals.

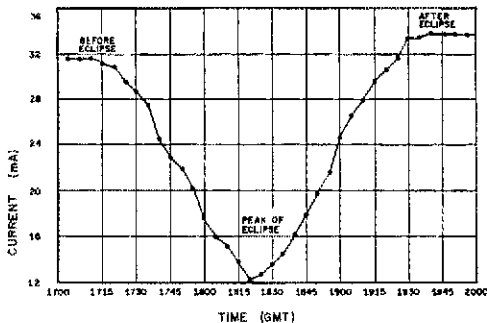


Fig. 2 — Electrical current developed by a solar cell during period of partial eclipse, as measured in Illinois. Maximum coverage of the sun's surface was 72 percent, and occurred at 1820 GMT for this location.

period quite a few operators in the midwest area would have worked many foreign stations (logged as to time, of course), a comparison of sun intensity and ionospheric (skip) conditions could be made. Information from operator's logs could be compared with the information contained in Fig. 2. The results could be useful in future propagation predictions. By the way, the next chance at this type of data will be in the year 2024.— *Phil Goodman, WA9VWE, 347 Hampton Rd. Hoffman Estates, IL 60172.*

### CQ DX QRP!

Technical Editor, *QST*:

With great pleasure, we wish to report the results of a number of QRP experiments, conducted by Bill Gibson, W7BVV, Salem, Oregon, and

myself. Path length was computed to be 1,650 miles, and the frequency of operation is 28,760 kHz. Our computations and measurements imply that the minimum power required to maintain a cw circuit over the path between W7BVV and this station is on the order of one microwatt. We continue to work towards this goal.

We have worked many stations throughout the U.S. and Canada with power outputs down to 100 microwatts on a-m phone. In addition, we wish to report that we worked CE7DW, Puerto Mont, Chile, 600 miles south of Santiago, with 250 milliwatts, a-m phone, and received a report of 5 x 7. This estimated path length is 8000 miles!

The equipment used here is as follows: 6AU8 MOPA, plate modulated by a 6AQ5, running at reduced ratings. The 250-milliwatt transmitter output is fed through multistep attenuators to a rhombic antenna that is ten wavelengths long.

W7BVV has worked this station many times on 28,760 kHz, with 50 mW power output on a-m phone, receiving signal reports as high as S-9 plus 10 dB. He has also worked Japan and UAØFAL, getting reports of 5 x 5. So-o-o, phooey! Who needs 2000 watts PEP ssh? — *Richard N. Shoup, KL7YU, P. O. Box 5-823, College, Alaska 99701.*

[Editor's note: For those of us not familiar with thinking in terms of microwatts of power, we plugged some information into our Headquarters computer and came up with the startling fact that one microwatt is a power level 90 dB below that of a kilowatt! There can be little argument that KL7YU and W7BVV are not complying with section 324, Part 1, of the U.S. Communications law: "In all circumstances, except in case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired."]

## Strays

On July 1, 1970 an ocean sailing race from Victoria, B.C. to Maui, Hawaii will get underway in the Strait of Juan de Fuca and will last the better part of the month of July.

Ship-to-shore communication will be handled by radio amateurs afloat and ashore working on a scheduled and organized basis with VEØMCA in the sloop *Porpoise III* acting as fleet communication center. Her Captain, F.R.(Bill) Killam, VE7BKI, and Radio Opr./Cook Brian Lagden, VE7QH, are active Vancouver amateurs.

During the race, ships' positions and traffic will be transmitted on about 14.180 and/or 7.200 MHz starting each evening at 1800 PST. It will be greatly appreciated if amateurs could be encouraged to refrain from transmitting on these frequencies during the reporting periods. VEØMCA will of necessity be using fairly low power.

Immediately following the traffic period each evening some time will be allotted to hamming.

Would you believe it? Three generations of hams in the same family! From left to right are daughter-in-law, W8ZOC; grandson, K8TND; grandma, W8EBB; grandson, W8ZOA; son, W8ZOD; son-in-law, W8WJC; and the leader of the clan, grandpa, W8BU.

### HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:00 on a "drop-in" basis, and at other times by appointment. We'll be closed on May 29, July 3 and September 7 to make up for regular holidays falling on weekends. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway. (For WIAW visiting hours, see the schedule in the "Operating News" column.)





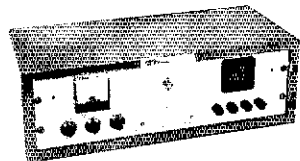
# Recent Equipment



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

## Communications Associates Inc

### CF-8 FSK Converter/Keyer



**O**VER the past several years, amateur radioteletypewriter operation has increased tremendously in popularity. The reason undoubtedly stems from the fact that Western Union, railroad and telephone company teleprinter equipment, retired from regular service, is being released for amateur use, supplementing the already available surplus military gear. With the introduction of CAI's solid-state CF-8 FSK Converter-Keyer, an amateur may now begin RTTY operation with a minimum of effort. The CF-8 provides the complete interface between any ssb station and the teleprinter machine, for both transmission and reception of hf RTTY signals.

For transmission, a tone-keyer section in the CF-8 provides a shifted-frequency audio signal to be fed into the microphone input of any conventional ssb transmitter or transceiver.<sup>1</sup> For reception, the CF-8, operating from the audio output of the receiver or transceiver, converts the signal into the direct-current pulses required to operate the selector magnets of the teleprinter. A cathode-ray

tube in the CF-8 provides an indication for properly tuning the received RTTY signal.

The CF-8 FSK converter/keyer is available to cover any one of the following frequency shifts: 170 Hz, 400 Hz, or 850 Hz. The frequencies of operation for the demodulator or converter section, and for the keyer section, are identical for a given shift:

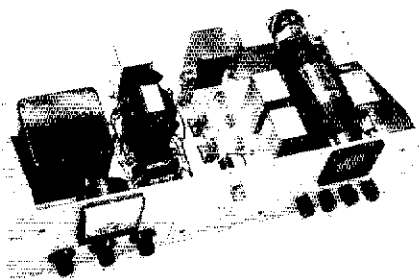
Shift	Mark	Space
170 Hz	1985 Hz	1815 Hz
400 Hz	2100 Hz	1700 Hz
850 Hz	2425 Hz	1575 Hz

(Other shift frequencies are available upon special order.) For both transmission and reception, operation of the ssb equipment in the upper-sideband mode will provide for shifting in the proper direction according to amateur standards, i.e., the space signal being on a lower radio frequency than the mark signal. The CF-8 tone keyer may be keyed at speeds up to 100 wpm. The low-pass filter which follows the detector in the converter section is designed for 45- to 50-baud operation (60 to 66 wpm teleprinter speed), but a low-pass filter for 75- to 100-wpm operation is available. The CF-8 contains a loop-current power supply which provides either 20 or 60 mA of loop current.

The CF-8 is furnished for mounting in a standard 19-inch rack. The unit is mounted on a 5 1/4-inch-high panel, and extends 8 1/2 inches behind this panel. An optional desk-top cabinet is available, as shown in the title photograph. As was previously mentioned, a built-in oscilloscope provides an indication for the proper tuning of the received RTTY signal. In addition, a front-panel meter, by switch selection, indicates either the strength of the audio signal being fed into the converter, or the amount of loop current.

Front-panel controls are provided for power ON/OFF, meter switching, and STANDBY/

<sup>1</sup>When transmitting RTTY signals with any ssb equipment, the user should make certain that the equipment is capable of withstanding the higher average power involved. The RTTY signal is transmitted with a 100-percent duty cycle, i.e., the average-to-peak power ratio is 1, while ordinary speech waveforms generally have duty cycles in the order of 25 percent or less. Many ssb transmitters, such as those using sweep-tube final amplifiers, are designed only for low-duty-cycle use. When using audio tones, the user should also make certain that carrier and unwanted-sideband suppression is sufficient so as not to cause interference in receiving equipment of good engineering design.



Top view of the CF-8 converter/keyer. The low- and high-voltage power transformers appear at the left, while the cathode-ray tube and its high-voltage supply capacitors appear at the far right. Inside the cans are the bandpass-input-filter, channel-filter, and tone-oscillator-network components. Relay control the auto mark hold and transmit/receive switching functions.



RECEIVE/TRANSMIT. This latter control provides for either VOX or push-to-talk control of the ssb equipment from the CF-8, requiring no modification of the ssb transmitter or transceiver. Provision is also included in the CF-8 to control remotely the converter/keyer and the ssb equipment from the teleprinter machine.

In addition to the front-panel controls just mentioned, the usual electron-beam adjustment controls for the oscilloscope are provided. Additional controls for the converter/keyer are located on a subpanel which is concealed by a hinged door on the front panel. These controls include a loop-current adjusting potentiometer, an AUTO MARK HOLD ON/OFF switch, a LIMITER IN/OUT switch, and a REVERSE/NORMAL switch to reverse the mark and space signals inside the converter during reception. A TONE BALANCE control and a TONE GAIN control are also provided for the keyer section.

### The Circuit

The CF-8's lineup looks a great deal like that of any other deluxe RTTY demodulator, such as have appeared in past issues of *QST* as construction projects.<sup>2,3</sup> The exception is that the CF-8 uses solid-state devices completely (other than the cathode ray tube and a gas-tube voltage regulator). The input bandpass filter in the 170-Hz-shift converter/keyer tested had a -3 dB bandwidth of 194 Hz and a -30 dB bandwidth of 1030 Hz, or a 3-to-30-dB bandwidth ratio of about 1:5.3. The filter is followed by a buffer and a limiter. The limiter may be bypassed by switching to limiterless operation.

An amplifier drives the mark and space "channel" filters. The filters themselves consist of several inductive and capacitive components connected in a bandpass-filter configuration, rather than of the single-tuned circuit arrangement commonly used in home-built demodulators. Individual filter bandwidths are 100 Hz, measured at the -3 dB points. The inductors used in both the channel filters, and in the input bandpass filters, are variable, with inductances adjustable for the approximate range between 500 and 700 mH. These are of "pot-core" construction, and exhibit a Q of about 20 at 1 kHz, when adjusted for an inductance of 600 mH. This type of inductor is manufactured by Sangamo Electric Co., for one, and is their type NV. The Q of these inductors provides the proper circuit selectivity without the need for external loading resistors, which are frequently required with toroidal inductors.

The channel filters feed a mark-hold circuit, which samples the ac voltages present at the mark and space frequencies. In the absence of a continuous signal in either or alternate channels, the mark-hold circuit provides a dc bias signal to the loop-keyer stage, simulating a mark condition at the teleprinter. This feature prevents the machine from printing random characters in the absence of

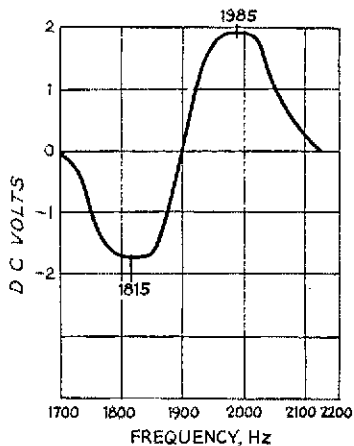


Fig. 1 — Discriminator response of a CF-8 converter/keyer manufactured to operate with 170-Hz-shift RTTY signals. The dc voltage measured at the output of the instrument's detector-combiner stage is shown versus the input frequency in Hz. The input test signal was being fully limited in the converter when this measurement was made, and the NORMAL/REVERSE switch was in the NORMAL position.

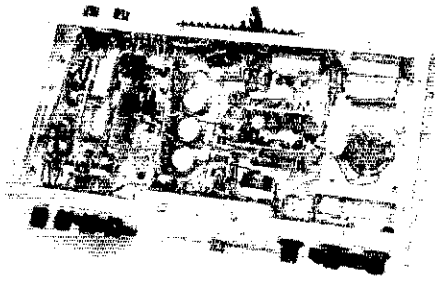
an RTTY signal. The feature may be disabled, however, for copying weak signals.

The channel filters also feed a detector-combiner circuit. This circuit, along with the two channel filters, forms an audio discriminator which converts changing frequency information into changing dc-voltage information. The measured response of the discriminator is shown in Fig. 1. To a degree, this shows the response of the individual channel filters, especially the flattened responses at the voltage peaks. Such a characteristic permits uniform TTY copy even though some drift may occur in the signal. The zero-crossing frequency for this discriminator is 1895 Hz. By "straddle-tuning" the received signal so that the two audio tones are symmetrical about this frequency, shifts as low as 2 or 3 Hz may be copied. (The limiting factor here is related more to the stability of the transmitting and receiving equipment than to the capability of the converter.) Such tuning is easily accomplished with the CRO tuning indicator provided.

Referring to Fig. 1, a negative dc voltage is developed for an RTTY space signal, and a positive voltage for a mark signal. During normal RTTY keying, alternate mark and space signals are transmitted, the switching rate being determined by the teleprinter code for the characters being sent (and by the machine speed). The maximum switching speed is developed when the letters R and Y are sent alternately, being about 23 Hz for 60- to 66-wpm operation. Such a keyed signal resembles a square wave at the output of the converter's discriminator. This signal is passed through a low-pass filter having a cutoff frequency of about 25 Hz, which aids in eliminating improper copy that might otherwise be created by static crashes or bursts of radio interference.

<sup>2</sup>Hoff, "The Mainline TT/L FSK Demodulator," *QST*, August, 1965.

<sup>3</sup>Petersen, "The Mainline TT/L-2 FSK Demodulator," Parts I and II, *QST*, May and June, 1969.



A peek inside at the "works" of the CF-8 converter/keyer. Vertically-mounted component boards house the transistors, diodes, and integrated circuits, along with other small parts. Connections from the CF-8 to the ssb equipment and to the teleprinter are made via the barrier-type terminal strip on the rear apron, just visible in this view.

From the post-detection filter, the signal is passed to an automatic mode-selection (AMS) circuit containing two IC packages and some other components. One of the ICs is a Motorola MC1710, which is a differential-voltage comparator. A control voltage is derived by integrating and summing the discriminator dc voltages present for both mark and space signals. If both signals are equal, the sum is zero, but if one signal fades momentarily, as frequently happens because of selective fading, the voltage will depart from zero. A reference voltage developed from this control voltage is applied to the differential-voltage comparator, where the instantaneous signal voltage (negative for space, positive for mark) is compared. Because of the high sensitivity of the comparator, voltage changes as small as 2 mV at its input will trigger the teleprinter keying stages which follow. The AMS circuit maintains a properly centered trigger level on the received signal even though selective fading may occur. The circuit also uses a JFET as a switch which prevents steady mark or space signals from affecting the reference level applied to the voltage comparator.

The tone keyer consists of an LC oscillator and a frequency-shift keyer. The CF-8 is connected to the teleprinter with the keyboard and printer selector magnets wired in series. Typing at the keyboard, while the CF-8 is in the transmit mode, will produce both local copy at the machine and a frequency-shifted tone for feeding the ssb equipment. With clean keying provided from the teleprinter loop circuit, the keyed audio waveform exhibits negligible keying transients. But with the inductance of the magnets in the loop in the presence of "hash" generated from keyboard contacts which may not be in the best of condition, severe transient spikes of several times the amplitude of the tone sine wave can be created. Loop transient-suppressor filtering, and rf filtering of the audio feeding the transmitter will help to prevent the transmission of spurious signals, in cases of worn and stubborn keyboard contacts. This will also protect the transmitter from peak overloads.

(These same precautions in the loop generally apply, as well, when an rf oscillator is frequency-shift keyed directly from the loop.)

Typing while the CF-8 is in the receive mode will produce local copy at the teleprinter only. Although the ssb equipment may be VOX-controlled in going from receive to transmit, manual switching of the CF-8 is required. This function may be removed from the CF-8, however.

### Oscilloscope Tuning Indicator

The two-inch cathode-ray tube presents a display which is commonly called a "flipping line" indicator. This type of tuning indication is frequently used in military equipment and is favored by a number of RTTYers.

Fig. 2 shows the appearance of the flipping-line indicator during keying of a properly tuned RTTY signal. The vertical deflection plates of the tube are direct-coupled through a deflection amplifier to the dc output of the converter's discriminator. A sweep-voltage signal (the 60-Hz power-line waveform) is applied to the horizontal deflection plates. With no RTTY signal present, a single line appears at the reticle center line of the display. When a mark tone is present at the converter's input, this single line is deflected upward, and when a space tone is present the line is deflected downward. With alternate mark and space tones applied, the line alternately "flips" up and down, and because of the persistence of the display, appears as shown in Fig. 2. As the sweep signal is not synchronized to the switching between marks and spaces, faint trace lines appear on the display between the mark and space lines. These lines are simply ignored during operation.

The deflection of the mark and space lines is directly related to the amount of audio signal passed through the corresponding mark and space channel filters. If the received signal is mistuned so that unequal-amplitude tones are passed, the deflections of the two lines will not be symmetrical about the reticle center line. Thus, a symmetrical display assures that the signal is tuned properly.

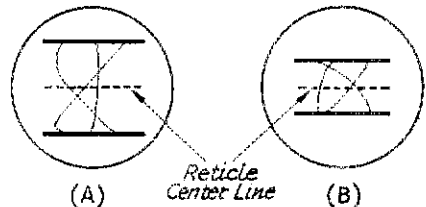


Fig. 2 - The "flipping-line" cathode-ray tube indication for properly-tuned RTTY signals. The frequency shift of the signal at A matches the shift for which the converter's channel filters are made. At B, the shift of the received signal is narrower than that of the channel filters. For a CF-8 converter/keyer manufactured for 170-Hz shift, the display at B shows a received signal being shifted approximately 50 Hz.

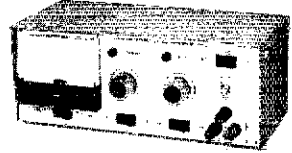
"Straddle-tuning" of narrow-shift signals is easily accomplished with this type of indication, as shown in Fig. 2B. The deflection between the two lines is merely less than for full-shift signals. If the discriminator response is linear with frequency, the reticle for this type of display can be calibrated directly in Hz of shift.

The CF-8 is rigidly constructed with quality components and materials. All manufacturer's specifications were met or exceeded in the unit tested in the ARRL laboratory. Included with the instrument is a detailed instruction book. The section covering operation of the converter/keyer is brief, with no information concerning the use of the oscilloscope as a tuning indicator. However, full information on installation and the theory of operation is included, as well as complete schematics for all options, and parts lists with original-manufacturer parts identification. — *KIPLP*.

**Communications Associates, Inc.,  
CF-8 FSK Converter/Keyer**

Height: 5½ inches.  
Width: 19 inches (for rack mounting).  
Depth: 9½ inches.  
Weight: 18 pounds.  
Power Requirements: 115/230V ac, 50/60 Hz, 100 watts. Price Class: \$825 for rack mounting, \$875 with desk-top cabinet.  
Manufacturer: Communications Associates, Inc., 1208 Third Ave., New Hyde Park, N.Y. 11040

## Heath IP-28 Regulated DC Supply



THE DESIGNERS of low-voltage regulated supplies have come a long way since the development of transistors demanded new techniques. The Heath IP-28 is a good example of up-to-date circuitry. Using a minimum of parts, and a surprisingly-simple circuit, it provides a number of features that were not previously available in a low-cost kit. These features include voltage and current limiting, remote voltage sensing, and the use of an independent reference supply.

Fig. 1 shows the regulator and reference supply used. The heart of the device is the series regulator, transistor

Q3. This transistor is set with a variable reference voltage to pass the desired output voltage (which can be anything between 0.7 and 30 volts, depending on the setting of R1). Any change in voltage output is sensed, amplified, and appears as a correction voltage on Q3, maintaining the desired output.

The IP-28 is rated for 1 ampere maximum output. This much current, flowing through small-diameter conductors, can produce a voltage drop at

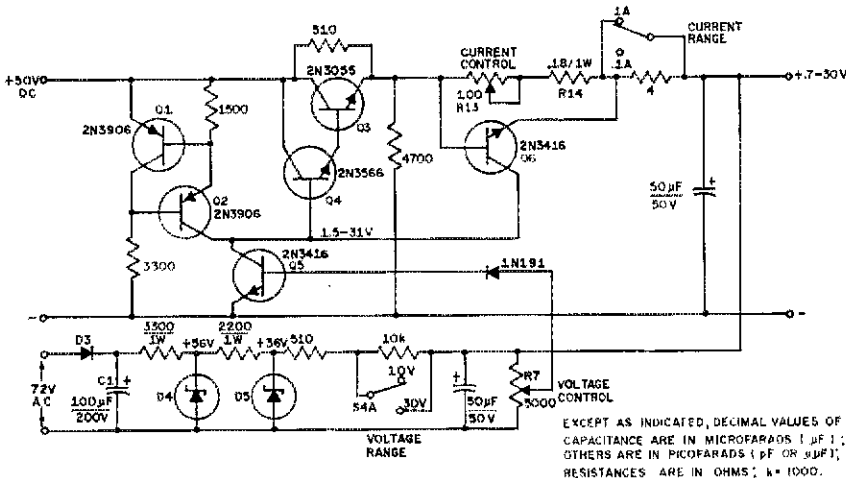
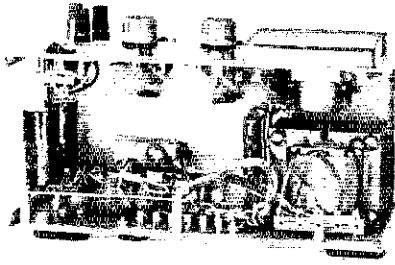


Fig. 1 Simplified diagram of the regulator and reference supply of the IP-28.

## Safety Features



Interior view. The fuse block is located next to the power transformer, so the top cover must be removed to change the fuse. The etched-circuit board containing most of the small parts is mounted to the rear panel on standoff pillars.

the load because of the resistance of the connection leads. If this problem exists, the IP-28 can sample the voltage at the load through separate conductors, and have this sample be the controlling factor for the power supply. Called remote sensing, this feature allows the actual voltage at the load to be the determining factor.

The reference voltage is the standard that determines how well the power supply will maintain a set output. Using a separate supply for this purpose allows a wider range of voltage control and better voltage stability than is obtainable using a reference taken from the main supply. A separate transformer winding is used for the reference. This ac voltage is rectified by D3, filtered by C1, and regulated at 36 volts by D4 and D5. The VOLTAGE RANGE switch, S4, and VOLTAGE CONTROL, R7, set the reference on the regulator.

The regulator is a Darlington pair, consisting of Q3 and Q4. For practical purposes, this can be considered as acting like a single high-gain transistor. The Darlington connection, because of its superior gain, will produce a large degree of control with a small error voltage. The regulator is biased by a voltage divider across the input, Q1 and Q2 (which are connected as a constant-current source).

The output voltage from the regulator is equal to the reference voltage, less the drop in Q5. Q1 and Q2 bias the regulator into conduction. The less the drive, the more the regulator's base current decreases and its series resistance increases. For any reference setting, a balanced condition is established which holds the output voltage at the desired setting.

Current limiting is accomplished with Q6, which acts on Q3 and Q4. The OUTPUT CURRENT control, R13 (a five-turn control for easy adjustment), works with R14 to produce a drop of 0.6 volts when the current reaches the limiting level. This voltage turns on Q6 which acts to increase the series resistance of the regulator. Any further increase in current is prevented once Q6 is on. The setting of R13 determines the point at which limiting will occur.

Once the current limit is set, the voltage will be held at the value necessary to produce the set value of current. Turning up the voltage control above the set voltage will not increase the voltage or current output. Using the IP-28 properly will save many a transistor in experimental circuits that might otherwise be damaged by voltage or current overloads.

Another safety feature assures that, should a sense lead become disconnected, the output voltage will be held to no more than a 1.2-volt increase. Without this feature the full output of the supply might be put across the load, should a remote sensing lead accidentally be knocked loose.

The Heath power supply is not large. Its front panel is dominated by the meter which reads output voltage and current. The styling follows the two-tone tan that Heath is now using on all their instruments. Rocker switches turn the supply on, select the voltage or current scales on the meter, and choose the desired range of output voltage and current. An important feature is the use of a toggle switch to cut off the dc to the output terminals. It is nice to have the long bat handle to dive for when something goes wrong while testing your latest design. Dc output voltage is not referenced to the chassis, so it can be used easily with either the positive or negative terminal used as common. A separate panel binding post is provided for a chassis common connection.

Building the power supply takes an evening. All of the electronics except the regulator transistor and panel controls are mounted on an etched board. Q3 is mounted on the rear deck, using the panel as a heat sink. Interconnections are made with a cable harness, so even the novice kit builder should have no trouble. Following the instruction manual, you make extensive resistance checks before the unit is turned on, so if you pass the checks OK, the power supply should work the first time it is plugged in.

The kit meets or exceeds all manufacturer's specifications. The output ripple is very low, less than 4 mV on our unit. Shift in voltage from no load to full load is less than 50 mV. The writer tried a 30 percent current overload for 2 hours, and the IP-28 took it without complaint. Obviously, for long life, it is best to stay within the manufacturer's specs, however. To sum up, the Heath IP-28 offers a number of features and a level of performance that heretofore was only available in supplies costing much more. And, it's easy to build. - WIKLK.

### Heath IP-28 Power Supply

Height: 6½ inches.

Width: 10 ¾ inches.

Depth: 4 ⅜ inches.

Weight: 6½ pounds.

Price Class: \$50

Manufacturer: Heath Company, Benton Harbor, Michigan

# An RC-Active Audio Filter for CW

BY WES HAYWARD,\* W7ZOI

**A**POPULAR project among amateur experimenters is the construction of audio filters to improve receiver selectivity for cw work. In years past, the job was frequently done with various types of surplus LC filters<sup>1</sup>, while more recently, appropriate LC circuits have been fabricated from the popular 88-mH telephone toroid inductors.<sup>2,3</sup> The unit described here uses a more modern approach, the RC active-filter element. In this type of filter, resistor-capacitor networks are combined with amplifiers to synthesize the characteristics of an inductor. When this inductance is properly resonated with a capacitor, the equivalent of an audio tuned circuit results. The text presents a practical filter circuit which may be used either as an accessory for a ssb transceiver, or as an aid when using receivers that are lacking in cw selectivity. An attractive application for the filter is as an accessory for direct-conversion receivers.<sup>4,5</sup>

Presented in the appendix is a method for designing filters of this kind. The procedure is somewhat unique in that a direct analogy is drawn between a filter section and its equivalent LC circuit. This "real time" approach contrasts the more typical s-plane, or frequency-domain technique which is typical of modern network synthesis. The advantage of this method, at least to this writer, who is not a circuit-design engineer, is that the results are intuitively consistent with the more classic circuit concepts.

\*7700 S.W. Danielle Ave., Beaverton, Oregon 97005.

<sup>1</sup>Countryman, "Selective Audio Filter for CW Reception," *QST*, February, 1964.

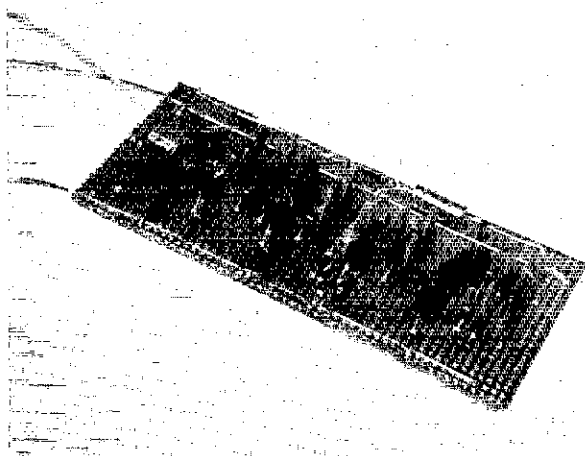
<sup>2</sup>McCoy, "The Selectoroid," *QST* December, 1966.

<sup>3</sup>Anciaux, "A Solid-State Audio Filter," *QST*, December, 1968

<sup>4</sup>Hayward and Bingham, *QST*, November, 1968.

<sup>5</sup>DeMaw, *QST* May, 1969.

*Here is the rundown on RC-active-filter design. W7ZOI gives the basic design information for this type of audio filter, and provides practical data for building a highly-selective cw filter. Filters of this type are useful for normal cw work, but can also be an asset to those operators who are involved in moonbounce and scatter communications.*



Top view of the W7ZOI RC-active cw filter. The components are mounted on Vector-type circuit board. Straight-line construction is used, placing the various stages in a single row across the board. The board can be housed in a metal box, and the jacks, switches, and batteries contained therein.

The circuit for the filter is shown in Fig. 1. Each of the four sections consists of a so-called Twin-T network and a unity-gain amplifier. Shown in Fig. 2 are the measured response curves for this filter. As indicated, a single section (curve A) presents a 6-dB bandwidth of about 380 Hz. The skirt selectivity of a single section is so poor that little real advantage is realized in use. However, when four identical filter sections are cascaded, the response (curve B) represents a truly suitable cw filter. The 6-dB bandwidth is about 150 Hz, and the response is 40 dB down at 420 and 1120 Hz. This circuit differs from many narrow-bandwidth audio filters in popular use because there is minimal tendency for the filter to "ring" with signals or noise peaks. This desirable characteristic is a result of each filter section having a relatively low loaded  $Q$  - about 6.

A prospective builder might consider using fewer filter sections as an effort toward simplification. Two cascaded sections would probably be the minimum practical configuration, while three would yield a very suitable circuit. If more than four sections are used, the builder should consider stagger-tuning the various stages, using the methods outlined in the appendix. This would maintain a practical peak bandwidth while providing a further improvement in skirt response.

An audio amplifier follows the filter in the author's unit. This serves two purposes. First, it overcomes the small insertion loss of the filter, which is a little over 1 dB per section. Second, it allows the receiver audio circuits driving the filter to be operated at low levels. This minimizes

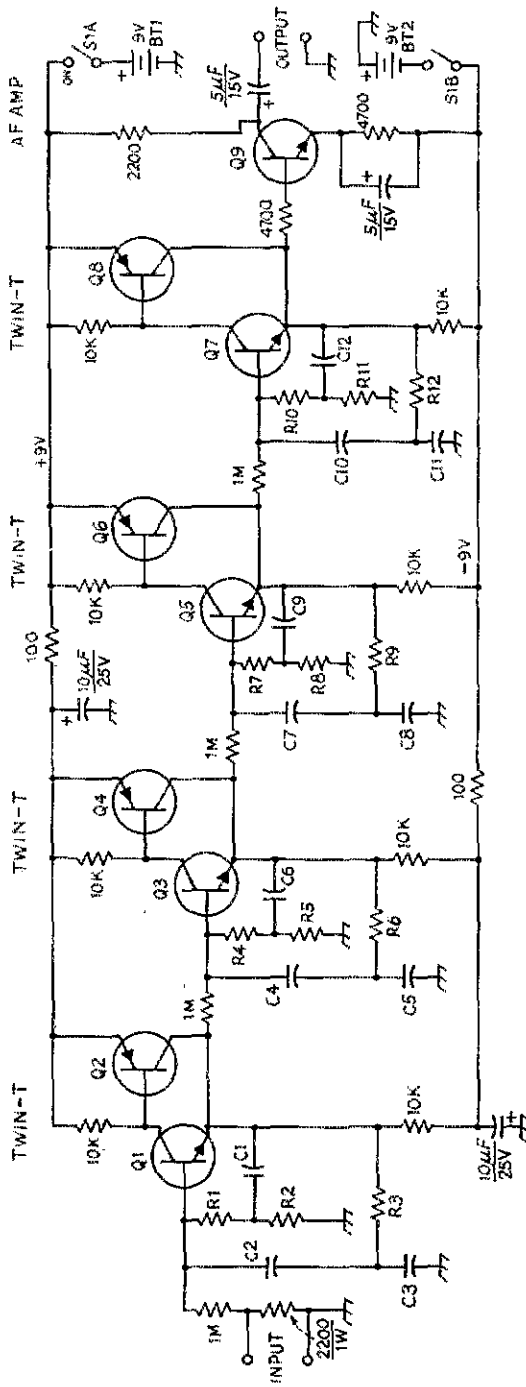


Fig. 1 - Schematic diagram of the RC active filter. Capacitors are disk ceramic except those with polarity marking, which are electrolytic. Resistors are 1/4-watt composition unless noted differently. Resistance is in ohms. K = 1000. Capacitance is in  $\mu$ F.

- BT1, BT2 - Small transistor radio 9-volt battery.  
 C1, C6, C9, C12 - 0.005- $\mu$ F disk ceramic, 5 percent tolerance.  
 C2, C3, C4, C5, C7, C8, C10, C11 - 0.002- $\mu$ F disk ceramic, 5-percent tolerance.  
 Q1, Q3, Q5, Q7, Q9 - Npn transistor, type 2N3904.  
 Q2, Q4, Q6, Q8 - Pnp transistor, type 2N3906.  
 R1, R2, R4, R5, R7, R8, R10, R11 - 100,000 ohms, 5-percent tolerance.  
 S1 - Dpst slide or toggle switch.

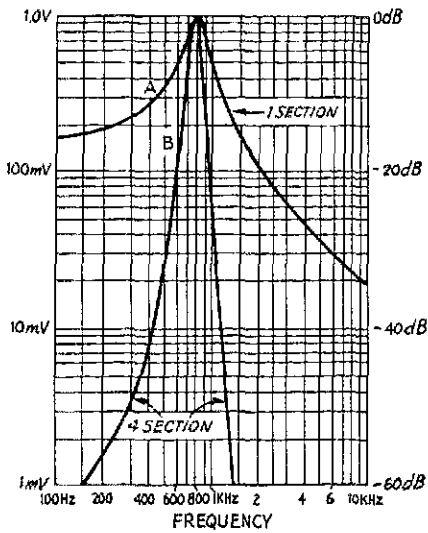


Fig. 2 - Filter response curve for the circuit of Fig. 1. Response A represents the characteristics of a single-section Twin-T. Curve B represents the band-pass characteristics of the four Twin-T sections combined.

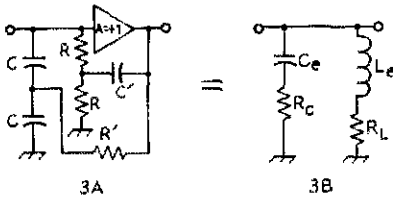


Fig. 3

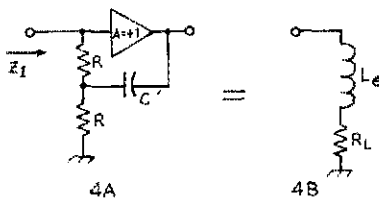


Fig. 4

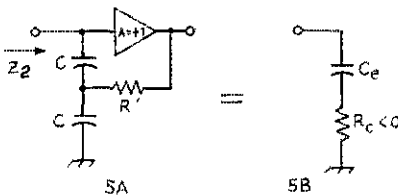


Fig. 5

cross-modulation effects in the amplifiers (before the filter) which would otherwise negate the high-selectivity advantages of the circuit. If the unit is to be used with a low-impedance driving source, such as the usual ssb transceiver, a 2000-ohm-to-voice coil matching transformer should be used, with the high-impedance winding connected to the filter. If the unit is to be used with a direct-conversion receiver,<sup>5</sup> it could be used as a replacement for the receiver's audio stage. If more audio gain is then required, a second amplifier stage could be added to the output of the circuit of Fig. 1.

### Assembly

Construction is not particularly critical, and the builder should encounter no problems if a layout similar to that shown in the photo is used. The writer's filter was built on Vector-board-like material. Considering the repetitive nature of the design, a printed-circuit board would be an ideal method of fabrication. The board could be mounted in an aluminum box with switches and input-output jacks. Since the unit only draws 55 mA of current, two small 9-volt batteries would provide suitable power. The only critical components in the filter are the resistors and capacitors in the Twin-T networks. The author used 5-percent-tolerance components, although satisfactory results might be expected if 10-percent capacitors were substituted. Total cost should be around \$10, and the unit can be built in one or two evenings.

### Appendix

Fig. 3A shows the Twin-T bandpass-filter configuration. An amplifier with unity voltage gain, infinite input impedance, and zero output impedance is assumed. It will be seen that the Twin-T may be modeled by the equivalent circuit of Fig. 3B.

Consider one half of the Twin-T, as shown in Fig. 4A. If some ac input voltage is assumed, the input current is easily calculated. Taking the ratio of the input voltage to input current, one obtains the complex input impedance  $Z_1$

$$Z_1 = 2R + jR^2 \omega C' \quad (1)$$

where  $\omega = 2\pi F$ . Since the imaginary part of  $Z_1$  is positive, an inductance is implied and the half-filter section is modeled by the circuit of Fig. 4B where

$$L_e = R^2 C' \quad (2A)$$

$$R_L = 2R \quad (2B)$$

Consider now the other half of the Twin-T filter as shown in Fig. 5A. The input impedance  $Z_2$  is again calculated as above and is shown to be

$$Z_2 = -\frac{1}{R' \omega^2 C^2} - \frac{2j}{\omega C} \quad (3)$$

Since the imaginary component is negative, a capacitance is implied and the circuit is modeled by the equivalent circuit shown in Fig. 5B, where

<sup>5</sup> Ibid.

$$C_e = \frac{C}{2} \quad (4A)$$

$$R_e = \frac{-1}{R' \omega^2 C^2} \quad (4B)$$

Of significance is the fact that the resistance is negative.

Clearly, when the circuits of Figs. 4B and 5B are combined, the equivalent circuit of Fig. 3B results. The  $Q$  of this "tuned circuit" is given by

$$Q = \frac{\omega L_e}{R_L - |R_e|} \quad (5)$$

where the brackets around  $R_e$  imply that an absolute value is taken. As suggested by the equation, if  $|R_e|$  is greater than  $R_L$ , the circuit will oscillate.

In designing a filter section for a given frequency, the first step is to choose an inductance value to synthesize (50 Hy was used in the filter of Fig. 1). Then, values of  $R$  and  $C'$  are chosen using equation (2A). Usually, the capacitance  $C'$  is chosen more or less arbitrarily, then  $R$  is calculated. Then, using equation (4A), a value of  $C$  is chosen to yield  $C_e$  to resonate  $L_e$  at the desired frequency. A value of  $Q$  is then selected and the required value of

$|R_e|$  is determined from equations (5) and (2B). This value is then used to calculate  $R'$  from equation (4B), thus completing the filter-section design. In the author's unit, the filter sections were designed for a  $Q$  of about 9. The 1-megohm coupling resistors then degrade the  $Q$  of each section to a loaded value of 6.

Referring to Fig. 3A, it can be seen that the filter may be made tunable by varying the value of the equivalent inductance of the Twin-L. This is accomplished by replacing one of the fixed values of  $R$  with a potentiometer and returning  $C'$  to the wiper contact. Similarly, the  $Q$  is adjustable by replacing  $R'$  with a potentiometer. The stages should be coupled with resistors which are much larger than  $R_L$ . As shown in equation (4B), the value of  $R_e$  is a strong function of frequency. Hence, it would not be practical to make a filter tunable unless the  $Q$  was also made controllable.

The above analysis may be extended to low-pass and high-pass filters. Methods for cascading such filter sections, to yield various responses (Bessel, Chebychev, etc.), are presented by Kincaid<sup>6</sup> in a convenient, computer-generated format.

<sup>6</sup>Kincaid, "RC Filter Design by the Numbers," *The Electronic Engineer*, Oct., 1968.



May 1945

... K.B. Warner is in a serious mood this month. He deplors a war-borne despicable situation wherein a number of SWLs and other unlicensed radio persons have been preying on the families of veterans— attempting to exact money from families of prisoners of war in return for alleged information copied from foreign broadcasts. This matter has been aired in the press but many publishers wrongly attribute this activity to radio amateurs — using the word "ham" loosely. He goes on to discuss this controversial word and is all for it when applied to licensed radio amateurs. He also gives what is a likely enough "genealogy" of the word. I don't agree.

... The history of development of the Army's SCR-506 highly perfected medium range mobile transmitter is given by David Middleton, W2OEN, who was himself project engineer on the development at the Signal Corps Labs. Perhaps it was felt that it would be available as a war surplus item. It weighs two hundred twenty three pounds!

... Claude L. Robinson, W6KJV, pretty thoroughly explores VFOs with the view of reducing drift. He really did some work on this one.

... George W. Brooks, W1JNO, describes a Crystal Controlled Transmitter of the V.H.F.s. It is a 175-watt job, using an HK24 in the final.

... Elliott A. Henry, W9FEN, continues his article on Practical Design of Video Amplifier.

WIANA.



May 1920

... The Editor is fuming about some recent propagation conditions which have fouled up amateur activity for about a month. In particular there was a spectacular display on March 22nd. The country-wide effects of this were drastic and even weird. He rightfully blames this on solar activity. Along with these woes, fading is in the limelight and amateurs are urged to bend their utmost energies in finding ways to overcome it. Big job.

... L. M. Clement continues his series on the vacuum tube as a detector and amplifier. It's basic stuff, but good.

... Elliott A. White shows how to combine crystal detector with a VT, one in the same hook-up. The idea is to save the tube by not using it when it is unnecessary. No switches are used.

... The Old Man is at it again. This time, it's "Rotten Booze." He claims he knows that a certain "Dr. Cook" is responsible for the vile radio weather lately experienced. He suggests violent application of the Wouff Hong, without any anaesthetic as fitting punishment.

... R.H.G. Mathews, 9ZN, describes how his CRL Paragon works and how to properly tune it. This is the same as the RA6, already well established as a very fine regenerative receiver.

... Glancing over the "Calls Heard" Department, those reported are almost entirely two-letter ones. 1AW is mentioned in most of them.

-WIANA.



# A **NEW** Index of *QST* Items on Commercial Gear

BY BILL WAGEMAN,\* WØBUR/K5MAT AND CAROL WAGEMAN,\* WØHQH

THE word "New" in the title infers that a similar thing existed in the past, and this is the case. In fact, the primary purpose of updating the previous comprehensive index is to call attention to the earlier work. It is apt to be most beneficial to the people that are least likely to have seen it, the newcomers to amateur radio. This index covers only those *QSTs*, issued in 1968 and 1969.

The current index duplicates gear in the earlier index only if there was a considerably more comprehensive review article or advertisement, or if there were significant modification articles.

Some of the manufacturers have changed their names, so the latest names are used here. The earlier index had a fairly complete cross-reference listing of manufacturers names, so that is omitted here unless there has been a name change during the period covered by this index. Some manufacturers may have gone out of business, while others may have moved, and the latest issues of *QST* are the best source of currently-active manufacturers and their addresses.

The list is alphabetical by manufacturer, with each model in alphabetical-numerical order. Articles dealing with modifications are denoted by M, review articles by R, and advertisements by A. Page numbers are given only when it is not obvious from the table of contents, or index of advertisers, as to where the information may be found.

Thus, **HEATH, SB-101**, (M) Nov. 68 p.50, (M) Mar. 69 refers to two modification articles, one on page 50 of the November, 1968 issue, with the other in the March 1969 issue. It would be necessary to look in the Table of Contents to determine the location of that article. For items with an advertisement as a source, consult the Index of Advertisers at the back of the issue in question.

**ALLIED RADIO (KNIGHT-KIT) - A-2515**, (R) Feb. 69; **T-175**, (R) Mar. 69;

**TR-108**, (M) Mar. 68 p.51.

**AMECO - AC-1**, (A) Dec. 68 p.5.

**CLEGG - 22'er MK II**, (A) Nov. 69.

**COLLINS - 32S-3**, (M) Dec. 68; **75S-1**, (M) Mar. 69.

**DRAKE - L-4B**, (R) Dec. 69; **T-4XB**, (A) Jan. 68; **TR-6**, (A) Nov. 68.

**GALAXY ELECTRONICS - GALAXY V MARK 3**, (A) May 68; **GT-550**, (R) June 69; **R-530**, (R) May 69.

**GONSET - GSB-201 MK III**, (A) Feb. 69 p.5.

**HALLICRAFTERS - SR-400**, (R) Oct. 68; **SX-122A**, (A) Dec. 69; **SX-133**, (A) Dec. 69.

**HAMMARLUND - HQ-200**, (A) Dec. 68; **HQ-215**, (R) Dec. 68.

**HEATH - HW-12**, (M) May 69 p.53; **HW-12A**, (M) June 68; **HW-16**, (R) Jan. 68; **HW-17**, (A) June 68; **HW-17A**, (R) July 69; **HW-18**, (A) May 68; **HW-22A**, (M) June 68; **HW-29A**, (M) May 68; **HW-30**, (M) May 68, (M) Feb. 69; **HW-32A**, (M) June 68; **HW-100**, (R) Jan. 69; **SB-100**, (M) May 68 p.53; **SB-101**, (M) Nov. 68 p.50, (M) Mar. 69; **SB-200**, (M) Jan. 69; **SB-220**, (A) Dec. 69; **SB-301**, (M) Oct. 68 p.44, (M) Jan. 69; **SB-400**, (M) Nov. 68 p.51; **SB-401**, (M) Jan. 69; **SB-500**, (A) Apr. 69.

**HENRY RADIO - 2K-3**, (A) Nov. 68.

**HUNTER - BANDIT 2000C**, (R) Sept. 68.

**INOUE - FDFM-2**, (R) Nov. 69.

**LAFAYETTE - HA-800**, (A) Dec. 69.

**NRCI (NATIONAL) - HRO-60**, (M) Dec. 68;

**NCX-5**, (M) May 68; **NCX-200**, (A) Feb. 68;

**NCX-500**, (A) Sept. 68; **NCX-1000**, (A) Sept. 69.

**RADIO SHACK - Realistic DX-150**, (R) Mar. 68.

**SIGNAL/ONE - CX-7**, (A) Nov. 69.

**SWAN - Cygnet 260**, (A) Feb. 69; **Cygnet 1200-W**, (A) Nov. 69; **Deluxe Cygnet 270**, (A) Oct. 69; **FV-2**, (A) June 68; **350**, (M) Jan. 68 p.42, (M) Dec. 68 p.46; **350-C**, (A) June 68; **500C**, (A) Feb. 68.

**TEN-TEC - PM1**, (A) Nov. 69.

**YAESU - FTDX-400**, (R) June 68; **FL-2000**, (R) Nov. 68. **QST**

\*35 San Juan, Los Alamos, New Mexico 87544.

<sup>1</sup>Wageman & Wageman, "An Index of *QST* Items on Commercial Gear," *QST*, April, 1968.





# Hints and Kinks

## For the Experimenter



### COILED CORD FOR THE SOLDERING IRON

There must be a special section of Murphy's Law covering soldering irons. No matter how carefully you set the iron down, you always end up burning holes in its cord — or the schematic that you are working on. One cure is to replace the present cord on your soldering iron with one of the coiled appliance cords available at electrical supply houses. The cords stretch out to five feet, but coil up to about nine inches when the iron is not in use. — *WIKLK*.

### DIRECTION FINDER SCALE

In the article, "Direction Finder," which appeared in the "Hints & Kinks" column of *QST* for December, 1969, instructions are given for drawing a calibration scale. However, it's not stated whether the degree marks should increase numerically from right to left or from left to right. The natural inclination, if one does not think this through in advance, is to start at the left and work to the right, as is shown in Fig. 1A. However, this method is incorrect; the right way is shown in Fig. 1B. — *C. W. Fowler III, W4TVC*.

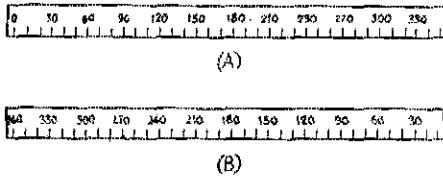


Fig. 1 -- (A) Wrong and (B) right ways of drawing the globe calibration scale.

### NEON-BULB LAMP DRIVER

The circuit shown in Fig. 2 permits operation of a neon bulb from a 12-volt supply at a current drain of approximately 6 mA.

Transistors Q1 and Q2 form a complementary astable multivibrator. The output of this multivibrator is used to drive switching transistor Q3. When Q1 turns on, Q3 also turns on. During the time that Q3 is on, current flows in L1. When Q3 is turned off, a large voltage spike appears across L1 and fires the bulb.

In a complementary multivibrator both transistors are off during one part of the cycle, and both transistors are on during the other part of the cycle. A complementary multivibrator, rather than the conventional variety, is used in the neon-bulb lamp driver, because it is off during most of the cycle. This results in less current drain. The circuit will operate satisfactorily at supply voltages of 8 to 16 volts, although the brightness is decreased at the lower operating voltages.

Transistors Q1 and Q2 were selected for their high beta, while Q3 was picked because it has a high breakdown voltage. A Miller No. 6304 ferrite-core rf choke was used for L1. — *Joe H. Duncan, K4ZLI/2*.

### USING DB AND VU METERS

In checking and monitoring the output level of phone patches, a dB or VU meter is useful to insure that voice peaks do not exceed the maximum allowed in the new tariffs. However, two factors should be taken into account when hooking up such a meter. First, the standard impedance for these meters is 600 ohms (prior to 1940 several standards were in use and meters made before

### MULTIVIBRATOR

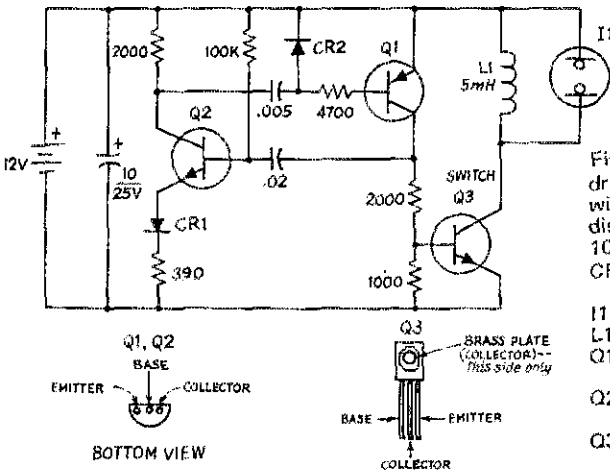


Fig. 2 -- Schematic diagram of the neon-bulb lamp driver. Capacitances are in uF. Capacitor marked with a polarity is electrolytic; other capacitors are disk ceramic or paper. Resistances are in ohms; k = 1000. Resistors are 1/2-watt composition.

- CR1, CR2 — High-speed silicon switching diode (1N914).
- I1 — NE-51H neon bulb.
- L1 — See text.
- Q1 — Pnp silicon, hFE 300-600 (Motorola MPS 6523).
- Q2 — Npn silicon, hFE 300-600 (Motorola MPS 6521).
- Q3 — Npn silicon, VCEO 300 V (Motorola MJE 340).

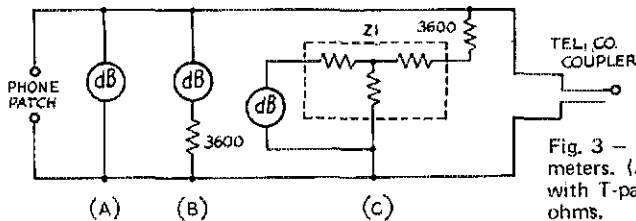


Fig. 3 - Various connections for dB and VU meters. (A) Direct, (B) with multiplier, and (C) with T-pad (Z1) and multiplier. Resistances are in ohms.

World War II may have been made to any of the then-popular standards). The telephone line is close to 900 ohms impedance, so the 600-ohm meter will read on the high side.

Second, as shown in Fig. 3, many of the meters on the surplus market were made to be used with a 3600-ohm multiplier resistor, while others have built-in multiplier resistors, and some require that a T-pad and a multiplier resistor be added externally. An appropriate pad, such as Z1, will be necessary if the 600-ohm line meters are to read correctly on 900 ohms. Until you know what the meter you have is suppose to do, don't believe the readings you get on the phone line. In fact, don't hook up the meter, because if it is a type requiring an external multiplier resistor, it will place on the phone line a low-impedance load, which can cause trouble with the telephone service. - WIKLK.

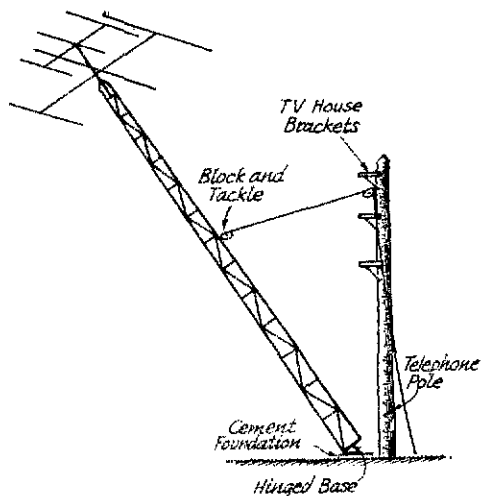


Fig. 4 - Details of the easy tilt-over tower.

### EASY TILT-OVER TOWER

A tilt-over tower costs a bag full of money if you want a structure that does not require any guys and is large enough to hold a big beam. My approach uses a surplus telephone pole obtained from the power company. The local branch moves a lot of their lines around and doesn't reinstall older poles. A request to their office produced a 30-foot pole within two weeks. Then, a used TV-type 40-foot tower was purchased for \$25.

Getting the pole set in the ground was a problem until I found a power-company crew who put up

clothes poles in their free time. A cement foundation for the hinged base of the tower was poured next to the pole, and eight-inch TV house brackets were used to secure the tower to the pole (Fig. 4). The easiest way of getting the tower up straight was to first put the brackets on the pole, next mount the first three tower sections in the brackets, and then align the tower with a level. Once the tower was correctly positioned, the cement was poured around the hinged base. A block and tackle from the local "rent-all" is used to raise and lower the tower.

The wisdom of the tilt-over approach was proved a week after the beams were up. My 13-year old rotator burned out. Back came the block and tackle; the array was lowered, rotators exchanged, and the antenna raised again. The structure is quite strong - it hardly moved in several winter storms that damaged a number of other antenna installations in the area - and the total cost was only \$60. - WIKLK.

### NEW LIFE FOR WORN SOLDERING-TIPS

Soldering-iron tips that have been subjected to prolonged service usually become poor conductors of heat. This condition may be remedied by cleaning away the oxide that has formed between the tip and the heating compartment of the iron. However, several such treatments ordinarily reduce the diameter of the tip excessively and render it completely useless.

One method of extending the life of a tip that has been cleaned and recleaned to a state of apparent uselessness is to wrap it in a strip of flashing copper. The tip should be thoroughly cleaned before the wrapping is applied, and the fit between tip, copper and the heating barrel should be as tight as possible.

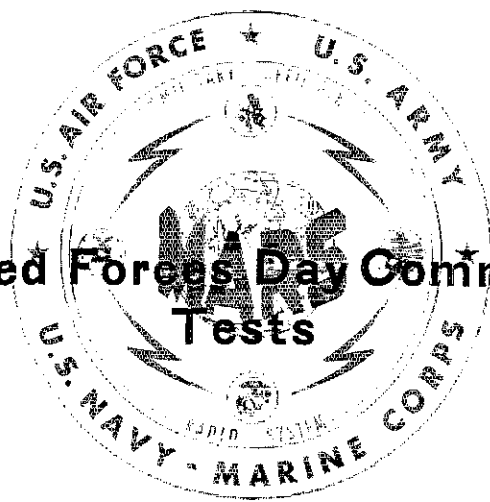
-George Grammer, W1DF

### A TIP FOR A SOLDERING TIP

To make a soldering tip that can be used in those small out-of-the-way spots that cannot be reached with standard tips, saw off the end of a standard size tip. Drill a hole large enough to take No. 9 wire down through the center of the remaining tip. Drill another hole in the side and tap for a 6-32 set screw. Insert a piece of No. 9 wire in the center, tighten the set screw and there is your new tip.

It takes a little longer to heat up the new tip and it doesn't have the heat capacity of the old one, but for hard-to-get-at spots it does the job.

-Ralph Arsenault, VE1AK



# 1970 Armed Forces Day Communication Tests

**E**ACH YEAR on the third Saturday in May, the Department of Defense sponsors the observance of Armed Forces Day. As a part of this observance the Departments of the Army, Navy and Air Force annually conduct communication tests designed to demonstrate to the world the close partnership and mutual respect enjoyed between U.S. amateur radio operators and the U.S. military. This year's program will be conducted on Saturday, May 16, 1970, and all licensed radio amateurs are encouraged to participate.

The Radio Amateur's contributions to communication training, international goodwill, military morale and emergency services are recognized by every echelon of the military services. The Armed Forces Day Communication tests are designed as the tangible demonstration of the firm and long-standing Department of Defense policy to encourage and support amateur radio activity. On this twenty-first observance of Armed Forces Day, all radio amateurs are invited to participate and to demonstrate to the world the close partnership and mutual respect that U.S. amateurs and U.S. military enjoy.

Once again this year, several military radio stations will participate in communication tests which include military-to-amateur crossband operations and receiving contests for both continuous wave (cw) and radioteletypewriter (RTTY) modes of operation.

Special QSL cards confirming crossband communications will be forwarded to those amateurs who establish two-way contact with participating military stations. Certificates will be awarded to those who aptly demonstrate their operating ability and technical skill by receiving a perfect copy of the Secretary of Defense originated cw and/or RTTY message(s) transmitted during the receiving contest portion of the communication tests. Interception by short wave listeners (SWL) will not qualify for a QSL card in confirmation of crossband communications. However, anyone who has the equipment and abilities may copy the Secretary of Defense messages and receive a certificate.

### Military to Amateur Crossband Test

Military radio stations WAR, NSS, NPG and AIR will be on the air from 16/1400 GMT to 17/0245

GMT. During this test of crossband operations, the military stations will transmit on specified military frequencies while amateur stations will transmit in the indicated portions of the amateur bands. Contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted. The tabulation shows, in addition to the frequencies and modes, the appropriate amateur band on which to respond in each case.

WAR	4001.5cw	3.5 - 3.65
Army	4020 cw	3.65 - 3.8
Radio	6992.5cw	7.0 - 7.1
Washn.	7325 cw	7.1 - 7.2
D.C.	14405 cw	14.0 - 14.2
	*3385 cw	3.5 - 3.65
	4012.5 RATT	3.65 - 3.8
	*4040 lsb	3.8 - 4.0
NSS	6970 lsb	7.2 - 7.25
Naval	**7301 cw	7.1 - 7.2
Communi-	**7336 lsb	7.25 - 7.3
cation	7380 RATT	7.0 - 7.2
Station	7385 cw	7.0 - 7.1
Washn.	13940 RATT	14.0 - 14.1
D.C.	14385 usb	14.2 - 14.35
	14400 cw	14.0 - 14.2
	21500 cw	21.0 - 21.25
	***49,692 am	50.1 - 54.0
	***143,820 am	144.0 - 145.5
	***150,090 fm	144.0 - 147.0

\*To be operated from 16/2200 GMT to 17/0245 GMT.

\*\*To be operated from 16/1400 GMT to 16/2200 GMT.

\*\*\*Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between Washington, D.C., and Brunswick, Maine, between 16/1200 GMT and 16/1430 GMT. The aircraft will depart Brunswick, Maine, at 16/1730 GMT and fly westerly to Akron, Ohio, southerly to Morgantown, West Virginia, and return to Washington, D.C., at approximately 16/2100 GMT. The call sign NSSAM will be utilized from the aircraft.

	4001.5lsb	3.8 - 4.0
	4005 cw	3.5 - 3.65
	4016.5 RATT	3.65 - 3.8
NPG	7301.5lsb	7.2 - 7.3
Naval	7347.5 RATT	7.0 - 7.2
Communi-	7365 cw	7.0 - 7.1
cation	7495 cw	7.1 - 7.2
Station	13922.5 RATT	14.0 - 14.1
San	13975.5cw	14.0 - 14.1

Francisco	14356 usb	14.2 - 14.35
Calif.	14375 cw	14.1 - 14.2
	20954.5 cw	21.0 - 21.25
	21600 usb	21.25 - 21.45
	†143.700 am	144 - 148
	††148.410 fm	144 - 148

†Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between San Diego, California, and Seattle, Washington, during the major portion of the time allotted for military to amateur crossband contacts. The call sign NPGAM will be utilized on the aircraft.

††To be operated from Mt. Diablo.

	3347 cw	3.5 - 3.8
AIR	4025 lsb	3.8 - 4.0
Air	6997.5 cw	7.0 - 7.2
Force	7305 lsb	7.2 - 7.3
Radio	7315 RATT	7.0 - 7.2
Washn.	13995 cw	14.0 - 14.2
D.C.	14397 usb	14.2 - 14.35
	20994 cw	21.0 - 21.1

### C.W. Receiving Contest

A cw receiving contest will be conducted for any person capable of copying International Morse Code at 25 words per minute. The cw broadcast will consist of a special Armed Forces Day messages from the Secretary of Defense addressed to all radio amateurs and other participants. The schedule for this broadcast is as follows:

Time	Station	Frequencies (kHz)
16 May 1970		
17/0300 GMT	WAR	3347, 6992.5 14405
16/2300 EDST	NSS	3385, 7385 14400, 21500
16/2000 PDST	NPG	4005, 7495 13975.5, 20954.5
	AIR	3397.5, 7315 13995
	A6USA	6997.5
	Army Radio	S. Francisco

### RTTY Receiving Contest


A radioteletypewriter RTTY receiving contest will be conducted for any individual amateur or station possessing the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. The RTTY broadcast will consist of a special Armed Forces Day message from the Secretary of Defense to all radioteletypewriter enthusiasts. The message will be transmitted at 60 words per minute in accordance with the following schedule:

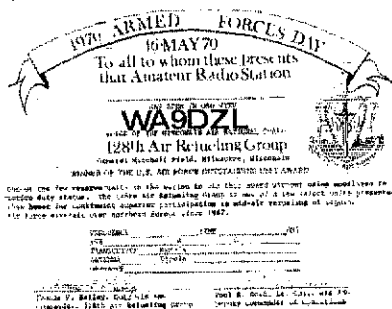
Time	Station	Frequencies (kHz)
16 May 1970		
17/0335 GMT	WAR	3347, 6992.5 14405
16/2335 EDST	NSS	4012.5, 7380 13940
16/2035 PDST	NPG	4016.5, 7347.5, 13922.5
	AIR	3397.5, 7315 13995
	A6USA	6997.5
	A5USA	4025
	Army Radio,	Fl. Houston, Texas

### Submission of Competition Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address of the individual submitting the entry must be indicated on the page containing the text. Each year a large number of perfect copies are received with insufficient information, thereby precluding the issuance of a certificate.

Completed entries should be submitted to the Armed Forces Day Contest, Attn: AFOCOM, Room 3E099, James Forrestal Building, 1000 Independence Ave., Washington, D.C., 20330, and postmarked no later than 31 May 1970. 



On Saturday, May 16, WA9DZL, the amateur radio station of the 128 Air Refueling Group (TAC), Wisconsin Air National Guard will be operating in conjunction with Armed Forces Day. A very attractive commemorative certificate shown above, will be mailed to all hams who contact WA9DZL on this day. The operating schedule is as follows:

14.297 MHz  $\pm$  5 kHz 1300 GMT through 2100 GMT  
7.280 MHz  $\pm$  5 kHz 1300 GMT through 1730 GMT  
28.650 MHz  $\pm$  5 kHz 1730 GMT through 2100 GMT

To qualify for a certificate, just make a 2-way contact with WA9DZL and send your QSL card to WA9DZL, 128th Air Refueling Group (TAC), General Mitchell ANG Base, Milwaukee, Wisconsin 53207.

After K3BWL finished his teaching post at Salesian High School in New Rochelle, N. Y., he took up residence at the Pontifical College Josephinum in Columbus, Ohio, for theological studies. There seemed nothing unusual about his room; that is, until he affixed his call sign onto the door immediately beneath the room number. Now passersby are greeted by this prominently displayed notice:

73  
K3BWL

# Rules for the

# 1970 ARRL Field Day

## Annual Test for Emergency-Powered Stations, June 27-28

**A** I.L set for Field Day? If not, still plenty of time left to: (a) find a FD site (b) stock up food, repellent, etc. (c) get the generator running again and (d) see that all gear is in A-1 operating condition.

There are 3 significant changes this year, upon recommendation of the ARRL Contest Advisory Committee: Time-sharing devices are now prohibited (see Rule 4); the field day period will be advanced one hour (see Rule 5); a novice station will be permitted without adding to the transmitter classification (note Rule 9c).

The limited setup-time proviso remains optional rather than mandatory. If you chose to honor it, then you may operate all 27 hours; if you set up beforehand, however, you may operate no more than 24 consecutive hours of the allotted 27.

To keep on good terms with ARRL, FCC/DOC, logs must be kept in GMT for cross-checking purposes, portables must be logged as such in your

entry, do *not* send your original FCC/DOC log as your entry and last (though not least), odds are in favor of Murphy striking, so plan ahead!

ARRL Field Day forms are now available from the Communications Department, ARRL, 225 Main Street, Newington, Connecticut 06111.

To aid us in getting these logs to you as fast as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with Zip code. *Unless sufficient postage is included, logs will be sent via third-class mail.*

All entries must be postmarked no later than July 27 for QST listing. Please submit your FD photos, messages, publicity along with your entry. It is extremely difficult, if not sometimes impossible, for us to match up all the pieces when they arrive here separately. If you intend to claim bonus credit for message origination and/or handling, do send in *now* for a copy of ARRL Operating Aid 9a which gives an example of a standard message form.

C U Field Day, Good Luck. - *W1KQ/M*.

### Rules

1. Eligibility: The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

2. Object: For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

3. Conditions of Entry: Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority and the decisions of the ARRL Contest and Awards Committee.

4. Entry Classifications: Entries will be classified in accordance with the number of operating positions capable of instantaneous operation at any one time during the FD period, followed by designation of the nature of the individual or group participation. This does not prohibit more operating positions than your intended classification; however, use of electronic or mechanical devices or other methods of simultaneous operation on two or more bands without counting them separately in the entry classification is prohibited.

a. *Class A*: Club or non-club group 13 or more licensed (amateurs) stations set up specifically for operation in the Field Day and using portable identification procedure. Such stations must be located in places which are *not* regular station locations and must use no equipment or facilities installed for permanent station use, nor any structures installed permanently for Field Day use. Stations must be operated under one call and under control of a single licensee or trustee for each entry. All control locations for equipment operated under a single call must be within a circle whose diameter must not exceed 1000 feet.

b. *Class B*: Non-club stations operated by not more than two licensed amateurs. Other provisions same as for Class A.

c. *Class C*: Stations located in vehicles capable of operation while in motion and normally operated in this manner, including antenna Class C stations may operate stationary, but no stationary equipment or facilities may be used. A Class C station may *not* be used as a Class A station.

**ARRL Field Day** Do not write above this line

FIELD DAY CALL LETTERS (indicate portable) *W1KQ/M* ZIP LOCATION *06111* ESTATE'S ELEVATION *1000*  
CONNECTICUT

ENTRY CLASS (check only one)

A. Club or non-club group portable Club or group name *MURPHY'S MARAUDERS*  
 B. Non-station portable (A-2 ops.) NUMBER OF TRANSMITTERS BY SIMULTANEOUS OPERATION *4*  
 C. Mobile (if Class B, calls of transmitters).....  
 D. Home station

The number of people participating at this station: *17*

CHECK POWER SOURCE:  Generator  Commercial Mains  Battery  Other  
 Description of power source (generator type, etc.): *MITSUBISHI MARK III*

Band	Sp. ops.	Independence of nets, multipliers	D.C. input multiplier	Score	Transmitter	B.W. Output
10 m.	<i>108</i>	<i>x 3</i>	<i>x 2</i>	<i>648</i>	<i>32V3</i>	<i>150</i>
20 m.	<i>267</i>	<i>x 3</i>	<i>x 2</i>	<i>1602</i>	<i>5B-101</i>	<i>90</i>
30 m.	<i>415</i>	<i>x 3</i>	<i>x 1</i>	<i>1245</i>	<i>6146-813</i>	<i>400</i>
40 m.	<i>93</i>	<i>x 3</i>	<i>x 3</i>	<i>837</i>	<i>5B-34</i>	<i>50</i>
50 m.	<i>205</i>	<i>x 3</i>	<i>x 2</i>	<i>1230</i>	<i>RANGER</i>	<i>75</i>
80 m.	<i>87</i>	<i>x 1</i>	<i>x 1</i>	<i>87</i>	<i>SWAN 500</i>	<i>250</i>
10 p.	<i>70</i>	<i>x 3</i>	<i>x 3</i>	<i>420</i>	<i>5B-34</i>	<i>50</i>
2 w.	<i>32</i>	<i>x 3 x 1.5</i>	<i>x 4</i>	<i>576</i>	<i>HW-30</i>	<i>5</i>
TOTAL	<i>1277</i>	TOTAL OPS.		<i>6645</i>	GRADED SCORE	

Check and attach proof(s) of claimed bonus points, to be added to score at ARRL HQ.

100% Emergency Power (200 points per transmitter class)  Mobility (200 pts.)  Message Order  Messages (10 pts. plus 100 maximum 200)

This certifies that the station whose call appears above was operated in accordance with the current Field Day rules (see Reg 95F) and that, to the best of my knowledge, the points and score at left forth in the above summary are correct and true.

*W1KQ/M* Date *6/29/70* *W1KQ/M* Signature (call) Club president

To sign in black ink, proof necessary for bonus points, snapshots, photos and send promptly to ARRL Headquarters, 225 Main Street, Newington, Connecticut, U.S.A. 06111.

7-64-70 (9-63) Printed in U.S.A.

Entries must be accompanied by this summary sheet. You may obtain the summary shown here plus log forms free on request from ARRL, or prepare a facsimile. Attach logs of all Field Day contacts and copies of all messages received and relayed. Furnish publicity proof if applying for Spirit of Field Day bonus as well as a copy of your message origination.

d. Class D. Stations operating from permanent or licensed station locations, not portable or mobile.

5. Field Day Period: Field Day operation starts at 1800 GMT the fourth Saturday of June and lasts until 2100 GMT the following Sunday, a period of 27 hours. Entries that do not begin any setting-up operations until 1800 GMT on Saturday may operate the entire duration of the contest; others may operate no more than 24 consecutive hours.

6. Bands: Each phone segment and each cw segment is considered as a separate "band." All forms of voice contact will be considered *phone* band contacts, in the voice segments in which they are allowed. Cw and RTTY will be considered "cw band" contacts. The same station may be worked on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited.

7. Exchanges: Stations making contact, in order to count their contact as valid must exchange ARRL Section (see p. 6, QST) or specific location.

8. Valid Contacts: A valid contact is defined as a two way *cw* *hange* (see Rule 7, above) between stations. Class A, B, and C stations may contact any other amateur station. Class D. stations may contact any Class A, B or C station. Stations may be worked only once in each "band" (see definition, Rule 6).

9. Miscellaneous Rules:

a. Operators participating in the FD may not, from any other station, contact the Fd portable station of a group with which they participated. This is intended to outlaw any kind of "manufactured" contact.

b. A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station using different calls.

c. Any Class A group whose entry classification is four or more transmitters may also use one novice operating position to be set up and operated only by novice (class licensees) without changing the basic entry classification.

10. Scoring: Scoring is based on the number of valid contacts (times the power multiplier times the independence-of-mains multiplier, times the battery multiplier, plus bonus points. The following are multipliers and bonuses:

a. Power: For each contact made using output stage plate (collector) dc input power of 10 watts or less, multiply by 4. Over 10 watts up to 50 watts, multiply by 3. Over 50 watts up to 200 watts, multiply by 2. Over 200 watts up to 1000 watts multiply by 1. Over 1000 watts, multiply by zero! Power on ssb phone is considered to be half the peak envelope power: that is, 100 watts PEP would take the 50-watt multiplier. Where various powers are used, each contact must take only the multiplier for that particular contact.

b. Independence from Mains.

(1) Contacts made with both transmitter and receiver operating from power source independent of commercial mains take an additional multiplier of 3.

(2) Contacts in Classes B, C, and in 10-watt Class A (see Rule 4), made with battery power, take an additional multiplier of 1.5.

(3) Charging batteries from commercial mains while using them to operate equipment is *not* considered "independence from mains" or battery operation. However, batteries may be charged from an independent source while being used, or they may be charged from commercial mains while *not* being used.

c. Bonuses: The following points may be added to the score after all multipliers have been applied.

SCORING EXAMPLES

A home station (Class D) uses a generator to power his transceiver. The station runs 120 watts d.c. input and 150 QSOs are made.

$$150 \times 2 \text{ (50-200 watts)} \times 3 \text{ (Independent power)} = 900$$

A one-man portable (Class B) makes 50 QSOs using a battery-powered 5-watt rig. He originates a FD message to his SCM.

$$50 \times 4 \text{ (under 10 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (Independent power)} = 900$$

Bonus for 100% independence from commercial power (200 X 1)	200
Bonus for message origination	200
	1300

A small club mans one transmitter in the field, runs 40 watts d.c. input and uses commercial power exclusively. 400 stations are worked.

$$400 \times 3 \text{ (10-50 watts)} = 1200$$

A club mans two transmitters simultaneously. One runs 8 watts d.c. input, powered by batteries and makes 70 QSOs. The other station runs 180 watts input, generator powered, makes 300 QSOs. No commercial power on site. No FD traffic, no publicity.

$$70 \times 4 \text{ (under 10 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (Independent power)} = 1260$$

300 X 2 (50-200 watts) X 3 (Independent power)	1800
Bonus for 100% emergency power (200 X 2)	400
	3460

A home station (D) using commercial power and running 30 watts d.c. input works 200 FD portables.

$$200 \times 3 \text{ (10-50 watts)} = 600$$

A mobile (Class C) makes 60 contacts running 30 watts input. He originates a FD message, receives two and relays two.

$$60 \times 3 \text{ (10-50 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (Independent power)} = 810$$

Bonus for 100% independence from commercial power (200 X 1)	200
Origination bonus	200
Receive/relay bonus	40
	1250

A large group in the field mans 6 transmitters simultaneously (Class 6A). Three setups run 30 watts input and make 350 QSOs, three run 150 watts input and make 600 QSOs. No commercial power on site, publicity supplied, a message originated, 4 received and 2 relayed by ham radio.

$$350 \times 3 \text{ (10-50 watts)} \times 3 \text{ (Independent power)} = 3150$$

$$600 \times 2 \text{ (50-200 watts)} \times 3 \text{ (Independent power)} = 3600$$

Bonus for 100% independence from commercial power (200 X 6)	1200
Publicity bonus	200
Origination bonus	200
6 rcd./rel. @ 10/points	60
	8410

(1) *100% emergency power.* (If all equipment and facilities at the Field Day site were operated during the entire FD period by emergency power independent of commercial mains, add 200 points per transmitter classification (See Rule 4). (Example: Class 1A would get 200 points, Class 2A would get 400, Class 3A would get 600, etc.). This includes *everything*: keyers, refrigerators, lights, monitoring receivers, cooking, battery charging, etc. If commercial mains are at hand, *pull the main switch* from 1800 Saturday until 2100 Sunday. Even if your generator goes *psst* you lose the bonus if you turn on the commercial power.

(2) *Publicity.* Evidence of publicity must be attached to the FD log and report to get additional 200-point bonus. This can be in the form of a newspaper or magazine clipping, or a letter or memo from a BC or TV station stating that publicity was given.

(3) *Message origination.* An additional 200 points may be added if a message is originated by your club president or activities manager or other FD leader addressed to the SCM or SEC, stating the club name (or non-club group), number of operators, field location and number of ARRL members participating. The message must be transmitted during the FD

period and a fully-serviced copy of it is standard ARRL form must be included with the FD log and report.

(4) *Message handlings.* Add 10 points for each message received and each message relayed during the FD period, up to a maximum of 200 points. Copies of each message, properly serviced, must be included with the log.

d. *Club Aggregate Mobile Scores.* Entries under Class C may be combined to form an aggregate score for the club, having no connection with the club's portable entry, if any. Individual reports must include the club name, and the club secretary or other designated club official must submit a claimed aggregate score. Only bona fide members of the club residing in the club territory may contribute to this aggregate mobile score.

11. *Reporting:* Mail reports or entries on or before July 27. Reports must show starting and ending time of FD operating period, bands used, dates and contact times in GMT, calls of stations worked, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, class of entry, and score computations. [part]

## Strays

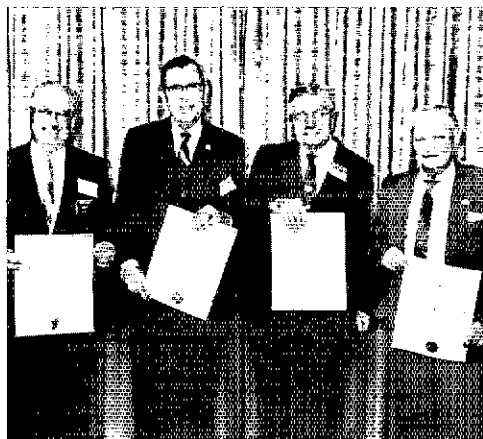
Back in May, 1935 *R/9* magazine there was a "stray" that might be of interest today, what with 5-band awards and such. *Proposed by the Norwegian branch of the I.A.R.U. (N.R.R.L.) as reported in Radio R.E.F. a new abbreviation: QSLN. "La station ne desire pas de cartes QSL et n'en enverra pas, sauf demande speciale." Meaning, in American (not English), "we doanawanenny and ainagonasendenny."*

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When WØPSE was returned to his hospital bed from the recovery room he was surprised to learn that WØAAJ did the surgery.

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



The QCWA Northern California Chapter recently presented four members with certificates for 50 or more years of active hamming. Shown, from left, are K6J1, W6NU, W6JN, and K6HT.

### RULES FOR LIFE MEMBERSHIP

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



# VHF QSO Party Announcement June 13-15

**STARTING TIME**                      **ENDING TIME**  
 1900 GMT, June 13      0600 GMT, June 15  
 Operate any consecutive 28-hour period

**M**ADE any plans for the second weekend in June? If not, how about giving some thought to the June VHF QSO Party scheduled to take place June 13-15.

What better time to work those new states, test those Field Day vhf rigs, meet old friends. And if mountaintopping is your bag, why not take the YL or XYL and junior ops (as the case may be) and make a day of it, complete with a picnic. You scribe looks forward to doing just that. It won't win contests, but what better way to promote our hobby to friends and loved ones.

You may operate any consecutive 28-hour period, working the same station on different bands for additional QSO and section credit. All that is necessary is to exchange your sections. Your final score equals the total QSO points times the total number of band-sections worked.

Read the rules carefully, then send right away for your free contest logs, being sure to state the quantity desired (38 QSOs per log sheet). To aid us

in getting these logs to you as fast as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with Zip code. We can send 5 log sheets First-Class for 6 cents postage. Using this as a guideline, you can estimate the amount of postage to include.

**Be sure your entry is postmarked no later than July 5th and don't forget to include comments and pictures with your log. - WAIKQM**

**Rules**

1) The June 1970 V.H.F. QSO Party begins at 1900 GMT, Saturday, June 13, and ends at 0600 GMT, Monday, June 15. Entrants may operate any continuous 28-hour period beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the chosen 28-hour period and must be made on amateur frequencies above 50 MHz, using authorized modes of operation.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed, portable or mobile-station operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOG).

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

Contacts made by retransmitting either of both stations do not count for contest purposes.

4) Scoring: 1 point for completed two-way on 50 or 144 MHz., 2 points for such exchanges on 220 or 420 MHz., 3 points for such exchanges on the higher vhf bands. The sum of these points will be multiplied by the number of different ARRL sections worked per band, i.e. those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Cross-band work does not count. Aircraft mobile stations cannot be counted for section multipliers.

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

6) A contact per band may be counted for each station worked. Ex.: W2EJF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 MHz. for complete exchanges. This gives W2EJF 4 points (1-1-2) and also 3 section-multiplier credits. If W2EJF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.

7) Each section multiplier requires a complete exchange with at least one station. The same section provides another multiplier point only when contacted on a new vhf band.

8) Awards. Entries must be postmarked no later than July 5, 1970. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multioperator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final.

**ARRL V.H.F. QSO Party**

STATION... K1ZND/1 .....

ARRL SECTION... CONN .....

Mhz.	(GMT) Date/Time	Station Worked	Section	No. mults. per band					Pts.
				50	144	220	420	1215	
	SEPT. 7								
144	1903	KIABR	RI		1				1
	1918	K2HLA	NLI		2				1
50	1933	K1MUJ/1	CONN	1					1
	1937	WB4HIP/4	EFLA	2					1
220	1958	K1YON	CONN			1			2
420	2232	W1QWJ	WMASS				1		2
1215	2347	WALIOX	CONN					1	3
	SEPT. 8								
144	0031	WALIOX	CONN		3				1
	0042	K1HTV	CONN		-				1
	0217	W8SH	MICH		4				1

ENTER BELOW ON LAST SHEET USED.

Single Operator       Multiple Operator

Band	Contacts	Points	Mult.
50 Mhz.	2	2	2
144 Mhz.	2	2	2
220 Mhz.	2	2	2
420 Mhz.	1	2	2
1215 Mhz.	1	3	3
<b>TOTALS</b>	<b>10</b>	<b>14</b>	<b>9</b>

Calls of all operators/loggers.....  
 D.C. power input.....  
 Transmitter.....  
 Receiver.....  
 Antenna.....

Mail promptly with comments and photos to ARRL, 225 Main St., Newington, Connecticut 06111.

CLAIMED SCORE: 14 x 9 = 126 (points) (mult.)

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.  
 Signature: Dave Sumner K1ZND 2 Grove Rd. Cromwell, Conn 06416  
 Call: \_\_\_\_\_ Mailing address: \_\_\_\_\_

# AMATEUR RADIO PUBLIC SERVICE

## NTS RACES AREC

*In the Public Interest, Convenience, Necessity*

CONDUCTED BY GEORGE HART,\* WINJM

### *Field Day and Emergency Preparedness*

**Y**ES, next month we have Field Day. It occurs the fourth full weekend in June, every year, come heat or cold, wet or dry. The rules are detailed elsewhere in this issue.

The general consensus seems to be that Field Day was originally intended as an emergency exercise. Those of you with old files of *QST* should refer to the June, 1933, issue, page 15, where the first annual Field Day is announced. No where in the announcement is emergency preparedness or public service mentioned. "Besides offering an opportunity to get out in this fine spring weather," the announcement concludes, "the real object of this contest is to test portables." The announcement of the second Field Day (June '34 *QST*, p.8) adds the emergency aspect only as an afterthought, to wit: "The operation of portable transmitters and receivers afield is a most enjoyable activity; in addition it facilitates operator preparation to render constructive service in time of emergency."

The fact is, and we might as well face it, that the great majority of those who participate in FD do so either for the glory of winning a contest, or just for the doggone fun of it. Only a small percentage go out with altruistic ideals aimed at being better prepared to serve the public in times of disaster.

Nevertheless, Field Day is a group rather than an individual exercise and its success depends on teamwork, which is also a prime ingredient in the effectiveness of emergency preparedness. Furthermore, credits are given for operation from emergency power and for using low powered equipment of the type any emergency group may have to contend with in a real emergency. The new (third year) set-up time rule also rewards the FD group for participating on an emergency-preparedness basis. Thus, whether or not Field Day was originally set up for this purpose, and whether or not it is conducted exclusively for that purpose today, emergency preparedness is a *principal* purpose of Field Day, and those of us interested in public service communications shouldn't forget it.

Of course in a real emergency you don't ordinarily go out into a hay field and set up tents, you probably do your setting up at a school or other public building. In a real emergency you aren't usually fortunate enough to find yourself at a high location, but in FD this is much-sought-after. In a real emergency you don't put up fancy beams 100 feet high and strive for contacts at great distances on 40, 20, 15 and ten meters, but in FD this is common practice.

In a real emergency, you would most likely operate from a permanently-established RACES or AREC station in a civil defense or Red Cross center, using emergency power provided at that point; yet this is prohibited by FD rules. You would use the highest power available, yet if you do this in FD you are penalized for it. You would certainly use commercial power if it were available, but if you do this on FD you lose multipliers and bonuses.

Every year many comments are received to the effect that our FD is not truly an emergency exercise the way it is conducted, and to make it so we should change it this way or that way. In most such cases, to do so would perhaps add to its significance as an emergency exercise but take away some of the other aspects of it that drew participants and make it our biggest (from the standpoint of participation) activity of the year.

No, Field Day is valuable as an emergency preparedness exercise, but it is also valuable as a contest in which exists such things as rivalry,



Members of the Manchester (N.H.) Amateur Radio Club Sponsored a message center over the holidays in that city's shopping district. Here is the view inside the message center with WA1BLR in the left background operating on 20 meters while K1ISJ in the foreground helping a shopper compose a message.

\* Communications Manager, ARRL

camaraderie, camping out, picnicking and challenges to the ingenuity of amateurs. True, we have our jousts about the rules every year, and each year they are changed a little. This year is no exception (see FD Announcement elsewhere in this issue). Some of the changes are designed to enhance the emergency preparedness aspect, others to make the contest angle more fun, and all changes are made only after thorough discussion and contemplative decision concerned with the wishes of the majority of participants.

What is Field Day all about? It's about many things, one or more of which is bound to appeal to nearly any active amateur. But more than any other single thing, it is about emergency preparedness. Keep this in mind, when you're out there sweating or shivering, getting eaten up by mosquitoes, going without sleep, pounding away at the key or shouting into the microphone. Don't let it get too far away from you. It's too important. - WINJM.

### Traffic Talk

Quite a few comments on the PSHR. That's good. We are still feeling our way. The February QST column was quite modest. The March column was more extensive, and when the April (January activities) column promised to be even more so, it was decided to raise the minimum points to 30. However, after thinking this over we decided this would be unfair to those who, having made their 25 points and felt they would be in the PSHR, would be left out. So it was decided to list those making from 25 to 29 points inclusive at the bottom of the column, without a breakdown. The same procedure is being followed in this issue. Starting with the July issue, only those with 30 points and above will be listed.

Meanwhile, confused SCMs and others have been asking us questions, although for the most part they are requests for interpretation rather than complaints about the setup. One notable exception was an SCM who felt that giving five points to a net manager just for being a net manager was unjustified unless we gave SCMs (net managers' managers) points too, and also SFCs and ECs and other leadership appointees. In answering this complaint, it should be remembered that the PSHR is a recognition for operating, not administrative, effort. The latter is recognized in other ways. Of course managing a net is partly administrative, but there is usually a lot of operating connected with it also, and it is directly connected with a specific operating entity - the net. The recognition seems deserved, but any further comments would be welcomed - especially from net managers who feel it should be deleted, or those who are not net managers but feel it should be continued.

A few other questions: 1) How come cw QNIs get twice as many points as phone check-ins, and cw NCS jobs get more points than phone net controls? This is intended as an approximate measure of the amount of skill required for each type of function. A cw station QNing the net has to know his QN signals, his prosigns and other cw abbreviations and special procedures - not to mention more than a nodding acquaintance with the International Morse Code. Same applies to net-controlling, although here the difference is not too wide, since a phone NCS must also have considerable skill in a properly-controlled net.



In the February issue, amateur activity in the Northern Ohio storms of July Fourth was described. This picture of a few of those who participated was received too late for inclusion so is presented here. Left to right are W8VYU, K8ZLG, K8UKY, WB8CMF and W8DCE.

2) Does a net control get credit for a QNI, in addition to his NCS points? How about a liaison station in addition to his liaison function points? No to the first question, yes to the second. The NCS doesn't really report in, whereas the liaison station really does. This points up a possible discrepancy in that a liaison station can collect up to 8 points for one liaison function (two for reporting into a cw net he is liaison from, two for reporting into the cw net he is liaison to, and four for being a liaison station), while the NCS can only claim four points for being NCS. More points for NCSing? Net controls will think so; how about the rest of you?

3) How complete does the liaison have to be to get the liaison points? It has to be complete as assigned by the net manager or NCS. That is, the station has to take all the traffic dispatched to him by the NCS, duly report into the net he is liaison to and clear all the traffic as directed by the NCS of that net. He cannot claim the liaison points unless he succeeds in making liaison.

3a) A related question concerned the station who serves as a two-way liaison between NTS section and region nets. If station A serves as liaison from a section to region net and also as liaison from that region net back to the section net the same day, does he get credit for two liaison functions? Absolutely, if both are completed.

It pays to volunteer as liaison station on an assigned basis!

4) What is meant by a "legal" phone patch? Aren't they all now legal? No, not all. A foreign phone patch with a country with whom the U.S. has no third party agreement can be as illegal as hell. Foreign phone patches with countries with whom we have such agreements also may be illegal if they go beyond the scope of the agreements between the countries (no business transactions, etc.). The adjective means just what it says.

5) How about MARS functions counting toward PSHR? Sorry, no. The PSHR, like the HPL, envisages only amateur-band functions.

6) How come you allow a maximum of 20 points for phone-patching and only 3 points for handling a minimum of 100 messages? Well, the

Public Service Honor Roll

February, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 25 points or more total in the nine categories below. Use form CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 QST for details. Please note maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Total
Max. Pts.	10	5	16	12	12	20	7	-	5	
W88FQW	10	5	16	12	12	20			5	80
W88EXT	10	5	16	12	12	2	2		5	72
WA2CAL	10	5	16	12	12	1	3		5	84
WA2UWA	10	5	16	12	12		3	1	5	64
W6BNX	10	5	16	12	12	20		1	5	64
K0LVB	10	5	16	12	12	20			5	84
W82BAN	10	5	16	12	12		3		5	63
WB8BG	10	5	16	12	12				5	60
WA1HOL	10	5	16	12	12		5			58
WA7KIU	10	5	16	12	12		5			58
WB2FEH	10	5	16	9	12				5	57
WA1IYY	10	5	16	12	12					55
W4OGG	10	5	16	12	12					55
W5QGZ	10	5	16	12	12					55
W3JMX	10	5	16				3		5	51
WR1MI	10	5	16	3	12				5	51
WA8UPI	10	5	16	12	12	4	3		5	51
W8YUB	10	4	16	12	9					51
K1ZNP	10	5	8	12	9	1			5	50
WA2DRH	10	5	8	12	12		3		5	49
WA0LAW	10	4	12	9	9				5	49
WA2DHS	10	5	16	12		5				48
WA2VYS	10	5	16	12					5	48
WA3AKH	10	5	16		12				5	48
W88PPE	8	8	8	12		20	5			48
W6BGJ	10	5	16		12				5	48
W61RU	10	5	16		12				5	48
K7NHL	10	5	16		12				5	48
WA8VNU	10	5	16		12				5	48
W9HRY	10	5	16		12				5	48
W9LCX	10	5	16		12		3		5	48
WA2HMO	10	5	16		12		3			46
W3EMI	10	5	16		12		3		5	46
WA8ZNC	10	5	8	6	12				5	46
W6VNO	10	5	16		12		3		5	46
WA00LJ	10	5	16	9					5	45
8K1Y/W4	10	5	16		12	2				45
WA1KJ	10	5		12	12	5				44
W7OCX	10	5		12	12				5	44
W1BIG	10		16		12				5	43
W1EPW	10		16		12				5	43
WA1HSN	10		16		12				5	43
W82DRG	10	5	16		12					43
W2FR	10		16		12				5	43
W2RUF	10		16		12				5	43
W3LOS	10		16		12				5	43
W3NEM	10		16		12				5	43
K4EHY	10	2	16		12		3			43
W8GVX	10	2	16		12					43
K0MRI	10		16	12					5	43
WA0VAL	10	5	16	12	3	20	3			43
WA0WES	10	5	16		12					43
K7ITH	10	5		3	12	14		2	5	41
WA8ZTV	10	2	16	6	6					40
W1BUF	10	1	16		12					39
K2KIK	6		16		12				5	39
W4UO	10	1	16		12					39
K51ZA	4	1		12	6	7			5	39
WA6ROF	10	5	12		12					39
W7TYN	10	5		12	12					39
WB8ALI	10	1	16		12					39
WA0OTO	10	5	12		12					39

W1BVR	10	16	12							38
W1HKJ	10	16	12							38
K1SSH	10	16	12							38
W1ZPB	10	16	12							38
W2QC	10	16	12							38
WA3IPU	10	16	12							38
WA3IYS	10	2	16				3		5	38
W3KUN	10	16	12							38
K3MVO	10	16	12							38
WA6SCE	10	16	12							38
WA7CLF	10	16	12							38
W7GMT	10	16	12							38
K7QFG	10	16	12							38
WA87ZI	10	16	12							38
W0HD	10	16	12							38
WA0TGM	10	5	8	3	12					38
K2KDQ	10	5	12	12			3		5	37
W8LT*	10	5	16	6						37
W0LGG	10	5	16	9	6				5	37
K0MVF	10	5	12	9	11					37
W2MTA	10	5	16	9					5	36
K1WZY	10	5	16	9						35
WA2TBS	10	5	12	12	1				5	35
K3OHO	10	5	16	9						35
WA0HRM	10	5	16	12	9	3			5	35
K0MNO	10	5	16	12	9					35
K1ESG	6	16	12							34
K1SXF	10	5	16	12	12				5	34
WA2FRZ	10	5	4	3	12					34
WA3PMI	10	5	8	12		4		3		34
WA0VYV	10	5	12	12		14	3			34
W4PED	10	5	12	6						33
W5MEX	4	5	16	3					5	33
K0BXX	10	5	8	6	12					33
K2DFI	10	5	12	12			3			32
K3HKK	8	12	12	12						32
WA4PHG	10	5	8	3	6					32
K7GGQ	10	12					5		5	32
E0ECR	16	16		6						32
WA0RRA	10	5	16		12				5	32
K2DEJ	10	5	12	12	12	3				32
K3HKK	8	12	12	12						32
WA4FBG	10	5	8	3	6					32
K7GGQ	10	12					5		5	32
K0ECR	10	16		6						32
WA0RRA	10	5	16		12				5	32
W1DWW	10	5	16						5	31
WA2ICU	10	5	16							31
K2SIN	10	5	16	6	20					31
W4ILE	10	5	16							31
W6FJT	10	5	16	6	20					31
W7HLA	10	5	16							31
K7WWR	10	5	16							31
WA8MHO	8	5	3	6	9					31
WA9YXA	8	5	12				3	5	31	
WA1ILR	10	5	16		12		3			30
K2KIK	10	4	16							30

The following stations submitted points totals between 29 and 25. Beginning with July QST only those totals above 30 will be listed: (29) WB2DDQ, W5ISM, WA6DB, WA0MNL; (27) W2OOJ, WA2VYT, W27Z, W3E2T, W5SBM, K7SI-M, WA0UTT; (26) W4DVO, K4IEK, W6DEF, W0J G, W0LRN, W0LRW; (25) W89AMB.

The following stations submitted points totals of 25 or more but no break down was furnished: WA6LFA (43), K5MAT (38).

\*Denotes multi-operator station.

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

traffic-handler who devotes full time to passing messages is amply recognized and rewarded in the BPL, whereas the phone-patcher is recognized only in the PSHR. The first impulse was not to recognize message handling in the PSHR at all, but in retrospect this didn't seem right, because message handling is a very definite part of public service. If the PSHR had replaced the BPL, as originally planned, message handling would undoubtedly have come in for a higher point tally. As the situation now exists, the PSHR recognizes

mainly the non-message-handling aspect and the RPL recognizes *only* the message count.

Answering questions always seems to generate more questions, so let's have 'em. WINJM.

Public Service Diary

Again we are in receipt of several reports from VE2ALE recording assistance amateurs provided to motorists after traffic mishaps in the Montreal area. On Feb. 4, VE2DHV was mobile in the Point

Claire area when he discovered a truck stalled on the service road blocking traffic. VE2DEA was raised via the VE2MT repeater and summoned the police after copying all necessary particulars.

On Feb. 9, VE2BU was mobile in Strathmore when he came upon an accident involving a car and truck at the site of some highway construction. Using the VE2RM repeater, VE2AKM was contacted and the police were notified.

On Feb. 10 at 1445Z VE2BHH was proceeding west on the Bonaventure expressway in the city of Quebec. At the Atwater service road a truck had been involved in a collision. Again it was VE2AKM who answered the call and notified authorities.

A half hour later on the same date, VE2DIC was heading west on Metro Boulevard near the Decarie Interchange when he saw a truck hit a bump and loose part of a load of tires. VE2AKM was on hand to call the Quebec Provincial Police. VE2DIC was also able to supply a description and the license number of the truck so the police could intercept it and return the lost freight.

On the morning of Feb. 16, VE2AAS discovered an accident at the interchange of the Trans-Canada Highway and Sources Road. At the time he was in contact with VE2AKM through the VE2RM repeater. The police were called and a patrol car was sent to the accident scene.

On Feb. 23, while mobilizing south bound on the Decarie expressway, VE2BUF came upon an accident which was apparently part of a chain reaction tie-up which began further ahead. VE2AKM was on hand to call the police. - VE2ALE, Sec. Quebec.

At 1756Z on Feb. 13, WB6UJO and K6AQV were engaged in a QSO on twenty meters when WB6AGT/R2 (maritime-mobile) broke in with an emergency call. WB6AGT advised that he was aboard the fleet oiler *Manatee*. An engine room fire had occurred and had disabled power for the ship's normal communications. WB6UJO, in San Rafael, was nearest a Coast Guard Station and taking control of the situation he had soon established contact with the Navy in Honolulu. He then continued to relay between Hawaii and the *Manatee* until the fire had been extinguished, regular communications had been established and the ship was again under way. In case the *Manatee* needed assistance, information on the positions of nearby ships had also been gathered. The operation lasted about an hour. - K6AQV.

On March 2, K4RMX, a member of the Winchester (Va.) Volunteer Rescue Squad, was notified that the squad was responding to reports of a plane crash on North Mountain 15 miles southwest of the city. While on his way, K4RMX alerted several stations on the two meter fm frequency. WB4NER was on frequency and notified W4KAV, a member of the Civilian Air Patrol. W4ACC, the local EC, was also present, and assisted in giving directions to the search area. The two mobiles, W4KAV and K4RMX, followed a mountain road to a hunting lodge hut from there on the remainder of the trip had to be on foot. When the crash scene was reached it was learned that those aboard the single engine craft had perished. - W4ACC, EC Frederick Co., Va.

On March 10 at 0045Z, W8NZ operating mobile in Battle Creek, Mich., observed an accident. His call on six meter am was answered by

W8MFL and W8VXE. The police were called and assistance was sent to accident scene. W8VXE, EC Cathoun Co., Mich.

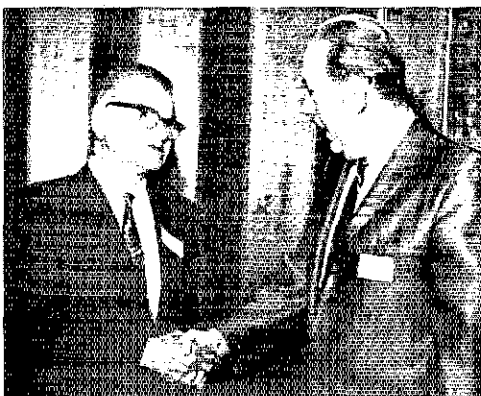
Several reports of amateur participation in March of Dimes campaign have reached headquarters. In Oklahoma City, the county Civil Defense radio van was used as a dispatching point for a number of mobile units which were used to pick up collections from neighborhood chairman. WA5CFZ and WA5BEN operated the control center while at least twelve other members of the Oklahoma Central VHF Club provided mobiles for the operation which has become an annual activity of the club. - WA5FSN, SEC Oklahoma.

After participating in the SET on the weekend of Jan. 24, members of the Bristol, Tenn., AREC joined in the March of Dimes relay to a Telerama on one of the local television stations. Members of the Johnson City Amateur Radio Club also helped out in the operation which lasted nearly twenty hours. Directing the amateur work was W4WJH, SEC Tennessee.

On Jan. 27, thirty-two members of the Shelby County (Tenn.) AREC assisted in the March of Dimes drive by picking up the collections when captains of the collection teams were ready. Facilities of the Red Cross were used to dispatch about fifteen mobile units operating in the ten, six and two meter bands. About ninety collections were handled in the three and one-half hours of the operation. - W4QQG, EC Shelby Co., Tenn.

The Cumberland Valley ARC of Chambersburg, Pa., provided the customary support for the Franklin County March of Dimes on Jan. 28. The Club station, W3ACH, was temporarily installed in the lobby of a local bank and was used as dispatching point for several mobile units which were used to pick up collections from local officials. About 100 such pick-ups were made during the evening. - W3LEZ.

What a way to start a new year! Only forty-three SEC reports were received for the month of



W2IIN of Elizabeth, N.J., is congratulated by W2EUI upon completion of twenty years service as Radio Officer and Communications Coordinator for the Union County Civil Defense and Disaster Control Staff.

January, 1970, the lowest number since July, 1969. The reports indicate an AREC membership of 13,934, about 1400 fewer than last January when we had only 42 reports. Come on, local ECs; get those reports to your SEC so he can forward progress reports to headquarters.

Reports were received from the following sections: Ala, Alta, Ariz, Ark, Conn, Del, Effa, EPA, Ind, Iowa, Kans, LA, Mar, Mich, Mont, Nebr, Nev, NMex, N.I.I., NC, NNJ, N.Tex, Ohio, Okla, Ont, Oreg, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WPa.

National Traffic System. W2FR reports another good month for 2RN with representation nearly perfect. But Howie is worried about the small number of people doing the job and says the bubble may burst at any time. W6LRU has taken over the reins of RN6 after WA6ROB's election as SCM of the Orange Section. W7BQ reports RN7 about on par with last year as far as average, rate and traffic are concerned but that representation is up 12 percent. W9HRY says he can't understand why "Grump's Law" is not holding true; both traffic and representation were up a little during February.

February reports.

Net	Sessions	Traffic	Rate	Avg. Rep(%)	
1KN	55	534	3.80	9.7	90.0
2RN	56	668	9.20	11.9	96.5
3RN	56	630	4.99	11.3	94.0
4RN	48	569	4.61	11.7	78.6
RNS	56	843	5.38	15.0	93.8
RN6	56	952	6.63	17.0	99.4
RN7	54	324	3.54	6.0	52.2
8RN	56	611	4.55	10.9	97.0
9KN	56	707	5.95	12.6	94.6
TEN	56	792	8.01	14.1	81.5
TWN	56	337	2.93	6.1	77.9
EAN	28	1994	1.494	71.2	98.2
CAN	28	1415	1.380	50.5	100.0
PAN	28	1446	1.176	40.8	100.0
ICC Eastern	112 <sup>1</sup>	790			
ICC Central	84 <sup>1</sup>	786			
ICC Pacific	112 <sup>1</sup>	1206			
Sections <sup>2</sup>	1631	11,738		7.2	
Summary	2319	23,460	FAV	13.0	
Record	3059	34,238	1,481	17.0	

<sup>1</sup>TCC functions, not counted as net sessions.  
<sup>2</sup>Section and local nets reporting (61): PVTEN, NJN, NJSN (N.J.); FMTN, VEN, GN, QFN, PPTN, NHN (Fla.); C. O. AREC/RACES, OSSR, QUN, OSN, BN, Franklin County (Ohio); WSN (Wash.); BUN (Utah); W. Que. VHF; OZE (Ark.); WSBN, VN (Va.); QIN (Ind.); NYS, NLIPN (N.Y.); QMV, WSSB (Mich.); BSN (Ore.); MDCTN (Md.-D.C.); SCN (Cal.); MTN (Man.); EPA, PPTN, EPAEPTN (E. Pa.); PCATN, KYN (Ky.); OLZ, SSZ (Okla.); CN, CPN (Conn.); AENB, AEND, AENM, AENO, AENR (Ala.); QKS (Kans.); WSSN, BEN, WIN, WSSN, BWN (Wisc.); WVN (W.Va.); ILN (Ill.); RISP (R.I.); NTEEN, TTN (Tex.); GSN (Ga.); CN (N.C. & S.C.); M.J.N, MSN, MSPN (Minn.); WMN (Mass.)

Area	Functions	% Successful	February reports	
			Traffic	Out-of-Net Traffic
Eastern	112	95.5	2084	790
Central	84	97.6	1640	786
Pacific	112	98.5	2412	1206
Summary	308	96.2	6136	2782

The ICC Roster: Eastern Area (W3EMI, Dir.) - W1s BIG, NJM WCG VKO, K1ESG, WA1JTM, W2s FR GK7 PU QC, K2s KIR RYH, WA2s CAL HMO UWA, W3EMI, K3MVO, W4s NLC SDQ UO, K4KNP, W5UM, K8KMQ, W6SS OCG YVR. Central Area (W0LCX, Dir.) - W4UGG, K4AT, W5MI, W9s UXY DND VAY, WA9s RAK V7M, W0s HI INH LCX ICE ZHN, K0AEM, WA0s DOU JAW RVR. Pacific Area (W6VNO, Dir.) - W5RE, W6s BGF BNX EOT IPW MLF VNO VZT, WA6s BRG LFA ROF, W7s DZX GH1 KZ, WA7CLE, K0JSP.

Independent Net Reports:

Net	Sessions	Check-Ins	Traffic
Eastern U.S. Traffic	28	80	91
Mike Parad E & T	24	363	268
North American SSB	24	773	283
7290 Traffic	39	1845	908
Northeast Traffic	28	346	569
Hit & Bounce	28	351	701
20 Meter ISSB	20	471	4215

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for February Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL/4	357	344	001	91	6785
K6BPI	4748	718	626	93	6184
W53PP	126	241	1810	601	4948
WA2UWA	25	2410	257	10	4802
W0LX	25	1021	907	49	2002
W0WAS	69	962	90	872	1993
W7BA	11	877	817	56	1761
K0ONK	185	693	679	72	1579
W3GPO	1	676	676	0	1353
W01YO	207	528	525	3	1243
K9LZX	5	612	602	8	1227
W0UPH	5	589	449	107	1120
W1PEX	42	549	494	24	1108
WA4JH	18	548	546	6	1102
W3YR/4	131	47	384	6	948
W04JW	6	471	458	13	948
WA9000	8	466	442	2	918
WA8WZ	19	472	539	22	857
W3EML	28	457	345	7	827
W01BO	31	406	373	16	826
WA2HMO	93	360	317	26	796
K0ZSO	9	383	4	382	769
W10JM	5	349	347	3	704
W6RSY	15	344	238	76	693
W4EYV	15	313	354	9	691
WA8FTX	58	288	289	24	659
W6VNO	14	343	284	0	641
W6MIF	195	214	206	4	619
WB4ICE	16	296	241	31	604
WA9YXA	470	93	33	5	601
WA2HAN	23	291	278	3	595
W50TQ	51	266	289	7	583
W3MPX	102	259	185	33	579
K4PH	26	105	420	25	576
W3CAL	10	286	267	10	573
W0KXY	10	281	276	5	572
W9EQO	18	270	270	6	538
K8LNI	9	243	233	18	533
W0INT	21	264	269	1	546
WA3JVS	19	211	205	99	445
WA2EPI	22	144	138	82	436
WA8UP	20	258	200	25	533
WB6BBO	49	135	197	10	511
K8ZJU	13	222	60	215	510
W8WYR	120	191	156	35	507

Late Reports:

WA2UWA (Dec.)	100	2490	2450	0	5040
WA2UWA (Jan.)	400	2150	2008	10	4568
WA2HMO (Jan.)	154	474	360	12	900

More-Than-One Operator Station

W4DUG/4	3070	0	0	0	3070
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BPL for 100 or more originations plus deliveries

KRONA	242	W4ILL	118	K1RBS	103
WB4GAN	182	WB9AMB	116	WA3DVL	102
WN3LE	170	WA2EB	112	WA3JOB	101
WB8DSV	167	K2KDO	112	WA0YVV	101
WA3HB1	138	WA3EM	112	Late Reports:	
WA0BY7	137	WA1EYV	111	WA2RIN (Jan.)	182
WA9MMV	135	W7AXT	107	WB2TUL (Jan.)	182
K8CJH	127	WA2BU	106	WA3HHT (Jan.)	141
WA1BO	119	WA3LR	105	WA2CWU (Oct.)	117
W20E	119				

K2DEL 107

BPL Medallions (see July, 1968 QST, p. 94) have been awarded to the following amateurs since last month's listings: WA2FRZ, WA3HBT.

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

Changes of Address

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

# Hamfest Calendar



	S	M	T	W	T	F	S
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

**California**— The LFRAC Amateur Radio Club is sponsoring the 1970 Burbank Hamfest on May 9. The Hamfest site is just 7 blocks from the Hollywood-Burbank Airport. For more information write the club at 2814 Empire Ave., Burbank, California 91504.

**Florida**— The St. Petersburg ARC, Inc., will hold its annual Hamfest at Lake Maggiore Park, entrance gate at 9th St. South and 38th Avenue, Sunday May 17. All Hams and guests cordially invited. This is an old fashioned Hamfest with picnic lunch, swap table and lots of fun for all.

**Florida**— The 2nd Annual Brandon ARS Camporee will be held at Florida Camplands campground north of Dade City, Fla., June 12, 13, and 14. All hams who camp are invited to attend. For those within driving distance, there will be a picnic Saturday evening. Advance registration is requested although not required. For more information, contact Gene, WA4YNW, 120 Morrow Circle, Brandon, Fla. 33511.

**Florida**— The Orlando ARC, Inc., will hold their annual Hamfest at the Hilton Inn, 3200 W. Colonial Dr., Orlando, Fla., May 23 and 24. This is the "largest" Hamfest in the Southeastern U.S. Large electronic show, good programs and a dance Saturday night. Advance tickets \$2.00. For room reservations contact Hal Shea, W4BKC, 736 Alfred Dr., Orlando, Fla. 32810.

**Illinois**— The Fourth Rock River Hamfest will be presented by the Rock River RC of Dixon, Ill. on May 17 from 9:00 A.M. to 5:00 P.M. at the Lee County 4H Center, Amboy, Ill., which is located at the intersection of Highway 52 and 30. Advanced tickets are \$1.00, at the door \$1.50. Plenty of parking and food. Talk-in frequency is 3.950 and 50.4 MHz. For tickets send check to Carl Karlson, Naclusa, Ill. 61057.

**Illinois**— The Starved Rock RC will hold their Annual SRRC Hamfest at the La Salle County 4H Home and Picnic Area Southwest of Ottawa, Ill. on June 7. This all-day affair suggests advance registration until May 29 at \$1.50, at the gate \$2.00. Free coffee and doughnuts from 10:00 A.M. to 10:30 A.M. Food available and ample parking provided. For a full day of activities, follow the big yellow "Hamfest" signs on Route 71 from the South end of the Illinois River bridge at Ottawa, Ill. For further details, including data on available motels and/or camp facilities, write W9MKS, RFD 1, Box 171, Oglesby, Ill. 61348.

**Illinois**— The Kishwaukee ARC will hold their annual Hamfest on May 3 at Hopkins Park, Route 23, DeKalb, Ill. Free parking, hot sandwiches, and free coffee and doughnuts until 10:00 A.M. will be available. Talk-in on 7290 kHz. For information write James Schwab, 743 W. State Street, Sycamore, Illinois.

**Indiana**— The Wabash County ARC second annual Hamfest will be Sunday, May 24, rain or shine. Held at the Wabash County 4H Fairgrounds, there will be activities for all including bingo for the XYLs, Fleamarket, and a technical session on the Fort Wayne VHF Repeater. Tickets are \$1.00 at the door. For further information write Bob Sutting, 700 Centennial St., Wabash, Indiana 46992.

**Kansas**— The Central Kansas ARC will hold their annual Hamfest Sunday, June 7 at the 4H Building, Kenwood Park, Salina, Kansas. For early arrivals there will be a dinner Saturday evening and a "Koffee Klatch" Sunday morning. The hamfest opens at 9:00 A.M. with interesting and entertaining programs for the OM, YL, XYL and harmonics. There will be a covered dish lunch with beverages supplied by the club. For more information write L.A. Anderson, Hamfest Chairman, P.O. Box 1093, Salina, Kansas 67401.

**Kansas**— The Hi Plains ARC Annual Hamfest will be held May 17 at the Grade School Auditorium. Basket dinner at noon. Bring your own table service. Drinks will be furnished. Large swap table, bring your trading gear. Camper round-up

and space available at City Park May 16. Airport near park. Registration is \$2.00 at the door. For further information write W0NIO, Plains, Kansas 67869.

**Missouri**— The Mid-West Missouri Hamfest, sponsored by the PHDARA Inc., will be held at Bennett Park in Liberty, Missouri on May 17. Registration is \$1.50 which entitles the holder to two sandwiches and a cold drink. Talk-in will be on 3.925 and 50.45 MHz. a.m. More information from the club at P.O. Box 11, Liberty, Missouri 64068.

**Nebraska**— The Pine Ridge ARC will hold their 16th annual Hamfest at Nebraska State Park 9 miles South of Chadron, Nebraska on Sunday June 7. Write K0ODF, P.O. Box 732, Chadron, Nebraska 69337.

**New York**— The Rome RC presents the 17th Ham Family Day on Sunday, June 7 at Beck's Grove, ten miles west of Rome. Features include technical talks, roundtable on VHF repeaters, technical quiz plus other contests, MARS meeting, mobile frequency checking and many other activities. The N.Y. State MARS Director will be there. Participants in the popular flea market are invited. An afternoon of entertainment for the ladies and children has been arranged. Registration will start at noon with that famous steak and chicken dinner which will be served at 5:00 P.M. Advance adult reservations \$5.00; at the gate \$5.50. Children under 12 \$2.00, under six free. Send your reservations to Rome Radio Club, P.O. Box 721, Rome, N.Y. 13440.

**New York**— Rochester is the location for the 37th annual Western New York Hamfest and VHF Conference the weekend of May 16. Activities start Friday night followed by a full day of technical programming with outstanding speakers, including QST's Bill Smith, K0CER. Special activities include Navy MARS, AREC and OCWA meetings, YL fashion show, code contests and huge flea market. Same location as last year: Bristol 50 Acres, Route 15 just South of N.Y. Thruway, Exit 46. Advance registration and banquet only \$6.75. Unlimited registration (includes entire Hamfest except dinner) only \$2.75. Advance sale closes May 9. Send check or request for information to Western New York Hamfest, Box 1388, Rochester, N.Y. 14603.

**Ohio**— The Second Old Time Hamfest, sponsored by the Indian Hills RC will be held all day Sunday, May 10 at the Slovenian Social Home, 20713 Recher Ave., Euclid, Ohio from 10:00 A.M. till? Buffet dinner at 6:00 P.M. Bring your family, bring your friends. Contests, swap and shop, refreshments, and interesting speakers. Advance donations \$1.50, at the door \$2.00. Dinner reservations by advance donations only \$3.00.

**Ohio**— The Lancaster and Fairfield County ARC announces their annual Hamfest is to be held this year at the Lancaster Fair Grounds in Lancaster, Ohio, Sunday, May 31. For additional information write Howard Schaefer, The Lancaster and Fairfield County ARC, P.O. Box 3, Lancaster, Ohio 43130.

**Pennsylvania**— The 16th annual Breeze Shooters Hamfest will be held at White Swan Park near Pittsburgh on May 17. This is the "largest" amateur event in the Western Pennsylvania area so plan to attend. For additional details write J. L. Burnett, K3IXB, 608 Charlotte Dr., Pittsburgh, Pa. 15236.

**Pennsylvania**— The 7th annual Penn-Central Hamfest by the Williamsport and Milton clubs will be held Sunday, June 7, starting at 12:00 noon at the Union Township Volunteer Fire Grounds on Route 15, Wintfield, Penna. Informal, picnic style, snack bar handy or bring your own lunch - come and go as you please. Auction, contests, swapping, free parking, with both indoor and outdoor facilities provided. \$2.00 registration at the gate. XYL and children admitted free. For information contact Al Schramm, 311 E. Mountain Ave., South Williamsport, Penna. Telephone 717-323-5376.

**Tennessee**— The Humboldt ARC will hold its Annual Hamfest Sunday, May 24 at the Humboldt Scoutland on 45W, North of Humboldt.

## SWITCH TO SAFETY!



# Happenings of the Month

## FCC FORMS AND PROCEDURES

The Federal Communications Commission last Autumn began using a new stock of Forms 610, on bright yellow paper and dated April, 1969. Washington has now directed the field offices to destroy their stocks of earlier Forms 610 (on white paper) and to issue only the new ones. If you or your club have the earlier papers on hand they should be thrown out and new supplies requested from an FCC office.

The new form has a place on the reverse side for volunteer examiners to certify results of a code test — we learn that many applications are being returned because the examiner forgot to insert the speed at which the code test was transmitted in the proper blank in the middle of the paragraph.

ARRL form S-45, certification of volunteer examiner, is no longer needed, since the Form 610 has a place for the same info. Accordingly, S-45 is no longer being furnished from headquarters.

Club and military recreation stations, incidentally, now have a form of their own — Form 610-B, dated April, 1969 — which should be used for original, renewed or modified licenses of group stations.

## HAM STATION AT INTERNATIONAL MEETING

An amateur radio station will be in operation May 15-30, 1970 at the International Electro-Technical Commission's 35th annual meeting. The station, to operate as a special events station under the call WF3IEC, will be located in the Washington Hilton. Ed Redington, W4ZM, is in charge of the all-band operation on behalf of the Foundation for Amateur Radio.

## AMATEUR RADIO WEEK, MASSACHUSETTS

The Hon. Francis W. Sargent, Governor of Massachusetts, has proclaimed the week of June 14-20, 1970, as Amateur Radio Week. He mentions disaster communications, civil defense preparation, and development of the radio art in war and peace as contributions by amateurs.

The "week" was sought by the Massachusetts Chapter, National Awards Hunters Club. Some of the activities being associated with the observance are listed with the Eastern Massachusetts report in the "Station Activities" portion of this *QST*.

The standard "week" this year, as listed in Chase's *Calendar of Annual Events*, is June 21-27, culminating in Field Day. Some banks, public libraries and the like use Chase's *Calendar* as an idea source for window or lobby displays — a fine idea for local clubs to utilize in their own public-relations programs.

## W8 QSL BUREAU TO COLUMBUS

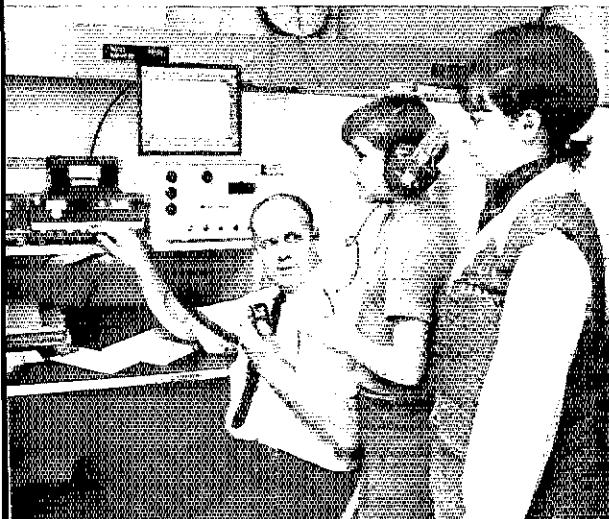
Paul R. Hubbard, WA8CXY, of Zanesville, Ohio, has resigned as manager of the 8th District ARRL QSL Bureau after five years service in the volunteer post. On behalf of the 8th call area amateurs, Paul, warm thanks!

The Columbus Amateur Radio Association took over the QSL chores effective March 29, with cards and envelopes being transferred to the new group. The bureau requests that its "customers" use 5 x 8 inch manila envelopes (e.g., "#50 scarf envelope") as the standard. The address is:

Columbus Amateur Radio Association  
Radio Room  
280 East Broad Street  
Columbus, Ohio 43215

Do you have envelopes on file with your ARRL QSL Bureau? Do these have your name and current address, your current call, first-class postage? If you're "portable," your envelopes still go to the bureau appropriate to your call — for instance, K8XYZ/1 still sends his envelopes to Columbus. (The W1 bureau doesn't have pigeonholes for 8th area calls!) Even those who don't work much DX can help the volunteers to help, by keeping at least one envelope on hand to receive cards sent them, whether earned or a mistake by another ham. Backlogs of unclaimed cards are the bureau's big bugaboo! The U.S. and Canadian Bureaus are listed elsewhere in this issue.

After March showing of the ARRL film, "Hams Wide World" at the Communications Club of New Rochelle, more than 25 potential amateurs saw and heard club station K2YCJ in action. John Roberts, VK1ZAR/W1, a club member, showed the 2-meter position to visitors Darby Coleman and Susan Braine. (Photo courtesy of Westchester-Rockland Newspapers)





## Behind the Diamond

Number 24 of a Series

This month we'd like to present one of our long-time staffers, Miss Charlotte A. Clark, who handles our accounts payable and other chores in the Accounting Department, and also serves as an assistant to the treasurer of ARRL.

Charlotte came to Hq. in 1946, to operate new accounting machines which had just been installed to handle the League's postwar boom.

Though we're fortunate enough to chat with Charlotte for a few minutes nearly every day, it took a number of interviews with close friends outside the office for us to get a line on all her interests. For instance, travel - she's been to Havana, Cuba, to the Bahamas, California, Canada and the nation's capitol on vacation trips. She likes plays, opera and concerts, so travels to New York City, Springfield, Massachusetts and the nearby "straw hat" circuit frequently, in addition to taking in events at Hartford's Bushnell Memorial Hall.

Then there's reading, with mystery stories a favorite. And crossword puzzles. And cooking - we're told that Charlotte turns out a terrific meatloaf.



Sewing - a very pleasant tradition has developed. Whenever one of the Hq. girls gets married, she can count on a handworked tablecloth and napkins from "CAC" - somehow, always in the right colors for the planned home.

Even stamps - Charlotte doesn't keep a collection herself, but one of her many friends does, so during the mail-opening chore at Hq. out come the scissors whenever one of those lovely Ceylon or Uganda stamps appears!

### MORE ON FCC RULEMAKING

The Federal Communications Commission has denied petitions for an extension of time to comment on rulemaking proposals filed in the amateur and citizens radio services; petitioner is George Nims Raybin, WA2GWB, who asked for an extension to six months of the thirty-day period immediately following submission of a petition to FCC, in which other parties may comment.

Affirming what we said in our comments on procedures in April *QST*, the FCC in its denial of Raybin's request said:

"... It may be noted also that our practice has been to give consideration as informal comments

to statements received after the 30-day period but prior to Commission action.

"Our experience also indicates that most interested persons in these services file comments after the Commission has taken action by issuing a Notice of Proposed Rule Making. In order to permit the widest possible participation by licensees in the Amateur and Citizens Radio Services in rule making proceedings affecting these services, we plan, in future Notices of Proposed Rulemaking in these services, generally to allow more than the usual 30-day comment period. . . a 60-day comment period would generally appear to be sufficient." QST

## Strays

The Palomar Radio Club has published a "Radio Amateur Directory" of hams in San Diego County, California. The Directory lists all area amateurs by call and by last name. Copies are \$2.00 postpaid and may be ordered from Jim Church, K6SLA, 627 Crescent Lane, Vista, CA 92083.

### ARE YOU LICENSED?

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

### COMING A.R.R.L. CONVENTIONS

- May 15-17 - Pacific/Southwestern Division, Fresno, Calif.
- June 13-14 - Rocky Mountain Division, Estes Park, Colorado.
- June 19-21 - Oregon State, Bend.
- July 4-5 - West Virginia State, Jackson Mills, Texas.
- July 18-19 - West Gulf Division, Orange, Texas.
- September 19-20 - Georgia State, Augusta.
- September 25-27 - NATIONAL, Boston, Mass.
- October 17-18 - Hudson Division, Tarrytown, N.Y.
- Oct. 31/Nov. 1 - Roanoke Division, Raleigh, N.C.

# 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

## SPECIAL VE/VK 3rd PARTY AGREEMENTS

To facilitate the exchange of information about the amateur radio satellite Australis-Oscar 5, Canada and Australia have concluded a temporary third-party agreement. Only traffic pertaining to the satellite is permitted, and the agreement is in force for the four months following AO-5's end of life (March 8). A similar agreement is in effect between the United States and Australia.

The Radio Amateur Satellite Corporation suggests that amateurs take advantage of these special third-party provisions to forward reports of reception of Australis-Oscar 5 signals to Amsat or Project Australis. (Reports may also be mailed to Amsat, PO Box 27, Washington, D.C. 20044.) Each person who reports reception of the AO-5 signals will receive an attractive QSL.

## NOTES

Although reported earlier by WIAW bulletin, Canadian amateurs are notified that Thailand has been removed from the banned list for VEs. A complete list of countries with which U.S. and Canadian amateurs can not communicate appears elsewhere in this column.



During the International Telecommunication Union's CCIR (technical study group) meeting in New Delhi during January, the *Amateur Radio Society of India* hosted a reception for delegates. Eighteen delegates attended — of which 14 were radio amateurs. The photo shows from left, VU2NS, *Radio Society of Great Britain* President Saxton, CCIR Director HB9AJI (standing) and XYL, and VU2CK.

FLASH — We've just received from the *Radio Sports Federation of the USSR* a breakdown of the new "UK" series of call signs now being used by Soviet club stations:

Prefix	Call Sign	Notes
RUSSIAN SSR	RU1-99	RU1-99 LETTERS
White Russian SSR	RU10-19	RU10-19 LETTERS
Belorussian SSR	RU20-29	RU20-29 LETTERS
Ukrainian SSR	RU30-39	RU30-39 LETTERS
Georgian SSR	RU40-49	RU40-49 LETTERS
Armenian SSR	RU50-59	RU50-59 LETTERS
Ossetian SSR	RU60-69	RU60-69 LETTERS
Abkhazian SSR	RU70-79	RU70-79 LETTERS
Ingush SSR	RU80-89	RU80-89 LETTERS
Dagestan SSR	RU90-99	RU90-99 LETTERS
Cherkassian SSR	RU100-109	RU100-109 LETTERS
Ingush SSR	RU110-119	RU110-119 LETTERS
Abkhazian SSR	RU120-129	RU120-129 LETTERS
Ossetian SSR	RU130-139	RU130-139 LETTERS
Armenian SSR	RU140-149	RU140-149 LETTERS
Georgian SSR	RU150-159	RU150-159 LETTERS
Ukrainian SSR	RU160-169	RU160-169 LETTERS
Belorussian SSR	RU170-179	RU170-179 LETTERS
White Russian SSR	RU180-189	RU180-189 LETTERS
Russian SSR	RU190-199	RU190-199 LETTERS

All USSR stations in the USSR have the new prefix "UR".

## CONTESTS

A World Telecommunications Day Contest will be sponsored by the Brazilian Ministry of Communications. The contest period is, for cw: 0000 to 2400 GMT, May 16, and for phone: 0000 to 2400 GMT, May 17. There is a required six-hour rest period on both days. An exchange must include a signal report and ITU zone number (for U.S. stations, call areas 6 and 7 are ITU zone 06, 5 and 0 are 07, and 1, 2, 3, 4, 8, and 9 are 08). The object is to contact as many zones as possible. Contact points for exchanges with other countries within your ITU zone count for one point, or two points on 80 or 160 meters. Exchanges with other ITU zones on your continent count 2 points on 10, object is to contact as many zones as possible. Contact points for exchanges with other countries within your ITU zone count for one point, or two points on 80 or 160 meters. Exchanges with other ITU zones on your continent count 2 points on 10, 15 and 20 meters, 3 points on 40 meters, and 4 points on 80 and 160 meters. Exchanges with other ITU zones on other continents count 3 points on 10, 15, and 20 meters, 5 points on 40 meters and 6 points on 80 and 160 meters. Multiply total zones by contact points for final score. Logs should be postmarked before June 30, and sent to: *Ministerio das Comunicações, Setor de Radioamadorismo do Dentel, Rua Miguel Couto 105-21.º andar, Rio de Janeiro, ZC-26, Guanabara, Brasil.*

The *Radio Sport Federation of the USSR* invites amateurs to participate in their 1970 "Peace to the World" contest. The contest period is from 2100 GMT, May 9, to 1500 GMT, May 10, using phone in the 80, 40, 20, 15, and 10 meter bands. Participants should call "CQ-M;" an exchange consists of signal report and contact number

(USSR stations will substitute a district number for contact number). Each prefix worked counts as a multiplier. Contacts with other countries count 3 points - one point for contacts within your country. Logs must be mailed before May 25, to the Radio Sports Federation, PO Box 88, Moscow, USSR.

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**DX OPERATING NOTES**

*Reciprocal Operating*

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

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

*Third-Party Restrictions*

Messages and other communications - and then only if not important enough to justify use of the regular international communications facilities - may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Barbados (only U.S. stations/8P) Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateur in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA FI W XE YS YV and 4Z.

*DX Restrictions*

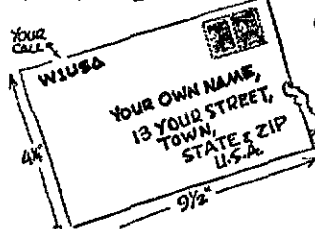
U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

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

**Q57**

(\*Agreement includes overseas entities.)

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



*A. R. R. L. QSL Bureau*

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

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

- W1.K1,WA1,WN1<sup>1</sup> - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2.K2,WA2,WB2,WN2<sup>1</sup> - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3.K3,WA3,WN3<sup>1</sup> - Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4.K4 - H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4,WB4,WN4<sup>1</sup> - J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5.K5,WA5,WN5<sup>1</sup> - Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701.
- W6.K6,WA6,WB6,WN6<sup>1</sup> - No. California DX Club, Box 11, Los Altos, California 94022.
- W7.K7,WA7,WN7<sup>1</sup> - Willamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8.K8,WA8,WN8<sup>1</sup> - Columbus Amateur Radio Assoc. Radio Room, 280 E. Broad St., Columbus, Ohio, 43215
- W9.K9,WA9,WN9<sup>1</sup> - Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
- WA9,K9,WA9,WN9<sup>1</sup> - Des Moines Radio Amateur Association, PO Box 88, Des Moines, Iowa.
- KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.
- KZ5 - Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KH6,WH6 - John H. Oka, KH6DQ, PO Box 101, Alea, Oahu, Hawaii 96701.
- KL7,WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - L. J. Fader, VE1FQ, PO Box 663, Halifax, N.S.
- VE2 - John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R. H. Buckley, VE3JW, 20 Almont Road, Downview, Ontario.
- VE4 - D. E. McVitte, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JJ, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 - Karel Tetelaar, VE6AAV, Sub. PO 55, N. Edmonton, Alberta.
- VE7 - H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 - George T. Kondo, VF8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.
- SWL - Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

*These bureaus prefer 5 x 3 inch or 150 manila envelopes.*

QSL Bureaus for other U.S. Possessions and for other countries appeared on page 87, December 1969 QST, and will be repeated in the June issue.

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



# Correspondence From Members-

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

## QST DELIVERY

• . . . Have you ever contacted the Post Office Department regarding this regular delay of *QST*? From the content of your letters I don't believe you have ever done anything in attempting a solution to this. It would appear that you don't have the necessary initiative to generate a solution and then to either order the change to go into effect or to pass the information on to the directors for their consideration. Because the service in the Post Office is getting worse is no reason for you to let *QST* get in the same rut. They are at least trying to improve but you are in a rut and doing the same thing as you have "for years and years and years" and not getting better. — *Ralph F. Lincoln, W7HEE; Walter Milewski, W7ODQ; Kirkland, WA.*

• In two years I do not recall even one instance of delivery prior to the sixth of the month; delivery has seldom been as late as that for the current month — 10 March. . . My local Post Office was contacted on 6 March. As of that date the current issue of *QST* had not been received. On 10 March I received a report from the local Post Office that the magazine had that date been received; my copy was delivered the same day. . . I have no doubt that delay in delivery of *QST* magazines, addressed to Poway subscribers, occurs at some point or points between the place of mailing and this community. — *Rex Jule, WA6-QAY, Poway CA.*

• Publications leaving Concord [New Hampshire] for the west coast would be handled as follows:

To Los Angeles

In a piggyback trailer for St. Louis via Boston & Maine, Delaware & Hudson, Erie, and Norfolk & Western RRs. Trailer leaving Concord Monday would arrive St. Louis Thursday. Mail is transferred there to a Los Angeles piggyback trailer leaving Friday via the Cotton Belt and Southern Pacific arriving Los Angeles Sunday.

To San Francisco

In a star route trailer to Boston P.O. Truck Terminal where it is loaded into a piggyback trailer for Omaha leaving Tuesday via Penn Central and Rock Island RRs. At Omaha mail is transferred to a San Francisco piggyback trailer leaving Thursday via Union Pacific and Southern Pacific arriving San Francisco Friday. — *A. A. Straut, Director, Logistics Division, Post Office Dept., Boston MA.*

[EDITOR'S NOTE: This is the letter, mentioned in last month's editorial, which took four days to travel the 75 miles to Concord, N.H.]

• . . . for the benefit of all League members I request they be informed *QST* is not given second class preferential treatment as *Life*, *Look*, *Time*, etc. and the large ones such as *Reader's Digest* and *Playboy*. Since *QST* arrives at each post office in small quantities (approximately 200 for Memphis) it is worked along with junk mail circulars when the distribution clerk has all the preferential

publications dispatched and if any time is left on his tour. These facts were ascertained after many calls and inquiries and has been a result of many years of frustration over the fact amateurs in east Tennessee and other states west of here received their copy before ours was delivered. Many amateurs have been wondering who was at fault for the inconsistencies of *QST* arrivals and now at long last I have determined the reasons. — *Dave Goggio, W4OGG, Memphis TN.*

• On March 9 I contacted the local postmaster concerning failure to receive the March issue of *QST*. He said his problem was lack of personnel to handle the flood of non-first-class mail, and that as a practical matter the monthly magazines are lumped together with all of the "junk" mail ("occupant," etc.) and are at the bottom of the totem pole as far as delivery is concerned. . . On March 11, I received the issue. I spoke again with the postmaster, who admitted that the magazine had been lying around the post office undelivered on account of lack of personnel. — [Name withheld].

• May I make a suggestion? Try putting "Season's Greetings" on the November issue, 1970. — *Charles R. Westrich, Jr., Canton OH.*

## UDE HOAX

• At least one of the reports of long-delayed echoes listed in Table 1 ("A Long-Delayed Echo" in February *QST*) is known to me as a hoax, and after this "joke" was perpetrated, it was well publicized in the area. Evidently the operator of the station supposedly hearing echoes of his own transmission was never let in on the true source.

I am inclined to think that delays of several seconds, allowing for transmissions of several words or complete call-ups or sign-offs, are hoaxes. Where the original transmission has a repeat overlap, there is little chance for a hoax — unless the hoaxter has an uncanny facility to guess what is coming. — *Eugene A. Hubbell, W7DI, Scottsdale AZ.*

• . . . W7DI has given me the name of the man hoaxed; I have reread the file, and believe it or not, the fact of the individual's having been hoaxed stands out loud and clear, although it escaped me completely at the time the Table was prepared.

I hope you will publish W7DI's letter, since it may well have the effect of stimulating others to report similar hoaxes which are known. Such reports couldn't be more valuable to our study; in this way not only is the total "signal" enhanced by removal of "noise," but also our ability to recognize this type of "noise" in the future is improved. — *Oswald G. Villard, Jr., W6QYT, Stanford Electronics Labs., Stanford CA.*

## THE NEW LOOK

• Your March issue just to hand and the "new look" is very good. I have no complaints as long as the computer does not hiccup and make the kind

of errors our local newspapers are prone to do, hi!  
- *S. J. Comach, VE3EU, Ottawa, Ont.*

[EDITOR'S NOTE: 'Fraid we did hiccup a couple of times in the April issue as we learn the ropes.]

●

and the UVE  
the UVE  
and the UVE  
the UVE

- "Matt" Oreskovich, WN2JIF, Buffalo NY.

● I like the clean style and easy reading of the type face you are using in *QST*. *Theodore M. Hannah, K3CUI, Silver Spring MD.*

● Are my eyes going bad or is the print smaller in *QST*? It seems that I'm having a bit of trouble reading it. - *Anthony J. Sivo, W2FJ, Bordentown NJ.*

● Congratulations on the new style of type in *QST*. It is much easier to read, particularly the "How's DX" column. [*Name withheld.*]

[EDITOR'S NOTE: Gulp! "How's" is the one department we haven't changed yet!]

● The body matter type is easier on the eyes than used formerly although I note some pages are still in the type formerly used throughout.

Using 8-point News Gothic (lead) on your captions (page 53, for example) is an unwise move. It is much more readable to use 8-point Futura medium type as you have, for example, on page 45.

These comments come to you from a printer who retired in 1969 after 46 years in the trade. - *Herbert G. Clark, K1CBV, Cromwell CT.*

[EDITOR'S NOTE: Agree. Hope you find current captions an improvement.]

### AUSTRALIS-OSCAR 5

● Many thanks to Amsat for providing me, through W1AW, with excellent A-O5 orbit predictions. It would not have been possible for me to track the satellite so easily without this information. - *John Reno, W1VTU, Waterbury CT.*

● The W1AW running account prior to and during the launch of Oscar 5 was a tremendous feat! Let me thank ARRL for all the services rendered in connection with A-O5. I have found the additional transmissions very useful, especially the 1900 GMT transmission, and of course the cw bulletins. - *Joseph Zelle, W8FAZ, Cleveland OH.*

### K7UGA QSO

● I was fortunate to obtain the ARRL film, "The Ham's Wide World," for showing to the boys at the Phelps School in Malvern, Pa., where I teach chemistry. In order to increase the boys' interest, I made arrangements with Senator Goldwater to have a sked on the air. It was a tremendous success. It kept most of our students sitting on the edges of their seats, as well as many of our faculty members.

Sincere appreciation to all those amateurs who were listening but who never once tried to break in to the QSO or interfere with the event. Barry was operating from W3USS in the Senate Building in Washington. Two of our students - Marv, WN8-GAY, and Gordon, WN3OFS - had just received their licenses and were on the air for their first QSOs. - *Bill Melcher, WA3AFI, Malvern PA.*

### MISCELLANY

● My receiver is not the best as far as dial accuracy is concerned, but I never have a problem finding W1AW for code practice. It is the spot on the dial where all the lids tune up, test, call CQ and carry on QSOs. Funny thing, though - after W1AW shuts down, the crud suddenly ceases too. - *J. M. Hinzay, K2RST, Vestal NY.*

[EDITOR'S NOTE: Such wise guys think they're harming ARRL by such tactics, when in reality they're only doing a disservice to fellow hams.]

● Congratulations on the series, "Let's Talk Transistors." The subject is handled in depth - starts from the most elementary and brings the reader along slowly but surely until complete comprehension is attained. You should have a series like this in operation at all times. It makes *QST* a meaningful publication to one who has no interest in construction. - *Stanley Schaffer, WB2QQX, Scarsdale NY.*

● While browsing through some 1932 and 1933 copies of *QST* I was amused to note the similarity in letters pertaining to new regulations in the offing to those now being written in connection with incentive licensing. What a hardship the change to crystal control would entail on many of the hams; no more "loop modulation," etc. But it all helped, as we now can see. - *Al Cutting, W7JYY, Moscow ID.*

● Is it possible to call a six month moratorium on all letters from us amateurs and other wordy persons about incentive licensing? I am damn sick of seeing letters on this subject and think a period of absence of such communications would be welcome to most of us. I celebrate my 50th year this next month and am just thankful the League has been in existence all these years. If it hadn't been, I'm sure I wouldn't be either. - *Charles E. Gardiner, W2TB, Bayside NY.*

● There is a new division of the 75-meter phone band in these parts as follows:

- 3800-3825 - Green Acres
- 3825-3900 - Geritol Acres
- 3900-4000 - Belly Acres

If the complainers would spend one-half the amount of complaining time on some study they could all be Advanced or Extras. - *Paul D. Carusel, W0PQW, Detroit Lakes, MN.*

● Just a few words of praise for that truly great book, the new 1970 *Handbook*. Its authors and editors have outdone themselves; they have provided a book that is practical and informative, yet really interesting also. . . Perhaps my increased ability in electronics (as stimulated by incentive licensing) has merely opened my eyes to this standard of quality which existed all along. - *Joe Malloy, WB2RBA, Binghamton NY.*

● Sometimes it is easy to get the idea that the opposition is large because of all the noise a few big mouths can make. I suppose in time the griping and complaining will subside. But that faction seems to be having a good time mouthing off here and there on the ham bands, showing everyone how lazy they are. If they had it their way, the ham bands would become just another citizen's band and in time cease to exist. They don't realize that we need a strong organization, influential in the right places, with members that at least give the impression of having some technical knowledge. *Marty Trout, K3UBS, Ridley Park PA.*

# Christmas City U.S.A.


BY NORM ZOLTACK, #WA3FGS

**C**O CQ, de WX3MAS, Christmas City U.S. calling."

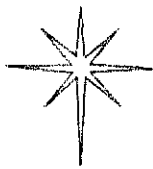
"QRZ the station calling CQ, — was that WX3MAS? . . . Did I hear right, WX3? . . . What is your country OM? . . . I never heard a WX3 before! . . . Are they up to WX3 in that call area already? .

These are some of the comments received at WX3MAS, a special station set up by the Delaware-Lehigh Amateur Radio Club, W3OK. In December 1968, W9FG asked for my QSL postmarked December 25th from the Christmas City — Bethlehem, Pa. A thought: maybe our club could get a special call for Christmas, 1969. Besides, we needed something to spark club interest — and all of a sudden the clubhouse was a beehive of activity with antenna projects, QSL cards, and committee meetings. After a few false starts, FCC issued the special call WX3MAS for the last two weeks of December.

On December 15th at 12:01 the first call was tapped out on cw. From then until the last QSO at 11:58 on January 1, 20 members logged 7,186 QSOs in all 50 states and 102 countries around the world. They also logged lots of sore throats, tired fists, tired ops, and plenty of fun. Not too bad a performance, either, considering lost time on account of the heavy ice storm which made the clubhouse inaccessible and tore down the antennas. Along with that went Christmas shopping, tree decorating, and playing Santa for the family.

It's all over now but the QSLing. (QSLs should be sent to WX3MAS, 1719 Callone Ave., Bethlehem, PA 18017.) Needless to say, we think our operation was a tremendous success mostly due to the issuing the special call, Bethlehem Chamber of Commerce, W1AW bulletin announcing the operation, and, of course, all the gang that called us during the fifteen days of operation. Are we going to do it next year? Just QRX! — WA3FGS. 

+2048 11th St., Bethlehem, Pa. 18017.



Seasons Greetings

Bethlehem, Pennsylvania

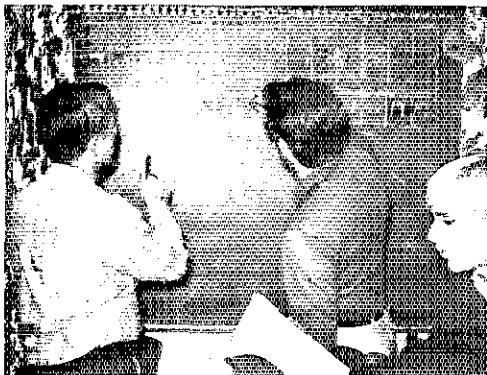
Christmas City, U.S.A.

WX3MAS

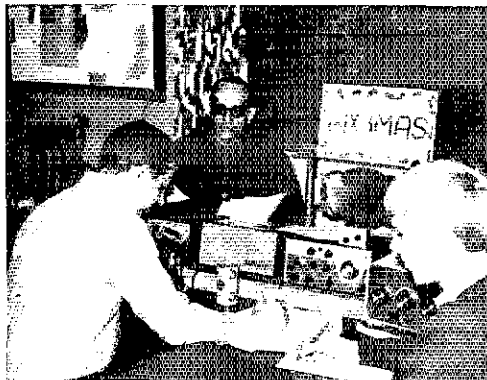
The Delaware-Lehigh Amateur Radio Club, Inc. W3OK

IN RESPONSE TO MANY REQUESTS THE DEARC AND THE CHAMBER OF COMMERCE HAVE WORKED TOGETHER TO ISSUE THIS SPECIAL QSL AND ALSO TO EXTEND OUR GREETINGS FROM BETHLEHEM. THE CLUB STATION, W3OK WAS USED FOR THIS EVENT AND OPERATED BY MEMBERS OF THE DEARC.

Did you get yours?



WX3MAS Committee completing the scoreboard on our final night. From left: WA3FGS, WA3CXM, WA3GUL.



Left to right: WA3FGS, K3MAZ, WA3GUI operating the club station.



Norm, Rich, Al and Bob starting in on mail for one day!



CONDUCTED BY ROD NEWKIRK,\* W9BRD

**Whew!**

*I beheld the wretch — the miserable monster whom I had created.*

— FRANKENSTEIN

Our 19th annual May meeting of the DX Hog-gery & Poetry Depreciation Society commenced in the customary unruly fashion. Too much Old Haywire, too many rafter-rumbling bars of our *Wouff Hong Song* and — what was that strange background murmur, the beeping, the clickings, the whirrings and hummings? Anyway, chairman Noyes E. Tester at last gaveled the throng to order or a semblance thereof. Hugh R. deBraekers opened the detestable program with

Says fumblefist Spaceless O'Key  
Who sends like a kook on a spree,  
"Sure, I sound like a lid  
Or a drunk in a skid,  
But it's really my keyer, not me."

Those strange noises became strouger and more distinct, like the beeping of staccato sequence signals, the clickety-clack of 800-w.p.m. readouts and the whir of magnetic storage disks. Nevertheless Alvis Yappen next contributed

Splashy-voiced Boomboom MacSwine,  
When told that his gain's out of line,  
Is prompt to reply,  
"If '8' is too high  
Then why is it numbered to '9'?"

The audience grew apprehensive, noting an increased tempo in the mysterious vibrations and, flashing through the dim reaches of Long Hall, the multicolored lightnings of overload indicators. Undaunted, Vada Nofflesig offered

Said big gun McSlaughter von Klout  
When sampling the QRP route,  
"I'll knock it down lots,  
Down to 900 watts. . . .  
Amazing — I'm still getting out!"

In a twinkling we were horrified to see a burly chromed computer take over the rostrum as

\*7862-B West Lawrence Ave., Chicago, Ill. 60656.

meeting chairman, dispatching Tester in a puff of purple smoke. And our friendly sergeants-at-arms were suddenly replaced by muscular computer terminals trailing thick gray snakelike cables. These terrifying machines, growing in number as we watched, slithered and poked about on huge transceiverlike feet. Otto Sign-right fearfully yelped

That one-time DX buff A. Shmear  
Disported the messiest gear.  
He grabbed his B-plus  
And made no more fuss —  
(Any last line will do here.)

Awakened to our danger we all seized axes and hatchets (brought for the postbusiness portion of the meeting) to battle the invaders. Massive ejections of poisonous programming tapes engulfed us as we frantically hacked away. Failing even to dent their armor we were brutalized by laser readout beams, magnetotoxic matrices and radio-active semiconductor chips.

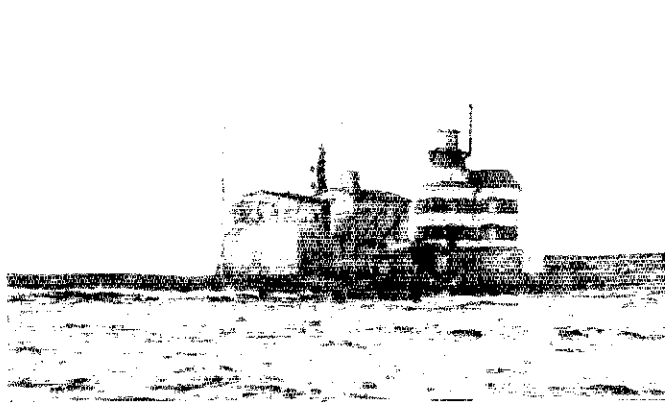
The thing that miraculously saved us, finally, was one of those inexplicable blackouts that abruptly blanketed the region in merciful blackness. Providence, perhaps — they say a housewife triggered it by turning on an extra air conditioner in rural Vermont. By the time power was restored we had smashed our tormentors to harmless smithereens. But *next* time. . . .

**What:**

That early March ionospheric flopperoo was a rousing dilly, eh? You missed it? Don't feel bad, more coming up. Vut enthusiasts had an auroral ball, though, in keeping with radio's traditional it's-an-ill-wind syndrome. All hf bands suffered a severe shakeout but recovered rapidly. This month we'll roll your "How's" Bandwagon down the 28-MHz. trail. Ten's been doing tremendous DX business and we'll hate to see it start sagging. In the DX bird-watchers' gazette to follow "H85ABD (46) 2" means that H85ABD was noted active near 28,046 kHz at 0200 or so Greenwich Mean Time. Giddap, Pegasus. . . .

**IO** CW first off, reported by Ws 1D7Y 3HNK 3JZJ/5 4YOK 8YGR, Ks 3CUI 4TWJ 5MHG/6, WAs 1FHU 1JKZ 2BCT 2BHJ 2YWR 3GVP 9SQY 6PXT, WBs 2DZZ 4EPJ 4KZG and old faithful 11ER (via W3-ASK) plus the clubs press: CEs 3ZK 15, 8AA (24) 17-18,

Market reef, Baltic sea playground of OJOs MR MI and future DXpeditions by Finnish DXers, is your "How's" QTH of the Month. Landings can be treacherous but the islet's lighthouse offers comfortable hamming quarters.



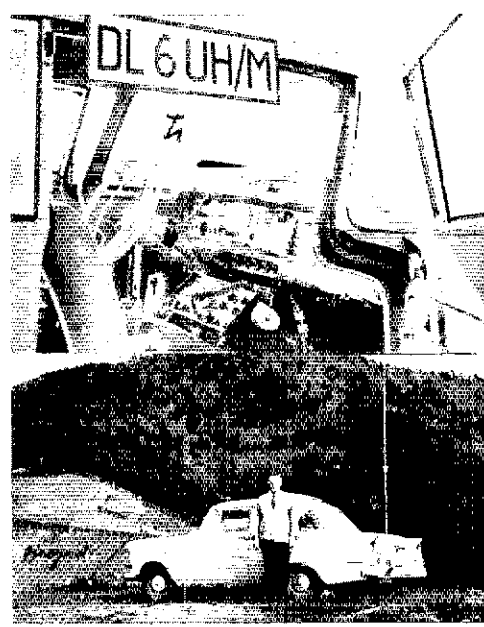


TA's HY (standing) and IB, shown in the latter's station, staunchly help represent Turkey on DX bands. More TA nationals would join the fun, they say, if radio equipment and components were more available over there. (Photo via W5QPK)

CNSDW (33) 15, GRs 4BB (49) 17-18, 6AL (30) 15, 6AL (43) 15-16, 6BX (30) 17-18, 6EL (61) 16, 6GO (22) 18, 6IK (60) 17-18, 6LK 7BY (49) 12, 7IZ (25) 13, 7PC (49) 13-14, CPTs LWY (45) 17, 2AO (56) 15, 3AS (32) 15, GXs 24J 4CO 16-17, 7AP (66) 15, dozens of DL-DK-DLs, DM2s AFO (24) 17, BOG (60) 16, DJU (63) 17, EAs 2UX 6BD (51) 15, SFH (50) 10, 8FO (97) 16, 8FU (41) 17, EL2s BC 15, BZ (12) 13, CB (26) 12-13, EFBUSA 21-23, Fz 3AT 3KW 3YP 5FZ 6AAV 8WK 9LT 9YZ, FBKX (37) 14, FLBSR, FM7s WD (45) 17-18, WH (60) 18, forty GAs, GCs 2PMY (30) 16, 2LU (72) 13, 31BW 16, 5AET (34) 19, GD3AIM (6) 15, GIBs AX1 (50) 13, HGV 12 13, IVJ (43) 15, GM3s HXF (65) 15, LWS (3) 19PT 12 13, 1VJ (43) 15, GM3s HXF (65) 15, LWS (3) 19PT (92) 16, GW3s NJV (29) 14, 4KNV (21) 14, 5AX (67) 13, 2RB (19) 17, 3MB (21) 14, 4KX (21) 14, 5AX (67) 13, 5HI (39) 14, 5KXZ (11), HBs 2KRP (62) 15, 9NL 6NL (23) 15, HC2G/T (36) 17, HCs 2KRP (62) 15, 4KNV (21) 14, 4VP (62) 17, 5KA (45) 15, HKUT (7) 21, HL9VQ 2, HPs (and HOs) HLE (20) 13, LXHG (27) 22, HSABD (46) 2, Hs ADW (30) LLL AYP, ISLs AWB (67) 16, KCV (110) 14, ATW (30) 15, VLA (50) 14, FTIs AGA 13, FRN (87) 15, G8A (20) 14, P1T (45) 16, JAs 1DIO HCG 1KZP 1LZR 1R1 1UWV 1WVY 1WZY 2B1P 2C1D1 2NMF 3ALN 31XD 3JYX 3KAL 3MIX 30EA 3YAT 4B4W 73 6GNI 6TQ 7BOB 7BC 7RF 7YFA 8ARA 8PFL all 21-24, JHIs BAY ERG GNL GYZ VAE WIX, KA2RH, KC6CT 2, KJ4DS 20, KHbs COB (30) 19, HR RM 19, 8P (68) 18, KJ6CD (80) 21, KL7PA 12, KX6HC (52) 22, KZ5s 11 (21) 16, KN 20, LAs 2YE (25) 14, 4MM (31) 17, 4ZL (20) 16, 8CE (20) 15, LG51G (82) 13, LUs (DGN 3EX 4CCO 7EX, LX1CF (42) 16, LZZs DC (18) 14, P1 (25) 14, MP4BHM 8-9, OAs ED 13-14, KE (24) 21-22, PE (38) 15, OD5s 8J (27) 12, LX (19) 12-13, OPs 3HJ (25) 13, 5PWL (20) 17, 6PX 13-14, 5RI (58) 13, 5XPL (18) 18, 6BD (20) 16, 6Hs 1FT 14, 2BMH 13, 3AZ (25) 14, 3YI (20) 12, 4RH 14, OKs 1GT 1HQ 1PR 1TA 1US 2KS 20G all 14-18, ONs 4EG 5GK 5KD 5TW, OX3s LP (4) 14-15, WQ 19, OY9LV (63) 15, OZs 4H 5CV 7K 7FP 7ON 7UD, PAs KOR SNG WAC, P12s HT (20) 22, VD 20, PYs 1HQ 1MCG 2RHJ 2DRH 2SO 5ANN 6FI, PZ1DD (49) 16, SK9FM, SMs 2RI 4M1 5CPC 5EXE 5HG 7ANA 7EHL, SPs (and 2Zs) 2ABO 3ALL 3RHG 3SDI 6ASD 8ARY 8CFZ 9BQX 9DOV, SUIIM (30) 10, SVs 1AE 14, 1CH (23) 13-14, 9WNN (110) 16, 9WOO (30) 14, TA2E (26) 13-16, TFs 2WKF 17, 2VLW (47) 14, 3SE (30) 15, TG4SR (42) 16, T12DL (103) 23, TJIAJ (86) 15-19, UAs 1B (19) 12, 2BC (11) 14, 2KAB 11, 3GI (66) 14, 3KFA 15, 3JQM 13-14, 3OK (61) 13, 6KMY 13, 6KXC (8) 16, 9CP (8) 13, 9KIL (11) 12, 9KWR (8) 15, 9RH (26) 0, 9W (29) 23, 9KFP (10) 0, UB5s APK (33) 16, WE (45) 14, UC2s AZ (15) 13, 1J (48) 13, WP (41) 14, UD6CA (44) 13, UF6s BO 12, CQ (26) 16, 1Z (42) 12-14, UH8s AB (59) 12-13, AWS (95) 15, UH8s ADB (93) 13, BA (18) 13, BI (19) 13-14, KRA (10) 10, UKs 2BAB 17, 9ABA 15, U17s 6J (96) 12, LB (44) 10, OA (17) 13-14, OE (19) 14, UM8s ABB (20) 12, ARE (96) 13, UN1BR (49) 13, UO5AP (7) 14, UP2s ER KBC 14, OJ 12, OQ (30) 14, PX (25) 14, PY (108) 15, UO2s KAK (46) 13, P1 (35) 14, UR2s AO (48) 13, IO (81) 13, QD (20) 18, UP5s DL 12, SY (67) 15, YB (45) 19, UVs XDL (17) 13, 3EJ 13, 3FO 14, 9CQ (34) 14, UWs 3EY (30) 15, 61R (1) 14, 9WB (38) 13-14, 6FZ (24) 22-23, 6LE 9, VKs (and ANs) 2ABN 2AP 2BO 2VN 3VG 3XB 4MY 5DS 7GK 9CK (42) 23-0, VPs 2GLE (45) 19-20, 2GTL (46) 18-19, 2KR 2MK (38)

17-18, 2AIT (24) 16, 2MU (12) 13, 2VJ (26) 18, 2VI (44) 15, 3KR (19) 18-21, VO9B (42) 16, VR2DK (26) 23, VSs 6AF (25) 12, 9MB (22) 12, 9MD (45) 17, VU2s EF (40) 15, OIK (14) 18, XW8BP, YN1AA (27) 17, YO2s 2BS (12) 15, 3RP (47) 15, 6AJF (58) 16, 7VF (50) 13, 7VJ 12, YUs INOL (18) 15, IYK (32) 15, 2QZ (28) 15, 3P2 13, 3KJ (30) 16, 4EJC (51) 15, ZB2s BO (31) 16, BS (25) 17, ZC4s AK 14, BX (15) 12-13, CB (25) 15, ZDs 5M (55) 15, 5X (33) 14-15, 80B (66) 21-22, ZF6s CAS (50) 16, 1RA (35) 13, 1B3 (24) 10, 1DD 14, 1DE (54) 16, 1DL (45) 15, 3JX (45) 15, 3JO (35) 16, 6LE (80) 17, ZLs (and ZMs) 1AAT/K (47) 22, 1AFV 1AII 1AIZ 1AJU 1HY 1H8 2GH 3AB 3GQ 3LE, ZP9AC (36) 22, ZS\* IAC 1HJ 3AW 3C (24) 20, 4M1 5LB 5NF 6BK 6A 6J 6K all 14-16, 3V8AC (31) 15, 4U1TU (8) 13, 4X4s 6U (77) 14, MR (49) 16, VB (96) 14, VL (5) 15, 5H3KJ (30) 15, 5T5BG (17, 5Z4R KI (7) 10, 1W (22) 13, 88 (47) 19, 6W8X (44) 17-18, 7X9AP (50) 14, 8P2B (30) 9, 8RIJ (49) 13, 9H1s AT 11, AZ (26) 13, 9J2G (1) PV (22) 9-10, HC (31) 18, WR (61) 19, WS (37) 12, XZ (46) 15, 9LIs HQ (50) 13-16, RP (67) 17, 9Q5YF (35) 19 and 9V1PA 9.

**10** phone is just as peppy, judging from the correspondence of Ws DLAL 3L1NK 1YR 6YRA 8YGR 9NTQ, KTFWJ, WAS 1RHU 1MOR 2HCT 2BHU 2FOS 3AVP 4ZZU 6EOW 9SQY, WBS 2DRR 2DZZ 1KZJ 9AVY and club literatures A2\* CAD (54) 17-18, CAQ (66) 18-19, AP2ME (62) 8, GEs 3FV 3RR (563) 14, 3UM 4M1 5PC (60) 23, 7DW (47) 17, 8BJ (59) 14, 6A1 (41) 0, GN8s HA (798) 22, HU (598) 20, CPTs GN 1W, GRs 4BB (565) 17, 4BC (555) 17, 6AL (512) 14-15, 6BF 6VA (590) 21, 6C1 15, 6C10 16, 6LA 6LV 6RY (557) 18, 7IC 7BO (549) 20, 7FC (520) 16, 7IC (533) 17, 717 (54) 18, GTs 1BH 1WV 1TV 17, 11U 2AW (63) 18, GXs CI CR (570) 22, two dozen 1J-DK-DLs, DUIFH (560) 24, EAs 4LK 6BJ (587) 16-17, 808 (595) 10, 8HA (532) 11, 9AG (534) 16, 1P2SW (580) 11, ETREL (667) 16, Fz 2H 3FC 5KS 5LV 7P1 9IL, FG7s TI XA, FPCY (510) 19, FNRA, FL8MB (630) 12-13, FR7Z (600) 14, GD3GHEI, GM3BCD (682) 16, GWS 3DZJ 3NNE 3NWY 3X1D 5DX, twenty GAs, HAs 3AB (550) 15, 5DU, HB0s 6T WU (574) 14, HCs 1FF 16, 1UT 18, 2HM (582) 16, 2IF (350) 14, HGs 2RD 80P, HSBVY (730) 15, HEs 3WO 4DF (650) 16, 8RXK (565) 19, HL9HU (555) 9-11, HM1BR, HPIs (and HOs) LXU (557) 17, JC (600) 14, 1Y XHG (615) 14-16, XWS, HRs 1EMM 1FL 1JZ (KAs 2RHF (603) 20-21, H8s LABO 11, 1AMP (660) 11, 1CB (10, 5ABD (610) 15, 5ABO (624) 8, HV38J (590) 14, 1H AA ARI BAF KRP LD MTT VGG, ISUFO (615) 18, LPLCO (630) 15, JAs 1BPO 1BRX 3 IUG 1CMI 1D3J, UDX 1FJR 1HR 1LBR 1LZR INDO INMM 1OYT



DL6UH/M has worked nearly 200 countries and all United States but Utah with this mobile outfit. Erich is particularly proud of a homespun remotely-tuned antenna coupler (resonated by simply whistling into the mike) that keeps his whip's efficiency high enough for QSOs with every continent on 80 meters. (Photos via WA4QQO)

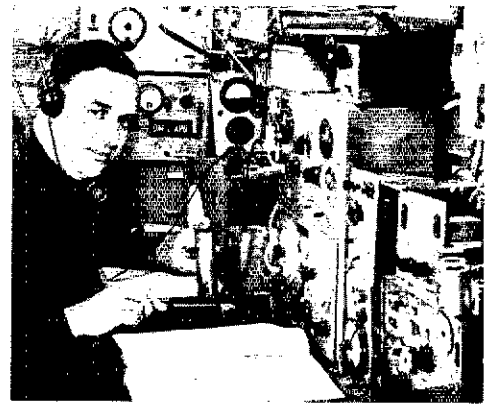


1PGY 1PLB 1RYA 1WSA 1WVK 1WVN 2AYM 2CLI  
 2IRQ 2NNQ 3DLE 3FHV 3IAE 3KQE 3LKC 3LXU 3LZ  
 3MCC 3NFA 3QDD 3USA 3UVZ 3CBP 3ERX 40PC  
 4RBL 4HBC 6CZV 6C8Y 6YCU 7BBS 7B8V 7C9C  
 7C1W 7COK 7DDH 7GDU 7GZA 7YT 8A1Z 8BLR  
 8BAK 8CKC 8CX 8CZN 8DYN 8DWW 8EAF 8EL  
 8EVL 8FNK 8FUC 8YD 9J1 9CJF 9DCM, 9H1S AJT  
 BSE CON DBU DPT EHP FLG GJF GNU JBG QPT  
 SJO UAH W8K, JW's 1G1 (588) 9, 7WH (552) 15, KA2s  
 HN NY, KC4s 1HM (515) 22, USP (545) 21, KGs 4DS  
 21, 6AA Y 11, 6AQY, KH6s GMIP (520) 21, IJ (532) 19,  
 RS (640) 19, KJ6BZ, KL7s DTH (539) 9, GJM GPV  
 (550), JDO, KP4s ASL 16, BBN (600) 18, CQB (560) 17,  
 DCR (555) 17, DHH 17, KR6s AQ 13, DZ HS 11, KI  
 (550) 23, NR Vx TAB (560) 9, KV4s AD (645) 19, FZ 18,  
 KW6DT, KX6s DC HC (650) 22, VF, KZ5s AM 14, AT  
 (550) 23, KZ NG, LAs 1ZI (95) 16, 6AD (620) 15, LUs  
 1DAB 2FAO 2FN 3D1V 3GDX 3P8S 4OLP 4DM 5DBS  
 6DRG 7FAG 8FDO 9DAC, LXs 1BB (558) 9, 1BW (576)  
 16, 1CG (512), 9LS (55U) 14, MP4s BBA (640) 10-11,  
 RFO (500) 14, OAs 4CR 4ZP 13, 6BW 6BY (715) 21,  
 ODSs BZ 14, EP (540) 14, FB (95) 14, OE5s PRL RJ  
 (611) 17, VG, OHs (and OH-DIG) 1VA 1VR 2BBR 2BH  
 2BM 2NAL 3KN 3VV 5OZ 6SM 5VY 5WF 6NI (559) 16-17,  
 OKs 1HM 2H8N (580) 15, 3UN, 3NOs 4FI 4HA 4OR 4UN  
 5GL, OY6NRA (546) 18, OZs 3WO (550) 15, 5GT (655)  
 16, PA6s HBO MDG PWO SFR UC, PJs 1AA 2CC (538)  
 23, 2HR (680) 16, 2PS (640), 7IC 9CL (530), 9CF 15,  
 PYS 1DAQ 2AGM 2PV 8ES, Russian RAs 1AET (583) 14,  
 3AAJ (455) 13, 3AVV 9CBC 9CBW (587) 11-12, SK6s  
 AC AJ CC 17, SMs 2BJQ (570) 15, 5BGE (610) 16, 6AEK  
 6E2B 7DKL 1 8BYG 8MC, SP7HX, SU1MA (598) 12,  
 TFs 2WLW 3HS (660) 16, TJAU (563) 13, TR8MC (585)  
 17, TY6AT6 (520) 20, UAs 1WA (720) 14, 2KAW (517)  
 16, 3AVV (652) 16, 3KBO 3OG 4LT 6BP 6ABV (575) 51,  
 UB5s AJG AQ BLB/m (765) 15, KIW, UC7J, UD6AFQ  
 (500) 13, UH8AAW (800) 14, UH8AR, UKs 2RAB 11,  
 5KAD (745) 14, 8AJ (523) 13, UO5WAD 11, UP2s ER  
 1V (590) 15, PG TAK (761) 13, UO2s AO ARO HM (770)  
 35, UR2s A 9, R1 (756) 14-15, KBB (720) 14, UF8s AM  
 (610) 13, CV (540) 14, KTH, UV8s CP 1M AAC (740) 14,  
 UWs 1BJ (760) 13, 3UG 9JZ, UV5H, VE8s G1 YAI,  
 VKs 1G1 (520) 0-1, 2APK 2AYT 2AXB 2BSW 2FU 2OK  
 2VC 3MJ 3OB 3QV 3XB 4DA 4RO 4VX 5NW 6JK 6NM  
 6RU 8KK 9EB (600) 12, 9LB (650) 0, 9RY (575) 10-11,  
 V8s 2AC 2AL 2LAN 2GL (684) 20, 2G1H 2KR 2LX  
 (510) 12, 2MW (540) 20, 2M1Y (595) 20, 2V1 (620) 19-20,  
 2V3 (598) 14, 8HZ (573) 18, 8K1 (550) 15, 8KL (530) 18,  
 VO8s CV (560) 16, CW (545) 13, VR1s L O, VS6s AA 9-10,  
 AL DR (580) 0, VU2s DK (625) 16, OLK (800) 15, XEs  
 1G1W 1J 1UX 1W8 2IH (593) 20, XT2AA (680) 14,  
 XW8s AG (619) 19, RP, YAs 1GNT (800) 14, 1HG (503) 13,  
 8C1PRC (535) 13, YNs (and HTs) 1H8M (600) 14, 2JN  
 2J5, YOs 2BB 2DS 4AKA (700) 15, 9V1 (630) 16, YS1XFE  
 (600), YUs (and YTs) 1AG 1BD (681) 2RBO 3EY  
 (600) 18, 3OV (640) 15, YVs 1GN (605) 15, 3AC (400)  
 16-17, 5AGM 5CDK, ZC4AK (530) 13, ZDs 3K 5B (580)  
 18, 6R (613) 16-19, ZEs 1BP 1CS (515) 19-20, 1CY 2JA  
 3U 4JS 8Y (550) 20, ZF1s IF (576) 15, GC (547) 21,  
 ZIs (and ZMs) 1DS 18Z 2AS1 2RM 2RC 3AB 3FO 3IS  
 3LE 3UJ, ZP9AC (585) 18, ZSs 1FH 3C 3L 3S 15-16,  
 3T (621) 18, 3YK (635) 17, 4RM (358) 17, 5PK 5QU 5PL  
 6ACK 6BB 6BD 6BLR 6BU 6HR 6OY, 3Y8AL (620) 11,  
 487PB (568) 11, 4U1UP1 (640) 17, 4X4X (585) 14,  
 4Z7BC (620) 13, 5H3s KJ (593) 8, LV (500) 20, 5N2s ABC  
 (750) 16, ABU (670) 22-23, 5R8AS (650) 15-16, 5T5AD  
 (550) 17, 5UTAI (640) 12, 5Z4s LS (575) 20, LW, 6W8s B4  
 18, DY (590) 12, 6Y5s AH (340) 23, DW, 7P8AB (550) 19,  
 7Q7s CZ (550), JG (585) 17, 8QAYL (597) 12, 8RIU (510)  
 20, 9H1s BL 8, DX 16, 9J2s DT (495) 13, RQ (555) 18,  
 XZ (530) 18, 9LIRP (600), 9N1RA (562) 8, 9Q5s B8  
 (600) 19, GV (600) 8, 9V1s PB PL, 9Y4s AA (589) 17 and  
 VT. The 28-MHz voice bag appears to be running roughly  
 20 per cent carrier a-m, most of this activity in the 28,700-  
 kHz region or below the Yank subband edge.

\* \* \*

**HEREABOUTS** — Five-Band DX Century Club membership is now the objective of YVs 1A and QQ, popular QM-NYL DX duo down San Mateo way. Nick and Mary, both 200-count types, led WICW that Caribbean-Southeast Asia paths are toughest. "Finally found my way back home to North Syracuse after eleven years of wandering and a four-year Air Force hitch," writes WB4EPJ/2. Dave, a 10-cw specialist, signed KL7FIR and W4HUR/3W8/XV5/HS while roaming. W2ADP forwaris a newslip about BCNU, a promising cancer-researching drug. Ed's having some QRP fun while giving his final a going-over. WA1PHU had to call for neighborhood reinforcements to help keep his outboard vertical aloft during winter gales. This paid off for Luci with 500-plus 5B-DXCC QSOs and now he's an ardent mailwatcher (although at this writing there isn't much mail to watch). "With my location I fear 5B-DXCC is far away," regrets W6EAY. No wonder Eric contemplates acquiring a ten-acre plot in Ventura county, a few hundred pounds of copper and some telephone poles. Those "easy" European counties are rough on 80 and 40 from Sixland. VERIG says HC8GS is

frequently found working his own DX near 14,130 kHz when not beehing W/KVEs around 14,220 or 14,300 kHz. Noting that computers now are called upon to supply astrological analyses, WA1JJC wonders when the inexact science of DX preparation will be similarly horoscoped. K2KIR exhorts the readership to come up with more "Where" and "Whence" data, less of the "What" variety, and K5MAT would like to see somebody push for a DX contest in which W/K participants could work only DXCC countries they need. W6RCG collected title as Northern California DX Club's DXer of the Year. OK1s AGQ NR and 9VINR qualified for NCDXC's California Award, Nos. 160, 161 and 162. In the club's monthly DXer W6B1VN expresses concern over the strengthening trend toward multioperated contest stations and the consequent drying up of individual efforts. How do you see it?



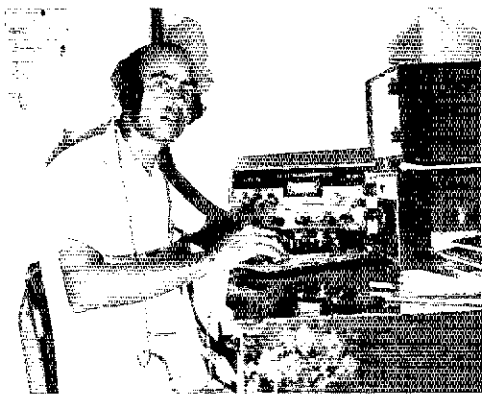
DM2APG collects DX on 10 through 80 meters with a homemade 50-wattter. Martin is a popular author of technical books for youthful East German readers.

**Whence:**

**EUROPE** — The DX world's eyes and beams now point toward Albania where DL7FT and colleagues make their annual effort to activate one of the game's most elusive DXCC targets. Collectors can suit away GB3BS, exhibition station at the big Bedfordshire Boy Scout Rally on the 10th of this month, by watching 14,025, 14,325, 21,025, 21,325, 28,025 and 29,525 kHz after 0900 GMT. W6BW/PL made QSOs on six bands from Bavaria. "My unusual call created pile-ups on 40 and 80. The experience of working from the other side was quite enlightening." Carl particularly enjoyed eyeballing with DL7BA and friends. "I'm a Southern Baptist missionary and have served here since 1963," records H89AOY (W6QNK). "After waiting out implementation of reciprocal licensing I got my Swiss ticket just in time for the AREL DX Test. Though my score will not win honors I'm enjoying the chance to give points to the Stateside gang." DX News-Sheet reports that W2QJH's recent QSO with GM3F8V/w in Kinross finally fulfilled Howy's ambition to work all United Kingdom countries. The GB38X beacon on 28,185 kHz remains a reliable conditions indicator on ten meters.

**OCEANIA** — "Greetings from sunny Karolonga," writes ZK1BK. "I'm very keen to get on the air, but being a family man with a wife and five children I find this impossible at the moment on my own resources." Anyone with unneeded apparatus can reach Norm via the address in "Where". VE3IG hears that ZK1AD, outfitted by KH6-GLU and associates, may be hitting Mamihiki about now with Tokelau in prospect. "I'll be operating from Guam for the next 18 months," announces KG6ASP. Gary displays a Masley tribander and 5MK-11. W6PAN confirms that VK9LB departed Norfolk for California in mid-March. KH6BZE, ARRL's Hawaii 8CM, was recently visited by 95-m.p.h. winds that grabbed part of her's roof and ripped out a six-band antenna farm with it. K4OCE, CR1MW, H1SUU, YV1TA and Z41TZ were continental leaders in Pacific DX Net's January QSO party. K5AA, W6HRV, WA5 7FFS 8Q1Y and K6P2M also scored well from Stateside.

**ASIA** — H81ABO reports Thailanders readily available in the Southeast Asia Net, 14,320 kHz at 1200 GMT. "Do not break in. Wait for 487PB to call the States. Interest is stirring here on 75 meters and H85ABD uses 80 and 160. I run a Galaxy V, 301-1 and triband quad.



FG7TG needs but another state or two to add WAS to DXCC and WAC trophies, Girard prefers cw sport on 15 and 20 but occasionally samples 40's DX skip. (Photo via W5OB)

Heavy power line QRN here but have 65 countries in two months. Don is no stranger to DX pile-ups having previously operated BV1085. . . . "JAs on 15 have been booming into the east coast around sundown," finds WAZBOT. "Some of 'em peak 88-9 on only about 25 watts." W9WCE, now retired and ready for serious DXing after forty years of railroadng, has 310 JAs/11s in his 1969 log. "Never heard such DX conditions as we've had lately, especially on 21 MHz," agrees John. . . . Asian addenda via aforementioned clubs and groups: AC3PT threatens renewed activity with a fresh 20-meter beam. . . . AP2MR still aims for East Pakistan, possibly in October. AP5HQ likewise. . . . SV0W/LJY was a Jordan quickie in February. King Hussein appears to be thoroughly enjoying his sideband activity as JY1APG, mostly near 14,200 kHz around 1300 GMT. . . . OD5BZ and MP4-BHI teamed up for five Qatar kiloQSOs as MP4QBK in February. . . . YD2KY still strives for Lacedaives progress. . . . New or renewed Far East Auxiliary Radio League memberships are held by KAs 21D (K1FDW), 2E6 (K8ORM), 3NA (K06HHN), 3VL (W3QPI), 2ZD (WA0ZZD), 7CW (WA5ZWT), 7GH (W7GH), 7YW (K8YWD), 8RT (K3FOX), 9PP (K4QDC) and 9RC (WA4FLL).

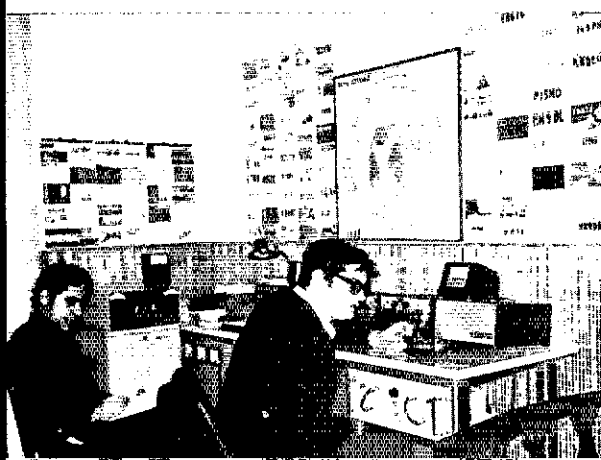
**AFRICA** — ZD8DB (W6JZT) expects to keep Ascension A. comin' on cw and sst, 10 through 80 meters, into July. Dale's 180 watts and rhombic are most active from 1900 to 2300 GMT. Neighbor ZD8CH (K1BUD), formerly VP5CS, prefers multiband cw sport. . . . W7VRO reports 5H3KJ QRT for return to LA6GE, 5H3s KJ's and LV's issued some 1500 DXpeditionary QSOs from Zanzibar's Latham isle in late February. 5H3IV may try it again solo this month. . . . W8SAB understands that OX3FD intends to fire up his HW-16 as a 5N2 this summer. . . . V86AD expresses the Hong Kong gang's sadness at the sudden passing of ex-V86B, 9J2NW, killed with his XYL in a Uganda auto accident in February. Tony made a host of global friends during a DX error that also featured stints as G3PKY, S7E2Z, W9ANW, ZL8 INW, 2N1WW and ZL3CH. . . . West Coast *DX Bulletin* hears that VQ8JDC may resume Chagos region under a different call.

**EUROPE** — "The reason for the new UK prefixes on Russian club calls is the increasing number of U.S.S.R. stations," explains K3CUI. "This will also account for three-letter suffixes signed by nonclub stations on bands below ten meters." Ted refers to the UK5BAB-for-UB5KAB, etc., varieties now being heard. . . . "I'll handle DL5DY's QSLs for U.S. stations only," specifies W9WCE. "Others should apply to Sgt. Jean A. D. Delancy, FR-041367158, 6900 88, Box 15, APO, New York, N. Y., 09101." . . . W3HNK's QSLing for UA1FF and LX1BW begins with QSOs of February, 1970. The latter, by the way, works sst only. . . . "Special QSLs will confirm contacts with G63BS," promises G6WA of Bedford & District A.R.C., concerning a special Boy Scout event on the 10th of this month. . . . SMICKE offers to assist in the collection of QSLs from SK1-SL1-SM1 stations. . . . Regarding last month's G63UML doings by G6s NMR and UML, the latter writes, "QSLs should go to my address. Reply will be via the RSGB bureau unless IRCs are enclosed, preferably with s.a.e." . . . Geoff Watts' DX *Notes-Sheet* understands that D17FT, QSL manager for numerous juicers, can accept no cards or inquiries via DARC. Go direct.

**AFRICA** — W5LEF reports a switch. ET3REL came A back home to W3CBB in February after turning his call over to a colleague in Ethiopia. So ex-ET3REL now handles QSLs for ET3REL and ex-ET3REL at the address in the list to follow. . . . "Effective immediately I am QSL manager for E67B," states W3HYV. "Contacts since January 1, 1970, can be confirmed. I've also sent out all QSLs for E68C QSOs from October 1968 to December '69." . . . W3KTT points out that K3HQL handles no QSLs for CT13. . . . W6EAY's card to CT3ZB was bounced by REP "unknown." . . . W7VRO launched some ten thousand 5H3KJ QSLs for the latter's five years in Dar-es-Salaam. . . . VE3IG, tending 9F3USA-9F3USA-9F3USA pasteboards, and W6EZZ, busy pushing his own ZD8DB cards, caution correspondents to use only current *Callbook* addresses. If your *Callbook* is out of date you can avoid wasted postage by interrogating fellow DXers who have up-to-date copies. No space to duplicate fresh data here. ZD8DB adds, "QSL immediately on receipt of s.a.s.e. and answer others periodically via bureau." . . . VE3IG is attempting to bestir manager CR6IV, at present too busy to clear up CR65P's 1969 QSL matters. . . . Excerpts from *DXation* of the Month's Bulletin 1-70 courtesy W2GBK: "CTB/DJ6QT QSLing is basically up to date. . . . We are now busily engaged in catching up with CN8HU's QSLing. . . . CN8GH activity has terminated although logs for the last few days of Stan's operation have not been received." Stu has been unable to close some gaps in QSO records for CR65P and ZD8BE, no logs available from the latter for contacts after March 20, 1969. . . . "I now have logs for 9Q5SH from June 22, 1968, to May 18, 1969," reports W3KNC, requesting the usual s.a.s.e. courtesy.

**ASIA** — "Two-letter suffixes are assigned to Thai national, three-letter to others," writes 081ABO (W4NDW) from Bangkok, explaining points about Thailand's recent hamming liberalization. "A limit of fifty non-nationals will be permitted to operate on a first-come first-serve basis (present count is over thirty) and IARU Region III frequency allocations apply. Licenses are issued by Society of Thai Amateur Radio with permission of the government. QSL address: STAR, Box 2008, Bangkok." H85ABD (ex-H83G-H8XAL) adds that Thailand is partitioned into licensing areas H81 through H89. . . . W9DY and WA4CZM hear that Z86JK has no Y12 QSL arrangements. . . . Delete KR6JT from W3HNK's list of QSL managerial clients. "Never received a log," declares Joe. . . . Now some individual specs but bear in mind that each recommendation is necessarily neither "official", complete nor accurate. . . .

BYPK, Box 127, Peking, P.R.C.  
DL4OR, H1U, 97th Sig. Bn., APO, New York, N. Y., 09028  
ET3REL, R. Lambert, W3CBB, 101 Kuehe dr., Annapolis, Md., 21403  
FR3USA-9F3USA-9F3USA (via VE3IG)  
FR7ZW, B.P. 753, St. Denis, Reunion Is.  
HC1BM, Box 691, Quito, Ecuador  
HR4ET/I, Box 119-C, Tegucigalpa, Honduras  
JX4GN, % Norwegian Embassy, Reykjavik, Iceland  
JY1APG, King Hussein, Box 1055, Amman, Jordan  
KG6ASP, G. Westfall, 4 Ragsdale st., Nimitz Hill, PPO, San Francisco, Calif., 96630  
KH6EDY (via KH6BZ); see text)  
KL7DTH/KG6 (via KLTBJD)  
P3ZAR, P.O. Box 383, Caracas, N.A.  
P3JCL, Box 448, Serre, Aruba, N.A.  
SV1DU, Box 132, Athens, Greece



IR6s IJ and JX, left and right, try Rome's capital centenary prefix on a puzzled pile-up. The two Tonys are ordinarily IJ and JX.

QST for



VK6s IZ and CB, fresh from a splash at the beach, check a promising bloom on their Western Australia antenna plantation. They show up regularly in W/K/VE/VO logs on several bands.

VK9BB, B. Bannister, Box 799, Lae, T.N.G.  
 ex-VK9LB, J. Liebold, % Barry Research, 934 E. Meadow  
 dr., Palo Alto, Calif.  
 ex-VPIDW, Capt. D. White, 16 Stour rd., Blandford,  
 Dorset, England  
 VP2GLA, P.O. Box 387, St. Georges, Grenada, W.I.  
 WA3EE/KG6, C. Doggett, Box 3351, Agana, Guam, M.I.  
 WA5YSI/TL2, D. Taylor, Box 10240, San Jose, C.R.  
 ZD8CS, K. Collins (K1BTD), RCA MTP, Ascension NCS,  
 Patrick AFB, Fla., 32925  
 ZK1BK, N. Allan, Civil Aviation, Box 90, Rarotonga,  
 Cook Is.  
 ZP5GS, G. Smith, U.S. Embassy, APO, New York, N.Y.,  
 09881 (or to W9QDP)  
 ZP5JO, USA IAGS, U.S. Embassy, APO, New York, N.Y.,  
 09881  
 5N2s ABF ABI (to K510J)  
 5Z4LV, Box 80077, Nairobi, Kenya  
 9Q5MG, Box 7700, Kinshasa, R.C.  
 9Q5RD, P.O. Box 868, Bukavu, R.C.

AX3BM (via W2GHHK) KR6JT (see text)  
 CE8TS (to CE8TS) LU2ECO (via LU8DKA)  
 CN8DW (to W6GZI) OJ8MI (to OH2ER)  
 CR5SP (see text) PJ9GF (via WB4GTS)  
 DL5DY (see text) SK1BL (via SM1CNM)  
 EL7B (via W3BY) TI9CF (to TI2CMF)  
 FK3EU (via 11PQ) UA1FF (via W3HNK)  
 FM7AA (via FM7WN) VP2AASL (to W2BKU)  
 GC3UML (to G3UML) VP2EX (via W4ZRZ)  
 HK5BVH (via HK5AJK) VP2MI (to W2EPCF)  
 HO1E (via W2CTN) VP2MY (to W1LXL)  
 HR2GK (via VE1ASJ) ex-VP5CS (to ZD8CS)  
 HS2ACA (via DK1RR) W9FHU/KS4 (to W9FHU)  
 HT1BW (via DL8DF) W6WBW/DL (to W6WBWJ)  
 HT1MG (to YN1MG) XE8LOW (to DJ4PI)  
 JA1IV (via W3HNK) YB8AAE (via DJ1OL)  
 JA1YAA (via JA1WU) ZB2BV (via G3RSJ)  
 JW1CI (via LA4AL) ZL3AB (via W6ZHQ)  
 K9IMC/KG6 (via W9MSG) 5U7AI (via DK3KB)  
 K9CFA/KC4 (via W1MIJ) 9Q5SE (via W4RNC)

QTH donors this trip are Ws 1BMR 1CW 1SWX 1YYM  
 2ADP 3HNK 4YOK 5LEF 6EAY 8YGR 9LNQ 9DAK  
 #PAN, Ks 3CUI 4AKE 5MAT 6SSN, WAs 1FHU 1KZ  
 4CZM #PXT, WBs 4GAH 4KZG 8ABN, SM1CXE,  
 Columbus Amateur Radio Association *CARAscope*  
 (W8ZCQ), DARCs DX-3B (DL3RR), *DX News-Sheet*  
 (G. Watts, 62 Bellmore rd., Norwich, Nor. 72, England),  
 Far East Auxiliary Radio League (M) *News* (KA2LL),  
 Florida DX Club *DX Report* (W4FR), International  
 Short Wave League *Monitor* (A. Miller, 62 Wardway Ln.,  
 Selly Oak, Birmingham 20, England), Japan DX Radio  
 Club *Bulletin* (JA3UJ), Long Island DX Association *DX*  
*Bulletin* (W2GKZ), Newark News Radio Club *Bulletin*  
 (J. Heien, 3822 Marshall et., Bellwood, Ill. 60104), North  
 Eastern DX Association *DX Bulletin* (KI1MP), Northern  
 California DX Club *DXer* (Box 608, Menlo Park, Calif.,  
 94025), Southern California DX Club *Bulletin* (WA8GLD),  
 UBA's *On the Air* (ONs 4AD 5VA), VERON's *DXpress*

(PA@s FX LOU TO VDV WWP) and West Coast DX  
*Bulletin* (W6AUD). Inquiries concerning publications  
 mentioned may be directed to the sources parenthesized.  
 Leave us hope that the 1970-71 ten-meter season at  
 least approaches 1969-70 production. Or have we had it?  
 Stay tuned in to find out, OMs. Meanwhile we'll be scanning  
 other ranges soon with the help of (20 phone) Ws 3HNK  
 4YOK 6YRA 8YGR 9LNQ, Ks 4TWJ 6RF, WAs 1FHU  
 1HAA 1JMR 2BCT 2BLJ 2HDZ 3GVP 4ZZU 6EQW,  
 WB4s JYB KZG; (20 cw) Ws 1H4L 4YOK 4ZYT 6EAY  
 7YTN 8YGR 9DY 9LNQ, Ks 3CUI 6MHG/6 STRF  
 6GSV, WAs 1FHU 1KZ 1JMR 2BLJ 2FOS 2HDZ 2YWR  
 3GVP 4CZM 5UAX 9SQY, WBs 2DRS 4GAH 4JYB  
 4KZG 9AVY, 11ER, VE7BAF; (40 cw) Ws 1BMR 4YOK  
 7YTN 8YGR 9EY, KSTRF, WAs 1FHU 11RY JJKZ  
 1JMR 2BCT 2HDZ 2YWR 3GVP 5UAX 9SQY, WB4GAH,  
 VE3GHO; (40 phone) WAs 1FHU JKZ JMR; (80 cw)  
 Ws 1SWX 8YGR 9EY, WAs 1FHU JMR; (75 phone) Ws  
 BMR WQC, WAs 1FHU JMR, VE3GHO; (15 phone) Ws  
 3HNK 8YGR, WA1FHU, WBs 4KZG 9AVY; (15 cw)  
 Ws 4ZYT 5BZK 9LNQ, K5MHG/6, WAs 1FHU 11RY  
 1KZ 1JMR 2BCT 2BLJ 2DFD 2HDZ 3GVP 5UAX  
 9SQY #PXT, WBs 2DRS 4KZG 5YMW 9AVY 9CJS,  
 WNs 2KEA 4OFO, 11ER, VE7BAF and reporters to file.  
 Next month we're due to recap the past season's 160-meter  
 DX developments with 11WB and friends. Plenty of WAC  
 action and some surprising firsts transpired.

**Where:**

HEREABOUTS — Going along with those who would  
 commemorate with confusion, K1ZAT (DL5DY) suggests  
 that FCC-licensed hams be authorized "N" calls in  
 1976. We would become NWA, Ks Nks, WAs NAs, etc.  
 Another anonymous contributor thinks we should all  
 merely sign our calls backward and upside down, urging  
 conhams to join the salute to Uncle Sam's 200th birthday  
 by juggling their names, addresses, auto licenses and social  
 security numbers . . . . . "If anyone fails to receive my  
 Grand Turk QSL he should write me at my new ZD8CS  
 address," invites ex-VP5CS (K1BTD). "At this writing all  
 VP5CS QSLs unclaimed by s.a.s.e. (self-addressed  
 stamped envelopes) are ready for mailing via bureaus."  
 . . . . . W3CTE manages nobody's QSLs but his own,  
 recent spurious indications to the contrary notwithstanding.  
 . . . . . "I have the logs for K9CFA/KC4's November  
 29-30, 1969, activity," offers W1MIJ, s.a.s.e. requisite  
 . . . . . From DXpedition of the Month's W2GHHK:  
 "All 160-, 80- and 40-meter 4M1A contacts have been  
 QSLd and we are working on 10 meters to be followed by  
 15 and 20. . . . QSLing for KV4EZ has started and will  
 continue on a regular basis until we are caught up. Logs  
 are on hand for Herb's activity as W9YUW/KV4 from  
 September 29 through October 29, 1968. . . . CW8AA  
 (not CW2AA) logs have been received and QSLing caught  
 up." . . . . What HO? HPs use that prefix occasionally  
 in conjunction with Panama commemorations . . . . .  
 Long Island DX Association's *Bulletin* understands that  
 W9JT holds CP1GN logs dating from July 26, 1969, and  
 also that W9QJ's share of ARRL QSL Bureau chores  
 has been running between 17 and 20 pounds monthly.  
 . . . . . Those four-letter VP2 calls are reciprocal-operating  
 tags according to *DX News-Sheet*, W2BKU drew  
 VP2AASL . . . . . For surprisingly snappy QSL production  
 "How's" correspondents Ws 1SWX 8YGR, K5MAT,  
 WA2HIU, WBs 4GAH 4KZG and 8ABN commend these  
 "QSLers of the Month": CP1GN, CR7EY, CT1WY,  
 DL6BB, EAs 8AT 9EJ, EL2BE, FR8XK, FM7WH,  
 HC8CS, KG4AN, KV4AA, OJ8MR, PY7AWD, PZ1AV,  
 TR8MC, VQ9CC, XE2JS, ZD78D, ZM1AAT/K, 187DA,  
 5R8AP, 7X9WW, 9J2RQ, 9M18MF, 9N1RA and 9V1OL,  
 plus QSL managers Ws 2CTN 2YY 6ANB 9JT, KADEN,  
 WBs 2EXS 4KZG, F2MO, HK3WO, PY7PO and ZL2AFZ.  
 Any laudables for this list? . . . . *Isajp!* The following  
 brethren in italics need nudges toward QSLs from holdouts  
 indicated: *W6EHY*, EL1LD '60, F7BI '62, MP4BBA '67,  
 TF3MB '68; *W6KMH*, HV1AN, KG6AP, KWBs 1N  
 EJ, TI2PZ, ZD71P, 5A3TT; *K3NFC*, 181V, VP2ARK,  
 6W8XX, 6Y5JB; *K4OLQ*, XW8CS; *VE3MR*, BV1UC '59,  
 KG61F. Any hints? . . . . . W6LYY and W69AVY add  
 their calls to the list of those willing to take on QSL chores  
 for needful overseas DXers.

OCEANIA — "I'm the new QSL manager for ZL3AB,"  
 confirms W6ZHQ. Charles coordinates the changeover  
 with retiring ZL3AB QSL tender W6BG . . . . . KH6-  
 BZF takes on confirmational duties for Kure's KH6EDY,  
 stating, "I hold logs from January 1, 1961, to December 31,  
 1969. Some 1969 operations appear to be invalid as logs  
 were not properly signed." Lee performs on an s.a.s.e.-only  
 basis for W/Ks, s.a.e. plus appropriate International Reply  
 Coupons from others, and naturally insists on Greenwich  
 Mean dates and times. About this s.a.s.e. business — for  
 direct reply, unless specifically waived, self-addressed  
 stamped envelopes, or self-addressed envelopes with Inter-  
 national Reply Coupons when appropriate, should be in-  
 cluded in mailings to QSL managers. This is only fair when  
 seeking postal response from anyone, for that matter.





CONDUCTED BY BILL SMITH,\* KØCER

### The Great March Aurora

AURORA is the watchword for March." That is how we began the March edition of this column. On March 8 it was fact, with what W2AZL calls, "the best aurora ever on 2 meters." In terms of the number of stations participating, the March 8 aurora may have been the most widely-worked opening of its kind as well. The following day my telephone rang frequently with called-in reports of exceptional DX. Through those phone calls, a number of hastily-written letters, and the assistance of Don Lund, WAØIQN, the following is a summary of what happened as best we know at this writing.

March began as February had ended, without indication of the excitement to come. WWV GEO forecasts were encouraging, but their previous indication of an active sun had left us unrewarded. Several letters asked, "Whatever happened to the aurora?" Some solar activity was recorded earlier, but it wasn't until 0926 GMT, on the 6th, that the great event to follow had its birth. ESSA recorded a bright surge on the extreme western limb of the sun. The region had exhibited a far from classical growth and development during the 14 days it had faced the earth, waxing and waning in area and complexity several times before rotating from view on the 5th.

Following the initial surge, ESSA photographed a solar spray beginning at 1838 GMT, March 6. This reached a height of at least three-tenths of the sun's radius. By March 7, the disturbance had reached minor storm proportions. ESSA personnel in Alaska reported brilliant aurora displays beginning about 1800 GMT. (There were several observations of auroral conditions prior to the major event, March 8. These apparently were the result of activity in another solar region not connected with the one responsible for the major event.)

At 0230 GMT, March 8, WAØIQN telephoned to say, "Looks good for granddaddy!" While talking with Don, I heard weak aurora on 50 MHz but nothing that could be identified. It faded at 0300. Exactly when the aurora was first workable is unknown to your writer, but WØLER's 144-MHz report of W8KAY at 0700 is the earliest I have on record. This is quite likely the beginning as both John and Art were closely watching the event. K2RTH reports strong aurora at 1500 GMT, but an inactive band.

### Six Meters

These early reports concern the 2-meter band; 6 was apparently quiet until around 1700. Checking

my own log, I find a notation of an unusual lack of Sunday morning scatter signals. WASTTH, who misses darned little that happens on 50 MHz in Louisiana, reports *F*-layer backscatter beginning at 1700 with signals from all U.S. call areas, VE2-3 and KP4 peaking southeast to southwest. Apparently the first hour of backscatter was not widely detected, as it isn't until 1810 that we find another report. This from W5WAX, Oklahoma, who worked K1JRW, Mass., and VE2AIO, Quebec, with signals peaking from the South Atlantic.

KØCER, S. Dak. was working K7BDU/Ø, Omaha, over a 160-mile path at 1825 when the Nebraska signal suddenly began to grow. Until then there was no indication of aurora or backscatter. Six meters quickly filled with auroral signals, from Wyoming to Kentucky. (Six meter DXers needing Wyoming shouldn't bypass the call W7VDZ. Jim is a fine cw operator but doesn't advertise that he is in Casper, Wyoming. He has 150 watts and a 6-element Yagi at 60 feet.) At 2150 I somehow worked K8MMM through the usual pileup around Tommy's outstanding signal. We noted signals had a hollow backscatter sound with no auroral characteristics, and they peaked direct-path. WØPFP, Iowa, was worked at 2220, typical aurora. Eight minutes later signals suddenly faded and there was no trace of aurora. WWV on 15 MHz was S9, with no auroral effect.

Swinging the Yagi southeast produced nothing for 8 minutes, but at 2236, as though someone had thrown a switch, there was K6QEH on backscatter, working W5WAX. What followed was the most widely-worked 50-MHz backscatter opening of recent times. K6QEH's signal was over-powering. Gary worked 42 stations in all call areas, I believe, except the first. Whether all contacts were on backscatter alone I'm not certain. Some may have been direct-path *F*-layer. At times beam headings had little effect, though the area of strongest reflection centered around 160 degrees. Some of the better DX contacts reported were K2RTH to K6QEH, WA6HXM to W2UTH and K4RBR, Miami. WAØQLP, Rapid City, South Dakota, worked W1HOY/KP4 at 2330, just as the backscatter activity was ending. In most parts of the country, the opening lasted about 70 minutes. Apparently there was no aurora or backscatter noted in most of the 7th call area. W7VDZ is the only seven to work the aurora that I know of, and none report *F*-layer activity.

It was fitting that such an event took place on a Sunday afternoon, during a time when band occupancy is normally high. This permitted many 50-MHz operators their first encounter with *F*-layer backscatter. Some were obviously awed; others blamed the previous day's eclipse. We'll later

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

## 220-MHz EME First - and Second

Louis Anciaux, WB6NMT, and "Lucky" Whitaker, W7CNK, successfully completed the first 220-MHz moonbounce contact, on March 15, between 1805 and 1843 PST. Several previous attempts had been unsuccessful, but revealed system problems which were corrected. This 220 EME first covered a terrestrial distance of 650 miles, but the record lasted less than 26 hours.

The following evening, at 1940 PST, WB6NMT began a 22-minute contact with Jud Snyder, K2CBA, over a distance of 2,650 miles. Signals on both nights were weak, rising barely above the noise and requiring many repeats. Jud said WB6NMT's signal was fairly solid, but frequent bursts made copy difficult. Both contacts were made on cw.

WB6NMT ran a pair of 4CX250Bs and an array of sixteen 10-turn helices. K2CBA's transmitter, a pair of 4CX300s, fed 700 watts to an array of sixteen 6-element Yagis. A photograph of the antenna appears on page 94 of December, 1969 QST. At W7CNK a similar transmitter was used and a 160-element collinear array.

Congratulations to all concerned. The contacts were the first EME work for WB6NMT and W7CNK. K2CBA has had considerable EME experience having completed previous contacts on 144 and 432. Now with 220 in the books, 50 MHz and the bands above 2300 MHz remain. W3GKP and W4HHK are closing in on that record, having now definitely identified their lunar-reflected 2300-MHz signals both ways.

examine some additional *F*-layer effects on March 9th, but first the aurora on 2 meters.

Some of the best 2-meter aurora DX on record was worked between 2100 and 2230 GMT. Thousand-mile contacts between the Northeast and Midwest were actually common! The best reported DX contacts were those of W2AZL and K2RTH with W5WAX, distances of some 1230 miles! K2RTH logged all states east of the Mississippi, except Florida and Alabama. Bruce heard W5RCL, Mississippi, S9, calling W2CUX. W5WAX worked 14 states. Other DX highlights: K1AFR's Connecticut-to-Iowa contact with W0MQS; W0LER's reception of K4GL, Minnesota-to-South Carolina; and W0RLI, Minnesota, heard by W2AZL, N.J. W2CUX added three new states: Kentucky, Indiana and Missouri. W0DRL, Kansas, worked W4FWH, Georgia, at 1520 GMT, followed by K4MHS, North Carolina, and W4LTU, Virginia. Al heard K4EJQ, Tenn., and many 2s, plus W5RCL at S9 and W0EYE in Colorado.

WA0QLP, South Dakota, reports working W0EYE on 220-MHz aurora and I have second-hand information that W0EYE worked Nebraska's W0BJ on 432.

At this writing, these are the highlights of the March 8 event. Some additional items appear in the regular operating news section. My thanks to those of you who telephoned or wrote immediate reports. By next month we'll know what happened on the 27-28 day recurrence.

## Parks 432-3 Modification

The Parks model 432-3 is a popular converter for 432 MHz, but the noise figure of several has been measured as from 6 to 8 dB. An improvement of 2 dB may be obtained with this simple modification by W0EYE.

First, remove the existing 1.5-pF input coupling capacitor. Place a grounding solder lug under the input BNC connector and solder two protective diodes, CR1 and CR2, back-to-back, from the BNC tip to ground using short leads. 1N34As or similar germanium diodes are suitable. Next, trim the leads of a 27-pF dipped silver-mica capacitor to 1/4 inches each and solder the capacitor between the BNC tip and the input tank line. The connection on the tank line is made 7/8 inch from the variable capacitor. Finally, the interior of the converter case is lined with aluminum foil.

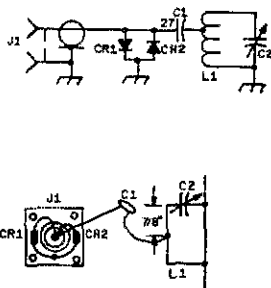


Fig.1 - Modification of the input circuit of the Parks 432-3 Converter, by W0EYE. Both the basic schematic and the approximate physical arrangement are shown. Further details appear in the text.

W6HPH, who worked on the design of the converter and supervised the original production run, says that every unit was checked carefully for noise figure, and all were under 5 dB, with some as low as 3 dB. It is easy to damage the input transistor with coaxial-relay leakage, but a likely cause of high noise figure is user misadjustment of the tuned circuits. Tuning for maximum gain rather than minimum noise figure will result in noise figures of 6 to 8 dB, or worse.

Injection level to the mixer is important, Fred says. The final multiplier was initially detuned purposely for optimum noise figure. Peaking will give much more gain, but adverse signal-to-noise ratio. Injection should be adjusted for a mixer collector current of about 100 microamperes. It is very important to obtain optimum mixer performance in any 432-MHz converter having only one rf stage, or the system noise figure will suffer.

## OVS and Operating News

50-MHz DX news this month mostly involves the March 8 aurora and *F*-layer activity. Backscatter and possible direct-path openings between the coasts, are probable immediately following the break-up of a major magnetic disturbance such as that on March 8th. Old hands at 50-MHz DX were

not caught unaware, though some apparently excellent DX possibilities went unused the following morning, local time. Six meters was open from the eastern, central and southern states to the Caribbean and South America as early as 1400 GMT March 9. The activities began with an *E*-opening between the upper midwest and the Gulf states. One such contact was between WASTTH, Louisiana, and WA0QLP, South Dakota. Immediately following that, WASTTH worked VP2MJ on Montserrat, in the eastern Caribbean, using *F*-layer backscatter with beams pointing southwest. VP2MJ was heard in Omaha by W0EKB, apparently direct-path *F*-layer, but local QRM prevented a contact. W0EKB also logged many South American commercial service fm stations near the lower edge of the six-meter band. The *F*-layer activity ended shortly at 1500 GMT, but was followed by a fair 30-minute *E*s opening between the midwest and southwest and the Los Angeles area. That opening was localized between Missouri, Nebraska and South Dakota and Arizona, Nevada and Southern California.

At 1700 GMT, six meters again opened for *F*-layer backscatter. WA6HXM heard U.S., Canadian and Puerto Rican stations on a 135-degree beam heading. The band closed at 1730. But there was still some life left as late as 2340 GMT. The husband-wife team of K5AGI and WASTTH began to hear the ZK1AA beacon. (Cook Island in the South Pacific, 50.1 MHz.) John tried to break the beacon and then attempted to telephone Stewart without any success. ZK1AA's beacon peaked S9 until 0130 GMT, March 10.

Also on March 10, WASTTH worked VP2MJ at 1830 GMT, and WA4MHS, Florida, at 1900, on *F*-layer backscatter. That evening, March 11 GMT, Mary worked LU3DCA and OA4C between 0200 and 0230 GMT, on *TE*, followed 30 minutes later with an *E*-opening to New Mexico.

Undoubtedly there were other contacts and we should have more details for next month. In checking the reports, I note an unusual amount of activity from Puerto Rico. At least four KP4s, AXJ, AZA, DCY and W1HOY/KP4, were active March 8th. Perhaps this summer Puerto Rico will become an easier catch on ssb.

While on the topic of summer DX, W4GDS and K8BBN will likely travel to Cayman Island for ZF1 activity around June contest time. Also, beginning June 1, W4GDS will be flying Washington, D.C.-to-Honolulu for United Air Lines and will have 28-hour lay-overs in Hawaii. Bob has applied for a KH6 call and will be looking for *E*s. And - W0EKB, W0JCO and K0CER will motor to Ketchikan, Alaska, beginning June 7, for a 2-week plus roundtrip. Included is one week in Alaska and mobile activity in VE4, 5, 6 and 7. Plans call for stacked S-element Yagis and a kilowatt at Ketchikan. At this writing the call to be used is uncertain, but will be a KL7.

Utah likewise will be represented during the June contest. W0MTK says a group from the Western Slope Radio Club (Colorado) will be active on ssb, using a portable generator. Looks like an interesting contest.

Prior to the March 8-11 period, VP2MJ reported "nothing doing to the states since December 23." Monty says *TE* to South America was poor this February; nothing like the month one year ago. Monty did work OA4C, Peru, on several occasions, plus Uruguay and Argentina. He says OA4C caught *TE* openings to Mexico and Texas on February 11, 26, 27 and 28. XE1BY, K5APY and K5WWQ were among those worked.

One scatter report this month. W0MTK, Western Colorado, reports working K6PYH, K61BY, W5WAX, and K5WVX on several occasions during February. Bill says also the knife-edge 180-mile path across the Rocky Mountains from Fruita to Denver is working well. In W0MTK works WA0-KIN, K0FTG and WA0SOV in Denver regularly. Signals peak 30 dB over the noise in 10-to-20-minute cycles.

How about some of you big-gun scatter boys in the east and west telling us what you're doing? Some of you have fat signals in the midwest.

Finally, 50-MHz WAS certificate number 89 was awarded March 12 to K6EPT.

**144-MHz** states totals will show the effects of the March 8 aurora when the boxes appear again next month. W0DRL, Kansas, added two states, North Carolina and Georgia. K1RJH, Conn., added W9PBP, Illinois, while also working VE1AFB, Nova Scotia and several 8s: K1AFR, also Conn., logged 1s, 2s, 3s, 8s, 9s and Iowa. WA1JXN, Vermont, was able to make but one contact, that with W8IDU, Michigan, but Lance lists many 2s, 3s and 8s heard, plus W9PBP and W9MAL, both Illinois. W9PBP reached 34 states worked, adding Delaware and South Carolina. Len reports aurora on March 5, 6 and 7 in addition to the 8th. On the 5th he worked K2GXI, on the 6th several 2s and 8s, and 8s and 9s on March 7. On the 8th W9PBP worked at least 10 states plus VE3. In Minnesota, W0LER heard many Ohio stations, spending most of the aurora session looking for extreme DX.

Except the 220 moonbounce contacts previously reported, the lone 220 report this month comes from K61BY. Joe says the San Francisco area 220 net held their annual dinner February 28 with 29 present. The net meets Sunday nights at 8 PST on 222.07, averaging 20 checkins. Joe says the Southern California VHF Club is planning a 222-MHz fm repeater under the call, K6BPC.

**432-MHz** did not fare well during the March 8 aurora. There were only two contacts I have knowledge of. W0EYE, Colorado, worked W0BJ, Nebraska, and W8HVX, Michigan, is said to have worked a K2. There were several reports of fragmentary signals heard, but it appears the aurora's intensity did not have much effect at 432, or the peak was very sharp and for the most part, undetected.

In Boston, W1GAN, W1JOT and K4GGI/1 have organized to make 432.1 the calling frequency for that area. Lewis, K4GGI/1, says the purpose is to provide a spot frequency which may be monitored and used to establish contact. The plan is for the stations to then move to another frequency, leaving 432.1 clear for others. The calling frequency should make possible more 432 contacts on nights other than Wednesday, long established as "432 night" in New England. Comments, questions and requests for technical assistance

#### EME Two-Way Records

144 MHz: SM7BAE - ZL1AZR  
11,055 Miles - March 4, 1969  
220 MHz: WB6NMT - K2CBA  
2,650 Miles - March 16, 1970  
420 MHz: WA6LET - G3LTF  
5,730 Miles - Sept. 25, 1965  
1215 MHz: WB6IOM - G3LTF  
5,492 Miles - April 27, 1969



This 420-MHz ATV signal from W9NTP was received by W8DMR, over a 160-mile path.

should be directed to Lewis Collins, 11 Brattle Street, Apt. 19, Arlington, Mass. 02174.

W9NTP writes that the Indiana Amateur TV and UHF Club is very active in the Indianapolis area, with 15 ATV stations on the air. Pictures are regularly received over 50- to 200-mile paths. Elsewhere in this column appears a photograph of a fast-scan ATV picture made by W8DMR in Columbus, Ohio of W9NTP's 300-watt signal. The path distance is 160 miles. W9NTP's antenna is a 64-element collinear at 50 feet, W8DMR has a 48-element collinear. Both operators are interested in hearing from and scheduling others likewise interested in ATV.

K4GL, South Carolina, tells W1HDQ he has replaced his 96-element collinear with four Tilton Yagis. W0LCN, Minneapolis, wants schedules with

Wisconsin, Michigan, Indiana, Nebraska, Missouri and North Dakota. K4EJQ suggests beginning a states worked box for 1296 MHz. Bunky says the boxes seem to generate competition which might, in turn, stir up more activity. Can do, Bunky, but I am disappointed in the lack of reporting by many operators listed in the existing boxes. I can't reason a good explanation unless the 75-meter nets are fulfilling their needs. I am also suspicious that not all SCMs are forwarding OVS reports to Headquarters. If you are reporting regularly but the reports don't appear in the column, try sending a duplicate to my home at 3900 East 24th Street, Sioux Falls, South Dakota 57103.

#### Fort Wayne Area Repeater, WA9YJV

The Allen County Amateur Radio Technical Society, through its president, Jack Forbing, K9LSB, supplied the following information on the Society's fm repeater:

The system operates continuously, with 146.46 input and 146.88 output. Presently it is open-access, and visitors to the Fort Wayne area are invited to use it. Plans for the immediate future include installation of emergency power for the repeater. ACARTS is 100 percent AREC, and complete reliability for emergency communication is a primary objective. Also coming is a 6-meter system, 52.64 in and 52.88 out. Simplex operation is currently on 146.88, with 146.94 and 52.525 as alternate frequencies.

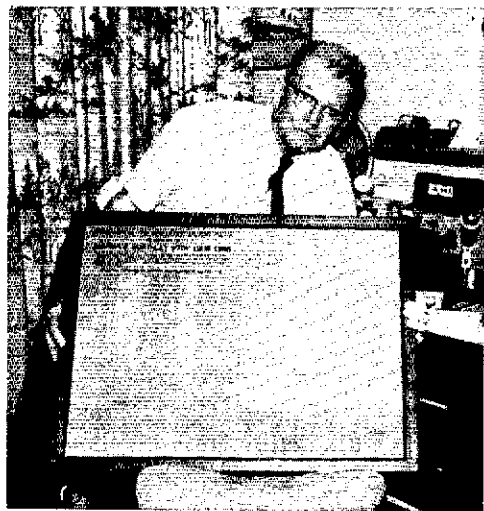
We hope to have more details on the ACARTS repeater setup in the near future. Once again, we invite fm and repeater enthusiasts to send this kind of information to ARRL, for inclusion in the vhf column. Technical details are also solicited. These will be handled in the column, as Hints and Kinks, or as full-fledged QST articles, as their nature may dictate.



## Strays



In the style of Mardi-Gras, Fort Myers (Fla.) each February holds "Pageant of Light." Crowned "King" at the Coronation Ball this year was Abbott Kagan III, WA4DKD. The King's father is W4HDH, an ARRL ORS and net control of Florida net QFN. (Photo courtesy "Sunshine Bobo," News-Press.)



Since 1955 a memorial has existed for the silent keys of Oregon. Shown in the photo is W7QWE the memorial's trustee. The memorial is on display at club meetings and hamfests and it will be shown at the Oregon State Convention this June.



# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* WB6BBO

"QRV"

**W**OMEN are usually chosen to illustrate the act of assistance to others. On almost every poster and picture of the many disaster relief organizations, we see women used as an example of the helping hand. Probably the most logical explanation of this is the fact that so often in times of crisis the ladies of a community seem to be there to pick up the pieces and help get started putting them back into place. They drop what they are doing, forget about personal concerns and appear to offer their assistance to a neighbor when there is illness, or tragedy in a family.

In amateur radio the difference is that the crisis may be in our own home town, or half way around the world, the need can be almost anything imaginable, but the gals are there to help in the same manner, forgetting their own interests to give aid where and when it is needed. There are YLs who are on their way to or from an airport to pick up and deliver a requested Eyebank shipment. We can find others assisting in the relay of a request from a distant country, or a missionary for badly needed medical supplies. There are the hundreds of gals in Army, Navy and Air Force MARS who daily maintain that personal touch between servicemen around the world and their homes. Others are doing much the same thing in the amateur frequencies helping students or visitors keep contact with their homelands in the countries where this activity is approved.

\* YL Editor QST, Please send all news notes to WB6-BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



WN7MKQ, Billie Estelita, is one of the few Novices who were able to accomplish confirmation of WAS during novice activity in amateur radio. She is looking forward to stepping into General Class soon. The OM is WA7LKA.



"Suzy" JH1WKS, ex-J2IX. For the many people who have inquired about Japan's first YL operator, Suzy is back on the air with a new call and anxious to meet all her old friends.

In times of disaster when there is no regular communication the women are there helping to keep the vital lifeline open, and relaying requests for aid, news of the extent of the emergency, as well as the vast quantity of personal traffic in and out of the affected area.

There are gals like W3GTC, and her group of busy women, who set up and help maintain communications for the Powder Puff Derby each year. Across the country with the AREC we have Yls in all phases of that service. The SECs and ECs, who plan and coordinate the emergency groups. And the countless women who are active in the nets that make these plans work.

Who are these women who give so much? Many of them are found in the Public Service Honor Roll, others on the BPL list. Some are calls that have become as familiar to us as our own, KØONK, W3CUL, WØLGG, W4WQM, K8LGA, K8ONV, VE7BBB, KL7FLS, W5LGY, K2KQC, W4TVT, WA1GAB. And there are many whose identity is disguised by the MARS calls because of their preference for working with the military affiliate groups. There are lots of rewards for the activity of helping others in time of need. Many of us have a folder filled with certificates thanking us for our services, but our greatest reward comes from the



actual *doing*. No contest can match the keyed up excitement of actual operation in time of a major disaster, or the bucking of all sorts of conditions to get a message through. A certificate is a comfortable thing to have, but the great satisfaction of hearing a grateful "Thank you" from some homesick serviceman, or the "Well done" of an Emergency Coordinator as the net is secured is something that cannot be put into words.

Women are always ready to help in time of need whether it is our individual assistance to the neighbor down the street, volunteering in the many organizations that give aid to those less fortunate than ourselves, or on-the-air emergency assistance. When the need for help arises, the YLs will be found doing "what comes naturally," waiting to be used, and asking "Is there anything I can do?"

#### Location Change - Mid West YL

The 18th annual Mid West YL Convention location has been changed to the Drifter Motel, 8416 Corunna Road, Flint, Michigan.

If you have already made reservations for the Convention, the chairman will transfer them from the former location to the new one. It is located away from the city about one half mile west of I-75.

Present plans call for a Friday evening buffet banquet of chicken and all the trimmings as a hospitality gesture of the Flint YLs. The evening will be an informal getting acquainted session.

Saturday includes the formal luncheon at the Sveden House, with the afternoon devoted to business meetings as well as other events. The banquet, which includes the OMs, will be Saturday evening.

Send all reservations to Marion Bees, W8UAP, 2039 East Whittemore, Flint, Michigan, 48507, and remember there is only one more month to plan.

The only change is in the location of the Convention site. The rest remains, as it has for the past eighteen years, that truly warm hospitality and rewarding experience of this very popular annual YL convention. Time is running short, so make your plans now, you won't be sorry.

#### The Time is NOW!

The joint Pacific-Southwestern ARRL Convention is about to open on May 15,16,17, at the Hacienda Motel, Fresno, California.

The Fresno YLs will be in charge of the social entertainment with a Luncheon and Wig Show, on Saturday, May 16. The SWOOP initiation is to be handled by the BAYLARCS, who originated this award for the unlicensed wives of operators.

There is to be a YL Forum scheduled for 11A.M. on Saturday, prior to the luncheon. Plan to bring your comments, and meet with the other YL operators there.

The Fresno affair is always popular, and this one promises to be one of the best. See you there.

#### Norwegian YLs

LA6XI, Knut Heimdal, Traffic Manager of NRRL, has sent a list of the 49 licensed YLs in Norway to supplement the three named in the December 1969, "YL News and Views." For those who are interested in working the "distaff side" of Amateur Radio in Norway, the YLs are: LA1GN,



June Severs, WB9DBA, got her ticket the hard way by starting out with the General Class test. June is the mother of two boys. The OM is not licensed. (Photo courtesy W9ELG)

LA1YM, LA1ZI, LA2GI, LA2QH, LA2ZI, LA2UK, LA2YL, LA3AH, LA3AYL, LA3GM, LA3IN, LA3KK, LA3KN, LA3LH, LA3WG, LA3WK, LA3XH, LA3XL, LA3YL, LA4LI, LA4NK, LA4PH, LA4WK, LA5BK, LA5CK, LA5JF, LA5JM, LA5WD, LA5WG, JW6AJ, LA6NM, LA6ZH, LA7QJ, LA7PM, LA7ZM, LA7YL, LA8CA, LA8DD, LA8DL, LA8EG, LA8UF, LA8YL, LA8SL, LA9LH, LA9LL, LA9MD, LA9NF, LA9QK.

#### That YL Suffix

Add three more calls to that list of these who have been assigned the very distinctive "YL" as a suffix. LA2YL, in Norway; XE0YL, in Mexico; DJ0YL, assigned to Elissa McDade, also WA4BVF, who is now operating in West Germany. So far as we know, Elissa is the only American who has had the distinction to receive the YL call. This brings the total to 65.

"YL News and Views" thanks those who sent in very helpful suggestions of feminine-type suffixes such as HER, and SHE. True, they are YL indicators, but, the original idea was to assist in the acquisition of WAC-YL, and DX-YL, awards by proof of contact with the call YL as the suffix so that the certificate would be literally accurate in its title.

#### K5PFF, 1970 YLRL Vice-president

A student, teacher, mother, professional woman, the YL picture is as varied as the dickens, but we all end up speaking the same language. Before World War II, Audrey went to a radio school in Minnesota, left to work for Northwest Airlines, from there joined the WAC Airforce where she was assigned to Army Air Communications as a Radio Operator. From 1943 to 1945 she was a busy gal both here and overseas (where, incidentally, she met the future OM.) On her way back to the United States the ship was so badly damaged by a hurricane that she was transferred to another one so that she and her companions hold the very rare distinction of being the only women to ever be passengers aboard the aircraft carrier *Enterprise*.



K5PFF, Audrey Beyer, 1970 YLRL Vice-president.

Family life intervened for a while and, when the GAYLARCS were about to be organized, Audrey boned up on her theory and code and received her amateur license.

K5PFF has been extremely active keeping students from South America who are in this country in touch with their families via phone patch, as well as in traffic work.

Audrey is affiliated with TYLRUN net, and formerly was secretary-treasurer of that group. She is a past president of GAYLARC, and is the 1970 Vice-president of YLRL. This latest office is really hard work, for the Vice-president not only sets up the calendar for the YLRL Contests, but is also the one who receives and checks the contest results before they are published. QST

## 

### Henry C. Gawler, ex-1RI

Old, Old-Timers will remember with considerable affection the first Radio Inspector of the First Radio District at Boston, Henry C. Gawler, ex-1RI, who died in December at the age of 87. In 1904 he helped the government develop its first wireless equipment while employed by National Electric Signal Co. An early radio officer of the Signal Corps, he served as a captain along the Mexican border in 1914, and during World War I, in the Azores. Later employment was with RCA, General Radio Company and DuMont Laboratories. From 1947 to 1957, he was associated with the late W2LA in the manufacturers' rep agency Gawler-Knoop Company and was a senior member of IEEE and the Radio Club of America.

#### Feedback

In the "Silent Keys" column for March 1970, K7LIR should have been shown as W7LIR.

The "DX Contest Announcement," *QST* Dec, 1969, page 62 contains an unfortunate error. The last line under examples of acceptable end-of-transmissions of less than 30 seconds should read, "589 Cal DX1DX W6XYZ K."

## Silent Keys

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

- W1ABA, Robert G. Pike, Hinesburg, Vt.
- W1FFC, Donald N. Grundberg, Lowell, Mass.
- W1LEX, Lyman D. Warner, Greenwich, Conn.
- W1GPF, Richard B. Brown, Jr., Braintree, Mass.
- W1RVK, Clarence F. Burnham, Norwalk, Conn.
- K1ZHD, Fletcher H. Warren, Framingham, Mass.
- W2AVL, Daniel H. Papp, Port Chester, N.Y.
- W2DEL, Horton C. Mosher, Scotia, N.Y.
- W2FWX, William H. Bossert, Woodside, N.Y.
- W2HWK, William L. Bagley, Roselle Park, N.J.
- WA2IAZ, Harry N. Perry, Swedesboro, N.J.
- WA2IVK, Lee Szenthal, Aurora, N. Y.
- K2JLY, Francis R. Ciancaglini, Sr., Malaga, N. J.
- W2JRJ, James R. Beantley, Bainbridge, N. Y.
- WA2KVN, David J. Perry, Webster, N. Y.
- W2NHG, Allan A. MacLean, Boonton, N.J.
- WB2OOG, Harry J. Wille, Glendale, N. Y.
- W2SB, Henry Barris, Silver Creek, N. Y.
- K2UFD, Jerome Bloomberg, Henrietta, N. Y.
- W2VCY, Louis J. Teator, Hudson, N. Y.
- WA2WBI, Maj. Gen. James Dreyfus, Middletown, N.J.
- W3DFG, Emile E. Swanson, Woodhine, Md.
- WA3GMO, Orville J. Sayre, Erie, Pa.
- K3VEY, Joseph F. Hasbach, Evans City, Pa.
- W4RZV, Joseph S. Bainter, Pensacola, Fla.
- ex-W4TA, Cloyd Hewes, Miami, Fla.
- WSAE, Louis Peine, Rockport, Texas.
- WASFVL, Robert S. Rushing, El Dorado, Ark.
- W5JBJ, Floyd J. "Sparky" Burton, Oklahoma City, Okla.
- K5JPG/W5IB1, Marcus B. Dalton, Pascagoula, Miss.
- W6APG, Gordon W. Brown, San Diego, Calif.
- W6GTE, Virgil Talbott, Monterey Park, Calif.
- K6JOK, Donald H. Fruehly, Burbank, Calif.
- W6KEF, William K. La Fayette, Oakland, Calif.
- K6MYM, S. Vernon Ray, Santa Rosa, Calif.
- W6QJ, James L. Meredith, Clearlake Highlands, Calif.
- W6TGA, Wayne B. Henderson, Burbank, Calif.
- W6UMO, Loyd C. Grimm, W. Los Angeles, Calif.
- W6VPC, Elliott "Buck" Buchanan, Oakland, Calif.
- W7CPS, Harold Garcia, Anacosta, Mont.
- W7DXV, Harold Mapes, Moose, Wyo.
- W7VTA, James Parr, Salt Lake City, Utah.
- ex-8BM, Orrin Dunlap, Jr., Great Neck, L.I., N. Y.
- ex-8CEH, Edward L. Wissmiller, Saginaw, Mich.
- W8OUE, Clarence E. Pearson, Warren, Ohio.
- K8SEV, John A. Williams, E. Cleveland, Ohio.
- K8SKP, Roy D. Tupper, Detroit, Mich.
- W9ARO, Orville L. Hillgross, Markleville, Ind.
- K9DOX, Lyman F. Stewart, Champaign, Ill.
- K9PPE, Lee Warnock, Robinson, Ill.
- W9UDT, Eric A. Thomas, South Holland, Ill.
- WA9VCW Frank Taltafarro, Chicago, Ill.
- W0BSP, Marshall H. Ensor, Olathe, Kans.
- K0DRW/W9IDW, Gerald T. Bergemann, Marton, Ia.
- K0FL, George Christiansen, Crookston, Minn.
- W0PGA, William W. Lanham, Atlantic, Ia.
- W0WTN, Charles A. Page, Trinidad, Colo.
- VE31L, John H. "Doc" Downer, Toronto, Ontario
- VE5ES, Reginald A. Roberts, Weyburn, Sask.
- VE5JU, James M. Crook, Regina, Sask.
- VE6AOH/ex-VE5RS, Geroge E. Hearn, Calgary, Alta.
- G5CV, P. Douglas Walters, Hook, Surbiton, Sv., England.
- KP4JA, Ulises Marin, Santurce, Puerto Rico.
- SP6FZ, Jan Ziembicki, Bielawa, Poland.
- 112EAG, Evangelos A. Gardis, San Jose, Costa Rica.
- VK3CX, Alan G. Brown, Canterbury, Australia.
- VK7PA, A. E. Allen, Moonah, Tasmania.
- ZL2JK, Garth Grocott, Palmerston North, New Zealand.
- 9J2NW, N. W. "Tony" Willis, Ndola, Zanzibia.

# Operating News

GEORGE HART, WINJM  
Communications Manager

ELLEN WHITE, W1YYM,  
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE

DXCC: ROBERT L. WHITE, W1CW

Training Aids: GERALD PINARD

Contests: ALBERT M. NOONE, W1KQM

Public Service: WILLIAM O. REICHERT, WA9HHH

**July Open CD Party.** Once each quarter, appointees and certain other eligibles in the ARRL "official family" get together for a contest known popularly as the "CD Party." Most operating amateurs are familiar with it and from time to time we receive inquiries about what one has to do to be eligible for this "Civil Defense" contest.

During the May 1969 ARRL Board Meeting, it was unanimously voted that one CD Party per year be opened to all ARRL members as well as the appointees and other eligibles. The matter was "bucked" by Hq. to the Contest Advisory Committee which, in mid-March, came through with a set of recommendations on the subject. As a result, there will be an "open party", cw on July 11-13, phone on July 18-20. June QST will carry full rules.

We hope all League members will plan to take part, and make this a big success. There will be no basic change in the time, scoring or log structure used in the other CD Parties (Oct., Jan. and April). The appointees will exchange section and appointment, as usual, and non-appointee members will send section and MBR (member) or, if preferred and applicable, LM (Life Member) or CLM (Charter Life Member). All those who participate will receive a copy of the *CD Bulletin* carrying the results. High claimed scores will, of course, appear in QST as usual.

If you are not an appointee and wish to take part, send us a s.a.s.e. for CD Party forms. The object is to work as many other participants as possible on as many bands as possible in as many sections as possible. You get a bonus for having a code proficiency certificate, so this may be something to look into between now and July (see activities calendar for dates of Qualifying Runs).

This is pretty close to a rejuvenation of the ARRL Member parties we had for a time back in the forties. If it's a successful venture, no telling, it may be expanded. . .

**Surprises.** The League's operating program has a little bit of everything (and a lot of some things), but two of our awards come as unsolicited surprises to the recipients. Pleasant surprises, too, for who wouldn't be pleasantly surprised to receive a certificate that said he is considered an A-1 Operator, or one which said he is considered to have rendered a public service during a communications emergency. Neither one of these awards is the type which is worked for (specifically, anyway), solicited or expected. In fact, in case of A-1, to ask for one is a good way to assure you will never receive one. As for the PSA, this is kept more or less under wraps and issued on a low priority, "when time permits" basis, and requests of "when do I get my award?" are dealt with in a somewhat peremptory manner.

"The Public Service Award," says the letter of transmittal, "is not the type of award that is specifically worked for, asked for or expected. It comes as a spontaneous recognition of outstanding work by individual amateurs during communications emergencies. It should give you deep satisfaction to know that the type of work you have done best exemplifies the spirit which makes amateur radio a valuable asset to the public and to the nation."

The A-1 Operator award is not given just for operating skill, any more than a good driver award is given for skill in handling a car. Knowing the rules, following the proper recommended procedure and exercising exemplary judgment and courtesy are also things that are considered. Any-

OPERATING EVENTS (Dates in GMT)

MAY	JUNE	JULY
3 VE2 Contest cw, Apr. Sta. Act.	3 W6OWP Qualifying Run	2 Qualifying Run, W6OWP
7 W6OWP Qualifying Run	6 Minn. QSO Party, Sta. Act.	11-12 Open CD Party, cw
9 FMT, OOs only	6-7 European Field Day, How's DX	16 W1AW Qualifying Run
9-11 Ga. QSO Party, Sta. Act.	10 W1AW Qualifying Run	18-19 Open CD Party, phone
10 Russian Contest phone, How's DX	13-14 VHF QSO Party, this issue	Sept. 12-13 VHF QSO Party
12 W1AW Qualifying Run	Oregon QSO Party	Possible W6OWP alternate, same schedule, is W6ZRJ
16 Armed Forces Day	14-20 Worked-All-Mass. Cities and Towns Contest and Mass. Week Certif., this issue	
16-17 Mich. QSO Party, Sta. Act.	27-28 Field Day, this issue	



### 5 B DXCC

- No.12 -- OH2YV
- No.13 -- K4HXF
- No.14 -- K6KA
- No.15 -- W6NJU
- No.16 -- W3MFW
- No.17 -- W4GK
- No.18 -- W2PV
- No.19 -- I1AMU
- No.20 -- I1ZV

one who asks for an A-1 Operator Award fails on the basis of judgment and courtesy. It just isn't done, you know.

When informed of the existence of an award, the average award seeker who is used to working long, hard hours in pursuit of his DXCC or his WAS or his code proficiency certificate, or otherwise extending himself in various ways, will feel somewhat frustrated in not knowing just how to "get" one. You don't go out after an A-1 or Public Service award. They are spontaneous recognitions of what you are or what you did. You don't go around pointing out to people what a topnotch operator you are or what a wonderful service you performed in an emergency. You don't fume and fuss because someone else got such an award while you, who deserves it a great deal more, were overlooked, forgotten or snubbed. You just continue being the kind of amateur who could be considered for such an award, and forget about it. Eventually, perhaps virtue will triumph. Perhaps not. In any event, you will surely have the inner satisfaction of knowing that your demeanor "best exemplifies the spirit . . . even if no one . . ." officially tells you so. Material rewards don't always come to the deserving; who knows, perhaps a heavenly award awaits you.

**Changes in FMT Procedures.** Four times each year, WIAW transmits a frequency measuring test (FMT) designed to give Official Observers and others an opportunity to check their frequency

measuring skill. OOs in Classes I and II are required to submit measurements within certain rather moderate tolerances twice annually in order to retain their classifications, or in order to qualify for appointment in these classes. Non-OOs, who measure "just for the heck of it," have also used the transmissions extensively.

In the distant past, only the February and September FMTs have been open to all comers, the May and November transmissions being announced to OOs only. On the other hand, anyone who submitted a reading was mailed a detailed, graded report on his performance as compared with the official measurement.

Effective with the September FMT, we are opening all Four FMTs to anyone who wishes to participate. For OOs, and prospective OOs, readings from any two of the four FMTs per year will be sufficient for qualification. For all others the tests will be "practice" except for once a year when any non-commercial frequency-measuring enthusiast may participate in an "Honor Roll" competition, the results to be run in *QST*.

This procedure will commence with the September FMT this year, and this will be the first "Honor Roll" transmission. Approximate frequencies and further details will be announced in August *QST*. Any entries received after the announced deadline (approximately two weeks after the run) will be ineligible, because at that time WIAW will transmit the official measurements in the form of a special bulletin. OO (and prospective OO) reports will be graded and reported (with a copy to the SCM) as usual. These and all other reports will then be tabulated, in order of average accuracy, in an Honor Roll *QST* listing, with a cutoff point at some still-to-be-determined percentage, and printed in the first available issue of *QST* - probably the December issue.

The other FMTs (Feb., May and November) will continue to be available for OO qualification but will be "practice" to the rest of you. The official measurements will be transmitted over WIAW a couple of weeks after the test and published in the first available issue of *QST* (probably May, Aug. and Feb. respectively).

### ARRL CERTIFIED AT 35-W.P.M. - JANUARY TO DECEMBER 1969

WA1CUN*	WB2SMD*	W4IG*	K6IH	WB8CAC	W0CJG
W1DDX	K2SOL	K4MD	W6JPW	W8DEW	WA0CWH/KP4
K1DLG	W3CN*	W4OX*	WB6NXX*	W8FF	W0HP
WA1GXC*	WA3HS1*	W4SM	W6ONL	K8MYU*	W0B*
W1IAU*	WA3JYB	W4TYE	K6OF	W9BHV*	W0KB
K11FJ*	WA3KZS	W5DF/3	W6QMC	K9DDA*	WA0PRL*
K1ZVU/W6KFV	WA3LAK*	W5FHN	W6RBK*	WA9HHH*	WA0RLQ*
W2BAX*	WA3LNL*	W5KFN*	WB6VGF	WA9LAE*	WA0SRJ
W2CLQ*	K3TVE	W5QGZ*	WB6WQH	W9RTP*	WA0STJ
W2GRD*	WA4AGT	WA5QQH	W7DUV	WA9UAW	W0UCE/3
WA2IAO	K4BSS/4*	W6BEC*	W7FHD	WA9VZM	VE2BPT
K2QDN	K4CR	W6FD	K7NHV*	W9ZTK*	VE3VH*
W2QIP*	W4HHN*	W6IG	W7SQD/W7DSJ	W0BV	PY2BKO

Eugene Merkel  
Silver Spring, Md.

John Penaz  
West Allis, Wis.

\*Endorsement Sticker

# DX CENTURY CLUB AWARDS

From February 1 1970, through February 28, 1970, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to the amateurs listed. The three columns at the right show issuances for radiotelephone operation.

## New Members

0I7BQ 240	K7JB 107	UR5NU 102	W6KUC 297	WA7CYB 120	DL2VS 106
0H2ZD 214	CW3AU 107	VE1AEJ 102	0H2ZD 210	PY1HT 118	118GC 105
WB2IEC 213	W4QYR 107	CE2BC 101	DL7BQ 174	WRHO 119	LU9D1V 104
F2QQ 157	JARQN 106	DI1UI 101	F2QQ 156	K6PZ 114	WA7IQY 104
W3FG 148	OB5AE 105	K3FPB 101	OK2DB 143	W7NML 112	HK4BNC 103
DJ0JK 143	WA2GWX 104	SM7AMV 101	CT1BT 141	DN3PY 111	W6PM 103
HW9E 137	K4QCL 103	W6G0R 101	E0KNZ 139	WA3LVX 110	ZS8A 103
7PAAB 132	K0LJH 103	K2ODZ 100	DMK 135	W9YGN 110	G5WNT 102
WA2YVK 126	W2FD 103	KP4DC 100	VE6MJ 129	VE1AR 108	CW9WR 102
DP8KA 125	W2PCD 103	OK3KQG 100	VE3WR 121	W6MG 108	YK5EF 100
JA1ANP 124	W3ECW 103	SP6BA 100	WA2YVK 121	W2CML 107	W6HF 100
WA3HSQ 123	W4WSX 103	W1LHY 100	JA6CNL 120	W8DKI 107	W6QVZ 100
SP3HQ 122	WA4MMO 103	W2MDM 100	UW0E 120	CT1TZ 106	W9QLM 100
DL3TU 121	WA6FKZ 103	WA2DNO 100	VE3EWQ 120		W6LN 100
WA7CYB 121	WB6SFA 103	WR2ZPW 100			
K8CCV 116	W4THH 103	W3BR 100			
JABAD 113	W4MS 103	W6QNY 100			
K1LFB 113	ZS5WH 103	W4SQH 100			
OD5AP 113	ZS6AR 103	W4SQA 100			
W8DKI 111	JA7TI 102	W7DVQ 100			
W4RMB 111	K4A8J 102	W8RAK 100			
PY1MCZ 109	K9ZMS 102	W4JG 100			
DBVC 107		YU7LAF 100			

## Endorsements

345	270	W1MDO	W1LJC	220	W8GHN	W3CDL
W9BG	K4EX	W2CU	W1ZL	I1WL	W6YB	W3CRE
320	VE6EWY	W32UH	W4WYF	K4LE	200	W4FOD
K0KH	260	W4WYF	W5AL	K8RWL	CT1JA	140
W6ISQ	K4GNS	W6DXG	W6DNG	WA2HSX	CT1UR	11ECF
315	K9JH	W6DNG	W6DNG	W3URF	K6GMO	K4PSJ
Z6YQ	0Z8SS	W6IPA	W6QMA	W4SAU	U3ACT	VE7JF
	SM6CKU	160	120	W6RPO	W2JEL	W1JN
310	U4SHI	DL8QP	H99Z	YU3OV	WA4GQZ	W2AUO
K8EHD	250	CH7P	LICZ	200	YV1QQ	W3HGV
OK1ADM	IJ3GG	SP8AE	K2KGB	W1CGX	Z1QC	W5AC
W1RPW	11FO	W4CB	K9BPV	280	240	W6MA
305	PY1RTX	W7RI	K9HKJ	HR1RAS	SM6KTU	W8YFK
SM7AAR	VE3CGO	W8MJE	EL7DD	W8HTV	WB6UO	0W3KV
290	WA4FDR	W9YGN	OZ4H		W8TWA	120
I1ZPB	W4SFBT	140	PY2RBD		Y4SRG	CT1PQ
DA3CT	JA7FDU	11ECF	W2EJW	270	K2QOU	CT1RR
ZL1AV	K2QOU	JA1AKH	W6JNM	SM4ATN	K8JH	K9KJJ
280	K4TSJ	SM6BTS	VE3CQA	VE4AU	OE1MEW	W4HDK
K5QHS	SM5RY	K8YVY	W2ZBK	WB2WJG	K4BFB	W4DWR
OH2BW	W1E2D	K9IR	WB2EJ	W6ZG	E23FN	W6RGO
W9HY	W6QUN	W1BQL	WB2JL	W6FJ	VR6RS	WASUGF
	W4TFG	W1JN	W4K8Q		W1HGA	
			WRPEM			
			W1HD			
			W8YMR			
			W1D6N/9			
			W6PKW			
			VE3CEA			

Endorsements issued for confirmations credited from February 1 1970, through February 28, 1970, are listed below. Endorsement listings from the 120 through 240 level are in increments of 20, from 250 through 300, increments of 10, and above 300, of 5. Totals shown do not necessarily represent the exact credits but only that the endorsement level has been reached. Four columns on the right cover radiotelephone.


This is not an extensive revision of our present procedure, but we hope will make the FM's more generally available and useful to the fraternity. - *WINJM*.

**Qualifying Run and Code Practice Schedules.** From time to time a rash of correspondence indicates a particular area needs further clarification. This past winter quite a few questions were received along with the following line: "The W1AW code proficiency information in *QST* arrived after the qualifying runs. Can't we get word on this sooner?"

Short of increasing the efficiency of postal deliveries (which looks doubtful at this writing!), steps have long since been taken to alleviate this problem by listing the qualifying run dates for both W1AW and W6OWP in the "Activities Calendar" for a 3-month period. In addition to this month, for example, dates are shown for the next two months. Frequencies and times change very seldom from run to run, and when or if they do

announcement of this is or will be made several months in advance.

Selected text for practice is also indicated monthly for specific nights. If this issue, for example, arrives much after the first of the month (way things are going right now you'll be lucky if it



**5 B WAS**

No. 1 - W1AX

No. 2 - W4IC

No. 3 - K9LBQ/7

No. 4 - W6ISQ

No. 5 - W8YEK

No. 6 - K0GJD

No. 7 - KH6SP

arrives at all!), you need not worry because the specific dates mentioned start about ten days into the month. For checking purposes, every W1AW practice tape starts out with a reference to the source. The tapes are run several times over a period of years before being discarded. — W1YYM.

### ARRL CODE PROFICIENCY PROGRAM

#### Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will simultaneously transmit a qualifying run on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz, at 0130 GMT May 12. (In converting, 0130 GMT May 12 becomes 2130 EDT May 11.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz, 0400 GMT May 7. (In converting, 0400 GMT May 7 becomes 2000 PDST May 6.)

#### Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions (each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10,13,15	7:30 P.M. EDST daily 4:30 P.M. PDST	2330 daily
5,7,10, 13,20,25	9:30 P.M. EDST Su,Th 6:30 P.M. PDST Sat	0130 MWFSu
"	9:00 A.M. EDST MWF 6:00 A.M. PDST	1300 MWF

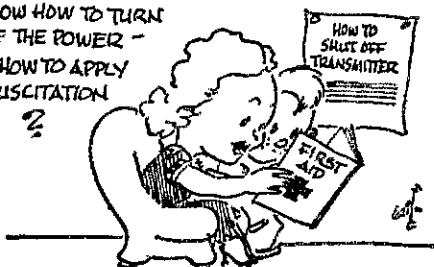
35,30,25, 20,15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThSu
"	9:00 A.M. EDST TTh 6:00 A.M. PDST	1300 TTh

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending in *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 texts to be sent in the 0130 GMT practice on the following dates:

- Date: Subject of practice text from March *QST*
- May 11: It Seems to Us, p. 9
- May 19: An Engineer's Ham-Band Receiver, p. 11
- May 27: High Versus Low Antennas, p. 20
- June 4: Amateur Radio Public Service, p. 52
- Date: Subject of Practice Text from *Understanding Amateur Radio*, First Edition
- June 5: Capacitor Types, p. 129
- June 8: Tuned Circuits, p. 129

QST

DO MEMBERS  
OF YOUR HOUSEHOLD  
KNOW HOW TO TURN  
OFF THE POWER —  
AND HOW TO APPLY  
RESUSCITATION



### W1AW SCHEDULE, MAY 1970

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. The station will be closed May 29, in observance of Memorial Day.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000				C. W.-OBS <sup>1</sup>			
0020-0030 <sup>4</sup>			3.700 <sup>6</sup>	14.020	14.020	7.150 <sup>6</sup>	14.020
0030			3.700 <sup>6</sup>	14.100	14.100	7.150 <sup>6</sup>	14.100
0100					Phone-OBS <sup>2</sup>		
0105-0130 <sup>4</sup>			3.820	50.120	145.600	1.820	21.270
0130			CODE PRACTICE DAILY <sup>1</sup> (35-15 wpm TThSat), (5-25 wpm MWFSu)				
0230-0300 <sup>4</sup>			3.555		1.805		3.555
0300	RTTY-OBS <sup>3</sup>				RTTY-OBS <sup>3</sup>		
0310-0330 <sup>4</sup>			3.625	14.095	7.095	14.095	3.625
0330	Phone-OBS <sup>2</sup>				Phone-OBS <sup>2</sup>		
0335-0400 <sup>4</sup>			7.220	3.820	7.220	3.820	7.220
0400	CW-OBS <sup>1</sup>				C. W.-OBS <sup>1</sup>		
0420-0430			3.700 <sup>6</sup>	7.020	3.945	7.150 <sup>6</sup>	3.520
0430-0500			3.700 <sup>6</sup>	7.080	3.945	7.150 <sup>6</sup>	3.555
1300			CODE PRACTICE <sup>1</sup> (5-25 wpm MWF), (35-15 wpm TTh)				
1700-1800		21/28 <sup>5</sup>	21/28 <sup>5</sup>	21/28 <sup>5</sup>	21/28 <sup>5</sup>	21/28 <sup>5</sup>	
1900-2000		14.280	7.255	14.280	7.255	14.280	
2000-2100		14.100	14.280	14.095	21/28 <sup>5</sup>	7.080	
2200-2300		21/28 <sup>5</sup>	21.100 <sup>6</sup>	21/28 <sup>5</sup>	7.255	14.280	
2300-2330					RTTY OBS <sup>3,7</sup>		
2330			CODE PRACTICE DAILY <sup>1</sup> 10-13-15 w.p.m.				

<sup>1</sup> 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.

<sup>2</sup> Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

<sup>3</sup> RTTY OBS (bulletins) 3.825, 7.095, 14.095, 21.095 and 28.095 MHz.

<sup>4</sup> Starting time approximate. Operating period follows conclusion of bulletin or code practice.

<sup>5</sup> Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

<sup>6</sup> W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

<sup>7</sup> Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1a QIS WPH. \* Times-days in GMT. Operating frequencies are approximate.

6CM — AREC — ORS — CP — SEC — OBS — TCC — OO  
**Station Activities**  
 OVS — A1OPR — EC — DXCC — CLUBS — RM — OPS — RCC

• 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. Appointment renewals, WA3KFF as OBS and K3KAJ as ORS. Advanced notice: The Delaware Hamfest will be held at Banning Park, near Wilmington on Aug. 16. WA3KFR has been appointed ORS. W3RDZ is back on the job serving as one of the top OOs in the country. K3JLY and Mrs. are proud parents of twins. W3EEG is having a ball working DX while on vacation in Arizona. W3TRC is to be complimented on his ability to quickly change modes during the SET to take traffic. W3DKX is preparing his new Ford for mobiling on all bands. K3UHU is active again on 6 meters. Field Day is near, fellows. How about going into it in a big way by participating with your local radio club? Traffic: (Feb.) W3DKX 33, W3PM 27, K3NYG 20, WA3DUM 11, W3TRC 9, WA3KFR 1. (Jan.) K3KAJ 24.

**EASTERN PENNSYLVANIA** — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3ICC. RM: W3ML, K3MVO. W3MPX. PAMs: K3PSO, WA3GLL, VHF PAM: W3BGO. OO reports were received from W3KEK, K3RDT, WA3BYV, K3HNP; OBS reports from WA3HGX, WA3MKQ, WA3FMI, WN3LEJ, WA3JFI, WA3ELC, W3CBH, WA3JKO, WA3IHV; OVS reports from WA3NVO, WA3BOJ, K3WEU, W3ZRR, WA3IOB, WA3LAZ, WA3HGX, WA3MCK. BPLers: W3EML, W3MPX, WA3IOB, WA3HBT, WN3LEJ, WA3FMI. Those making PSHR are W3MPX, K3MVO, W3EML, WA3FMI, K3JOJ, W3NNL.

Net	Freq.	Operates	QNI	QTC	RM/PAM
BPA	3610	6:45 P Dy	203	340	W3MPX
P1TN	3610	6:00 P Dy	203	145	W3MPX
PFN	3960	5:30 P M-F	549	335	K3PSO
PEP&TN	3917	6:00 P Dy	348	230	WA3GFI
Novice 80	3726	7:30 P Dy	75	40	WA3ISV
Novice 40	3170	4:00 P Dy	114	284	WN3LEJ

W3DXC, W3IDQ and W3ISE are all in W3EOS' power squadron class. We ought to hear some airmobiles soon! W3EML reports TCC holding its own. WN3LEJ is a busy Novice. K3MVO is now just as busy as before retiring. WA3IHV is half way to DXCC. WA3ATO still is busy with long haul, W3CUL and W3VR are basking in the Florida sun but pounding out traffic all the time. WA3CFU and WA3KAC are teaching code and theory at Penn State. Glad to hear WA3CKX's XYL is off the sick list. WA3INC, now with USN, will check into nets when he can. K3BNS, W3WJD and WA3EER made 1300 phone contacts in the DX Test. W3JET is now W3YQ. The two Novice nets have new managers. WA3ISV on 80 and WN3LEJ on 40. The boys are trying hard so give them some encouragement. Not much reported this month; how about giving me some news to publish? Traffic: (1Feb.) W3FMI 877, W3BIV 579, WN3LEJ 273, K3MVO 272, WA3LAK 189, WA3IOB 179, WA3HBT 171, K3PIE 171, WA3FMI 156, WA3MKQ 150, K3JOJ 128, WA3JFI 100, WA3IHV 75, W3HK 73, K3HNP 73, WA3GLI 67, WA3JGN 62, W3NNL 61, WA3ATO 51, WA3JZR 47, WA3GUK 45, WA3HGX 45, WA3CFU 44, W3HNK 40, W3VAP 37, WA3AZ 25, K3YVG 23, K3KKO 19, W3CBH 18, WA3CKA 17, WA3IYC 12, W3ISX 10, W3YR 8, W3ADE 7, W3EPC 7, WA3MCK 6, W3BNS 5, WA3JKO 4, WA3NVO 4, W3CL 3, K3FOB 3, WA3BJQ 2, W3CC 2, K3JOE 2, K3BNS 1, WA3CMD 1, WA3EEC 1, W3EJ 1, WA3IAZ 1, WA3INC 1, WA3IIV 1, W3KEK 1, W3YO 1. (Jan.) WA3HBT 175, K3PIE 139, W3HNK 76, W3CK 1.

**MARYLAND - DISTRICT OF COLUMBIA** — SCM, John Munnolland, K3LEF — SEC: W3LOY. PSHR (Feb.): WA3IYS, WA3EVI. Appointments: W3LOY as SFC, W3GEB and WA3IWI as OBS, WA3IIV as OPS. Endorsements: W4FA as ORS and RM, WA3GUL as ORS. The traffic net summary published monthly heretofore will now be published quarterly commencing with the

Apr. report in July QST. WA3IJR made BPL again. W3OPO, former Air Force MARS SMD for Maryland-D.C., convalescing from surgery, wrote us a nice long letter about amateur and MARS activities. W3TN missed a lot of Valentine's Day and Florida State Fair traffic because his rig got laryngitis and he couldn't find a cure for it. Goddard ARC club station, WA3NAN, is on the air with an NC-200; WA3IUM is station mgr. W3HXF has his Advanced Class ticket and a lifetime membership in ARRL. W3ECP says K3HHP, formerly of Mitchellville, is now settled in his Gibstonia, Pa., OTH. W3BLE is improving slowly after another stay in the hospital. WA3NNG has been transferred to Penscola, Fla. K3NCM and WN3KBU checked in, QRU for Feb. W3CDO got back from Jamaica and Florida in time for the OOTC and YL/OM Contest. W3ZSR continues restoration of his station and now has a 75S-3B and a 3L "short beam" for 40 meters. WA3NGL/3 passed his Advanced Class exam and operated from the Naval Academy for the CW DX Test. W3FA says there's nothing better than a CW DX Test in full swing to make an OM de-bug his rig and antenna system fast. WA3AJR has become an ECARS enthusiast and is also working on a new RATT vfo. WA3EOP and other Antietam ARC members toured WHAG-TV; club station W3CWC now has a Clegg 22er. W3EOW keeps busy operating in public service nets. WA3IYS and other R1TY stations are operating a traffic net on 14.080 MHz Sat. at 2330Z. W3GKP received and positively identified moon-reflected signals on 2304.95 MHz from W4HHK for the first time on Feb. 17. The Foundation for Amateur Radio is actively pursuing a program for improving the growth of amateur radio. K3TJF reports that Comsat ARC now has club station WA3LOS on the air with an SB-301 and an SB-401 in Clarksburg, Md. Many thanks to W3LDD for a fine job as SFC for almost three years. His neighbor, WA3GXN, is laying in a supply of extra S-meters and grounding all pots and pans in anticipation of the day Walt completes his new SB-220 linear and starts chasing DX. Traffic: WA3IYS 545, WA3IJR 276, W3EZF 91, K3LEF 88, W3EJA 39, K3GZE 37, WA3EOP 35, W3IQY 31, W3ECP 29, WA3GXN 28, W3TN 25, W3EOW 20, WA3LJK 20, W3NWN 18, WA3IIV 17, W3EAX 16, K3LEF 16, W3PRC 12, K3QDC 11, WA3AJR 3, W3GEB 1.

**SOUTHERN NEW JERSEY** — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW. RM: WA2KIP, WA2BLV. PAMs: W2JL, WA2UVB. Gary Gibilisco, age 15, a student at the Steiner Jr. H.S. in Hamilton Square, is now ORS and passed the Advanced Class exam. Gary is a regular check-in to the NEPT Net. WA2WLN, a senior at Drexel in Phila, was reappointed ORS and plans renewed cw activity beginning with spring activities. WB2GDY recently was appointed OPS and ORS. Ralph is 36 years of age, a student at Nakomis School in Medford Lakes, N.J., and holder of an Advanced Class license. WB2DRG made the Jan. Honor Roll with the following score: (1) 10 pts, (2) 5 pts, (3) 16 pts, (3) 12 pts, for a total of 43 pts. K8JLE totalled 18 pts. toward the Jan. Honor Roll. This is exceedingly good for we must remember that Dave carries a full college schedule at Princeton, U. OBS K2ARY continues to serve our area with a transmission of League Bulletins. Because of pressures of one sort or another some of our members find it impossible to be with us as often as they would like. However, they plan to be back as soon as conditions permit. Among these are K2SHE, WA2DNF, W2ZL, W2ISZ, W2CZD and WA2FGS. The South Jersey Radio Assn. has been affiliated with ARRL for 50 years as of Apr. 1, 1970. W2PEV, NEPTN mgr., reports QNI 616, traffic 412 in 28 sessions for Feb. WA2ANI, although located in New York State, now is a regular check-in to the NEPT Net. Traffic: (Feb.) WB2VEI 143, W2PU 82, WB2GDY 40, K2RKB 35, W2BLM 25, W2YPZ 23, WB2EJE 12, WB2SEF 8, W2ZQ 4, WB2HMU 3, W2LD 3, W2ORS 2. (Jan.) W2Q 3.

**WESTERN NEW YORK** — SCM, Richard M. Pitzeruse, K2KTK — Asst. SCM: Rudy M. Ehrhardt, W2PVI. SFC: W2RUF. Renewed appointment: K2ACQ as OVS. The NYPON has added a cw session with WA2CAL as net mgr. It meets daily on 3790 kHz at 6:30 P.M. local time. Other section nets are listed in this column in Feb. QST. WXXI-TV, Rochester, previewed the new ARRL film "A Hams Wide World" on Apr. 7. WB2YEF is feverishly working on his mobile rig. W2EMW is having a bit of receiver trouble that is putting a crimp in his DX style. WB2NZA is going back to Northeastern U. for more learning. WA2AJV reports the SET most interesting despite blowing up the rig on it. W2RUF terms the SET a disaster in itself. K2RXC, I am told, is doing a commendable job on NYPON.

W2CFP spoke at the WCARS meeting at SAROC. WN2EWC passed his General and will be QRV for skeds from rare Wyoming County. Bob is looking for an Alaska station to complete his WAS. As difficult as it may be to comprehend, W2FR is now on sbf I might add, though, that Howie has completed working the necessary goodies for 5-band DXCC - all on cw. W2BLP has himself a new Signal/One. WB2MWZ, a relative newcomer to WNY, is doing a magnificent job as NCS on NYSPTFN. W2RUF would like hear from hams in Alleghany, Chenango, Clinton, Essex, Herkimer, Lewis, Livingston, Otsego, Schoharie, Schuyler, Seneca, Washington, Wyoming or Yates County for work in NYSN and ARFC. W2HYM and W2FCG are new ORSs. K2PVN reports the Gowanda Amateur Radio Group is progressing with its fm repeater. NYS handled 540 messages with 667 check-ins in Feb. ESS handled 286 messages with 49 different stations on its roster. Would like to hear from more of you traffickers, both phone and cw, for the individual station listings. Don't forget the Rochester Hamfest on May 16. HPI this month go to stalwarts W2QE and WA2CAL. ARPSC Honor Roll: W2s, FR, MTA, RUF, OC; WA2s, ICU, DHS, CAL; K2s, KIR, KTK. Traffic: (Feb.) WA2CAL 573, W2FR 324, W2OC 239, W2RUF 200, W2QE 177, W2FEB 138, WA2ICU 138, K2KIR 125, W2HYM 119, W2MTA 112, WB2HLI 70, WB2VND 61, W2MSM 60, WA2CUZ 46, W2ROF 45, WA2AJV 29, K2UIR 26, K2KTK 21, K2NDN 12, K2JMI 12, K2OFV 12, WA2IYB 11, W2PVI 11, W2DBU 9, WB2NZA 9, W2ZPL 9, WA2GLA 7, W2RUT 7, WB2YKY 7, WA2ILE 5, WB2FPG 4, W2CFP 2. (Jan.) WA2ANE 9, WB2FPG 4. Total 2740. Last year 3884.

WESTERN PENNSYLVANIA - SCM, G.R. Stoneburner, WA3AKH - SEC: W3KPI. PAM: W3WFR, K3ZNP. RMs: WA3AKH, W3KUN, W3LOS, W3NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT 3585 kHz; WPP, 0300 GMT 3955 kHz. W3GJY announces that the Harold Link W3SIR Memorial Award for 1969 will be presented to W3YA, with honorable mention to K3VVO. The Penn State ARC is sponsoring classes for those interested in a first license or in upgrading. The New Kensington Campus of Penn State U. has a club station with the call WA3NTM. W3TON graduated from Penn. Tech. with a 1st-class radiotelephone license. A group of vht enthusiasts had to carry some of its gear up the hill to operate W3KWH during the Jan. contest. W3FVW is working out well with his new Swan 270. Note these hamfest dates: Breezeshooters, May 17; Somerset, June 7; Foothills, June 14; Uniontown, Sept. 5; Skyview, Sept. 13; Two Rivers, July 19. WA3IPU reports that K3QPK will be the "call in" station on 6 meters and W3LWF the "call in" station on 75 meters for the Foothills Club Hamfest. The Radio Assn. of Erie is making tentative plans for a three-day expedition to Serrana Bank or Roncador Cay sometime in June, July or Aug. The FCC has granted permission to operate under the call W3GV/KS4B. The attractive Erie Pennsylvania Award is available for working ten Erie hams. Send your list, including date, time and frequency, to RAF, P.O. Box 844, Erie, Pa. 16512. We welcome K3HSP, formerly of Maryland, to Gibsonia. License upgrades: WN3JPI, WN3KSA and WN3NCH to General; K3ZNP to Advanced; W3NDH to Extra Class.

Net	Sessions	QNI	Traffic
WPA	28	316	195
KSSN	20	118	38
WPP	14	110	40

Traffic: (Feb.) WA3IPU 365, W3NEM 155, WA3AKH 144, W3KUN 143, K3ZNP 143, K3HKK 126, W3LOS 106, K3HCT 40, WA3JBN 36, WA3FXX 33, K3SMB 25, W3JDO 14, WA3BLF 10, K3SJN 10, K3SOH 9, W3FL7 3. (Jan.) W3NEM 350, K3HKK 176. (Dec.) W3NEM 238, K3HKK 185. (Nov.) W3NEM 181, K3HKK 146.

**CENTRAL DIVISION**

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. RM: WA9ZUE. PAMS: WA9CCP and WA9PDI (vht). Cook County FC: W9HPG. Net reports:

Net	Freq.	Times	Days	Tfc.
LEN	3940	1400Z	Su.	4
ILN	3760	0000Z	Dy	218
NCNP	3915	1300Z	M.-Sa.	160
NCNP	3915	1800Z	M.-Sa.	160
HL PCN	3915	2245Z	M.-F.	716
HL PCN	3915	1430Z	M.-F.	716
HL PCN	145.5	0200Z	M.-W.F.	17
HL PCN	50.28	0200Z	Dy	2
Gr Lakes	39.52	0230Z	Dy	93

The Pioneer Amateur Radio Club of Normal High School and the Southeast College Radio Club of Chicago have been approved as duly affiliated societies by the League's Executive Committee. This column's sympathy goes to the family and friends of W9IPB, of Pekin, who recently joined the ranks of Silent Keys. W9HRY reports the 9th Regional Net had a traffic count of 491 during Feb. W9BSM spoke on "The Manufacture of Welded Pipe and Tubing" at

the Feb. meeting of York Radio Club. WA9RSK is winner of the Jack Benny Contest with 839 ham years in 66 contacts. WA9UC K9ORP and K9GXR are the new officers of the Central Illinois Radio Club (Bloomington). WN9ZFR is now WA9ZFR. The Chicago Suburban Radio Association Hamoree was an FB success and many an eye-ball QSO was held by the gang. The Wheaton Community Amateurs had a superb program on Atom Smasher given by W9EKK at its late meeting. The new officers of the St. Clair County ARC are WA9RTP, WA9YBA, WA9CEO, W9TRO and WB9AXG. WA9TUM and WA9TVJ passed the Advanced Class test and WN9AYL is now a General Class licensee. K9KLA is vacationing in sunny Florida. WA9LHU has accepted the office of Civil Defense Officer of DeWitt County and City of Clinton. Glad to see an Starved Rock Club's *Static* again in print. WB9AOF is a new call in Batavia. New Novices from Syton ARC's classes are WN9DXX, WN9DKA, WN9DKB, WN9DKC and WN9DKD. W9EY worked his first JAs on 40 meters. W9PVD has his SB-101 finished and on the air. WA9MLEJ has accepted a position with Motorola. W9IDKJ, back on the nets after a short hospital visit. Traffic: (Feb.) K9AVC 448, W9NXX 306, WA9WNH/9 266, W9FVJ 176, WA9MLEJ 138, WA9ZUF 93, W9HOT 72, W9IXV 69, W9FHJ 64, W9LNO 64, W9FUN 55, W9FLF 41, W9DOO 40, WA9TCC 35, WA9BRQ 33, WA9NZF 30, K9RAS 22, W9YH 20, W9LDD 14, K9HSK 12, W9PRN 12, WA9ZPL 8, WB9AJB 7. (Jan.) K9RAS 23.

INDIANA - SCM, William C. Johnson, W9BUO - SEC: W9FC. PAMS: K9CRS, WA9OHX, W9PMT (vht). RMs: WA9WMT, W9FC, W9HRY.

Net	Freq.	Time	Feb. Tfc.	Mgr.
IFN	3910	1300Z Dy	2300 M-F	286 WA9DXX
ISN	3910	0000Z T-S	2130 M-S	406 K9CRS
			2300 S-S	
QIN	3656	0100Z Dy	230	WA9WMT
PON	3910	1345Z Su.	240	WA9YXA
PON VHF	50.75	0100Z Dy	0200	106.5 WB9AMB
Hoosier VHF	50.175		104	W9PMT

Ind. PON VHF Net is on every evening 0100 and 0200Z on 30.175 ssb, 50.250, 50.7 am. New officers of the Hoosier Hill Ham Club, Inc., are K9BEH, pres.; K9RTK, vice-pres.; WA9LFZ, secy.; W9CNL, treas.; K9BGF, chmn. W9FDO, QIN Net Mgr., left for National Guard Mar. 3 for six month's training. W9EGG is our new Assistant Director. QIN will change net time when the clocks are moved up one hour to 0000Z. A new Novice at Seymour is W9NCUT. W1DRN/9 made DXCC with a long wire. K9YBZ had his Pacemaker replaced and is doing fine. K9CLG and W9DUD have returned from Florida. W9EUM is still down there. Indianapolis Radio Club, founded in 1914, is having a membership drive all this year. To all FCs, send your reports, to W9FC, Cliff McGuyer, 2900 East Oak Street, Evansville, Ind. 47714. OMK Radio Association will hold its Annual Meeting at Angola, Ind. at MAR-Fran Motel June 13-14. Lake County Banquet on Feb. 14 at Schererville had a very good attendance. I was one of the speakers; my subject was communication. QIN Honor roll: W9BDP 23, W9JBO 21, WA9ZKX 17, K9HYV 17, K9HYR 17, W9QLW 16, W9MZV 15. *Amateur radio exists because of the service it renders.* BPL certificates went to W9JYS, K9FZX, WA9QO, W9JBO, WA9YXA, W9EOO, WB9AMB. Traffic: (Feb.) W9JYG 1263, K9FZX 1227, WA9QOO 918, W9JBO 826, WA9YXA 601, W9FDO 558, W9ICU 453, WA9VZM 338, W9WBA 300, K9HYV 292, W9HRY 216, WB9AMB 210, WA9TJS 208, WA9WMT 120, WA9NYU 119, K9CBB 111, W9BUQ 90, WA9OHX 76, K9JON 69, K9HYV 64, K9CRS 56, W9VAY 56, K9RPZ 52, K9YBM 49, K9VHY 40, K9RWO 37, K9EY 33, WA9OAD 32, W9FC 29, W9QLW 29, W9YB 29, W9BDP 27, K9JON 27, W9YXY 26, WA9GJZ 24, WA9NIJ 20, W9RTH 20, W1DRN/9 17, K9ILK 16, W9DZC 15, W9FHH 15, WA9MBX 14, WA9VRC 13, W9JMI 12, WA9AXF 11, W9LGO 10, WA9WJA 9, K9HJH 8, W9PMT 8, WA9WSX 8, W9CMT 7, WA9OQO 7, W9SNO 7, WA9CHY 6, WA9BHG 4, W9HWR 3, K9WGN 3, W9JGE 2. (Jan.) W9WBA 239, W9QI W 8.

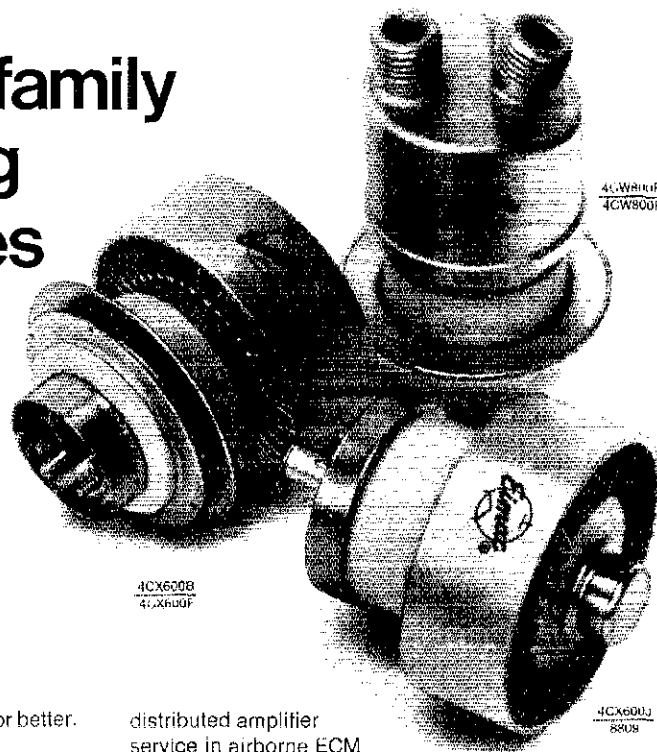
WISCONSIN - SCM S. M. Pokorny, W9NRP - SEC: W9NGT. PAMS: WA9E2T, WA9JZK, WA9OAY, WA9QRP, WA9QNI. RMs: K9KSA, WA9TXN.

Net	Freq.	GMT	QNI	QTC	Mgr.
BWN	3985	1245 M.-Sa.	343	186	WA9OAY
BEW	3985	1800 Dy	751	54	WA9QKP
PON	3925	1801 M.-F.			W9VCM
WSBN	3985	2300 Dy	1321	185	WA9QNI
WSSN	3780	0930 TFSa.	86	14	K9KSA
WIN	3662	0115 Dy	329	137	W9TXN
WRN	3620	0130 Sun.			K9GSC
SW6RN	50.4	0300 M.-Sa.	151	2	WA9E2T
SW2RN	145.35	0230 Dy			WA9JZK
RACES	3993.5	1400 Su.	53		

Net certificates went to W9CFB (BEN), K9KSA (WIN), WA9QYC (WSBN). New appointees: WA9ZTY as OPS and OVS. Renewed appointments: W9CBE and K9KJT as OBSs; K9KSA as OPS;



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4CW800B 4CW800F	6.0	890	5-PIN SPEC	Liquid	3000	0.6	700W	WIDEBAND AMPLIFIER SERVICE
4CX600J 8808	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE

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# So we moved ahead of them.

W9CBF and K9KSA as ORSs; K9KSA as RM for WSSN. WA9TXN is on ssb with an HW-12. K9KSA reports NC's on WSSN is now rotating so everyone gets a chance at it. A new harmonic (boy) arrived at K9KSA's Feb. 14. W9OMT has a new SB-630. We need more outlets on WLN and WSSN. W9CXY made the BPL in Feb. Your activity reports, net reports and other news items must reach your SCM no later than the 5th of the month to be included in previous month's report. Radio clubs, advise me of your activity and officers. The next WNA meeting will be held Sat. afternoon, June 20 at W9DXV. Advise your net managers that you would like to have representation at these meetings. Traffic: W9CXY 572, K9CPM 274, W9DND 176, WA0VYK/19 171, WA9QRP 84, WA9QNI 81, WA9TXN 67, W49OAY 56, W9EJF 49, W9R1P 49, K9FHH 43, W9NRP 43, K9RBY 41, W9IHW 33, W9NBJR 31, WB9ABF 27, K9KSA 26, K9JPS 24, W9BBI 23, WA9SAB 21, W9Y1 21, WA9PKM 19, W9HCH 16, W9DXV 15, W9KRO 14, W9OMT 12, K9OAE/9 10, WA9HEB 10, WA9IHF 8, WA9NBU 6, WA9ZTY 5, W9QNI 4, K9UTQ 4, WA9EDZ 2.

### DAKOTA DIVISION

MINNESOTA - SCM - Larry J. Shima, W0PAN - SEC: WA0MZ. PAMs: WA0FJ, WA0HRM, K0GYO, WA0MMV. RMs: W0AAU, WA0IAW, WA0URV. VHF PAM: WA0DWM. Reter to last month's column for Section Net listings. Cloquet Senior High Amateur Radio Club is a new ARRL affiliated club. If your club isn't all affiliated club, contact the SCM for information on becoming one. W0ADO is a new RCC member. WA0WCR and W0WRA were married at Lackland AFB Chapel. WA0GBW and WA0EWF are on K1TY. W0AJA has worked 25 states in 6 weeks on the air. W0ZPU has worked 49 states and 9 countries. WA0ZTU is a new General. The Arrowhead Radio Amateurs Club meets the 3rd Fri. of each month at WA0BJY's QTH. W0KFN, the XYL of W0EIH, recently passed away. Appointments acted upon in Feb.: WA0VPK, WA0WEH, WA0URW and W0PAN as new ORS; WA0VYV as new OPS; K0JUL renewed as ORS; WA0MZW renewed as SEC; K0SXP renewed as Belfram County EC. W0AAU is the new RM for MJN. Our sincere thanks go to WA0RRA for doing a tremendous job as MJN RM. During her term of office, MJN increased significantly in activity. WA0URW has been appointed RM for the Minn. 40-meter CW Net. Activity has greatly increased on this new net. Traffic: (Feb.) WA0VAS 1993, WA0TQ 583, WA0MMV 288, K0ZRD 196, W0BUC 177, WA0IAW 169, WA0VYV 150, WA0WEZ 139, WA0VTZ 138, WA0HRM 107, WA0RRA 96, WA0EJF 89, W0FHH 84, W0ZHN 84, WA0TGM 82, W0KRN 69, W0PAN 68, K0MYT 67, WA0RKY 54, WA0TFC 52, WA0UAI

### 4TH ANNUAL MINNESOTA QSO PARTY

This contest, sponsored by the Viking Amateur Radio Society, will take place on June 6 (phone) from 0000-0400 and 1600-2000, cw is from 1200-1600 and 2000-2400. Either phone or cw from 0400-0800. All times in GMT. It is open to all amateurs. Stations may be worked once on cw and once on phone on the same band, except during scheduled net sessions. (Only one transmitter may be used at any one time.) Minnesota stations may work each other. The exchange will be QSO number, RST/C and county for Minnesota stations. All others send QSO number, RST/C and section or country. Logging information: to the contact exchange information plus date, time, band, mode, multiplier lists and score computations. Suggested frequencies: CW 3580 7080 14080 21080; phone 3980 7280 14280 21380 and 29600. Contacts on any other bands or frequencies are valid and encouraged. On all bands, particularly 75/80, please listen carefully for nets and avoid them. Scoring system: Minnesota stations multiply total QSOs times your multiplier (which is the total number of different ARRL sections and countries worked on cw plus the total number of different ARRL sections and countries worked on phone). Minnesota may be counted as a section, if worked. Countries must be listed on the ARRL countries list and may not include or be a part of any ARRL section. Mobile stations operating in different Minn. counties are scored separately for each county. Mobiles must also make 20 QSOs in one county to be eligible for a certificate. A Minn. station using an antenna which crosses a county line will send both counties in his report. 50% of his total score will be used as his score for each county. Stations outside of Minnesota multiply total Minnesota QSOs times your multiplier, which is the total number of different Minnesota counties worked on cw PLUS the total number of different Minnesota counties worked on phone (possible 87 on each mode). Awards: First place award certificates will go to the highest scoring station in each section, provided that station makes at least 5 QSOs, and to the highest scoring station in each Minnesota county, provided that station makes at least 20 QSOs. Special certificates to top scoring Minnesota and non-Minnesota stations. Logs must be postmarked on or before June 25. Send your log to Viking Amateur Radio Society, Box 3, Waseca, Minnesota 56094. Please include any suggestions you have for improving this contest. A self-addressed stamped envelope should be enclosed if certificates or the published results are desired.

51, WA0ZND 49, WA0URW 48, W0PET 40, WA0RKF 33, WA0NQH 32, WA0VJK 32, W0WAS 27, WA0DWM 26, WA0WVF 24, W0YC 19, WA0RUI 17, W0LYP 16, WA0DOT 15, K0JUL 15, WA0YMU 15, WA0TYL 14, WA0WNJ 14, K0FLT 13, W0NYAH 11, W0HT 10, K0ORK 10, W0KLG 9, K0ZWG 9, W0QXA 8, K0SXP 8, W0NYVT 8, WA0VDG 7, W0BUO 6, WA0CIU 6, WA0JPR 6, W0EOU 5, W0MBD 5, W0SZJ 5, WA0MNF 4, K0ZBI 4, WA0JPS 3, WA0FZ 2, K0JKU 2, WA0JYB 2, W0QXA 2, WA0UTQ 2, W0BE 1, W0LTK 1, (Jan.) WA0VPK 56, W0EIT 25, WA0EZQ 4, W0NYVT 3, K0XZE 1.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. OBS: K0SPH. PAM: W0CAQ. RM: WA0RSR. OD: W0BE. WA1RT/0 has the new SB101 on the air. W0CAQ's XYL was in the hospital. WA0RSR lost the big tower in a recent windstorm. W0GGA took a long swing south and to Mexico. K0RSA returned safely from a jaunt to California and Mexico. W0LWJ was retired Mar. 1 from IHC and was presented with a Galaxy 550. W0BE has done some nice work on frequency measurements and also in tracking the OA-5 with success. The Bismarck Club has closed its code and theory classes. WA0RSR is pleased with the response to the CW Net invitation. WA0VMA, WA0UNA and WA0GJU are serving as net controls. W0LPE is hospitalized in Bismarck. WA0RWL received the Eagle award at a Feb. Court of Honor. LEN mgr. reports that WA0HUD made 50 out of 52 sessions and WA0RSR made 2 last month. Congrats to W0NMV for his work in the traffic department. The Minot Amateur Radio Club held its annual dinner meeting and elected W0HVA, pres.; K0GRM, vice-pres.; WA0LXC, secy. New calls in the state are W0AAUM, W0BATJ and W0BATI. The classes held at the UND yielded the following calls: W0NATZ, W0NAAU, W0GABU, AUC, AUD, AUE, AUF, AUG, AUH, AUI, AUJ, AUK, AUL and AQN. Of this group W0NAAU, W0NAAU and W0NAAU are on 40 meters. The Fox Club held a dinner meeting at which the ARRL film "Ham's Wide World" was shown and slides were shown by WA0SDQ on the International Snowmobile Race from Winnipeg to St. Paul. W0CGM has been bitten by the teletype bug. W0DM replaced some tubes in the SR-150 so is back in business.

Net	Freq.	Sess.	Ck-ins	Tlc.	
Goose River	1990	4	44		W0CDO
ND CW	3640	22	139	17	WA0RSR
YL WX	3994	28	729	564	WA0GAA, MND W0NMV
RACES	3996.5	39	1054	71	K0SPH
PON	3996.5	12	300	14	WA0HU

Traffic: W0NMV 182, WA0HUD 154, WA0RWM 43, WA0JPS 39, W0WWL 32, K0SPH 30, W0DM 29, WA0MND 29, WA0EJR 28, W0FNZ 26, W0BE 20, W0CDO 18, WA0UKD 8, WA0JPF 3.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPK - WA0VJG, of Centerville, got his General Class license in Jan. Several new Novices will be on the air from Winner shortly. W0ATF is a new ham in the Sioux Falls area. The Brookings Radio Research Club is sponsoring an Explorer Scout post. K0ZTV is leaving for Iowa to work on his graduate program. WA0PNB is the new PAM for out-state, while W0NEO takes over as manager of the late net and W0BLG turns over the NJQ net manager post to WA0RNE. W0RRN, of Sioux Falls Amateur Radio Club, is to be congratulated on 22 years of service teaching theory classes to amateurs. Net reports: Morning, QNI 420, traffic 235; NJQ, QNI 399, traffic 57; Early Evening, QNI 620, traffic 25; Late Evening, QNI 1301, traffic 47; AREC, QNI 48, traffic 8. Those having a traffic count of over 25 are W0ZWL/0 WA0SKA, WA0LEN, W0IG, W0CAS and WA0PNB.

### DELTA DIVISION

ARKANSAS - SCM, Robert D. Schaefer, WA5HS - SEC: W5PRZ. RM: W5NND. PAM: W5ASKJ. Welcome to new Novices W5SQA, W5NACR, W5SACU in Forrest City and W5SASH in Russellville. W5ARBH successfully tracked Oscar S. W5ASKJ has been working good DX on 10 meters with a dipole and plans to put up a quad. W5RXU is the new FC for Central Arkansas. The Lt. Smith ARC is conducting Novice classes. The newly-organized club in Forrest City is 100% ARRL. W5GVO and W5ZGI passed the Advanced Class exam. Net reports for Feb.

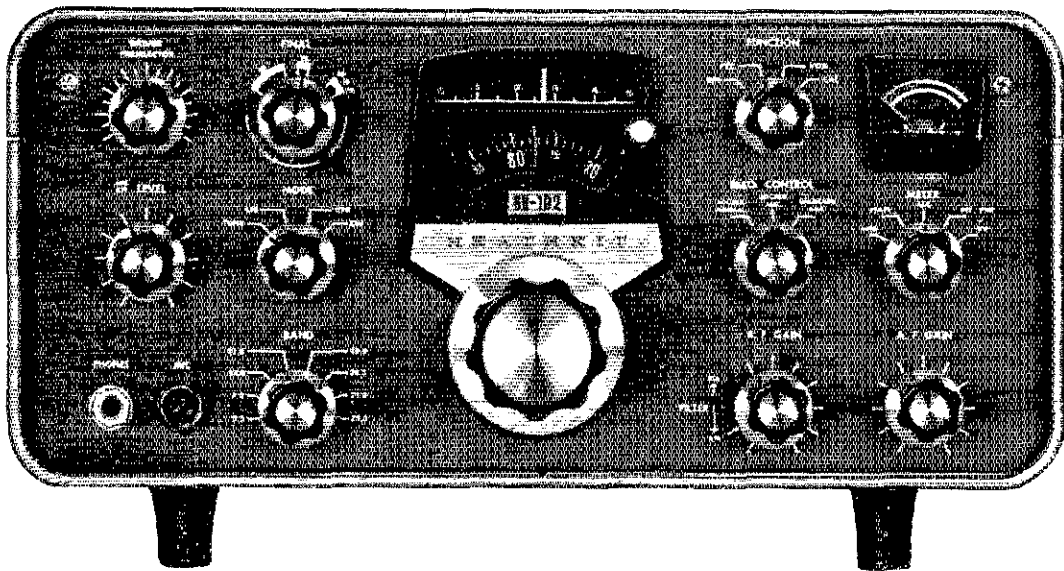
Net	Time	Freq.	T/c.	QNI	Min.	Mgr.
OZK	0100Z	3790	47	192	601	W5LUS
RN	0030Z	3968	32	480	508	W5ASKJ
APN	1200Z	3937	2	417	1284	W5VFW
PON	2130Z	3925	21	384	491	W5ATB
Teetage	2330Z	3998	14	106	275	W5AQO
LC Net	0000/1 Su	4498				W5PRZ
EX Info	0045Z M	3860				W5EFL

Traffic: W5GVO 1353, W5NND 261, W5VFW 39, W5LUS 36, W5VWH 27, W5PBZ 12, W5AJB 12.

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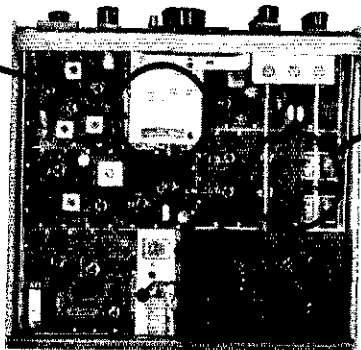
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- SBA-301-2, 400 Hz CW Crystal Filter, 1 lb. . . . . \$21.95\*
- SBA-100-1, Mobile Mounting Kit, 6 lbs. . . . . \$14.95\*

(TALC): 10 dB or greater at .1 ma final grid current. **GENERAL: Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 Hz per hour after 10 minutes warm-up from normal ambient conditions. Less than 100 Hz for  $\pm$ 10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Visual Dial Accuracy — "resetability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration or nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz  $\pm$ 3 dB. **Phone patch impedance:** 8 ohm receiver output to phone patch; high impedance phone patch input to transmitter. **Front panel controls:** Main (LMO) tuning dial; Driver tuning and Preset selector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch; Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutralizing. **Rear Apron Connections:** CW Key jack; 8 ohm output; Spare A; Spare B; Phone patch input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —115 volts at 10 ma; 12 volts at 4.76 amps. **Cabinet dimensions:** 14 $\frac{1}{2}$ " W x 6 $\frac{1}{2}$ " H x 13 $\frac{3}{4}$ " D.



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ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

LOUISIANA - SCM, J. Allen Swanson, Jr., W5PM - SEC: W5OB. RM: K5ANS/5. VHF: PAMS: WA5DXA, W5UOR. The Baton Rouge ARC will hold its Annual Hamfest May 2 and 3. Up Alexway W5BBV and WA5RZC passed the Advanced Class exams. WA5EVU has announced that the Rapides Emergency Net now meets on 5912 Sun. at 1400 GMT. Yours truly had a visit from Vice-Dir. W4WBK. The FCC is proposing rule changes, etc., for vhf repeaters. K5ANS has a new construction project for handling self-starting and stopping RITY! W5CEZ says that MARS got most of his traffic. W5FA is trying to repair receiver troubles. Members of the GNOARC were given a most interesting antenna display and discussion recently by Carl Mosley's gang. Congrats to WNSVYP and WA5ZVB, who recently passed their Generalship! K5BLV is the proud owner of a new NCX-500. Howard works 80, 40, 20, 15 and 10 and uses all modes. W5PFT has been elected pres. of the Ozark ARC at Slidell, WA5UMK was elected vice-pres. WA5QXII secy-treas. WA5SNS is St. Tammany Parish EC replacing W5PFT. WA5WBZ is most active on LAN. The Calcasieu Police Jury presented a plaque to the Southwest Louisiana ARC for its service to the Parish. WA5NUR's work schedule kept him from the DX Contest! W5MBC, LAN Net Mgr. urgently needs help in the form of outlets in Baton Rouge and New Orleans. LAN meets daily at 0030 and 0400 GMT on 3615. Fellows, I have been persuaded by several clubs in the state to run for another term as SCM. This is very pleasing to me and thank you. Traffic: (Feb.) W5MI 215, W5CEZ 77, WA5WBZ 76, W5MBC 52, WA5NUR 11, W5EA 6. (Jan.) K5ANS 64.

MISSISSIPPI - SCM, Clifton C. Comfort, WA5KEY - New Asst. Directors for Miss. are WA5APS, WA5UYW, WA5JWD, WA5KLY. The MSBN Winter Picnic was a real success, thanks to WA5UBO, WA5YJA, WA5WJP and others. Field appointments made or endorsed were: W5KDM as EC; W5SBM as ORS; WA5RXV, WA5UYW, WA5YJA, W5HTV, W5SBM, W5HZQ, W5NCB as OPSs; W5BW, W5HTV, WA5RXV as OVSs; WA5SEG as OD. Interest is building on the Gulf Coast in 2-meter fm, with a repeater in the works. Those now operating on 146.94 MHz are WA5UFG, WA5YIH, WA5UOD, WA5KYB, W5PDG, W5SAAI, WA5PBL, W5IBO, WA5SUE, plus many others at Keesler. There is more interest in RITY, too. K5FFA is on the air, WA5UBO is gathering gear, WA5UYW, with W5HTV reading instructions, is almost there! W5SBM is working on reorganization of the Miss. CW Net. It is to be a slow-speed traffic and training net, tentatively on 3665 kc at 0045 GMT daily. WA5PTE is scheduled to transfer to the Philippines. A new Novice is WNSAXL. The bill on Emergency Amateur Radio Mobile units with a reduced tag fee was still in committee at last report. Jackson ARC is planning a Ham and Swapfest for May 31. Contact W5MUG or W5EVY for details! Traffic: W5SBM 131.

TENNESSEE - SCM, Harry A. Phillips, K4RCT - SEC: W4WJH. PAMS: W4PEP, K4MQI, WA4EWW, WB4HHH. RM: K4AMC.

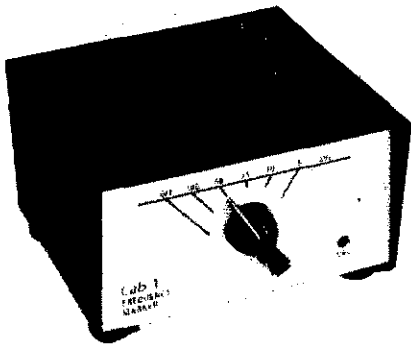
Net	Freq.	Time	Sec.	QNI	QTC	Mgr.
TSSB	3980	0030 Tu-Su	24	1544	151	K4MQI
IPN	3980	1245 M-Sa 1400 Su	25	1134	67	W4PEP
E1PN	3980	1140 M-F	20	574	36	WA4EWW
IPON	3980	0030 M	4	141	19	E4RTA
FTN	7270	2200 Dy	25	191	98	WB4HHH
TN	3635	0100 Dy	28	152	100	K4AMC
FTVHF	145	0000 T-T	5	74		WB4IOB
TOMNN	50.1	2h&S	5	108	5	K4LOU
FTVHF	50.4	0000 MWF	12	176	2	WB4IOB
FTTMN	28.8	0230 W&F	5	83	8	WA4YON

Reda Rogers, a blind YL, will soon be on the ham bands, thanks to EC W4RMI and many generous hams. K4LOU participated in a S-state round table on 6 meters Feb. 18. ORN WB4JFT reports Explorer Post 15 operated WN4MSN/4 during the Novice Roundup. EC WA4YFG reports the Humboldt ARC has purchased thirty 2-meter units to be used on its 2-meter net. The Radio Ops. Club of Oak Ridge will again sponsor the Crossville Hamfest July 18-19. WA4YFM is hamfest chairman. Traffic: WA4JTT 368, WA4UC 205, W4OLG 179, K4AT 178, WB4HMA 146, WB4JFT 124, K4AMC 80, WA4YFG 78, WA4UAZ 73, WA4GLS 41, WB4ANX 28, WA4ZXZ 26, W4JFP 25, WB4JIE 20, WA4NLC 18, K4LOU 17, WB4NAL 17, WB4GIW/4 16, W4VJ 16, WB4HLJ 15, W4SGI 15, WB4EHD 14, WA4YEM 14, WB4NDX 12, K4PUZ 10, K4SXD 9, WB4JTS 8, W4PSN 8, WB4GSS 7, K4LOU 7, WB4DYJ 6, W4TYV 6, WA4EWW 4, W4SGI 4.

**GREAT LAKES DIVISION**

KENTUCKY - SCM, George S. Wilson, III, W4OYL. SEC: W4VYS. Appointed: WA4ELT as OVS. Endorsed: WA4DYL and WA4WWT as ORSs; W4KJP and K4CSH as OPSs; K4FPW as OBS and OVS.

Net	Freq.	FST	QNI	QTC	Mgr.
KRN	3960	0030	190*	26	W4BEJ



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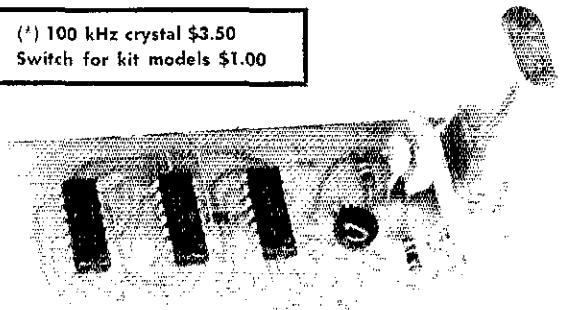
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KYN	3600	20 & 2300	340	347	W4BAZ
FOATN	50.7	2100	188	337*	W40TP

W4ZLI and WB4FLA upgraded to Extra, WB4MOR to Advanced. Emergency power is at WB4HTN. WB4EOR has added an SB-220. We're glad to hear WB4-OT/KP4. Welcome in the nets anytime. Tom, W4GSH has a kw on 6 and WA4MEX one on 75. Murray State's RC is in business. Nice to see most net QML increasing. Let's have more traffic originations. Owensboro's K4HY has increased its 2-meter output to 250 watts, courtesy of the local police department, and the gang is beginning to ready for the annual hydroplane race. Traffic: (Feb.) WA4VZZ 369, WB4KPE 269, W4BAZ 142, W4OYI 121, WB4FDK 83, WB4IOU 80, WA4AGH 72, K4TRT 71, WB4EOR 60, K4MAN 56, WA4MEX 34, W40TP 34, W4UK 33, WB4L1Z 29, WA4MKD 28, K4UMN 28, WB4HFY 26, W4NBZ 25, K4FPW 22, WB4LKP 22, WB4LF 21, W4ADO 18, WB4GCV 15, WB4HFU 15, W4GSH 14, K4VDG 14, WB4LOY 13, W4KJP 13, W4SZB 13, K4UNW 13, WA4BZ 11, WA4GHY 11, WB4HTN 11, W4BTA 10, WB4KER 10, K4AVX 8, K4HOE 5, WB4LL5 5, K4YCB 3, WB4FLA 1. (Jan.) WB4FDK 262, WA4DYL 183, WB4FLA 33, WB4LL 18. Traffic 2324, reports 44\*.

MICHIGAN - SCM, Joseph L. Pontek, K8HKM - Asst. SCMs: Howard A. Walker, WB1JO, Rodger C. Phillips, WA8LWK, SEC: WBMPD. RMs: WA8PIM, WBRTN, WBWVL, K8KMQ, WB8DIT. PAMs: K8GOU, W8ZBT. VHF PAMs: W8CVO, K8AFM. Silent Keys: WB0LY, WR7GV.

Ner	Freq.	Time	QMI	QTC	Seas.	Mgr.
QMN	3663	2:30 Dy	1083	571	84	WA8PIM
WSSB	4935	0000 Dy	760	95	28	WB0JBE
UFEN	3920	2:30 Dy	302	37	21	WA8LHC
PON-10AY	3950	1:00 Dy	865	625	28	K8LNE
GLFTN	3932	0:30 Dy	713	93	28	K8HLI
PON-CW	3645	2400 M-Sa	207	91	24	VF3JHO
M6MTN	50.7	2400 M-Sa	329	31	23	WA8RC
BR/MLN	3930	2:30 M-F	910	91	24	K8LJS

New officers of the Red Bud ARC are W8ZBT, pres.; WA8CLN, vice-pres.; W8RVP, sec.; WA8BL, treas. Huron Valley ARA: WB8BOJ, pres; W8FNZ, vice-pres.; WB8AEV, sec.; W8RHOJ, treas.; K8BPA, trustee. Midland ARC: W8RR1, pres.; WA8VSL, vice-pres.; WA8ZCX, sec.; W8QOI, treas. I received a real nice certificate from the Mich. PON for over 20 rctck-ins. WA8WZC has been raking in the DX on 20 and 15. K8RCT put up a Marconi for RO but his bound chewed the feedline to pieces. WA8VXE only needs two states to work and a few more QSL's. She also says that the QSL's and certificates saves on the painting. WA8ZJM is working on higher power. WA8ZHZ is portable at Kincheloe AFB. K8IED made PON Amateur of the Month. I hear all the Swap and Shops are doing a booming business this year. Must be a lot of basement cleaning going on. Huron Valley ARA will celebrate its 20th anniversary in 1970. W8NJM is near retirement from Buick. Mid-West LY Convention will be held June 19, 20 and 21 at the Drifter Motel in Flint. Traffic: (Feb.) WA8WZV 857, K8LNE 553, K8ZJU 510, WA8YVR 502, K8KMO 291, WA8PIM 214, WBNOI 211, WB8DIT 157, WA8LXY 152, K8MLEG 96, W8WVL 96, W8BEZ 89, WA8ONZ 89, WB1HR 74, WB1Z 73, W8LNV 71, WA8ZAV 71, WA8OGH 43, WA8SQC 41, WB1UC 36, W8MO 32, W81Z 29, W8FX 27, K8IED 26, W8ZBT 25, WA8VXE 23, WBMPD 22, K8TYI 22, W8SRYB 20, WA8ZF 17, W8RANR 14, K8GOU 12, K8HKM 12, WB1BP 10, WA8LKC 7, W8SWF 6, W8CUP 5, WA8Q 4, W8YNY 4, WA8ZJM 3. (Jan.) W81Z 111, WA8ZJM 28.

### 3RD ANNUAL MICHIGAN QSO PARTY

This contest, sponsored by the Central Michigan Amateur Radio Club, Inc., will take place from 2100 GMT May 16 to 2100 GMT May 17. It is open to all amateurs. Stations may be worked on cw and phone on each band. Michigan stations may work other Michigan stations. The exchange will be RST(D) and a 3-digit serial number starting at 001 and county for Michigan stations. All others send RST(D), a 3-digit serial number starting at 001 and state, province or country. Logging information: dates, times, stations worked, reports exchanged, bands, modes, location and final score. Suggested frequencies: cw 3500 7060 14060 21000 28060; phone 3925 7260 14290 21360 28560 50400 52525 145350 146940. Michigan stations are urged to be on 15 meters at 1600 and 1900 GMT and on 30 meters at 1700 and 2000 GMT. Scoring system: One point per contact. Michigan multiply by states, provinces and non-WJVE countries (includes Mich.). Others multiply points by the number of different Michigan counties (83 maximum). Awards: Certificates to the highest scoring station in each state, province and non-WJVE country. Michigan stations will compete for first-place trophy, 2nd through 5th place certificates and for 1st place certificate for each of the 83 counties. A trophy will also be awarded for the highest out-of-state score. The mailing deadline is June 30. Send your log to Central Michigan Amateur Radio Club, P.O. Box 73, Lansing, Michigan 48901

OHIO - SCM, Richard A. Egbert, WB2TU - SEC: WB0DU, RM: WB8MI, PAM: K8UBK, VHF PAM: WA8ADU, Jan. net reporter: Ncr	QMI	QTC	Seas.	Freq.	Time (Z)	Mgr.
OSSBN	2021	978	57	3977.5	15.40	K8UBK
BN	599	326	56	3580	7.345	WB8MI
QoMtrN	532	45	56	50.61	0000Z	WBADU
OSN	229	66	28	3580	0200Z	WB8VNU

February BPI went to WRUPL, WA8ETX, WA8UPI, WB8DSV, K8ONA and WA8DWL. Buckeye Net certificates were earned by W8CUT, K8ONV, K8OHG, W8BZX and W8BAKU. Ohio Slow Net regulars WA8KPN, WA8RUO and W8BCKG received net certificates. Section net certificates are sent to those checking into section net a minimum of five times a month for three months. Do you have one for 1970 yet? Congrats to new Extra Class WB8FGD and to new Advanced WA8DBL, K8DWO and K8COC. WA8ZYT was appointed OPS in Feb. With regret we report that WA8OUF and W8E-UO joined Silent Keys. ECs WA8FOW and W8ERD report visiting clubs in their areas of jurisdiction on AREC membership drives. Warren ARA's new officers are W8MKF, pres.; W8HCL, vice-pres.; W3FVY, sec.; WA8INO, treas. Club activities mgr. WA8HP tells us that the Dover-New Philadelphia Area County-Wide and Tusco ARCs have combined to form the Tusco RC, Inc. The club will operate the W8ZX memorial station. Officers are WA8YPX, pres.; WA8JPW, vice-pres.; K8CQA, sec.; WA8GLL, treas. QCEN advises that its new officers are W8CIT, pres.; WA8STX, vice-pres.; WA8RYE, sec.; WA8CKB, treas. Congratulations to new ARRL affiliate, the Aviation Radio Club of Columbus. Greater Cincinnati ARA reports a total of 46 students in its General and Advanced class. Columbus ARA will sponsor the 1970 Ohio QSO Party. Rules will be about like last year. The date is Aug. 8 and 9, and W8ERD will be contest chairman. Let's all mark our calendars, watch for the notice, and reserve some time for the QSO Party this year. K8LGA back in the swing of things, with WN8RN and FAN schedules again. Annie is also involved with 2-meter ARCC activities. Medinet, managed by Health, Education and Welfare employees, is intended to handle medical information during "health emergencies." It meets on 7260 and 14280 kHz at 1700Z Mon. and 2200Z Wed. NCS is K8YYG. As of this writing the minimum score for PSHR listing is 30. Please send me the complete breakdown by category for PSHR listing. From time to time we get mail asking for support of local nets in traffic routing and handling. The role of the local net is implicit in our NTS organization. Local nets send representatives to sections nets, announcing the net being represented. Traffic will be routed to you by the section NCS as a matter of course. Don't expect the section nets to send reps to your local net. I'd like to take this opportunity to thank the amateurs of Ohio for your support in the election: honored to be your SCM for another term, and will do my best to justify your confidence in me. Traffic: WB8P1 1120, WA8ETX 659, WA8U1 533, WB8DSV 301, K8ONA 287, WARDWI 220, WA8VNU 199, WA8CY 196, W8IAG 196, WA8FVW 180, W8PMJ 166, W8MI 161, W8BAKW 136, WA8TFE 135, K8LGA 134, W8QZK 127, W8GVX 120, WA8OUC 116, WA8WAK 109, W8OQU 90, W8OUU 87, WA8ZTY 85, WB8BLH 82, KRUBK 82, WA8RUO 79, WA8ED 79, W8JD 73, W8L1 68, WA8AM 67, W8GNI 63, W8VND 61, WA8VYO 60, W8UPD 57, K8DHD 50, WA8ULF 45, WA8ADU 42, WA8SX 41, W8LX 38, WA8YB 35, WA8VWH 33, WA8FOW 32, W8MD 31, WA8NDU 31, W8RGR 30, WA8QK 30, W8MOK 29, K8OYR 27, W8FTU 26, K8BYR 25, W8UDG 25, WA8MHO 22, K8BTT 21, K8PBF 21, W8FGD 20, WA8ESX 20, WA8YLW 19, W8BFB 18, W8BAIC 17, W8DAE 17, WA8YHN 17, K8ZBL 17, K8DHI 16, W8PNP 16, W8KAO 14, W8BCKG 4. K8LXA 14, W8GOE 12, K8LFI 12, K8BL 11, K8ONV 11, W8WLG 11, W8HJ 10, W8SHP 10, WA8JH 9, WA8TKM 9, WA8AJZ 8, W8BZX 8, W8CR 8, W81Z 8, W8RBP 7, W8GDU 7, W8ARW 5, WA8ZNC 5, W8QXO 4, WA8TKL 4, K8CKY 3, W8BCCO 2, W8L1E 2, W8ERD 2, W8FVX 2, WA8MCR 2, K8BPX 1, W8C1W 1, W8RQO 1, W8RQO 1.

### HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2S2N - Asst. SCM/RM: Ruth I. Rice, WA2VYS, SEC: W2EGC. PAM: WB2VJB. VHF PAM: WB2YOU. Section nets: NYS nightly 5675 at 2300Z; ESS nightly 4590 at 2300Z; NYSPT&EN nightly 3925 at 2300Z. All appointees, please forward certificates for renewal via RM, PAM or VHF PAM. On the club circuit: Harmonic Hills RL heard WB21NV on "Basic Electricity." Schenectady ARA now has 16 family groups representing 40 individuals. Section record? New Rochelle Club heard W2EAR on telephone mobile setups. Westchester ARA had W2EEX, who was sgt.in-chn. of NY City Police. Emergency Service Squad for 28 years. Known 1970 FD plans:



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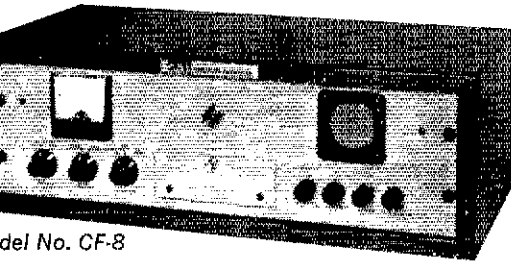


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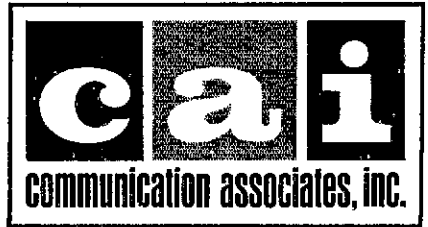
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Schenectady is going mountain-topping in Vermont with K2AE. New Rochelle is back after a Sabbatical in '69 with K2YJ. Individual station activities: Congrats to new Novices MQR, MHP, MII, MOI, MKC, MYH, MHY, MIM, MRX, MOY, MNC and MKE. New Advanced tickets: K2DMR, WA2CRW, WB2YLB and WB2DSK. Extras: K4GXV/2 and WB2VPL. Ex-WN2MDY is waiting a General call. WB2SHI renewed as OBS. WN2JLO, WA2STH, WA2CDE and WB2PEI are new officers of Poughkeepsie ARC. WB2DGH reports Roosevelt HS Club in Hyde Park is now ARRL-affiliated. WB2YLB now edits *SARA News* of the Schenectady Club. WB2GMN is busy giving Novice tests to New Rochelle Club's class students with 10 successful so far and more to come. K2JOB and WB2NVI are heading CCNR Field Day team. W2PFI has been appointed Asst. Director again by W2TUK. WA2VLS is on the air with a new HW-100. WA2HBN is moving to Texas. W2KGC is back from vacation and active netwise. WA2RAU is after his second DXCC via KWM-2 only. WA2ZGV was active all winter with sk patrol. WB2YUK writes from Germany where he is with the Army and MARS-active. WA2OEG is running an SR-42A on 2 meters. WA2TEO soon will be mobile in the VW. WA2VYK is a Jan-graduate and bound for graduate work. WA2VYS now is a boat-owner. Traffic: WA2IBI 248, WA2VYT 146, WA2VYS 124, W2EAF 111, W2THE 88, WA2FUV 60, K2UYK 40, WB2VTR 39, W2URP 29, K2GXV/2 28, WA2WGS 21, WA2GOW 14, K2HNW 13, W2ANV 8, WA2VLS 8.

**NEW YORK CITY AND LONG ISLAND - 50M, Fred J. Brunies, K2DGI - SEC: K2OVN, RM: K2UAT, PAM: W2EW, WB2ROE.**

The following nets are major ARFC nets. Join one!

Bronx	50.35 MHz	146.17 MHz
Brooklyn	38.64 MHz	50.40 MHz
Nassau	38.72 MHz	145.26 MHz
Queens	29.50 MHz	50.20 MHz
Richmond		145.62 MHz
Suffolk	29.56 MHz	53.51 MHz
Huntington	38.73 MHz	145.50 MHz
Brookhaven	38.73 MHz	50.46 MHz
New York	38.50 MHz	50.48 MHz

Note: Net times usually open 8:00 P.M. Mon.

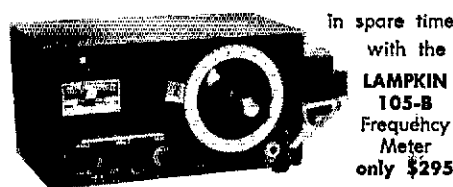
It appears that K2AAS lost more than his shirt on his recent jaunt to Las Vegas. Says he's planning to retire to this oasis! W2PEI is sporting a shiny new Signal One. Claims this is what's happening for the 1970s. The Massapequa Radio Club is all decked out with a new-oid(?) club call of W2II! WA2LJS has a new "Sky Needle" with signal squatters for 2.10-15.20 meters plus an any-band long wire at the QTH. WB2QJL/4 reports activity on 20 meters and he is looking for the "boys" from the old sod down there at Robins AFB. WB2AXG obtained a BNEI from Georgia Tech. and a 2nd Lt. commission from the U.S. Army Signal Corps. (guess people read this column after all, hi). Seems WA2GPT has her problems; first the Collins rig went West of Cedar Rapids that is) then the little Swan refused to take to the air! It appears that Australis Oscar 5 and WA2KSB pooped out about the same time with both needing some rest. Well, at least we know that somebody is hearing our section Bulletin stations; WB2STQ received an SWL card from Bulgaria! K2CIG, club operator is elated that somebody can copy his first. QLF? W2ALE, Columbia U. station is going full swing at last, reports WB2UQP. Word out of the QRP group has it that a new harmonic can be found at the QTH of K2QMF; raise those K07s high! K2HFX is sporting a new 20-meter beam installed during the winter antenna-raising season (high wind, snow, ice; is there another time?) Word has it that W2LH and XYL W2FFO showed the professionals how to install a FH-3 and 30-ft. tower atop an apartment house six stories up! Such a signal! Found the reason for the dim lighting around Detroit City; W2OWL is loading up one of those city type "invisible" 50-ft. antennas. BARTO has a new president - WR2DPW. Congratulations! The following is the OBS schedule of WR2STO - Mon., Wed., Thurs. 1800Z 14,340 MHz, 1830Z 21,340 MHz ss; Fri. 1800Z 14,040 MHz cw. Traffic: (ch.) WA2UWA 4802, WA2HMO 796, WA2GPT 253, K2UBG 240, W2DSC 154, W2ALE 21, W2RC 17, WA2KSB 14, W2LKG 14, K2AAS 12, W2DRQ 9, W2PE 8, WA2BRF 7, WA2LJS 2, WA2QJL 2, WR2UQP 2. (Jan.) WA2UWA 4568, WA2HMO 900, W2KGC 350, K2UAT 305, W2DSC 73, WA2GRI 8, WA2KSB 7, WA2OJL 2. (Dec.) WA2UWA 5040.

**NORTHERN NEW JERSEY - 50M, Louis J. Amoroso, W2ZZ SEC: K2KDQ, RM: WA2TAF, PAM: W2PEV, K2KDQ, WA2KZF, WA2TBS.**

### ARPSC Section Net Schedules

Net	Freq.	Time	Sess.	QW	Pfc.	Mgr.
NJTTYN	3625	7:30 P MWF	12	18	4	WA2TAF
NJN	3695	7:00 P Dy	28	381	334	WA2BLV
NJN	3695	10:00 P Dy	28	168	51	WA2BLV
NJNS	3740	8:00 P Dy	15	26	7	W2LFFH
NJEPIN	3950	6:00 P M-Sa	28	616	412	W2PEV
NJPN	3930	6:00 P Sun	4	96	56	WA2TBS

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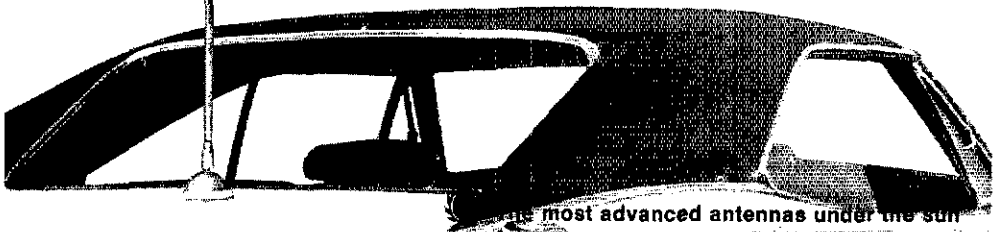
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NJAN	50425	8:00 P M-F	20	238	47	WA2KZF
PVEIN	145710	7:30 P Dv	28	314	199	K2KDO
EUTN	145800	8:30 P M-Sa	25	126	45	WA21BS
	146700	8:30 P Sun				

Endorsements: K2KDO as EC for Passaic, WB2NSV as EC for Belleville and WB2BCS as EC for Red Bank, WA2TAF as OPS, K2KDO as OBS, W2TJF, K2BML and WA2CCF as OOs. We have room for more appointments of all types. K2KDO, our SEC, is looking for IC's in Hunterdon, Warren and Ocean Counties. Please contact him if you are interested in this type of appointment. WN2IQV, a new ham in Teaneck, is using a Globe Scout and HA-350 receiver. WN2NDU is new in Englewood Cliffs. WN2KJD has a new 18AVQ. WB2FEH is busy fixing rig trouble, ditto W2ZZ. WA2DRH has a new keyer and Comm 111. The WA2YXO group aided T-60 to the shack. W2PEV tried DX and surprised himself with a few new ones. WA2LDX was flooded out of his home during Feb. storm. WA2HSI and WA2CGM report new 2-meter gear. WB2LW is new in Jersey City and is looking for a Polycorn ZB manual. W2CVW reports success on 220 and 432 with his 2-39s. WA2LUX won first place in N.J. for 1969 Tenn. QSO Party. WB2SEZ is busy working on a 432-Mc. converter. WN2LAO reports using a Drake 2B and HR-10B. WA2DBK, WA2CAI, WB2LSO, WA2XCS, WA2VYT and WA2AYZ all joined Navy MARS. K2JOU reports May 17 through May 24 will be Amateur Radio Week in Belleville. Contact W2FOY during that period on 2 meters for a special certificate. The Knight Raiders VHF Club is planning a hamfest for July 11. WA2HDS is now on both 75 and 2. WB2JCI has his 2-meter rig trouble cleared up. W2OV and WA2BNF are regulars in the PVEIN WB2QOO in JA-Land with the Army. K2ARU is active with Vietnam phone patches for Navy MARS. WB2JCI reports his N.J. Chapter of the NAHC meets Sun. at 9 A.M. on 50.425 kHz. WA2DXX is recuperating after a recent illness. Traffic: (Feb.) WA2BAN 598, WA2EPI 536, K2DFL 405, K2KDO 356, WB2DDO 338, WB2FEH 314, WA2FRZ 233, WA2DRH 190, WA2DQE 120, WB2VPR 106, K2OOI 105, WA2LDX 83, WA2BFJ 78, WA2FRS 74, WA2LUX 62, WA2HSI 62, W2PEV 60, K2DOJ 55, WA2TAF 49, WA2HEL 36, K2ZFI 33, WA2BCT 31, W2ZZ 29, WA2CCF 24, WA2GL1 24, WA2BNF 22, W2DRY 21, WB2BKX 20, W2EZW 20, WA2FUI 20, W2CVW 18, WB2WNZ 15, WA2YXO 13, WA2KZF 12, WA2CRF 11, WN2FVH 10, K2MFX 8, W2TFM 6, WA2NJR 5, W2CU 4, WB2BCS 2, WB2VFX/2 2. (Jan.) WB2RKK 455, WB2TUL 300, WA2RIN 184, WA2DNU 121, WA2GIE 15,

WB2SEZ 12, W2CVW 11, WA2GOC 8, WA2DNB 3, W2ABL 2, (Oct.) WA2CWU 124.

### MIDWEST DIVISION

IOWA — SCM, Wayne L. Johnson, K0MHH — Asst. SCM: Al Culbert, K0YVU. SEC: K0LVB, PAM: K0OKD, OBS: W0LCK, W0IAQ, W0LX, WA0MIT. New appointees: WA0NGZ Cerro Gordo Co., WA0VBC Monroe Co., WA0EOA Ringgold Co., as 6's. Congratulations to the following for upgrading their licenses, especially a young lady, WA0TBC who, has had Advanced Class at age 15. New Extras are W0JIG, K0HTF and WA0ERT. New Advanced are W0FGH, W0KWU, W0RIZ, K0BWK, K0JZY, K0LMA, WA0AVW, WA0LVS, WA0OYS, WA0OZR, WA0TBC, WA0UCE, WA0WSI, WA0YBD, WA0YDO. New Generals are WA0KQJ, WA0RGV, WA0UBC, WA0VYZ, WA0WYN, WA0YDR, WA0YFM, WA0YKL, WA0YSU, WA0YTC, WA0ZFG, WA0 WA0ZID, WA0ZYX. Our thanks to W0SEJ for the above list. May is the month for the SCM nomination and election. Although it has been a very gratifying experience and the cooperation has been splendid your present SCM finds he cannot continue after the present term.

Net	Freq	GMT	QMI	QTC	Men
Iowa 75	3970	1730 M-Sa	1313	258	K0LYV
Iowa SSB	4370	2300 M-Sa	1075	47	W0YLS
Iowa 160	1815	0000 Dv	815	8	K0TDC
Tall Corn	3560	2330 Dv	189	09	K0AZZ
PON-Phone	3915	2330 Th-Fr	84	8	WA0DYV
PON-CW	3697	2330 M-F	29	5	WA0DYV

PSHR: K0LVB 64, WA0OTQ 39, W0LGG 37. Happy Spring-time.  
Father: (Feb.) W0LCK 2002, K0AZJ 145, WA0VZH 110, K0JG 111, W0LGG 74, W0KB 68, K0TET 60, WA0UO 52, K0OKD 47, W0MOO 42, W0HJ 33, WA0MIT 18, WA0OZL 14, WA0VBC 14, K0TDO 11, W0DMX 9, K0CNM 8, W0RIZ 8, WA0AIW 6, K0LKH 6, K0YVU 6, W0BW 5, W0FMZ 2, K0ISA 2, WA0PUI 1. (Jan. W0UCF 137

KANSAS — SCM, Robert M. Summers, K0BXF — SEC: K0EMB, PAM: K0JMF, RM: K0MRL. VHF PAM: WA0CCW, W0BSP, Olathe and W0CLH, Edgerton, have joined Silent Keys. On Feb. 21 I packed up K0JME and we journeyed to Ft. Dorado for the Annual Dinner meeting of FHARC. WA0CCS was the club's elected Amateur of the Year. Congratulations to W0HAI, who recently was

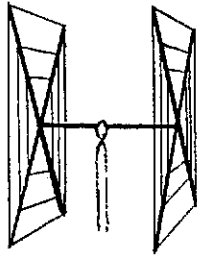
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was a giant, automated, mechanized, computerized factory. No, no, no. Just two brothers, making thousands of the best antennas possible at low, low, low prices that reflect the tiny overhead. In QST since '53 without missing an issue!

**QUADS** Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—

## 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 fool-proof 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' x 1 1/4" OD, 18 gauge steel, double plated, gold color.  
Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.  
Radiating elements: Aluminum wire, tempered and plated, .064" diameter.  
X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.  
Radiator Terminals: Cinch-Jones two-terminal fittings.  
Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

- 10-15-20 CUBICAL QUAD . . . . . \$35.00
  - 10-15 CUBICAL QUAD . . . . . 30.00
  - 15-20 CUBICAL QUAD . . . . . 32.00
  - TWENTY METER CUBICAL QUAD. 25.00
  - FIFTEEN METER CUBICAL QUAD. 24.00
  - TEN METER CUBICAL QUAD . . . . . 23.00
- (all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. **DEALERS WRITE!**

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**BEAMS** "Just a note to let you know that as a Novice, your 3-E1. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36" of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 7/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

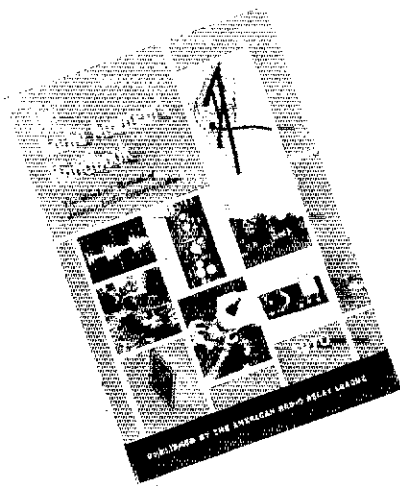
2 E1 20 . . . . . \$19	4 E1 10 . . . . . \$18
3 E1 20 . . . . . 25*	7 E1 10 . . . . . 32*
4 E1 20 . . . . . 32*	4 E1 6 . . . . . 18
2 E1 15 . . . . . 15	8 E1 6 . . . . . 28*
3 E1 15 . . . . . 19	12 E1 2 . . . . . 25*
4 E1 15 . . . . . 25*	
5 E1 15 . . . . . 28*	*20' boom

## ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MUV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2-KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

**FLASH!** Switched to 15 c.w. and worked KZ51KN, KZ5OWN, HC1-LC, PY5ASN, FG7XT, XE2I, KP4-AQL, 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



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awarded the Sertoma Internationals "Service to Mankind" award for his 20 years of work in ham radio. New officers of the Newton ARC are WA0SWS, pres.; K0JDB, vice-pres.; WA0FZG, secy-treas. K0LPE, net mgr. for HBN, announced June 14 as the date of the Annual HBN Picnic with the eve of 13th as the fun frolic and WRM. The event to be held at Lee's Summit, Mo. in conjunction with the picnic there also will be a meeting of the Midwest Amateur Radio Services. For more information, contact K0LPE or K0HGL. W0INI recently was named an Asst. Director of the Midwest Division. Net reports for Feb.: HBN, QNI 639, QTC 107. Kans. WX Net, QNI 636, QTC 68. Kansas Post Office Net, QNI 1402, QTC 540 in 28 sessions. Kansas Phone Net, QNI 180, QTC 14 in 14 sessions. Kansas Sideband Net, QNI 780, QTC 132 in 23 sessions. OKS, the Kansas cw net, reports QNI 500 and QTC in 56 sessions. Net Mgr. K0MRI is showing off his new AI Operator certificate. Zone 15 AREC 75-Meter Net, QNI 80, QTC 3 in 5 sessions. Zone 1 75-meter Net, QNI 53, QTC 1 and the 2-meter Net, QNI 59, QTC 5 in 4 sessions each. AREC standings on 3/1/70 - 424 members, 20 emergency nets. Traffic: W0INH 546, WA0LBB 218, W0HT 205, K0MRI 110, K0BXI 107, K0JME 104, WA0LCC 87, W0CHJ 68, W0MA 66, W0GCI 56, WA0TZK 40, K0LPE 35, WA0JEF 34, WA0DWH 31, K0PSD 31, W0BGX 29, WA0UTT 28, K0EMB 23, WA0OZP 20, WASHNN/0 19, K0UVH 13, WA0SEV 12, WA0SHG 12, K0FIG 9, K0FFC 8, K0JJD 8, WA0JOG 8, W0PDI 6, WA0SRQ 6, WA0TAS 6, WA0KDC 5, W0LYC 4.

MISSOURI - SCM, Robt. J. Peavler, W0BV. With deep regret report the passing of W0BUL, SEC for Missouri and former SCM, on Feb. 5. One of our most vigorous spokesmen for amateur radio, and above all a good friend, he will be greatly missed by amateurs in Missouri and all over the country. New appointments: WA0TXP as OPS, W0YZS as OVS. Appointments renewed: K0ONK as OPS, ORS, RM, PAM. Net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3905	2302	MWF	12	193	12	K0KUI
MON	3585	0100	Dy	26	127	38	K0AEM
MoPON	3933	2300	M-Sa.	24	109	109	WA0TAA
MWN	3585	0345	Dy	28	203	153	WA0RVR
PHI	50.45	0130	Tue.	4	136	5	WA0KCE

These nets will meet one hour earlier (GMT) with the start of Daylight Saving Time. K0KUD has been elected mgr. of MEN. W0UD was elected vice-pres. of Tri-State Radio Club to fill the unexpired term of W0BUL. WA0ZLU needs VK for WAC. W0PKW reports favorable DX conditions for a change. We are glad to hear WA0DGG, who is back from Vietnam. Members of the Mules ARC at Warrensburg are building a Heath SB-101; operators are K0BITX, WA0RTO and WA0ZES. W0UNR has gone to Puerto Rico to teach math. W0YZS has worked W0DDX on 420 Mc. over a distance of 35 miles. WA0RVR passed Advanced Class. The PHDARA will hold a banquet on May 17 at Shelter House One at Bennett Park in Liberty. WA0TXP is experimenting with effects of low-voltage electricity on the growth of yeast cells. WA0RVR is working on a program to run CAN by computer; Tom promises to tell us more about that later! Traffic: (Feb.) K0ONK 1579, K0AEM 303, WA0RUR 124, W0BV 116, WA0HTN 94, WA0EQL 79, WA0VIN 72, W0QUD 21, WA0QIA 15, W0BVL 11, W0JKE 11, W0KHU 6, WA0WQA 6, WA0ZLU 4, W0BGJ 3. (Jan.) WA0TAA 55, K0JPL 1.

NEBRASKA - SCM, V. A. Cashion, K0OAL - SEC: K0ODE, K0WPF, Box Butte County EC, advises 2-Meter AREC Net meets Sat. on 145.26 MHz at 0300Z. Feb. QNI 28, QTC 1. W0HOP visited his son and daughter in W6-Land. W0EWF was in Florida until the end of March. If you must leave a net prior to completion, NCS would like to be informed. There have been instances where unexcused check-outs were recalled and just were not to be found. Your cooperation is appreciated. New appointment: WA0SOP as OPS. Renewed appointments: WA0DOU as ORS, K0BRS as OD, WA0IBL and WA0JKN as OPCS. Feb. net reports:

Net	Freq.	GMT	Days	QNI	QTC	Mgr.
NSN I	3982	0030	Dy	1046	100	WA0LUV
NSN II	3982	0130	Dy	888	81	WA0LUV
Neb 160	1995	0130	Dy	761	7	WA0CE
NEB	3590	0400	Dy	151	41	WA0HFW
EBSN	3982	1230	1st M	3	0	WA0SOL
MNN	3982	1330	Dy	978	28	WA0JUN
WNN	3950	1400	M-Sa	569	48	W0NIE
AREC	3982	1430	Su	191	1	W0IRZ
CHN	3982	1830	Dy	1051	71	WA0GHZ

Traffic: (Feb.) K0UWK 196, W0LOD 158, WA0DGU 148, K0JFN 105, WA0ZOR 105, WA0BB 41, K0JTW 38, WA0GHZ 35, WA0JH 34, WA0BFV 33, WA0HWR 32, WA0DCI 30, WA0CBJ 28, WA0ITM 27, W0FOB 26, W0NIK 24, WA0PCC 24, K0FRU 23, K0ODF 21, WA0BOK 20, W0ZOU 17, W0DMY 13, WA0FGV/0 13, WA0LE 12, K0PTK 11, W0VEA 11, WA0TMG 10, WA0LOY 9, WA0TET 8, WA0TOD 8, WA0DXY 7, WA0EEI 7, K0MUF 7, W0EXJ 6, W0RAM 6, WA0VH 6, W0GEO 5, K0OAL 5, K0DGW 4

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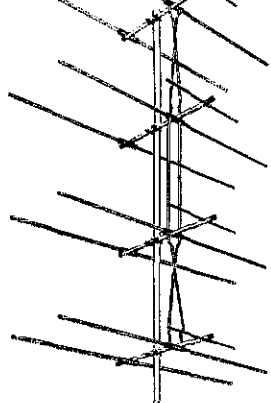
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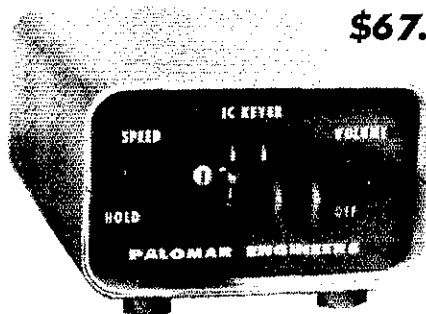
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### NEW ENGLAND DIVISION

CONNECTICUT - SCM, John McNassor, W1GVT - SEC W1HHR. RM: W1HNSN. PAM: K1YGS. VHF PAM: K1SXF. Feb report.

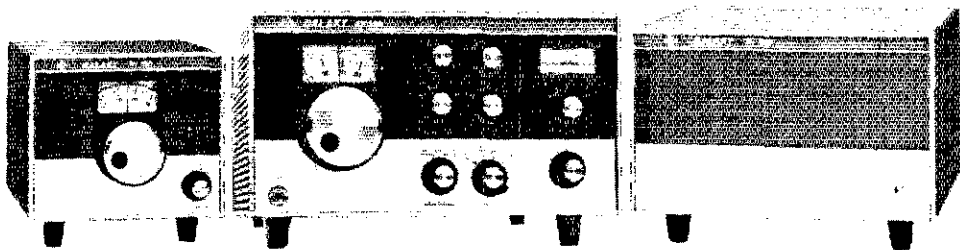
Net	Freq.	Time	Sess.	QNT	QTC
CN	3640	1845 Dy	28	293	306
CPN	3965	1000 Su 1800 M-S	28	387	169
VHF 2	145.98	2200 M-S	20	96	8
VHF 6	50.6	2100 M-S	20	122	6

High QNT: CN - W1HOL, W1GFH, W1LLB. CPN - W1GVT, 28, W1LLB and K1YGS 25, W1HOL 23, W1DQJ and K1SXF 22. W1HHR 21, W1VBH 20. SEC W1HHR provides publicity, club visits and new ECs. He would appreciate all EC information on your area. The Annual Directors' Report from W1QV shows another very busy year. *Nuzem Net News* de W1HNSN includes SET report and suggestions for improvement. Thanks to CN and CPN Members who took part. *CARA Newsletter* from W1ADW covers the recent Danbury disaster - bombing and bank robbery - and immediate response by members. Their previous work aided Police Communications in time of need! Navy MARS held Conn. Area EC Drill Feb. 22. New officers of Murphy's Mauders: K1JHX, pres.; W1FTU, vice-pres.; K1GUD, secy. Congratulations to: W1LLB on BPL, W1HOL on BPL and Extra Class, W1JVV, W1IYW, W1LLEH, W1LQO and W1LEP on Advanced W1MCE on General. W1MKI new Notice, W1DF on his retirement! It's my pleasure to continue as SCM. Sincere thanks to SFC W1HHR, RM W1HNSN, PAM K1YGS and VHF PAM K1SXF for their help. They make the work easy. Appointees, NCSs, net representatives, mail contacts and QNTs make it a pleasure. Clubs and ARRL make it worthwhile. Thanks a million! Traffic: W1LLB 320, W1HOL 292, W1EPP 221, W1EJL 173, W1HNSN 142, W1JJC 107, W1GFH 103, W1KGO 56, K1YGS 56, W1GVT 49, W1AW 44, W1QV 25, K1SXF 24, W1BDI 18, W1DQJ 18, W1RNB 16, W1HHR 14, W1VBH 14, W1JMO 13, W1JVV 13, W1JJA 12, W1JJC 12, W1HXS 10, W1CUH 9, W1CWE/1 9, W1GWS 9, W1CTI 7, W1MPW 6, W1CHR 4, K4CSY/1 2.

EASTERN MASSACHUSETTS - FRANK L. Baker, W1ALP - W1AOG, our SEC, is in Fla. W1NMMT is W1ZLX's XYL, W1M1NX is K1SAY's son, W1KBN is on with OBSs on 6 and 80, W1EET reports that the NEFPN had 4 sessions, 80 QNTs, 8 traffic. W1MFCG is on 2 and 6. W4YAC/1 is working DX at W1MX and building a new IC keyer. W1ALP and XYL attended Whitman Club Banquet. W1EPP spoke of his experiences at sea as a radio operator at the South Shore Club meeting arranged by W1GM. W1DJC has an HW-100. W1MIE is on 6. W1NF added an LAR-1 frequency marker to his equipment and heard Oscar 6 times. W1NCK mobilized to Calif. and worked the gang back here every night on 15, reports W1PKV. Ex-G1K8K is working in Norwood. W1DAL now is a member of A1-Op. Club. K1TKI has a new HW-12 on the air. 19 Club met at W1MNK's. W1FON moved to Walpole. K1T9E/1 lost his antenna. W1M1CY is on 15 mornings. W1AFNM has a Swan-350 and HW-30. W1KOW is active in nets. W1KZE has 4 RTV vertical. W1LFHU is in all contests and parties. W1UJF says AREC/RACES combined in a Boy Scout rescue drill during the search for a lost child. W1LE is new Radio Officer for Dartmouth. K1CLM is selling old equipment and buying new. W1JGG is home and out of the Army. Six-Meter Cross Band Net had 17 sessions, 68 QNTs, 1 traffic. K1BKG is NCS on Tue. W1s PEX and OJM made BPL. Waltham RC meets the 1st and 3rd Wed. of each month. W1LFE has 62 Ameco transmitter and HO110A receiver. Xaverian Bros. HS RC has the call W1MNE in Westwood. EM2MN had 20 sessions, 154 QNTs, 158 traffic. W1M1ZF1JF and XYL W1SCS/ZF1RF were on from Grand Cayman. Capeway RC met at W1UOH's. K1KNM is back here again. W1KJ, W1BUJ and K1ESG made PSHR. W1ADUZ won the "Ham of the Year" trophy from the Whitman RC. Framingham RC has had good attendance at its meetings. K1UEG is going to retire. W1s JYY and JHQ are new OBSs. W1JYY a new ORS. W1NF has been endorsed as OO for 23 years. W1FJN has a new SB-301 and H13. W1MPP and W1PS are now at Boulkways Gwynedd, Pa., 19436, Apt. M-13 and have been getting on from W1DMR's QTH. About 70 showed up at the meeting of the OOTC at Lord Waketield Inn, Middlesex AKU held a meeting and then went to the Newton Red Cross Hq. for a tour. K1SAY spoke at the Quantapowitt RA on "How to Get the Best out of your Equipment." W1M1MO is a new YL in Burlington. G1DKS is coming over this month and will visit G1DKK/1. New calls: W1s MMN, MML, MMM, MMO, MMS, MMU, MMP, MMR, MNA, MMT, MMV, MOB, MNI, W1s MMK, MNI, MOG, MNP,



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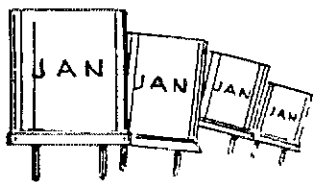
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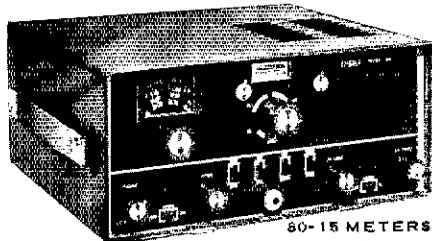


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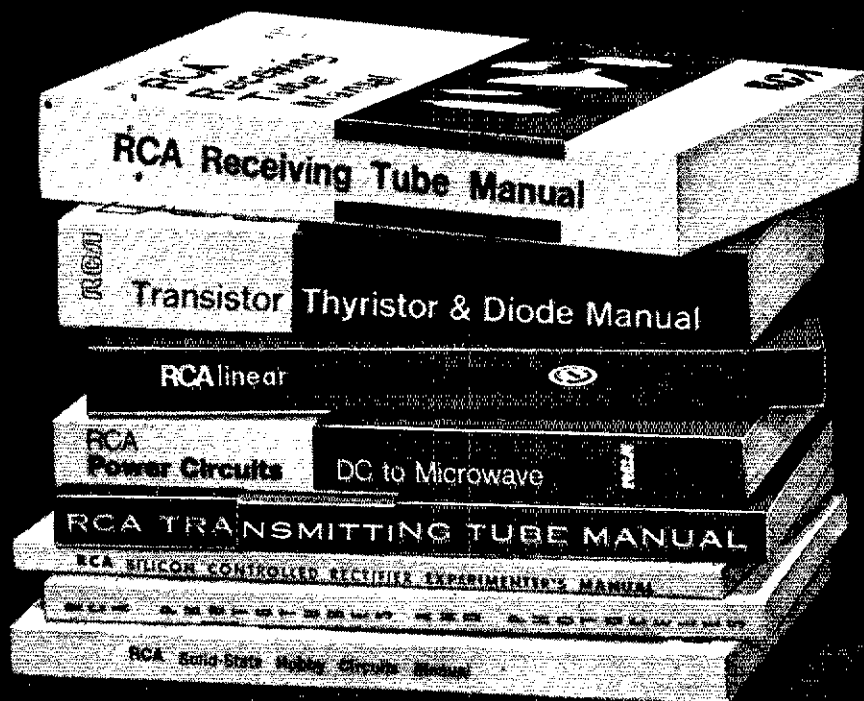
This contest, sponsored by the Mass. Chapter of the National Awards Hunter Club, in conjunction with the SUM of E. Mass., will take place from 0001 GMT June 14 to 2400 GMT June 20 with no time limitation on any authorized amateur frequency and mode. It is open to all amateurs. The exchange will be signal report, city or town, county and state. Logging information: date, time, frequency. Scoring system: one point for each Mass. city or town. Each city or town may be worked once for credit. FINAL SCORE is the number of different cities and towns worked multiplied by the number of different counties worked. (Multipliers are the Mass. counties, a total of 14.) Contacts with community subdivisions of a city or town count only for the city or town. (Example: Hyannis is part of Barnstable, Dorchester is part of Boston, etc.) Awards: a minimum of 10 points total score is required for eligibility for any award. A certificate will be awarded to the winner in each state and country. Certificates will be endorsed for band and mode only if requested. Second and third place winners will be advised by letter. Decisions of the judges will be final. The receipt deadline is July 31, 1970. Send your log to Warren Baker, W1DFK, on Roxford Street, Mattapan, Mass. 02126 for the Mass. Amateur Radio Week Certificate, during the same time period. Mass. amateurs must work 16 other Mass. amateurs, the rest of New England must work 8 Mass. amateurs, all other amateurs in the U.S. must work 5 Mass. amateurs and DX, including KH6/KL7, must work 2 amateurs. Exchange signal report, county and state. Same logging information as above. Amateurs who submit logs meeting requirements will be issued a certificate signed by the Governor of the Commonwealth who has proclaimed the week June 14-20 to be Mass. Amateur Radio Week. Applications must be received no later than July 31, accompanied by a No. 10 size self-addressed stamped envelope. DX may enclose 1 IRC. Send applications to Bill Holliday WA1EZA, 22 Trudy Terrace, Canton, Mass. 02021.

MAINE - SUM, Peter E. Sterling, K1TEV - SEC: K1CLE, PAM: WA1FLG, RM: W1BIG, K1TSC and XYL, W5FJO, are now stationed in Topsham as W1FJO and W1FKD. WA1JTT is active on 2 meter RTTY. The Farmers Net, which went off the air in 1941, has been reactivated and is using the old 1840 frequency and meets each Sat. from 1900 to 2100. New hams in Maine are WN1MKY, WA1MLM, WA1MMC, WA1MMA. Welcome to the fraternity. New appointments: WA1JFX as OBS, K1RSA/K1FHK as OVS, K4BOV/1 is a new ham in the Milbridge area. WA1MEY is a new Advanced Class licensee in the Bangor area. Me./N.H./Vt. Net meets on 3685 at 2330Z; Sea Gull Net meets on 3940 Mon. through Sat. at 1700; Pine Tree Net meets at 1900 on 3596 Mon. through Sun. We are looking for NCS for the PTN. Anyone interested in one night a week on the net, please get in touch with W1BIG. Traffic: W1GU 60, WA1JFX 56, W1KLO 10, WA1FCM 7.

NEW HAMPSHIRE - SUM, Donald Morgan, K1QES - SEC: K1RSC, RM: K1BCS, PAM: K1APO. Welcome to WN1MLZ, of Portsmouth. Also we are pleased to welcome the Twin State Radio Club of West Lebanon, an affiliate of ARRL. W1HPM, the Manchester Radio Club, reports much interest in code and theory classes from Novice through Advanced class and other very worthwhile activity. W1JYK1O1Z is in Lancaster, Calif. for six months and reports working W1GUE daily while en route with his HW-100. K1BCS is busy with traffic and local Red Cross program. K1TXC is back in Salisbury for the summer. W1SWX reports OO activity, also working HSSABD. K1AC reports a clean-up campaign along the Saco River in which it is expected many hams will participate and furnish communications. WA1KTX reports contacts with several countries using 25 watts on 30 meters. New Hampshire contacts seem to be in demand for the SB-WAS award. New OVS appointee is W1JSM, and new ORS is WA1KTX. GSPN reports 670 check-ins and 101 traffic. Certificate endorsement is necessary if you still would hold your appointment. Traffic: WA1JTM 320, K1BCS 169, WA1GCE 33, K1QES 9, WA1KTX 7.

RHODE ISLAND - SUM, John E. Johnson, K1AAV - SEC: W1YNE, RM: W1BTV, PAM: W1TXL. VHF PAM: K1TPK. Appointments: W1YNE as SEC and OO. RISPAN report: 28 sessions, 577 ONI, 62 traffic. W1YNF has returned as SEC of R.I. Gordon now lives at 13 York Drive, Coventry, R.I. 02816. He will be happy to hear from all former ECs as he plans to reorganize the ARK in the area. If your EC appointment has expired, contact him at once.

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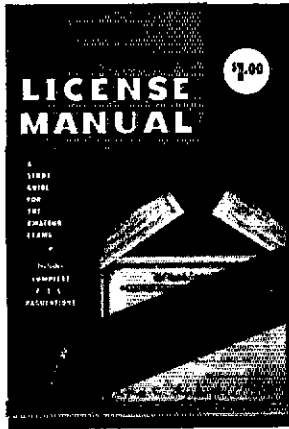
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WA1JXD reports that he has several antenna projects under construction and is waiting for spring to get them in the air. W1FLN has completed the 8B-220 and hopes to get it on the air soon. WN1LSV earned a total of 6664 points in the Novice Roundup. He and several other hams have started a Narragansett Bay Net which meets Sat. and Sun. at 2030 GMT on 3710 MHz. The purpose of the net is to get acquainted with other hams in the area. In a recent election at the Newport County ARC the following officers were elected: WB2HPW/1, pres.; W1WLG, vice-pres.; WN1KLR, treas.; Louis Sturtevant, rec. secy.; WA1JJO, corr. secy. Traffic: WITXL 206, K1VYC 33, K1QFD 22, WA1JST 8, W1FLN 6.

VERMONT — SCM, E. Reginald Murray, K1MPN —

Net	Freq	GMT	QNI	QTC	V.Mgr.
Gr. Mt.	3932	2230 M-S	338	27	WA1JLZ
Vt. Phone	3955	1400 Su	110	1	WA1EDI
MNV	3685	2330 M-F	207	162	
CARRIER	1945	1400 M-F	390	27	W1KED
VTCLD	3990 1/2	1800 Su	57	9	W1AD
VTPO	1909	2300 Su	109	24	K1BOB
VTSB	1909	2230 M-S	612	125	WA1HSG
		1330			

Welcome to new Novice WN1ML1 (St. Johnsbury) and new General WA1JXN (Middlebury). Don't forget to advance your clocks Apr. 26. All nets will probably follow local time. Mark Aug. 16 for International Field Day at Charlotte. Thanks to all persons who assisted in "Green-Up" day Apr. 18. Congrats to editors and publishers of *Green Mountaineer*. Traffic: K1BOB 241, WA1GKS 106, W1ERT 71, K1MPN 39, K1YGI 10.

WESTERN MASSACHUSETTS — SCM, Percy C. Noble, W1BVR — SFC: WA1DNB. CW RM: W1DWV. We still need a PAM for 75-meter phone. WA1LNF is a new GRS. WA1JYB got his General and is going after Advanced. New Technician: WN1KLP. WN1MKL is a new Novice in Pittsfield, West. Mass. AREC has a Sun. session at 0830 on 3935 kc. All West. Mass. stations are welcome. WIHRC has a tri-band beam for 10,15 and 20. RM W1DWV reports that WMN had 171 QNIs and handled 123 messages with the following highest in attendance: W1BVR, K1SSH, WA1LNF, W1DWV, K1IJV and W1ZPB. An excellent organization meeting of the AREC was held at CD Area Hq. in Belchertown on Feb. 27 with the following in attendance: W1ALL, WA1DNB, W1DWV, W1IUB, W1NDW, W1QFB and W1STR. Feb. speaker at the HCRA was G3XPN, who spoke on amateur radio in England. W1MOK has a 5-watt transistor 80-meter cw transmitter and is really working 'em. New officers of the CMARA are K1VNT, pres.; K1HIS, vice-pres.; WA1JBV, secy.; K1RNG, treas. Feb. speaker was Sister Ann Marie Marshall. At the Feb. meeting of the VARC two U. of M. Professors gave a talk on transmission lines and matching of same. Attendance at the meeting was 89% of total membership. Error in last month's report: WN1LUG has the bedroom in Japanese decor — not K1AGL, Solly. The former has a two-page poem entitled "A Primer of Ham Radio" along with the cartoons to go with it in the VARC Bulletin. It's a dilly. Traffic: W1ZPB 121, W1BVR 68, K1SSH 63, W1DWV 57, K1IJV 48, WA1LNF 22, W1IHI 20, W1PUO 20, WA1DNB 3, WIHRC 2.

#### NORTHWESTERN DIVISION

ALASKA — SCM, Albert E. Weber, K17AEQ — KL7s DRZ and F1W have both worked H1LCI in Bologna, Italy via SSTV. Understand the boys on the Pacific Coast have turned brilliant green. It should be noted that KL7DRZ is running the World-Wide SSTV Net Mon. through Sat. at 1800Z on 14.232. John is in Juneau, incidentally. KL7EWO is with the White Alice system and has just been transferred to Granite Mountain. He plans to run 2 meters from there, aimed toward McKinley. The Northland Club is issuing a real nice certificate. Anyone interested can get the information from any of the NARC members. Understand that KL7FLO is back at Seward after a fling of a year or so on the chain and down at Yakutat. KL7FB is headed for radioman school in the Navy after finishing boat camp at San Diego. Rumor has it that ex-KL7CLH will be at the new Comsat station at Talkeetna. Traffic: KL7CAH 135.

IDAHO — SCM, Donald A. Crisp, W7ZNN — The FARM Net convenes each day at 0200 GMT on 3935 kHz. The Idaho RACES Net convenes weekdays at 1515 GMT on 3991 kHz. The Clearwater Valley Club at Orofino has been affiliated with the League. W7GHT has qualified for the new Honor Roll award. The Lewiston-Clarkston Club is sponsoring a local workshop to convert fm equipment to the 2-meter band. The Annual Weather Net Banquet was held at Coeur d'Alene. K7LRD received the "Ham of the Year" Award for his outstanding performance as an EC. W7GHT was very QRL in a local production of "Hello Dolly" in Boise. W7PI filled in for W7GHT on RN7. W7JF had one of the leading parts in the production. The newly-elected Gem State Club officers are W7CXG,

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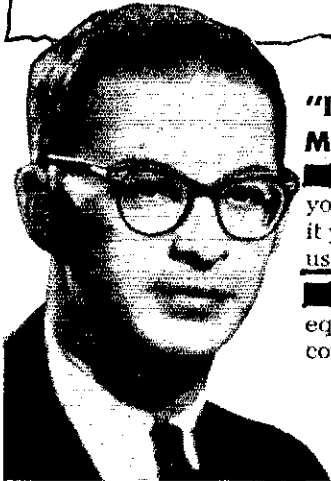


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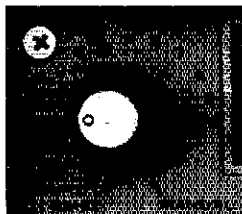
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pres.: W7IWU, vice-pres.: K7BJH, secy.: WA7MXM, treas. FARM Net report: 29 sessions, 883 check-ins, 157 traffic handled, Traffic: K7KBX 398, W7GHT 315, WA7BDD 45, W7FIS 16, W7ZNN 15, K7CSL 4.

**MONTANA** - SCM, Joseph A. D'Arcy, W7TYN - SEC: W7RZY, PAM: W7ROF. Appointments: WA7MKY as Deer Lodge Co. EC. Endorsements: K7SVR as EC. New officers of the Laurel Radio Club are W7OGJ, pres.; K7JAT, vice-pres.; W7LBK, secy.; K7MOW, act. mgr. New officers of the Anaconda Amateur Radio Club are W7TYN, pres.; K7SJK, vice-pres.; K7OFK, secy.; WA7BPY, treas.; W7TUO, act. mgr. W7LOC has moved into the state from Arizona. WA7LRX has put the Helene High School Vo-Tech Radio Club station on the air. K7PFO has been talking with W7RIU in the Great Falls area via 2-meter fm. W7LNU and WA7FBN both have new ssb rigs on the air. K7OER, W7TOC and W7BC have just returned from a trip with their wives to Spain. K7MSB is moving from Helena to Flint, Mich. We shall all miss W7CPS, who passed on recently. The PON in the state still needs representation in some cities. Look up WA7IZR on 3950 in the evenings at U245 on the Montana Post Office Net and he will give you all the details on joining. Mont. PON traffic: 140. Traffic: W7LBK 53, WA7IZR 37, K7CGJ 11.

**OREGON** - SCM, Dale I. Justice, K7WWR - SEC: W7HUF, RM: K7GGQ. PAM: K7ROZ. Section net reports: K7ZQU reports for the Beaver State Net, sessions 56, traffic 205, contacts 262, check-ins 1277. K7YQM reports for the AREC Net, sessions 28, traffic 24, contacts 42, check-ins 449. K7GGQ reports for the USN, sessions 20, traffic 41, check-ins 114. K7OUF reports for the NSN, sessions 28, traffic 116, check-ins 332. A new Novice in Grants Pass is WN7OCX; new Novice in St. Helens is WN7OAI. WA7FTN handled 1071 phone patches to S.E. Asia during Feb. He also has a 2-meter rig working into the Eugene repeater. WA7LDZ and K7WWR are having a race for 5RWAS honors. Traffic: K7ROZ 411, WA7HKV 183, WA7ICX 163, WA7FIS 133, WA7KIU 99, K7OUF 64, WA7KDU 63, K7GGQ 52, K7OFG 48, W7ZB 48, K7YQM 34, WA7KRI 30, K7WWR 29, W7HUI 22, W7BFX 13, WA7JAW 13, W7MJJ 8, K7KPT 7.

**WASHINGTON** - SCM, Harry W. Lewis, W7JWJ - The Radio Club of Tacoma and associated sponsors announce the big State Hamfest near Tacoma on July 11 and 12. Nightly QSTs are being given on 3970 kHz via the WARTS Net. Space is available for overnight camping, along with trailer space and hook-ups. There will be demonstrations of slow-scan television, video tape recording and presentations of "The Ham's Wide World." The Skagit Radio Club held its Annual Hamfest in April with the usual good turn-out, fine food and the good time had by all. The V'Ls of the area had a dinner in Seattle during the early spring and several from out of state were in attendance. Those signing the roster were W7WMS, W7EUI, WA7KMC, WA7GMX, WA7DGM, K7RNE, WA7DXF, WA7DXI, W7RVM, K7ADI, K7NZO, W7NJS, W7WLX, K7AMJ, K7NKZ, W7WHV, W7LXO, K7LXO, K7KHU, W7LCS, K7NXO, WA7HKB, K7NQR, W7ZUV, W7OME and W7QGP. At the 101st meeting of the Puget Sound Council of Amateur Radio Clubs nominations for "Ham of the Year" were received. WA7CYU of Everett, Wash. WA7AXT has resigned as EC after per syndrome lack of interest in Kitsap County. Wally tried radio announcements over KBRO, a Bremerton Newspaper and a number of direct mailings. Total replies totaled zero. WA7KOB is now a member of Navy MARS as N0QBH. Following the resignation of W7DZX we hear that W6VNO has been appointed Director ICC, Pacific Area Staff. Clallam County Amateur Radio Club not only has 59 members, but all have paid their dues for 1970! Ex-WN7BWG is a helicopter pilot in Vietnam and has just been awarded the Air Medal. The son of W7MCW is also a helicopter pilot and has just left for Vietnam. W7PI is working very long hours and Sun. besides. Seems he is due to retire in just a few weeks. Traffic: W7BA 1761, W7DZX 375, W7PI 306, W7AXT 164, W7APS 77, W7BQ 76, WA7KOB 74, W7BUN 62, W7GVC 62, W7JEY 50, W7JWJ 44, W7USO 34, W7AIB 15, W7RXH 14, K7SUX 10, WA7ACQ 9, K7LRD 6, W7EUI 5.

### PACIFIC DIVISION

**EAST BAY** - SCM, Paul J. Parker, WB6DHH - WA6DIL has taken on the job of RM. With this job go all the responsibilities of keeping me informed on cw activity in the section. I would sure enjoy hearing from more of the people in the section. New officers in the East Bay Radio Club are W6JKY, pres.; WA6KZL, vice-pres.; WA6EFM, 2nd vice-pres.; WB6ZAC, 3rd vice-pres.; WN6PZL, secy.; WN6DTM, treas. The January SARO meeting saw WA6PKN give his very interesting slide/lecture talk of his experiences in Africa. W6IPW reports that a shop project has been keeping him away from the traffic world. W6RGG reports that the Nor Cal DX Club vhf



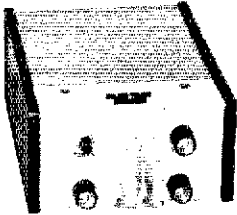
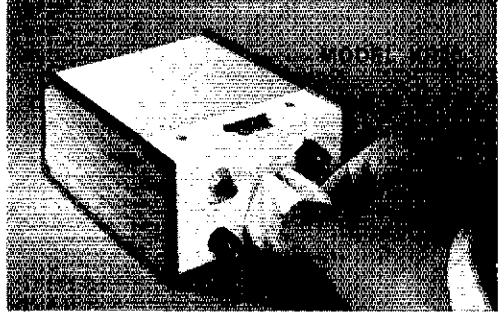
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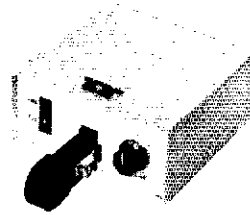
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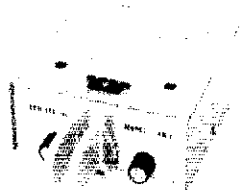


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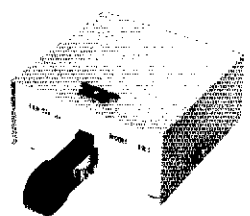
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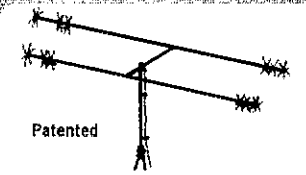


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**SEE PAGE 108**

bulletins are going out on schedule. WA9FDU/6 has finally got his inverted "V" up to 40 feet and found that there really were people checking into Northern Calif. Net along with himself. The NCN meets daily on 3630 kHz at 0200 and 0330Z. K6PJ enjoyed working in both the ARRL DX Test and the Novice Roundup this year. W6UZX reports having a very FB time in the CW DX Contest. W6TTS finally got his linear together and is working on a vto to make his Heath Apache calm down a little. Another note on the District 6 QSL Bureau. There is a great need for those who have not sent in any envelopes to claim the cards they have earned. The address of the Bureau is now in QST under ARRL QSL Bureau. WA6DIL reports that his traffic total is down because he is out looking for a car. WB6NMT/6 sent in another outstanding report on the 270 MHz world of EME. Traffic: WA6DIL 205, WA9FDU/6 163, W6IPN 121, W6UZX 7.

**HAWAII** - SCM, Lee R. Wical, KH6BZF - SEC: KH6GQW. RM: KH6AD. PAM: KH6GJN. QSL Mgr.: KH6DQ. ECs: KH6s GPO, G.L.U. BAS, GKV/KR6, KX6FT, KC6EJ and W7UZH/Guam. RACES Nets coordinate with KH6AIN, Radio Officer.

Nets	Freq.	Times(GMT)	Days
Friendly	7,290	2030Z	M-F
Boy Scout	21,360	1800Z	Sa
Pacific Interisland	14,335	0830Z	M-W-F
Micronesia	14,335	0800Z Tu-Th-Sa-Su	
S.E. Asia	14,320	1200Z	All
Pacific Typhoon	14,265	During typhoon alerts	
Confusion (Patches)	21,400	0130Z	All
Gecko (KG6 Ids)	14,315	1000Z	Th

Remember: The 1970 combined Pacific-Southwestern Divisions convention will be held in Fresno, Cal., at the Hacienda Motel (Fresno Travel Host) at 99 Freeway at Clinton May 15-17. Write WB6GSH, Chairman, P.O. Box 783, Fresno, Ca. 93712 for last-minute details. New News: The Interisland and Micronesia Nets now provide traffic outlets for the Pacific every day of the week. Thanks to KX6BU and KH6AQV/KC6RS for their NCS actions. KR6FT and family passed through HNL for a visit before returning to the Mainland. KH6SP completed the coveted 5BWAS in one month. Welcome ex-KR6AO to the "islands." KH6HDA has been reassigned to HL9-Land and WA9EOO, another operator at KH6SP, to KC4-Land. KH6GRQ has a new Dodge Charger. KH6GRG visited KH6EXR on Maui recently and both visited the new 2-meter repeater site on Mt. Haleakala. W6EUV visited KH6BAS during a trip to Kauai. KH6LP lost his Mini-beam in a recent storm. KH6HCM, ex-W7UXP/KH6 back in '61-'64, is working on 5BWAS. He helped K1HNO/KH6 put up a new antenna and 50-ft. tower. W7UZH/KG6 is sporting a new '70 Toyota Land Cruiser. Jim was recently elected secy. of the Marianas ARC. KH6GFI is on with a new HyGain 18A VQ. K1HNO/KH6 works the Astro Net at 0600Z on 3880 kHz. KH6IJ works ZK1AA every night on 50 MHz T-E. I wish to welcome K1HNO/KH6, our new OPS on the North Shore of Oahu. Traffic: (Feb.) KH6GQW 34, KH6BZF 28, KH6GRG 20, K1HNO/KH6 10, KH6BAS 1, KH6IJ 1, KH6SP 1. (Jan.) KH6HCM 68, KH6LP 24, W7UZH/KG6 1. (Dec.) KH6LP 56, KH6GRG 15, KH6BAS 4, W7UZH/KG6 1.

**NEVADA** - SCM, Leonard M. Norman, W7PBV - SEC: WA7BEU. Hats off to the gang putting on the SAROC Convention. Plan now to attend the Sierra Hamfest 'Sat., Aug. 22, at Bowers Mansion, midway between Carson City and Reno. QSL to K7ZAU. Nevada QCWA Chapter chairman W7CSB and secy. W7CMV report increased QCWA activity. WA7ARZ is a schoolboy again for a few weeks. K7USR is active on RTTY. W7CSB is active on cw. W1IKE was a guest speaker at SAROC. W7PRM is still out looking for that yellow and silver stuff. License plate collectors might do well to contact W7PBV for a new Nevada plate. Sierra Nevada Amateur Radio Society has an FB code and theory class going with over 60 students. Don't forget the Pacific-Southwestern Division ARRL Convention in Fresno May 15-17. WCARS-7255, using the special event call WC7ARS, did an FB job at SAROC in connection with Amateur Radio Week in Nevada. A special WC7ARS QSL card is available to those who worked WC7ARS. QSL to P.O. Box 73, Boulder City, Nev. 89005.

**SACRAMENTO VALLEY** - SCM, John F. Minke, III, W6KYA - SEC: W6SMU. Those of you who are interested in forming emergency communications systems in your areas, please contact our new SEC. At present there is only one EC, WA6TQJ in Yolo County. League appointments for this section now are at an all-time low since I became SCM. The North Hills Radio Club sports three of them - the SCM, SEC and an RM - and only has a membership of about 15 amateurs. Any of you fellows interested in an appointment (ORS, OPS, OBS, OO, etc.), drop me a line. Novices interested in forming a net on 7175 at 2 P.M. week ends should contact



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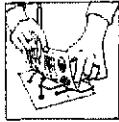
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WB6ZJV. TDY trips have kept WRVDA/6's traffic count to a minimum. Former OPS/OBS WB6MAF is operating from Bullhead City, Ariz., with a brand-new Swan 500C with a remote vfo to boot. K6BIQ, of Willows, received a cash award for outstanding work in the conversion of the forest service radio system. Traffic: (Feb.) WRVDA/6 146, K6YBV 83, K6YZU 10, W6KYA 2. (Jan.) WB6ZJV 18.

**SAN FRANCISCO** - SCM, Kenneth S. McTaggart, K6SRM - All section appointees are asked to submit their reports to K6SRM. Acting SCM, until an SCM election procedure has been completed, W6RO reports good results in the Feb. FMT. W6AJF discovered his 432 array was no longer rotatable because of rust in the guy rings. Fortunately, the antenna was pointed toward the more active part of the area. SEC W6WLW looks forward to reports from section ECs. OO W6EAJ reports that heavy rainfall this winter made antenna repairs necessary. WA6AUD keeps busy with his West Coast DX Bulletin, a weekly chore, and the job of Pacific Division Vice-Director. Section members interested in traffic should catch NCN, 3630 kHz at 0300Z, or NCN/2, the slow speed net, 3630 kHz at 0430Z. WA6AMH has obtained a new Advanced Class license. WB6HZZ remains active with mobile work during his commute to S.F. and 160-meter activity. Traffic: (Feb.) WA6BYZ 328, W6WLW 139, W6RQ 2. (Jan.) W6WLW 308.

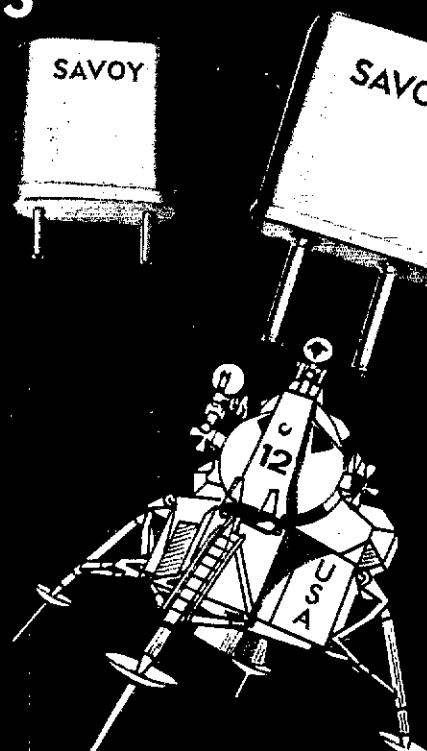
**SAN JOAQUIN VALLEY** - SCM, Ralph Saroyan, W6JPU - This is your last opportunity to send in your reservations to the Fresno Amateur Radio Club, P.O. Box 783, so that you can attend the Pacific Division Convention, to be held at the Hacienda Motel, May 15-16-17, 1970. The Delta Amateur Radio Club meets the 3rd Fri. of each month at 7:30 P.M. at the Dan Webster Jr. High School. The Tulare County Radio Club held its Annual Breakfast with W6LER in charge. New officers of the Kern County Radio Club are WB6WCY, pres.; WB6ZWG, 1st vice-pres.; WB6JFH, 2nd vice-pres.; WB6KZC, treas.; K6APE, secy. The club meets the 1st and 3rd Fri. of each month at the Naval Training Center. W6YKS has 118 countries and is in his new shack. The Madera Amateur Radio Club is now affiliated with ARRL. K6RGZ is conducting Novice classes in Hanford. W6EZA received his Extra Class license. W6ARB is the trustee of the TCARC 2-meter repeater. W6DXP is on 2-meter ssb. W6PPO has a Galaxy V and checks in the Weather Net. K6RPL is chasing DX on 20 meters. W6JLL is heard on 75 ssb. WB6KHB is on 10-meter ssb. K6AP: is teaching Novices in Bakersfield. Traffic: WA6SCE 136, K6KOL 135, WA6JDB 36.

**SANTA CLARA VALLEY** - SCM, Albert F. Gaetano, W6VZT RM: WA6LFA. By now I am sure all of you have heard of the passing of W6VZE, our SLC. Charlie was a very active ham for many years and an outstanding participant in all emergency exercises. We will certainly miss him. W6AUC has been working a lot of European stations on 10 meters lately. W6BPT now has RTTY on 2 meters and is using it for handling traffic in the local area. W6BVB was low in activity this month because he spent two weeks in Washington, D.C. K6DYX has built a speed regulator for his keyer and now can accurately hold it at 10, 15, 20, etc., wpm. Would like to welcome K2EIU/2 to SCV. All avid traffic men are sure needed, Ken, and you fill that bill. W6MMG has found that being a QSL mgr. for a DX station (KC6RS) is sure a lot of hard work. Would like to welcome W6GOMK to the amateur ranks. He already is very active as he did quite well in the Novice Roundup. W6YHM has his modified 30K running and is now back on the air. The reactivated Santa Clara Valley 2-Meter Net, controlled by WA6YDF, had a lot of participation through Feb with an average check-in of twenty guys per session. If you would care to check in they are on every Tue. at 8:00 P.M. PST on 146.0 kHz. W6ZRJ has been so busy lately with his Director functions that he never seems to be home at night any more. In fact his XYL, K6BGM, has been running the code practice for him quite a bit lately. Traffic: W6RSY 693, WA6LEA 177, W6NW 134, W6DEF 103, W6VZT 94, K6DYX 89, W6AUC 49, W6BPT 40, W6BVB 36, WA6GTE 18, W6YHM 17, W6OH 9, K2EIU/6 8, W6RFF 8.

### ROANOKE DIVISION

**NORTH CAROLINA** - SCM, Calvin M. Dempsey, WA4UQC - Asst. SCM: James O. Pullman, W4VTR. SEC: W4EVN. RM: W4IRE. PAM: W4AJT. VHF PAM: W4HIZ. The Yadkin Valley Amateur Radio Club is now affiliated with ARRL. Good luck to K4WLW and all the gang. K4PKF is now K4NU, 1-B, Bob. W4WXZ now has a 30L1 linear on and he says traffic-handling is a little easier. K4NU has a new HW-100 which he just built and put on the air. K4CAX says he enjoyed participating in the Novice Roundup, ARRL CW DX Text, YL-OM Contest and the Vermont QSO Party. He suggests we have an N.C. QSO Party. Our OOs are doing a good job. I need net reports by the 7th of each month. Only one report this month. N.C. SSB 3938 kc. 0030Z Daily QTC 78 Mgr. WA4KWC

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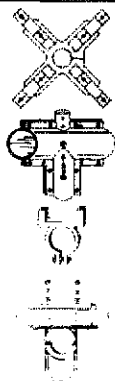


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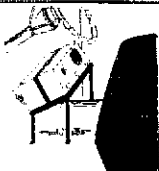
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Traffic: W4EVN 691, WB4ICF 604, WB4GAN 368, K4TTN 126, WB4MLI 59, WA4GMC 50, WB4HGT 44, W4WXZ 38, WA4VNV 22, K4VBG 20, WA4UQC 15, W4ACY 10, WB4JMG 7, WB4HGS 6, WA4KWC 6, K4CAX 4, K4MC 4.

**SOUTH CAROLINA - SCM, Charles N. Wright, W4PED - SEC: WA4ECJ. PAM: W4VFO. RM: Vacant.**  
CN: 3573 kHz Daily 2345Z, and 0300Z.  
SCPN: 3930 kHz Daily Noon; Sun, 0830 and 1530 EST  
SCSSBN: 3915 kHz Daily 0000Z Feb. Fric.: 123  
WB4CJ reports that the Carolina Repeater Society has erected two 170-ft. towers at its Edmond and Gaston sites. Plans are underway to mount vhf/uhf antennas and move equipment from temporary locations to these permanent sites. WA4QWY has resigned as RM because he is entering the Armed Forces. We'll miss Bill and hope he makes it back in record time. Activity reports were almost non-existent this month. How about writing sometime? Traffic: WLOA/4 171, W4NTO 106, WB4CJ 58, W4PED 22.

**VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst.SCM Albert E. Martin, Jr., W4THV. SEC: WA4PBG. PAM: W4OKN. Asst.SEC WB4CVY. RMs: WA4EUL, K4MLC, W4SHJ. SE Va. Assn. has fine write-up in Virginia Pilot with pictures. Thanks to W4AKN, who came forward with facts and figures and kept car license plate fees from being increased. W4DM has been chasing DX Contests. WB4FJK handled 283 pieces of traffic in one week end home from school! WB4FDT is half-way toward 5BWAS with confirmed QSLs. W4GEQ is moving. K4JM remarks on the fine gentlemen met in Novice Roundup. W4YZC worked 7 countries in one night on 7 MHz cw, mobile! W4TE receives traffic but XYL K4LMB has to relay! W4KAO is back at work after being hospitalized. W4WBC is traveling too much. Hopefully the XYL of W4OP is through with therapy. WB4LQV is drooling over acquisition of an FT DX-560 transceiver. W4JHK made his first CD Party in 20 years. Our Director, W4KFC, attended an Executive Committee meeting, 3 club meetings and two net banquets and had 101 contacts in Novice Roundup, 303 in phone and 473 in CW DX Contest - didn't report his spare time activities! We need PAM, RM and OBS support on 40 and 20; also need more stations reporting. Remember the news section is independent of the traffic reporting unless something unusual is noted and we need more stations reporting in with traffic. Come up on the nets where Virginia gentlemen and ladies concentrate (daily, local time):**

V5BN	6:00 P.M.	3935
V5N	6:30 "	3860
VN	7:00 "	3860
V5N	7:30 "	3947
V5BN	10:00 "	3935

Traffic: (Feb.) K4KNP 404, K4KDJ 274, W4UQ 205, WB4CVY 201, W4RHA 175, W4TE 126, W4NLC 109, WA4JJE 76, WA4PBG 66, W4TJE 50, K4PQL 41, W4OKN 38, W4DM 36, WB4FJK 31, K4GR 24, W4SHJ 24, W4OBE 23, W4ZYT 23, WB4FDT 20, W4GEQ 19, W4THV 13, WB4IRA 12, K4JM 11, WA4WQC 11, K4VCY 9, W4KX 8, W4MK 8, W4YZC 8, K4LMB 7, W4KFC 6, WA4YRH 6, W4JHK 5, WA4NJG 5, WB4HNJ 4, W4KAO 4, K4TSS 4, W4OP 2, W4WBC 2. (Jan.) K4KDJ 365, WB4FJK 283, WB4JEZ 93, K4ESS 87, WB4LQV 51, K4MLC 50, W4JHK 5, W4OP 2.

**WEST VIRGINIA - SCM, Donald B. Morris, W8IM - SEC: WA8NDY. RM: W8BBG. PAMs: W8IYD, K8CHW. Phone Net mgr.: W8BAQE. Because of retirement and moving to Florida, W8EV has resigned as SEC. WA8NDY, of Buckhannon, has accepted the SEC post and all amateurs interested in ARPC should contact him. It is with deep regret, I report the passing of John McCord, K8KZR. W8FFYY is a new Novice in Belington. K8QEW, K8BCF and W8HVB report good publicity in local papers on their EC activity. W8HZA reports 22 prospective Novices attending classes held by Kanawha Radio Club. W8HVB reports formation of a radio club in the Beckley area. WVN Phone Net, with 27 stations and 298 stations, handled 57 messages. CW Net held 49 sessions with 268 stations and 126 messages. Tri-State ARC of Huntington plans its annual ham-picnic in June at Camden Park. State-wide RACES-C.D. Net meets Sun, at 1300 on 3996 kHz. Mountain State Emergency Net is active each Sun, at 1330 on 3920 kHz. State Council-Convention meeting was held at Parkersburg. Remember State ARRL Convention at Jackson's Mill, July 4 and 5 and Roanoke Division Convention, Raleigh, N.C., Oct. 31. Traffic: W8BBG 207, W8ANDY 65, W8ARQB 56, W8HZA 50, W8CKX 36, W8JM 28, W8JWX 24, W8SZT 22, W8AQE 20, W8WCK 16, W8LFW 8, W8SYHH 8, K8QEW 7, W8BYWK 6, W8BAST 2, K8QYQ 2, W8BAKR 1, K8BCF 1, W8VQT 1.**

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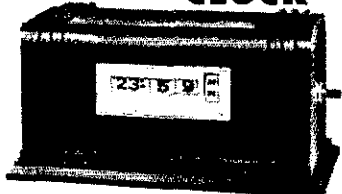
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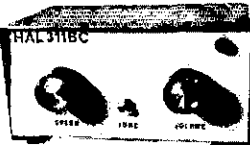
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band. W0LRW has been appointed 160 PAM and we are in hopes of having a section net here by next fall. All interested amateurs are asked to lend their assistance. K1WYS/WB0AWG is the new VHI PAM for the Denver metro area. The Denver Radio Club will host the Division Convention at Estes Park June 13, 14 and 15. W0HPF is chairman. WA0SDU sports a new linear. W0HEP is set to resume Official Bulletins. W0LRN and K0FDH received PAN certificates. W0UAT has a Valiant and reports increased activity on CCN; ready for 160, too. SEC WA0HLQ still needs ECs for districts 4, 5, 6, 9, 11, 15, 16 and 19. Congratulations on all the EC annual reports. Best ever. OOs W0GIL and W0LRW made FMT, as well as W0LRN and W0SIN. Any other amateur interested in frequency measuring, let me know. The following stations made the Public Service Honor Roll for Feb. K0MNO 35 points, K0EXR 32, WA0MNL 29, W0LG 26, W0LRW 26, W0LRN 26, all on CCN. Where are the phone stations? Patches count. CCN total for Feb. is QNI 151, QTC 81, time 559 min. Hi-Noon, QNI 874, QTC 122, time 978. Columbine, QNI 1096, QTC 109, patches, etc., 195, time 1583 mins. Traffic: (Feb.) K0ZSO 769, W0WYX 187, K0JSP 106, W0LG 95, WA0MNL 62, WA0SDU 59, W0LRN 51, K0EXR 46, W0SIN 36, K0MNO 34, K0DCW 25, K0SPR 14, W0UAT 8, K0FLQ 6, W0KFF 6, K0IGA 4, W0OWP 4, W0LCE 1. (Jan.) K0JSP 56, (SET 29), WA0LVM 19, WA0HLQ 7, W0ATA 4.

NEW MEXICO — SCM, James R. Prine, W5NUI — New licenses have been issued in the section as follows: Albuquerque — W5AII, W5AMA, W5AMB, W5APP, W5AOD, W5ARA, W5AQV, W5ARC. Alamogordo — W5ARN. Artesia — W5ARW. Holloman AFB — W5ALA. Los Alamos — W5ALR, W5AIP, W5AIO. Congratulations to these new amateurs. W5SDK has replaced WA7FBV/5, K7IRC/5 qualified for Advanced Class. Some others probably have been upgraded but neglected to pass the word. I hope everyone made a good score in the QSO Party. The scores will be announced in the July issue. There are only a few weeks left before Field Day. Better finish up that small portable or emergency rig and get your site picked out. W5QNY has qualified for DXCC. Traffic: W5RE 151, K5MAT 85, W5DMG 44, W5JXU 28, W5ASJC 24, W5PDY 15, W5AOHI 10, W5MIF 9, W5ASBL 4.

UTAH — SCM, Thomas H. Miller, W7QWH — SEC: W7WKF. Amateur radio is playing an increasingly important role in civil defense in the state. Much of the credit for this certainly must go to W7NFT and those few who pioneered 2-meter fm in the area. W1KE spent three days at Alta and enjoyed "the greatest snow on earth." Dick also spoke at a joint meeting of several of the clubs in the area. W7EM is now on TCC and is working on 435-MHz TV. Several others have also started on TV helped by W7EU, WA7JWD has earned the net certificate on the Beehive Utah Net. W7OCX made PSHR again with a total of 44 points. K7EZR, W7LYV, K7ZVT and K7QE are the new ECs in Box Elder, Washington, Davis and Salt Lake Counties, respectively. WA7HHH has worked all 29 counties in Utah and will be getting his certificate with a gold seal on it soon. Official Bulletin Stations are still needed. Please contact the SCM if you are interested. New officers of the Utah Council of Amateur Radio Clubs are K7LKH, pres.; K7DOT, treas.; WA7JLM, secy. Traffic: K7HLR 292, K7SOT 85, W7OCX 84, W7EM 80, W7QWH 3.

WYOMING — SCM, Wayne M. Moore, W7CQL — SEC: K7NOX. New appointment: W7GMT as ORS in Laramie. K7TCI is now in Casper after serving his hitch in the service. W7BKR, formerly of Ranchester, has also settled in Casper. WA7DKZ is giving his new transceiver a workout. K7ITH now has his antenna hanging from a new 70-ft. tower and says the signal gain he got has made it worth the effort. Don't forget to mail a copy of your Field Day results to me for a chance at the trophy. High score wins for any club or any group from a town that doesn't have a club. Looks like we are getting a QRP club started here in the state. K7KSA, WA7GYQ, K7SDD and WA0PFJ have been having a ball on 80 cw with 2 warts. If you are not now on the roll of at least one of our nets, join in as you will always be welcome. Traffic: K7NOX 337, WA7CLF 263, W7SDA 159, K7ITH 120, W7GMT 103, W7TZK 58, K7KSA 54, K7SLM 52, W7YWW 34, K7VWA 25, K7QJW 22, W7HLA 20, W7VII 17, K7TXZ 9, WA7AUV 4.

**SOUTHEASTERN DIVISION**

ALABAMA — SCM, Donald W. Bonner, W4WLG — SEC: K4KJD. PAM: W4HDO. RM: W4HFU. It is with deepest regret that I must inform you of the passing of WA4ROB on Feb. 20. Jake was loved by everyone who knew him, and his death is a great loss to the section. K4VJL has been in the hospital for an operation. On the lighter side, don't forget the Birminghamfest on May 3. Please attend the net meetings, bring your ideas, and let's see if we can make the nets even better than they are. WB4EKJ, NM of AFND.



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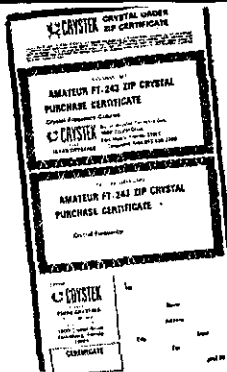
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prints a real fine net bulletin. Congratulations, Jim. Clubs, please send in your annual club report to ARRL. WA4JRR was also in the hospital for a minor operation. K4UMD has been QSY to Memphis VA Hospital. Welcome to Susy, HB9AOE/4, from Enbochat, Switzerland. Traffic is down this month. Traffic: WB4LAL 162, WB4EKJ 114, W4FVY 107, W4HJU 106, WB4JMH 65, K4AOZ 44, W44VEK 39, WB4LAG 33, WB4LHH 29, WA4GGD 26, WB4KSL 20, W4AWLG 17, WA4AZC 16, WB4NCT 12, K4WUG 10, W4DGH 7, K4KJD 2.

**EASTERN FLORIDA** - SCM, John F. Porter, W4KJG - Asst. SCM: Albert Hamel, K4SJH. SEC: W4IYT. Asst. SEC: W4SMK. RM: W4LLE, K4EHY (cw), W4RWM (RTTY). PAM 75: W4OGX. PAM 40: W4SDR. Congratulations to W4BNE on getting the following TV stations to air "Ham's Wide World" - WFLA WTVT and WEDU. The Indian River ARC has a 2-meter A2 net for code practice. Anyone else? W4IA takes over as new GN manager. Good luck, Ev. Thanks Tom (K4CQO) on a job well done. Tom took over as manager of GN when K4KDN became a Silent Key. South Fla. FM Assn. provided the communications for the "March for Hunger" in Dade County. The club also is increasing the range of its repeater by putting in a receiver repeater in Homestead connected to Miami repeater via uhf, increasing the base to 250 watts. NOHARS participated in the Eclipse Net to provide communications for U.S. Naval Observatory, three TV stations and networks plus National Geographic. Over 50 amateurs took part on 2-meter fm and 75 ssb. W4WOP is setting up a network between Miami and Central America for MAHI Shrine Comm. Unit and will relay information regarding children being sent to Shrine Hospitals in this country. Gator, Citrus and S.E. Chapters of QCWA now are very active in Fla. W4DUG/4, Tampa ARC, had a heavy year at Tampa Fair, with a big assist from W3CUL/4 and W3VR/4. W4DUG originated 3070 pieces of traffic. This was a boost to all our section nets. New appointments: WB4HKP as ORS and WB4IHI as OPS. We had six BPLers this month. PSHR now requires 30 points for listing. QFN, GN, EPTN and FAST showed an increase in average QTC for this month. BARC Auction was another big success this year. See you all at the Orlando Hamfest. Traffic: (Feb.) W3CUL/4 6785, W4DUG/4 3070, WA4IJH 1102, W3VR/4 958, W64AIW 948, K4EHY 576, W4LLE 383, WA4SCK 377, W4FPC 210, WB4HJW 202, W4SDR 159, WA4NBT 136, W4DVO 119, WB4IER 111, 8R1Y/W4 107, WB4HKP 102, WB4HTJ 95, W4EHW 93, WB4HNL 84, W4ZAK 76, WB4EPD 68, W4KJG 61, W44HDH 50, K4CVO 45, K4DAX 41, WA4FJA 38, W44HED 38, W4YPX 37, W4IYT 33, K4JWM 32, W4ROA 31, W4N9R 30, WA4HI 26, K4LPS 26, WB4GHD 22, W4SMK 21, W4IAD 20, W4BNE 18, K4IEX 18, W4TJM 17, WB4EY 16, W4LLE 14, WB4KPK 12, K4DVM 11, W4IA 11, WA4EYU 10, W4GDK 10, K4HS 9, K4SIJ 9, W4VPO 9, K4EBE 7, WA4OHO 7, WB4JRV 5, W4SOM 5, WA4LIW 3, W4PHZ 2, WB4JH 2. (Jan.) K4EHY 491, W4LDM 133, K4ILC 51, W4OGX 40, WA4OHO 19. (Dec.) W4LDM 73.

**GEORGIA** - SCM, Howard L. Schoner, W4RZL - SEC: WA4WQU. RM: K4BAI. PAMs: K4HQI, W4LRR. K4BAI is putting out a fine GSN bulletin. He indicates that the net now has 60 active stations. During Feb. NCSs were W4CZN, WA4RAV, W4PIM, W4EAW, W4NSO, K4OSL, K4BAL, W4JWO and W4JXO. The following stations divided 4RN duties: WA4RAV, W4NSO, W4PIM, W4CZN, K4OSL, W4EAW, WA4GXZ, W4DDY, WB4JXO and WB6UTC. 56 sessions netted 240 messages with 433 check-ins. We are looking forward to K4AKP returning to the air. K4NM has retired and plans to vacation by travel trailer. WB4NQA now holds Extra Class ticket. Sorry to lose WA4UQO to Florida. Glad to welcome WA4UPF back after his activity as KL7AIR. WB4PQM is the new call of Shamrock High in Decatur. W4LRR alternates week ends on vhf with 144 Mc. The first week end, 22nd second, 420 third. He is looking for DX from 8 A.M. to 9 A.M. on 144.090. Phil runs 500 watts cw for the contacts. Traffic: WA4EAV 153, W4CZN 136, W4NSO 112, K4BAI 99, W4DDY 86, W4RZL 48, WB4DMO 24, WA4IWO 18, WA4LLI 5, WB4KVE 3, K4PIK 2.

**WEST INDIES** - SCM/SEC: Jose Medina-Hernandez, KP4CO - Congratulations to KP4SV, HI8RRP/KP4, KP4ES, WD, HI7ECL/KP4, HI8RO, HI3MPW, HI8HV, and HI3PC, and Antilles WX Net for active participation in the sad aviation accident where 102 persons lost their lives. Their public service spirit reflects on organized amateur radio. KP4BJU finished his electrical engineering course at Georgia Tech. and joined J.A. Jones Construction Co. KP4DV must be very proud of his son. Congratulations to Radio Club de P.R. for fine photos in groundwave for the FB meeting in Cabras Island. Congratulations to P.R. Amateur Radio Society for a splendid hamfest at Arecibo with 108 amateurs present and a total of 220 attendants. WB4FOT/KP4, at Ramey AFB, now has dipoles for 80-10 and enjoyed pile-ups on his frequency. 36th ARRL

International DX competition participation: KP4AST, KP4AM, KP4CQB, WB4FOT/KP4, KP4DF. A. Traffic: KP4WT 146.

**WESTERN FLORIDA** - SCM, Frank M. Butler, Jr., W4RKH. SEC: W4IKB. PAM: W4MOQ. RM: K4VFY, KM-RTTY: W4WEB. Nets:

Net	Freq.	Time-Days	Sess.	QNT	QTC
WFBN	3957 kHz	2300Z Div	28	413	42
QFN	3651 kHz	0000/0300Z Div	56	563	576
2m FM	146.94 MHz	0130Z Th	4	25	1

Pensacola: K4VFY is the new RM for West Fla. W4NRF/NAS Club station, meets alternate Tue. at 7:30 P.M. in Hangar 708. New officers of the FFARA: K4LAN, pres.; WA4WAR, vice-pres.; K4CFS, secy.-treas. WB4JCV and WA4SSB received Extra Class tickets. 8R1Y/W4 stays high on PSHR each month. WA5GTJ/4 meets the Maritime Mobile Phone Patch Net. Fort Walton K6QPH/4 is active on the traffic nets; he uses a 200-ft. long wire. WB4NJW received the PARC Outstanding Amateur of the Year Award at the Annual Club Dinner. Guest speaker was Dr. Simpson of the Miami Hurricane Center. The NW Fla. FM Assn. received its ARRL affiliation charter. WB4NHH got his antennas up, only to find his receiver on the blink! The Crestview C.D. station is now equipped to use the WB4KLT repeater. The repeater autopatch is operational, thanks to W4SMS. Panama City: WB4NEO is on 146.94 fm. Chiplew: New Novices are WN4s PVG and PVH, daughters of W4IKB, Tallahassee. The FARC Novice class, taught by WA4EAO and W4MOQ, has 25 members. WB4LOQ, W4MOQ, WA4EAO and WA4GHE, of Perry, assisted with communications for the solar eclipse. Traffic: (Feb.) K4VFY/4 171, 8R1Y/W4 107, W4WEB 26, W4IKB 12, W4RKH 12, K6QPH/4 7, W4FDJ 6, WA5GTJ/4 6. (Jan.) 8R1Y/W4 287, WB4EOU 15, WA5GTJ/4 13.

#### SOUTHWESTERN DIVISION

**ARIZONA** - SCM, Gary M. Hamman, W7CAF - SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. Now is the time to make plans to Field Day June 27 and 28. Clubs participating and their Field Day chairmen are: Arizona ARC, Bill Gregory K7CFH; Old Pueblo RC, Bill Chapman K7POI; Scottsdale ARC, Tom James, W7OPS. Contact one of these gentlemen if you want to participate with one of those groups or get a group of your own and participate. On July 25 and 26 the annual Ft. Tuthill Hamfest will be held at Flagstaff. Activities include a Sun. pot-luck lunch, swap table, transmit line, etc. Write to the secy. of the Amateur Radio Council of Arizona, W7GX, for more information. The deadline for film comments on FCC Docket 18803, concerned primarily with proposed repeater regulations, is May 15. An original and 14 copies are required. The Arizona ARC transmitter hunt was won by K7PRS-K7PLR. WA7IFD is now attending ASU. Those attending SAROC in Las Vegas included W7AKU, WA7DUC, WA7DSW, WA7EIG, K7GPZ, W7GX, W7MES, K7NFZ, K7NNI, K7OHL, K7LXC and W7DLE. PSHR: K7NHL 48, W7CAF 24, WA7EQC 14. Traffic: (Feb.) K7NHL 343, W7GEP 108, K7UYV 45, W7JMO 28, W7NQA 26, K7NTG 26, W7CAF 25, W7OJF 23, WA7NBM 19, K7WUG 16, W7DQS 10, WA7EQC 7, K7ZMA 3, W7LLO 2; (Jan. W7GEP 135.

**LOS ANGELES** - SCM, Harvey D.D. Hefland, WA6KZI - Asst. SCM: Donald R. Etheredge, K6UMV. SEC: WA6QZY. WN6JE passed the General and WN6MCK passed the General and Advanced. W6NKE and W6IVC both are active on SCN while recovering from operations. WB6ZYE has available a bibliography on slow-scan ATU articles in exchange for a SASE; he is also available for club demonstrations of slow scan. Santa Monica HS Club station, K6CLL was on display as part of club week. The W6FNO wide-band fm repeater is available for base and mobile communications using 146.820 mhz in and 146.770 mhz out. The Palisades, San Fernando Valley and So. Calif. VHF Clubs are working on club repeaters using 144, 432 and 220 mhz, respectively. New Crescenta Valley Radio officers are WB6DRH, pres.; W6INH, vice-pres.; WA6SJJ, treas. K6PWU, secy. New So. Calif. DX Club officers are W6ZJA, pres. W6DGH, vice-pres.; K6SXA, secy.; K6GLC, treas. The So. Calif. VHF Club put on a display on amateur radio for the City of Carson's Annual Parade and Festival and provided communication for the kayak races on the Kern River. The Monterey Park Radio station K6GIP activates weekly Wed. at 7:15 P.M. on 145.35 mhz for the club net, and the club is developing a RACES program for the city. Asst. Dir. W6GTE joined the ranks of Silent Key. WB6KXI is now on RTTY. WB6MCK built a delta loop beam and WN6EBQ has a new vertical working successfully. WB6QVF now mobile on 144-mhz fm. WB6PAV completed WAS. W6EJJ nearing 5BDXCC with 80 meters lacking. WB6WIT busied himself with the ARRL DX Tests. W6GEO installed KWM-2 in his car. WA6ONK built a tr switch. K6VNX expects to soon have h



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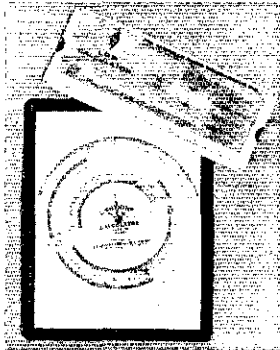
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Net	mhz	Time	QST	QTC	Mgr.	Month
SCN	3.6	6:30 PM	398	546	W6LCP	Feb.
Novice	7,1810 A.M.	Sat.	32	7	WA6KZI	Feb.
SCN	3.6	6:30 PM	371	745	W6LCP	Jan.

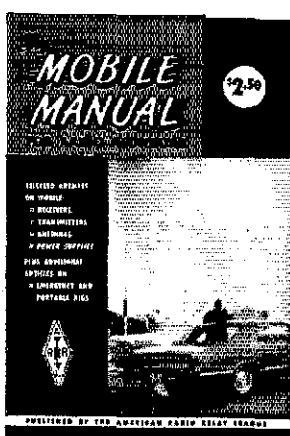
Operating activities wrapbox - Pages 53 and 54 of Mar. QST carried an announcement that the PSHR requirement was changed from 25 to 30 points and effective with the month of Jan. Such a retroactive decision will deprive many of PSHR listing after they were led to believe they had earned such a listing. Those who share my opinion that such changes of ARRL operating activities should not be made without the courtesy of advance notice to the participants are urged to write their Division Director (addr. page 8) and the ARRL Comm. Mgr., WINJM, at ARRL Hq. - WA6KZI, SCM. Activity reports (BPL/PSHR): (Feb.) WB6BBO 511/3, W6BHG 74/0, WN6BJP 1/0, K6CWD 119/0, K6CL 7/0, W6DQX 4/0, K6EA 13/0, WN6ELB 1/0, W6ID 4/0, WA6EJ 4/4, W6EJT 23/31, W7GAO 7/10, W6INH 50/0, W6IVC 16/14, W6JET 0/28, WA6JHD 1/0, W6KGG 12/17, W6KXI 9/15, WA6KZI 9/20, WA6LSB 1/2, WN6MCK 2/2, WB6MH 4/9, W6MLF 619/3, W6NKE 5/10, W6QEO 9/8, WB6OJD 18/0, W6QAF 48/0, W6RCV 0/6, W6IN 6/0, WB6WIT 0/8. (Jan.) K6GIP 20/17, W6JPH 22/0, WB6MH 72/19, W6OQH 0/5. (Dec.) W6JPH 26/0.

ORANGE - SCM, Jerry L. VerDuft, WA6ROF - Asst. SCM: Richard W. Bierbeck, K6CID. SEC: WB6CQR. RMs: W6LCP, W6BNX, W6RVM. In addition to the above, the following are the current appointees of this section: ECs: K6CID, K6GGS, WA6GQI, W6KIF, W6OAT, WA6TAG, WB6WOO. OBSs: WA6FIT, K6GGS, WA6LJZ, W6WRJ. OO - W6BAM, W6BNX, W6GPR, W6IQH, WA6JZZ, K6LJA. ORSs - W6BNX, WA6FOO, K6IBL, W6LCP, K6OT, WA6ROF, WB6TYZ, WB6ZPC. OPSs - W6BNX, W6BUK, W6GB, W6RVM. OVSs - WA6FIT, K6YNB, WB6WOO. W6BUK's OPS appointment is one of the oldest in the Division, dating back to 1938. 1970 officers of the Fullerton ARC, W6ULI, are K6HXO, pres.; W6KCB, vice-pres.; WB6VVO, secy.; S6ATK, treas. The SCM and SEC were guest speakers at the beh. meeting. The club sponsors a slow-speed cw net on 3740 kHz at 2000 PST Thurs. K6GSC is the net control. W6HHC was elected chairman of the Orange County Council of Amateur Radio Organizations for 1970; WA6LVS was elected secy. The Council has selected W6MUR as general chairman of the 1971 SW Division

Convention to be held at Disneyland. W6KFI is our new EC for Orange County 6-meter activity and soon will be forming a 6-meter ARRL net. The Feb. 24 issues of the Santa Ana Register contained an article on the Autonetics Club MARS station, AFC6YPX. They completed 1536 patches to SEA in Jan. Our new Orange County 2-meter EC, WB6WOO, did a bang-up job of organizing the AREC for the Annual Heart Fund Charity Drive. Bill has appointed WB6VVO and WA6FIT as Asst. ECs. WA6JZZ is moving to a new home just one block from WA6ROF. W6BAM is busy giving Novice exams. W6BNX and WA6ROF made the Public Service Honor Roll this month. See page 75 of Nov. QST regarding PSHR point system. Traffic: W6LCP 204, W6BNX 174, WA6ROF 67, WA6FOO 42, W6WRJ 14, WB6TYZ 7, K6OT 6, W6BUK 3, K6GGS 2, WB6ZLC 1.

SAN DIEGO - SCM, Richard F. Lettler, WA6COF - Asst. SCM Art Smith, W6INI. The combined Southwestern-Pacific Divisions Convention is being held in Fresno May 15-17 at the Hacienda Motel. Thanks to all who helped with the QST delivery delay survey these past 3 months. We covered the entire section and are hoping the results will help in getting the magazine out to the members sooner. AREC membership continues to climb. Activities of this group include the glider meet in Feb. and possibly the Walk for Development in May. Why not join the others in serving our community? Registration forms are available at Western Radio Clubs: CCWA held its annual brunch get-together in Mar. Interest among these members is growing under K6PM's leadership. Palomar Club enjoys its new meeting place in Vista. El Cajon heard a fine talk on theft prevention from El Cajon Police in Mar. North Shores held a successful auction at its Feb. meeting. K6CF, pres. of SJ DX Club, had his group in a joint Mar. dinner meeting in Oceanside with Orange County DX Club. May meeting is at K6ZMZ's home. Section: W6INI boasts new KW matchbox and WB6LNB (OBS) now is on sb! Thanks to WB6OIA for special purchase of AREC generators. WB6VKV now is Extra. K9ZMS/6 now is W6MAR. PSHR: W6LRU, W6BGF, W6NVO. Silent Key: W6RT. Traffic: K6BPI 6184, W6VNO 641, W6EOF 376, W6BGF 297, W6LRU 280, K6HAV 62, W6YKF 19, WA6COE 2.

SANTA BARBARA - SCM, Cecil D. Hanson, WA6OKN - RM. W6UI. Estero ARC station WB6GYK in Los Osos has a completely new antenna installation. The Central Coast Amateur Relay Society is busy installing a 2 meter fm repeater on a mountain top in the Morro Bay area with WA6MGG and K6OIK heavily involved.



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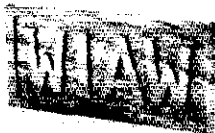
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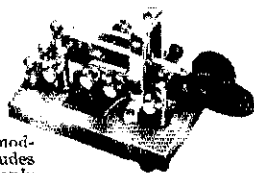
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WB6YCH has a new tower installed. W6JTA is getting RTTY gear in operation. WA6GOR has worked 112 countries. The Simi Valley ARC meets the 2nd and 4th Wed. of each month at 8 P.M. at the Security Pacific Bank, 1307 Los Angeles Ave., Simi. New officers of the Simi Valley ARC are WB6JWM, pres.; K6GOS, vice-pres.; W6ORW, secy-treas. The Simi ARC reports that check-ins on the Channel Cities Net on 145.8 each evening at 6:30 to 7:00 P.M. are going very well. WB6JWM has his Heath HW-17 working as a mobile and home rig. WB6FXW operates his Heath HW-17A on both a-m and fm. WB6QNH is on 2-meter a-m with a Clegg, K6UV, of Santa Susana, has moved to Los Molinos, Calif. WA6WWC, in Thousand Oaks, got his Advanced class license recently and is finishing construction of a 4-1000 linear. The Ventura County ARC meets the 2nd Fri. of each month at the Oxnard Community Center, 9th and Hobson, at 7:30 P.M. The Thousand Oaks ARC meets each month on the 1st Thurs. at the Recreation Center. WA6DEI is working 20-meter DX with his new SB-401. Traffic: WA6DEI 229.

### WEST GULF DIVISION

**NORTHERN TEXAS** - SCM, L.E. "Gene" Harrison, W5LR - Asst. SCM: Gene Pold, W5NIG, SEC: W5JSM. PAM: W5BOO. RM: W5GOZ. Asst. SEC ETex/PAM VHF: W5KHE. W5EYB's first annual report to Board of Directors notes a marked increase in membership over past year. W5BNG is back in harness. W5EYB traveled more than 13.5 k miles in the division and mailed 7979 letters. Dallas repeater group, Jack Mason, pres., met Feb. 9 in SWBT Auditorium, Dallas. W5EYB/W5LR represented league. Denton County reported one day late. WA5VJW is a new ORS. Your SCM attended Lawton-Fort Sill Founders Day Hamfest and was guest speaker at the Garland ARC meeting Feb. 23. Kilocyte ARC, Ft. Worth, nominating committee is W5AKY, W5VGP, W5MWS and W5NZC. Arlington ARC new member is K5ZKS, who lost his sight in '42 as the result of a car wreck. W5VDY, of Odessa, is now General Class and wants in NTS. Your SCM is planning '70 travel in No. Texas and asks clubs to please complete and return forms in SASE. Thanks for copies of San Antonio ARC news letter plus *Ignition Noise*, Lubbock. Clubs, please note W1LVO's letter regarding the Annual Report sent to each club free provided you fill out the card. Any of you guys hear music on 7290 kHz (500Z daily)? Lemme know. Oklahoma has a real nice emergency plan. We hope to have the ARRL issue on remaining Dallas TV stations soon. The Panhandle ARC files a nice club paper. '70 ARRL Convention is set for July 17, 18 and 19 in Orange, Tex. Key City RC's new officers are K5LH1, pres.; W5LVH, vice-pres.; W5PPE, secy-treas. W5EZM/VE8 applied for OPS appointment. Arlington ARC has a new emergency-communications plan. W5VTO says SLEN Convention will be held June 5-6-7 in New Braunfels; Tex RACES meeting and MARS meeting 20-21 in San Antonio. North West Tex. Emergency Net meets on 3950 kHz 1400Z Sun. W5APPE has applied for OO appointment. SEC says AREC members total 211, with 12 emergency nets and 12 liaison stations. This section has shown a marked increase in number of PSHR participants. Check and see how you show up on national listing. Following reported: W5JSM, W5QOZ, W5NFO, K5BDC and W5PPE, plus W5DQP. (Thanks for all the reports. Keep up good work. Richardson ARC sends a nice newsletter. Traffic: (Feb.) W5PPE 4948, W5QOZ 167, W5JSM 41, W5DQP 34, W5VJW 30, W5KIV 29, W5PBN 27, W5LR 22, W5SMI 22, W5HVF 17, K5BDC 14, K5LZA 11, W5AEV5 10, W5NFO 10, W5QKM 4, W5QWA 3. (Jan.) W5VJW 14. (Dec.) W5QWA 8.

**OKLAHOMA** - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. Smoky Stover, K5OOV, SEC: W5FSN, RM and QSL Bureau: W5QMJ, PAM 75: W5MFX. Well, the Lawton Hamfest is history. The next scheduled state get-together is the Texhoma Hamfest Nov. 13, 14 and 15, but in the meantime don't forget the West Gulf Division Convention July 17, 18 and 19 at Orange, Tex. Letters of praise are still coming in from some of the state and county health officials for our assistance during the Rubella Drive. We got good mileage this month on the film "Ham's Wide World." It was run on ETEN-TV at Ada, and at the FAA Aeronautical Center for the public where we had a good turnout. KOCO-TV taped it for future running; also your SCM has a tape copy for use at TV stations or on closed circuit TV in schools and/or colleges. W5PAA has a new TC-2 converter to go with the TR-6. Muskogee ARC has obtained the well-known call W5BJK as a club station call. Net reports:

Net	Freq. (kHz)	Time (Z)	Sess.	QNT	QTC
OPEN	391.5	1400 Su.	4	175	13
OPON	391.3	2300 M-F	21	366	45
STN-1	385.0	2:30 M-S	24	343	37
STN-2	391.3	2:30 M-S	24	509	37
OWXN	391.3	0001 1-Su.	24	250	
W-7	3682.5	0100 1-Su.	18	-	52
S-7	3682.5	0445 1-Su.	12	-	21

Traffic: K5TEY 470, W5AYRO 134, W5QMJ 108, W2FIR/5 48, W5RRH 42, W5IMO 28, W5EW 27, W5FKL 25, W5MFX 20, W5PML 14, W5ZOO 12, K5WPP 9, W5FSN 8, K5ZDB 6, W5UFI 3, W5ASN2M.

**SOUTHERN TEXAS** - SCM, G.D. Jerry Sears, W5AIR - SEC: K5QOQ. PAM: W5KLV. RM: W5EZY. Conventions coming up in Southern Texas area: STFN at New Braunfels June 5-6-7. West Gulf Convention at Orange July 17-18-19. Make arrangements to meet the gang. New officers of the Corpus Christi Amateur Radio Club are W5BJ1, pres.; W5QEM, vice-pres.; W5AZRD, secy.; W5ASTPY, treas.; W5AOPX, W5OBF, W5IRQ, W5INN, K5UDU, K5GGB, dir. New editor of the *Pelican* is W5ZUN. From college station K5FJZ reports approximately 15 students in new code class. K5GDDH, while in California, worked back from the mobile to Austin on 75 meters. Back home he is putting a new final 4-1000 on the air. W5BHO spent most of Jan. and Feb. operating mobile and portable from trailer from the Valley to Kerrville. EC W5RFW reports 2-meter fm activity with more mobiles each week, hoping to have the new 2-meter fm repeater going in time for the West Gulf Convention in July. K1PKQ/5 is keeping weekly phone patch schedule with CE0AE. Congratulations to OO K5SBR/5, who graduated from Texas A & M with a BA degree. He expects to be there another year or so. *Off Resonance* reports W5HBI has the CARCOB group moving along with two new Novices, W5SAUG and W5NSAPT; also lists for sale a "Thunderbird linear" "Good for cw, RTTY, or CB." so if you hear a strong CB signal from Corpus Christi you will understand. Congratulations to K5OVH, also his K5L Mary, for an excellent job as 3th District QSL Manager. W5QMJ, of Enid, Okla., will take over the job as Hurley has resigned. Keep your SAS envelopes ready for your DX QSLs with W5QMJ. Traffic: K5GDDH 233, K5HZR 182, K5ROZ 95, W5ABQ 44, W5BHO 24, W5TFW 18, W5QSE 8, K1PKQ/5 2, W5KLV 2, K5WYN 2.

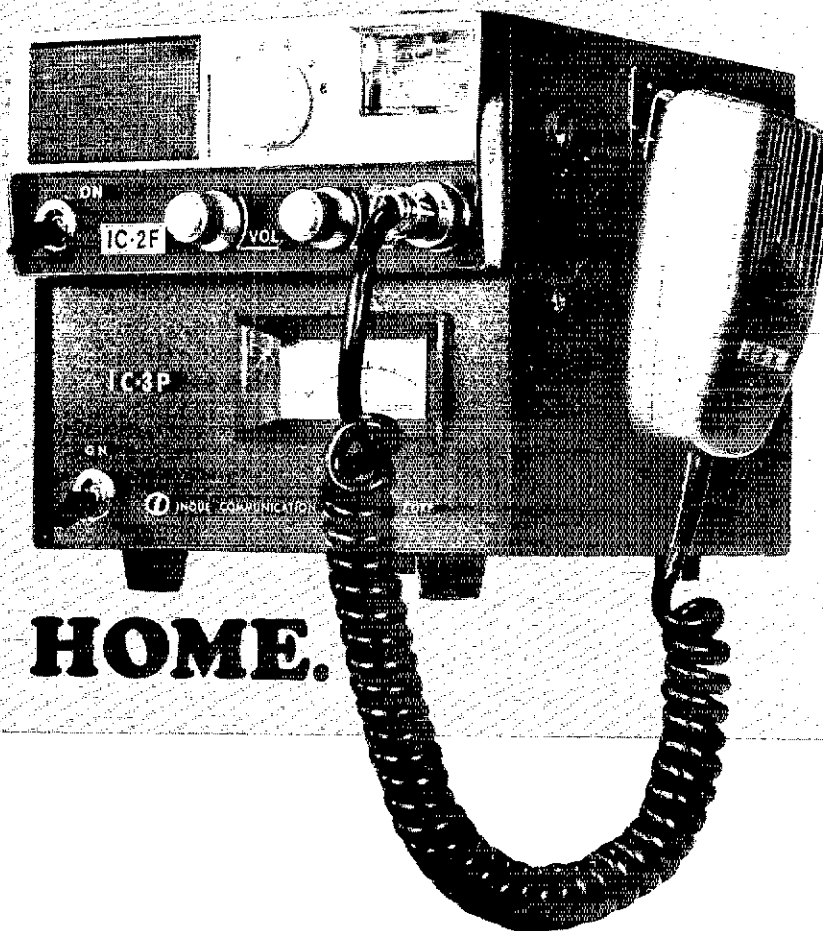
### CANADIAN DIVISION

**ALBERTA** - SCM, Don Sutherland, VE6FK - The early part of July is made to order for holidays with the Alberta Hamfest in Calgary July 11 and 12 and the Glacier Waterton Peace Park Hamfest in Aqgar July 17, 18, 19. VE6FY and VE6AWI are NCSs for the newly-started cw net, ATN (Alta. Ite. Net). The net is of the slow-speed variety designed to help your code speed and traffic-handling knowledge. ATN meets three days a week on 3690 kHz. Commencing at 0330 GMT Wed., Fri. and Mon. Please note that these days are advanced one because of GMT. Congratulations to VE6MJ on his DXCC and his fine showings in the FMTs. VE6XC is doing a lot of net work, both phone and cw. VE6AKK and VE6EC helped with communications for the Grand Prairie Ski-do Marathon. The NARC is working on plans for its new repeater site. Sounds like a very extensive program. The NARC is also compiling a history of its repeater, one of the very early ones in Canada. The CARA sponsored a station at the Brentwood Elementary High Hobby Show Apr. 10. Traffic: (Feb.) VE6TY 32, VE6FK 19, VE6XC 11, VE6SS 4. (Jan.) VE6MJ 12.

**BRITISH COLUMBIA** - SCM, H.E. Savage, VE7FB - Vancouver Sea Festival Amateur Radio Award has been around for some years, but Canada has not taken an active approach to the award. Most clubs in Canada will be renewing information on the rules. This event is a marine pageant held each year in June. K7LPZ has her ORS. This will cause problems for VE7BDJ, the OM, as he has been B.C. section high scorer in CD parties. The Doc regulations states you must be fifteen years old to obtain your license. VE7BEE waited his birthday plus one day. Also from the Vancouver ARC code and theory class is VE7BCA. VE7BDJ has been promoted to comptroller for J. Patterson Co. VE7VD and VE7KY are out of hospital. VE7YB has retired as Army Captain. Chilliwack ARC has been busy installing antennas for VE7BHG (IA-33 Jr., VE7BCJ dipole and VE7BE. The *Cleeks* from Beaver Valley and the *Log* from Penticon are some good papers received. Penticon ARC officers are VE7ALV, pres.; VE7EV, vice-dir.; VE7BNU, secy. VE7AWM is building a transmitter. VE7AXV, with a DX-20, is working DX on 80. VE7OQ's home-brew receiver is giving good results. OO/ORS VE7GG has a TH4 up 75 feet. VE7AMW and VE7HU have problems with 2-meter gear. Traffic: VE7BLO 54, VE7OQ 16, VE7SE 11, VE7BZA 7.

**MANITOBA** - SCM, Keith Witney, VE4EI - The Manitoba Centennial Award continues to be popular. For those interested in cw contacts 3695, 7075, 14015, 21075 and 28075 are the frequencies to check. The bonus stations for June are YLs VE4QF and VE4ST. VE4HJ has a mobile and VE4OL reports working two ZLs on 75

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Maybe VE4MP's DX hints at the last WARC meeting are worth trying. WARC was busy with snowshoe races, the annual St. John's Boys School race, and then the next week end the St. Boniface Carnival race. Operations were on 2-meter fm. Good luck to all you FD types but watch out for VE4E/4. For those interested in PSIR the forms are CD-190. MTN: QNI 140, QTC 50. MPN: QNI 1132, QTC 11. Traffic: VE4FO 50, VE4RO 27, VE4KE 14, VE4NE 10, VE4XN 10, VE4QJ 9, VE4YC 8, VE4EF 7, VE4RL 7, VE4CR 3, VE4FG 2, VF4JA 2, VT4JD 1, VE4HS 1, VE4JN 1, VE4RB 1, VF4XQ 1.

ONTARIO - SCM, Roy A. White, VE3BUX - SEC: VE3EWD. PAM: VE3ARQ. Mgr. Grey-Bruce Net: VE3DPO. Mgr. Ontario-Quebec Net: VE3GI. Mgr. Laurentian Net: VE3BLZ. Congratulations are due to the many Ontario amateurs who did so much to make the 1970 SET the best yet and our thanks to the SCMs and SECs in both Canada and the U.S. who cooperated by supplying traffic. Particular praise goes to VE3EWD, our SEC. Ed worked long and hard. Sure, we made mistakes and didn't please everybody but we learned a lot and will do even better next time. Congratulations and best wishes go to VE3CO, who has just retired from the Westinghouse Company after 45 years service. VE3BZB has relinquished his post as mgr. of the Eastern Canada Net and will be replaced by VE3GI. VE3DOB is moving to VE2-Land and we lose a valued controller on the Ontario Phone Net. We were saddened to hear of the passing of VE3TL, Doc Downer was one of the real old-timers and one of the first to be licensed in Canada. Just got word that VE3FRE has been moved to VO1-Land. We have lost an excellent Asst. FC and the Ottawa Valley Mobile Club has lost a valued member. Traffic: VE3GI 197, VE3RH 147, VE3DPO 135, VE3BUX 126, VE3DV 58, VE3GHO 24, VE3FWD 21, VE3EHL 20, VE3CLB 12, VE3EPX 8, VE3EBC 7, VE3VD 7.

QUEBEC - SCM, J.W. Ivey, VE2OJ - VE2APT is doing a fine job as net control for ARCC 2-Meter Net. VE2BAI has a very comprehensive report of the past SET. VE2EC reports winter ice damage at Three Rivers still not repaired but VE2AJU and VE2BLM keep skeds on time. Work on the interband link 144 to 4.32 MHz repeater between Ottawa and Mt. Royal is well advanced. A fine list of Canadian and U.S. 2-meter repeaters has been compiled by VE2DHQ and VE2BPF. Venez tous au Congres Provincial de RAQI a Quebec, les 10, 11 et 12 juillet. VE2ASU, publiciste de RAQI, parlera du Congres et de ses activites devant les membres du Club MARC, le mois prochain. VE2OB continue toujours ses nom-breuses transicions d'appareils. Apres plusieurs annees d'inactivite, il nous fait plaisir d'entendre a nouveau les stations suivantes: VE2HU, VE2AAH, VE2ARZ, VE2AAO, VE2AHU, VE2AKN, VE2ADI et quelques autres. Traffic: VE2DR 34, VE2CP 22, VE2EC 18, VE2BVY 17, VE2OJ 10, VE2APT 8, VE2ALE 5.

SASKATCHEWAN - SCM, Gordon C. Pearce, VE5HP - Saskatchewan Hamfest will be held July 3-4-5, 1970, in Regina. It promises to be one of the best. So plan now to attend this big event. VE3C3, Canadian Division Director, is expected to be present. The SET exercise in January was the most successful the Saskatchewan section has had to date. A 70% increase was recorded over the previous year. So you can see we are ready for anything: riot, flood, earthquake, volcano or tornado. Hi! Our thanks and appreciation to all who have assisted me in reporting for this column. Any who are interested in ham doings in Saskatchewan should contact the Editor, QSO Magazine, 1913 Connaught Street, Regina, Sask., Canada. Traffic: VE5SC 24, VE5OJ 4, VE5JK 3, VE5XL 3, VE5YR 3, VE5TJ 2, VE5XG 2.

WHAT

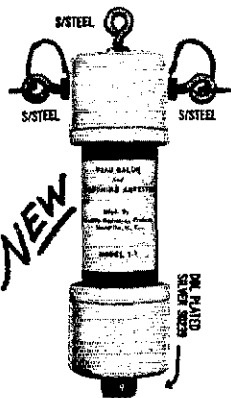
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SEE PAGE 108

# THE BIG SIGNAL

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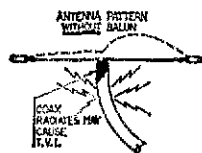
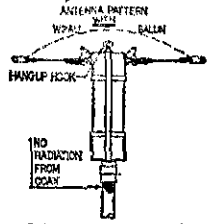
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QS 5-70

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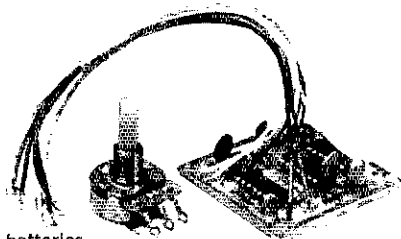
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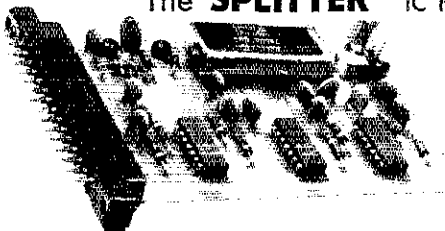
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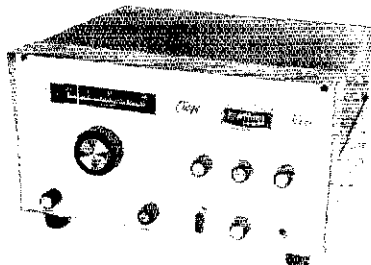
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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

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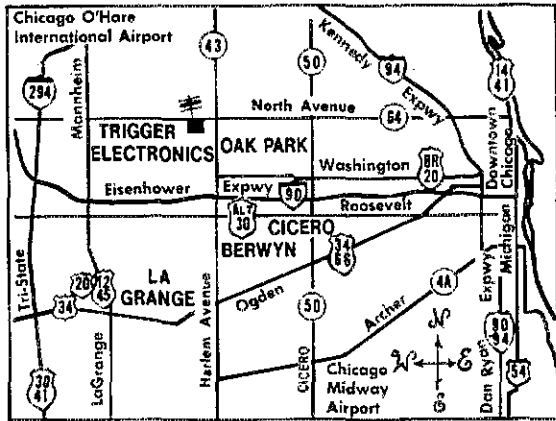
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QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, NJ 08848.

3-D QSLs - The modern concept that makes all others old-fashioned. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLs 300 for \$4.50, samples 10c. W9SKR, George Vesely, Rte. 71, 100 Wilson Rd., Ingleside, Ill. 60041.

J-LINE Engraved badges, any color, \$1.25. Special rates to clubs. Faber's Engravings, 121 N.C. St., Hamilton OH, 45013.

RUBBER stamps \$1.25 includes tax and postage. Clint's Radio, W2UDQ, 32 Cumberland Ave., Verona, NJ 07044.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, NJ 08638. Samples 10c.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 10c. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

QSL, SWL cards that are different. Quality Card Stock Samples, 10c. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

QSLs free samples 200 designed cut catalog 25c. Ace Printing 8601 Clark Ave., Cleveland, Ohio, 44102.

QSLs. Second to none. Same day service. Samples airmailed, 25c. Ray, K7HJR, Box 331, Clearfield UT 84015.

GORGEOUS QSLs, Rainbows, etc. Top quality! Low prices! Samples, 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater Fla. 32032.

NEW! QSLs professionally designed. Every card original. Samples, 10c. Printing follow-through by W1FLX, QSL Designs, 20 Britton St., Pittsfield, MA 01201.

QSLs: 100, \$1.40 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, MN 55803.

QSLs-SWLs, Samples 25c. Malgo Press, P. O. Box 375, M. O. Toledo OH 43601.

NEED HRO-57A1 receiver with coils, speaker, power supply. I am 19 years old and will use this receiver to get my code speed up and get my license. Any reasonable price ok. I will have it packed if you are more than 200 miles from me. Bobby Hecksher, Jr. Box 216, Fort Myers, Fla.

HAM - counselor, over 18, to instruct at a children's camp in the Pocono Mountains of Penna. Own equipment required. Explain type equipment and further qualifications to Pocono Highland Camps, 6528 Gaston Ave., Phila, Pa. 19149.

COUNSELLOR for ham radio program. Top NY state brother-sister camp, 10 miles N. of NYC. Camp Seatico, 25 Kenmore Rd., New Rochelle NY 10804.

WANTED: RME 69 in working condition with tubes. State price in first letter. Jack Swanson, W5PM, Covington LA 70433.

GALAXY v Mk2 \$320. AC supply \$55. Deluxe Galaxy accessory console \$75. Vnx, calibrator, and F3 cw filter three for \$65. Heath HDP-21A mike \$20. The package \$500. K3HTO, Tunshannock, PA 18657.

COLLINS S/Line latest models exceptional fine condx 7583B with cw filter \$525. 3283 with 516F2 \$610. David Talley W2PF 30 E 9th St New York 10003. Tel. 212-982-2420.

BRAKE 2C, 2CQ and xtal calibrator - excellent condition \$205 FOB. Ken Bauer, 6358 Lyric Lane, Falls Church VA 22044.

MOVING in England sacrifice mint 30U1 with manual and cables serial 26899 also 7A33, EZ-way tower RBS40G, EZ-way motor which and CD rotor Ham-M5-807. Best offer takes both. K2ZLG. 212-753-9516.

COUNSELLOR: Penna. brother-sister camp seeks ham radio college man with a General license. David Blumstein, 141Q E. 24th St Brooklyn NY 11210.

COLLINS for sale: KWM2 113378 with sr and dc P/S \$825; 30LJ \$300; all real clean. K8LQA Box 96, Sparta, Mich. 49345.

FOR SALE or trade: Henry 2K3, HT32B excellent, HA6 P26 power supply Hallcrafters SR42A with HA26 VFO like new, Gonset 2 meter linear, HQ180 receiver, very good, 75A4 with vernier dial and 500 cycle cw filter excellent, Need KWM2 or 2A, K390A or 513 receiver, D. W. Langston W5RRV 3808 Gingerbread Road Alexandria Louisiana 71301.

YASHICA autotron miniature 8mm camera \$40 and Sony TC 250 stereo recorder and tape deck \$65 (trade). SBE34 with calibrator, like new, \$270, SB300 receiver \$185, SB200 linear \$190, Dick Manahan WA3TC 8300 Ingersoll Road Alexandria Virginia 22309.

HW-17 very good \$80. Eico 722 VFO, 14AVQ both almost new \$25 each, John Chapman WA5VCT 3214 Hemlock Austin Texas 78722.

DRAKE R-46, T-4X, MS-4, AC-3. All like new in original cartons. Recent serial numbers, \$680. Also EV-729SR mike \$10. 12AVQ \$10 and HM-15 SWR meter \$8. Jack Cramer 21055 Keswick Canoga Park Calif 91304.

CHRISTIAN Ham fellowship for Christian hams. Christian ham callbook \$1 donation. Free details. Write Christian ham fellowship 5857 Lakeshore Dr. Holland Mich 49423.

NCX-3 HP-13, Motorola mic w/built-in pre amp \$150. E. P. Rolek 1166 Ridge Rd E. Rochester NY 14621.

WANTED: HRO-6 for parts does not have to be operating. State price. W6GI 2775 Semanote Rd Ann Arbor Michigan 48104.

K-350 receiver, excellent condition, recently overhauled, \$685. For. Cor. Marshall W6VHR 554 Westbourne Dr Los Angeles Calif 90048.

WANTED: 500 cps and/or 200 cps filters for Collins 75B-3C. W. V. Wilson WA5YQV Box 497 Batesville Ark 72501.

FOR SALE: NCX-5 NCX-A VX-601 NCI,2000 20A Bandhopper VFO G76, 12v supply Ham-M rotor 14 typing report, Regency AR-136 aircraft receiver, RCA mark 810 meter transceiver, Ameco oscillator converters, CN-50, CN-144, ps, 14 Mc v-f. Sorry no shipping. Write K3D5M Gene Mitchell 358 Conestoga Rd Devon Pa 18333.

STOLEN: Motorola Industrial Dispatcher, in hand, two frequency. Serial number unknown or missing. Without case. Set up on mobile telephone channels. All control panel wiring is home brew. Motorola legend strip on front panel missing. Call Bill Jeffrey 817-543-8068 evenings, or Foxboro Mass police.

HALLCRAFTERS HT44-P-150AC cables, accessories \$215. SX114 \$175. Yphant 11 \$60. All excellent WB2PCB 516-867-7035.

TELETYPE Mod. LPR 28 receiver-only typing repeater/oscillator without cover, operating, good, sync motor 60 wpm, \$125. Tape winder 110vac \$15. T28 LBXD1 trans-dist 60 wpm, sync motor, wired for complete 100vac operation and converted to 7.42 cdc \$75. T. Howard Box 252 Boston MA 02101, Tel. 817-42-0916.

SELL or trade - HQ105TR all hand recr with bandsread, transmitter on 29.610, \$106 FOB. Want HW12A with power supply. WBZF 4328 State Rd Saginaw Mich 48603.

WANTED: Japanese, German and Italian military radios of World War 2 vintage, need not be working. Philip McCoy 4212 Franklin St. Kensington Maryland 20795.

WANTED: All 7006 temperature-limited diode noise generator. Ronald E. Guentzer W8BBB Route 1 Box 30 Ada OH 45810.

PREPARE for FCC exams! You need Post-check, Original, expertly devised, multiple choice questions covering materials used in FCC exams, in the same form as FCC exams, with 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. General class \$3.50. Advanced class \$4.75. Extra class \$4. Third class postage prepaid. Add 32c per copy for first class mailing, 64c for airmail. Send check or money order to Post-Check P.O. Box 3564 Urbana/Iowa Station Des Moines IA 50322.

SALE: 2 mtr Terratt criterion navigator converter 14-18 Mc f-etal ac supply manual \$25. WA6VD 282-1461 Alhambra.

CYCLONE SR400 & ps 500AC \$550. Ronald M. Nagata 1330 Curtis St. Berkeley Calif. 94702. Tel 415-526-7345.

WANTED: 5-band ssb transceiver with ac & dc supplies. Low cost, good condition. Cygnat 270 or similar preferred. Denis Baggi HB9ALE 12 Tompkins Pl Brooklyn NY 11231. Phone 212-643-1072.

HEATHKIT DX60B xmtr and HR10B recvr, speaker and calibrator. Best reasonable offer. Will sell separately. WA5YTB 1738 Thompson Blvd Okla. 73701.

FOR SALE: Complete novice station HQ129X recvr with sideband slicer and Q-multiplier, Heath DX200 xmtr with tr switch, Hvgan 14AVQ vertical with 80M loading coil and 100 feet RG58 coax. Will deliver 100 miles or you pay shipping. First check for \$160 takes all. Tony Vigliotti 15-47 200th St. Bayside NY 11361.

SELL: Heath Apache HD-10 keyer, new Allied A2516 recv (Jan QST) 14AVQ antenna, Knight SWR, cable, relay, connectors. \$250. Bob Zack 720 Simpson Evanston Illinois 60201.

QSTs for sale, most issues from 1930 to date. Good condition. Carl Arnold 435 Spring St. Middletown Pa 17057.

SELL: Heath Mohawk recv \$140. Gary Gilbert WA5NFI 1038 Kenton Deerfield Ill 60015.

BTL LK-2000. Absolutely like new. Lute sm 1924, factory cartons, manuals. Cert \$695. WA6VQS 916-489-8659.

WARRIOR #125. K9RZZ 60656.

FOR SALE: Swan 500, both supplies. Excellent condition \$425. WA9ABE 4m Norrells 5629A Whitecomb Court Indianapolis Ind 46224.

HAM with general class license, high school graduate minimum. To teach radio to campers at outstanding coded camp. Write for application blank to New Jersey HMA-YVHA Camps, 589 Central Ave. East Orange NJ. Phone 201-678-7070.

LDW east mobile supply 400V, 150 ma out @ 12 to 14 v in at 900. Dynamotor-filter Navy type CWZ1109A. Limited supply at \$25 each. FOB your QTH. Send 10 cents for complete data E. B. Vinson, W6RA 18791 Jamson Road, Castro Valley Ca 94546.

UNDEPAID teacher assemblies Heathkits. Written guarantee. Stamford W02M/J, Hills MN 56138.

VHF NBFM transceiver solid-state modules, 25 watt transmitte including multiplier, six channel oscillator, phase modulated FFT front end, crystal filter, I.F. discriminator, audio amplifier 8 to 12 vdc. Request specifications and low price. brand new. J. D. Sylten 1651 NE 56th Court Fort Lauderdale FL 33308.

SOUTHERN California amateur network 14.325 MHz Mond through Friday 0400 GMT. K6YCM.

DON and Bob guaranteed goodies, Monarch Dual-net SWR-power bridge 1 reg. 24.95, 15.5A transformers 6V/1.1 1.49; 12V/1.5a 1.95; 24vct/1a 1.95; 24vct/5a 6.95; 60V/240V 5.45; 6V/12A 3.95; Monarch VF-11 blade fan 2.95; Monarch MT-1000 100kohms/v VOM 24.95; Diodes - Motorola HEPT 2.5a/1000piv 39c; GE 3a/600V 10/2.95; 4" P.M. speaker 99 one pin Novar socket 28c; Rohm 20G tower 15.45 ea; use guaranteed buys - Collins 75A-4 350.00; Johnson Invader 200 399.00; Write for high trade-in quotes on major line equipment accessories. Authorized Collins warranty repair. GEICI BankAmericard, Don, K5AAD, Bob, WA5UOK, Madiso Electronics, 1508 McKinney, Houston, Texas 77007 713-224-2668.

CIRCUITS for 32 electronic projects, r.f., audio and gadgetry complete plans \$1. P.M. Electronics, Inc., Box 4620 Seattle, Wash, 98146. Dealer inquiries invited.

SELL: Galaxy V Mk2, ac power supply, speaker console, VFO crystal calibrator, cw filter, Good conditions \$450. WAD7N, Apt. 15, 863 North 4th, Laramie, Wyoming 82074 307-742-2615.

RECEIVER, 80-10 meters, a-m, c-w, sbb, Harvey-Wells R50/extra clean, \$60 ppdms, W4VR0, Ray Crawford, 712 Kingsbury Circle, Tampa Florida 33610.

HEATHKIT Apache FT-1 with SB10, excellent condition \$175. Ed K8VIR 106 Hartz Dr. Holly Mich. 48442.

WANTED: Heathkit HO13 and HA14. Don Maxwell 71 Regency Drive Charleston W. Va. 25314.

ARMY bound must sell Swan 350c and ac supply. Best offer. L Jolly 1666B Spartan Village E. Lansing Mich 48823.

HEATH SB-301 with all the filters and six meters; asking \$281 David A. Heinsohn 947 Deerwood Dr. Dallas Texas 75232.

QST 1935 thru 1960 complete \$65. You pay postage. Le Doubler 12101 Debby Drive Parma Ohio 44130.

COLLINS R202, serial 15532 \$600. Gonset communicator U \$125. WRB 6 meter VFO model 666 \$20. R. C. Litterle 64 Snowhill Springfield Ohio 45504. Tel. 513-399-8697.

PLASTIC all letters signs 4", 1 1/2" weatherproof for fastening to cars, windows, houses. Specify magnetic or adhesive backing \$3 each or \$5.50 per letter colors: Black, red, blue, green Leiden Enterprises Inc. 19304 Stafford Ave., Cleveland Ohio 44137.

WANTED: D10 meter; rotor suitable triband antenna; no junk W2KAL 108 Glencove Drive Glenhead NY 11545.

COLLINS 50M - 2282 - 7587 - 312B4 - 516F2 - Hvgan Antenna \$1150. Hallcrafters SR150 with ac and dc power supplies - Astatic Microphone - Webster antenna \$300. Course CB rig & Turner microphone \$100. Mrs. D. G. Cragi 8901 West Frontage Rd. NE Space 133, Albuquerque, New Mexico 87113.

SELL: Mosley PA33 on 30' free standing tower with rotor \$1000 Novice Hallcrafters 75 watt 14AVQ transmitter with 2x16 and manual \$45. Fred Gross 4 Middleway, Hartsdale, NY 10530.

HEATH SB-301. Never unwired in original carton. Never unpacked. \$265. K208Z RD1 Hamburg NJ 07419 201-827-5478.

WANTED: RV1 external VFO for Galaxy transceiver. All letters included. W0YUQ 312 S. 3rd St. Manhattan Kansas 66502.

DX-60A \$50. Towner \$30. Both excel condx used little. Also have S-120 \$25 or best offer. K. Gelber WB2W01 350 First Ave New York NY 10010.

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for \$1, 10 for \$3. Prepaid and guaranteed. Tepebac Box 198T Gallatin TN 37066.

SELL: Swan 600, 14117 dc supply, 117xc ac supply, VY, YOK, Mux, offer, HW-12, HP-13, 120, Vahant 1 \$110. Dale M. Johnson 15800 Buckhill Rd. So. Ltd 78 Sahant, Minn. 55378 Phone after 5 PM 435-5895.

SOMERSET County Hamfest The 5th SCARC Annual Hamfest will be held Sunday June 7 at the Casper Grove 4 miles north of Somerset Pa on US Route 219. Registration starts at noon. Rain or shine - free tables indoors for swap-shop. Write K3YVJ 719 Division St. Berlin Pa 15530.

FOR SALE: Heath \$22 \$60. Will pay shipping. TA-33 \$50. AR-2 \$10. Tel 324-1127. WA6WYJ 17024 Faysmith Torrance CA 90504.

FOR SALE: Heath HW-16 transceiver and Heath HG-10B. Min condition. Both for \$100. Pick up only. Nicholas Lefor W1DR 39 Pond Rd Ridgely Ct 06877.

SELL: Gonset GSB-100 \$100, SB-200 \$200, R-4A \$270. A manuals. Will pack and ship if you pay cost. W5MIT 151. Elizabeth NE Albuquerque N.M. 87112. 299-7853.

WANTED: 1 RTTY model 35 100 wpm - reports - fm narrow band - excellent condition. Write WB2RLS.

NEW HT-46 sbb-cw sstr - still a virgin has never even been plugged in. \$225. W6GOT 1925 Bidwell Way Sacramento Calif 95818.

YAESU FTDX-400 serial 9062241. New, still wrapped. Matching speaker included. \$550. WA6WIX 415-967-8379. 30 East St Mountain View Calif 94040.

WANTED: Heath Q-meter, State price and condition, J. C. Van Kiper 6 Berkeley Place Fair Lawn NJ 07410.

INTERESTED in purchasing Hallicrafters SR-500, KZZER 2 Henry St, Homer NY 13077

CE100V excellent condition \$300, W4USM 320R Searcy Dr. Huntsville Ala 35810.

R-388 Collins, perfect condition \$395, Edward Centrone 2510 Grant Ave Redondo Beach Calif 90278.

SELL: Heath HW-22 transceiver \$85, HRA-10-1 crystal control w/ base bags list of equipment, meters and parts. W4HZD 2712 Woodson Drive Knoxville TN 37920.

WANTED: SX-42 receiver. Will pay good price for SX-42 in good cond. H. J. Hire W4FTT 141 Sherbrook Rd. Mansfield OH 44907.

WANTED: Knowledgeable responsible person or firm to repair HX-10. Must be within driving distance so that equipment can be delivered in person. Chester Kozlowski 31 Meadow Dr West Warwick RI 02893.

COLLINS 328-1, 75S-1, 516F-2 and mike A1 mint condition \$600. Commercial final amplifier in six foot rack 500 watts \$70. Complete model 19 and table \$65. Model 15 and 141D \$65. Model 16 typing unit and base \$25. 70 feet vinyl jacketed aluminum coax. \$7 new \$25. 150 feet 7/16 aluminum coax no jacket new \$25. Both 50 ohm. Handbook RTly TD rack mounting \$20. TX-62 only hours old \$100. Criterion 2 meter converter 14 and 28 Mc-t \$40. Mainline ST-3 TU 80% complete \$25. Make offers on any of above. Photos on request, you pay shipping. Phone 689-8744. R. G. Conroy Rt. 80 Killingworth CT 06417.

COMPLETE station. Swan 350 and Swan 117-C spkr/ac supply. Crystal calibrator and VFO unit. All v8 cond. 14 AVQ vertical 65 feet unused RG-8U, polyform, keyer, paddle, mike, SWR bridge, much more. Will talk and deliver. \$400. Stuart Eckschuh 30 Illinois Ave Long Beach NY 11561. Tel 516-431-0369.

SELL. Complete set new tubes for 32V3 inc. dial lights. Make offer W4QLW Honesdale Pa. 18431.

R-4 excellent cond \$275. Valiant 1, modulator needs work \$90. J. Djak Box 5872 River Campus Rochester NY 14627.

FOR SALE: Receiver BC342N 110 volt ac continuous coverage on six bands 1500 kc to 18 Mc. excellent \$50. Trap vertical antenna 14AVQ for 10-15-20-40 \$12.50. Tube 4X150A unused \$2.50. Small size selcys 110 v 60 cycle new \$10 pair. WB1EX 612 Sedgefield Bloomfield Hills Michigan 48013.

SALE: Drake T-4XB, R-4B, MS-A, new; 75A-4 rev.; Viking 500 w/pwr supply Hallicrafters R-51 spkr; Heath SB-610 monitor scope; Vibroplex keyer; all manuals and cables included. Misc. books and parts. Bring certified check for \$950 and take home. Prefer to sell complete kit. W. S. Newman W4OKH 881 Lakewood Dr. La Grange GA 30240.

WANTED: 6 & 2 meter xmtr, rcvr, convtr. Xmtr for RTTY sb 80 to 10 meters, or complete station covering MARS freq. John Waskowitz 35-30-73rd St. Jackson Hts. LI NY 11372.

IN A-1 shape: DX60B and HG10B very little use. I'm selling it for \$90 or best offer. Jerry Mueller Sumner RR3 Iowa 50674.

EURO 753 transceiver, 751 p/s, factory aligned \$125. K0BOB 605 South Fifth Breckenridge Minn 56520.

WANT Collins 328S, 516F ac supply 75S3B. Write details to John Shean W5LPO 3302 Litchfield San Antonio Texas 78230.

SALE: Teletypes model 15 \$69. Model 19 \$90. AN/FCC-1X auto converter \$20. Hornet TR-3R triband beam \$40. Masley A-92S (2 mtr) beam 110' twin lead \$15. Asahi-Pentax 35mm f1.8-55mm, f1.8-85mm with cases (trade) \$150. Want Central Electronics 20A, WA-TNW 29482.

FOR SALE: Heathkit HP-13 \$38, Heathkit MP-10 \$17. Motorola 150 xmtr strip needing work \$15. HRO-M E coil \$11. HRO-5 F coil \$11. Prices FOB. Ralph Sieloff 64 S Cottage St. Valley Stream NY 11580.

HEATH Shawnee 6mtr rcvr (estate of the late Mark Humphries, WB6M5K) won first place Moose craftsmanship award, perfect order \$175. C/o Mr. Bret Humphries 553-31st St. Manhattan Beach Ca. 90266. 213-372-9829.

MANUALS - R-390/URR, R-390A/URR, OS-8C/U \$6.50 each. Many others. List 20c. S. Consalvo 4905 Roanne Drive Washington DC 20021.

AMATEUR Extra radio course by NRI, 30 lessons. Latest and perfect \$35. Phil Geddy WB2ZKX, Tel 212-576-9372.

KWM2 \$650, 516F2 \$90, 312B4 \$130, BT linear \$650. Dan WA1FKR 205-925-7069 or 827-8311.

WANTED: Collins 30S1, W1DRS 410 Blake Rd. New Britain CT 06053.

OPENINGS for ham radio counselor for co-ed childrens camp Pocomo. Kittatinny Camp 119 S. Easton Rd. Glenside Pa 19038.

COLLINS 75S1, serial 11224, perfect with 500 cycle filter and Waters Q-multiplier, \$290 delivered. Gouset 903-A 2-meter amplifier with spare final \$180. Drake SC-2 2-meter converter with ac supply \$65 postpaid. Bill Smith K0CER 3900 E 24 St. Sioux Falls SD.

COMPLETE station excellent condition sell highest offer. Louderboomer linear power supply H72B SX115 D104 TA33 Ham-M rotorator Dow relays, switches, cables, transmission lines, custom formica operating table V shape. Must dispose of. Cortlar St. Charles Seminary 209 Flagg Place Staten Island NY 10304. Tel 201-351-0232.

2 METER fm brand new never on the air FDFM-2s and PS-1500 any offer over \$310. HA-6 six meter transmitt working fine \$75. Photos on request. George Lancraft Box 256 Ivoryton CT 06442.

CREATIVE QSL cards - Personal attention, imaginative new designs. Send 25c, receive catalog, samples and refund coupon Wilkins Printing Box 787-1, Atascadero Calif 93422.

DAH-DITTEP Keyer. Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in ac pwr. supply, reed relay output, with side-tone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnysbrook, N.E., Atlanta, Georgia 30238.

WIRELESS shop. New and reconditioned equipment. Write call or stop for free estimates. 1308 Tennessee, Vallejo CA 94590. Tel 707-643-2797.

V-E-R-Y In-ter-est-ing sample sent free. W0 Bargains galore, 1949 Van Reek Lane, St. Louis MO 63131.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductor and resistors. Aural Electronics, 150 Miller St., Elizabeth, NJ 07207. Tel. 201-354-3141.

SPIDERS for boomless quads. Helarc welded aluminum. AP's Antenna Accessories, 1339 So. Washington St., Kennewick, Wash. 99336.

SELL, trade or buy Call Books, Handbooks, magazines, and old radio sets and parts. Eiv Rasmussen, 164 Lowell, Redwood City, Calif. 94062.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also \$25,000.00 inventory used gear. Request list. Chuck, W5WGC, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewound. Jess W4CLJ, 411 Gunby, Orlando Fla. 32801.

GREENE - Center of dipole insulator with or without balun. Free flyer. O. Watson Greene, Box 423, Wakefield, RI 02880. See December QST, p.150.

MICHIGAN hams! Amateur supplies, standard brands, store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Mich. 48104. Tel. NOrmandy 8-8262.

TOROIDs. 88 mh uncase, 5/\$2.60. Postpaid Humphrey, W4PEKN, Box 34, Dixon, Calif.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Mass. 617-598-2530 for the gear u want at the prices u want to pay.

WANTED: All types of tubes. Top prices paid for Vaman and Elmec. Jaro Electronics Corp., 150 Chambers St., New York, NY 10007.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, NY 13902.

DUMMY loads 1 kw. all-band, \$7.93; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, NJ 07016.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass caps & bridging resistors, 10/\$3.95, 100/\$30. Postpaid USA. Dealers inquiries invited. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga NY 14225.

RECEIVING and industrial tubes, transistors, all brands. Biggest discounts. Technicians, hobbyists, experimenters. Request free giant catalog and save. Zalytron, 469 Jericho Tpk., Mineola LI NY 11501.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info, contact Al Marcy, W4ID, Sec'y., 461 Third Ave., Eau Gallie, Fla. 32937.

HEWLETT-PACKARD 524C counter and Tektronix 545A scope. Collins 51S-1 and 51J4 receivers. URR/388, 290 and 290A receivers. Cash or trade equal value for Collins ham gear. Write or phone, W2ADD, TM11 and FRR-33 manuals wanted. Your preposterous price paid.

HAM ticket. The Amateur Radio License Course for Novice, General, Advanced, Extra Class. FCC makes it difficult to get a ham license. Let Ham Ticket make it easy! Packaged course for each class and conf. Courses leased, not sold. Copyright 1975. Write for brochure. Clayton Radio Co., 220 Mira Mar Ave., Long Beach, CA 90803.

QST's Wanted: December 1915 to December 1916, 1913 IRE Priceings. Any unreasonable price! Ted Dames, W2KUW, 308 Hickory St., Arlington, N.J.

FOR SALE: SB-101 and SB-200. Wanted kits to wire. Heath preferred. 12% of cost, some in stock, professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna 17112.

WE buy all types of tubes for cash, especially Elmec, 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.

WANTED. Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R38R, R390, GRC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co. 308 Hickory St., Arlington NJ 07032.

INTERESTING sample copy free. Write: "The Ham Trader," Sycamore, Ill. 60178.

RTTY gear for sale. List issued monthly, 88 or 44 MHY trioids five for \$2.50 postpaid. Elliott Buchanan & Assoc., Inc., Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

COUNTER. 100 kc. Berkley, eqpt. model 7150BDK, excellent condition, \$200. Safety belts for climbing, new nylon body belt, \$15. John Link, 1081 Aton St., Cocoa, Fla. 32922.

DX Awards log. 150-page book lists contacts for over 100 major worldwide awards. Individual logs for each award for record of work logs and confirmations. Required over two years to prepare. \$3.95 (\$4.95 foreign). McManis Company, 1055 So. Oak Knoll, Pasadena, CA 91106.

HAM's Spanish-English Manual, \$3. Ppd. Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Fla 33304.

RE Patient!!! Only 170 days left before the gala opening of the Hudson Division convention! Exhibits, lectures, contests, gabfests, New York sightseeing, Sun, October 17-18, Hilton Motor Inn, Tarrytown NY. Info from Hudson Amateur Radio Council, c/o Larry Strasser 3591 Bambridge Ave Bronx NY 10467. Worth waiting for.

HAMMARLUND HX50 xmttr ush/5b a-c/w/e, vox 80-10m and MARS with 160m provision, excellent condition, \$190. Will ship. K3ZOT 836 Mason Ave, Drexel Hill Penna 19026.

SELL: Heath Apache \$85 excellent condition. Hy Portny W2CBI 158 County Lane Rd. Amityville NY 11701. 516-MY1-2885.

QSTs 1921 thru 1931 11 volumes in QST binders sold only as collection and pickup. Best offer. WBZHOH 808 Park Ave Manhattan NY 10030.

COLLECTOR'S item, Vols. 3, 4 & 5 "Modern Electrics," April 1904 to Jan 1913 incl. Prof. bound, good condition. Many photos of early hams and rigs, interesting articles and rkt diags. Unique ads of oldtime equipment. Mailed pp all four vols. \$80. WA2BGU 27 Pine St, Lincroft NJ 07738.

FOR SALE best offer, HA2, HA6, PM26 power supply, Heath HO-10 monitor scope. All new. Used Mosley 3 el 20 meter beam, Hyzam 15 meter beam, 922 Cowen St. Garretts Ind 46738.

W6T2A Honeywell transistor mobile supply 150 watts \$12. W0BHA Bird Island Minn.

VTVM for sale, Heathkit IM11 excellent condition, Standard, rt probes included, \$30. Will ship. WA9SXE 208 S 8th St, Goshen Ind 46626.

SELL: HA6, HA2, separate power supplies \$200 each combination. Mint condition, Manuals. No shipping. Bob Shull 12349 36th E. Seattle Wash 98125.

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WANTED: Motorola manual D43GGV-1 model. Write WA8QU 1016 Beatty Ave, Cambridge OH 43725.

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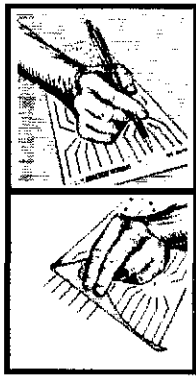
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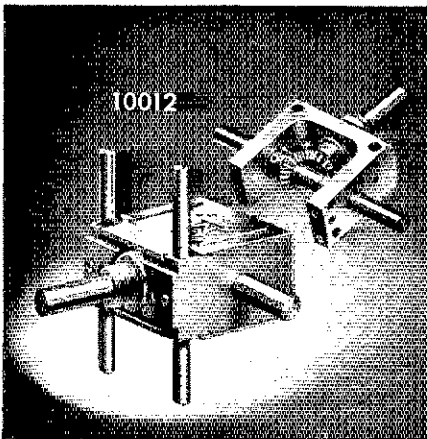
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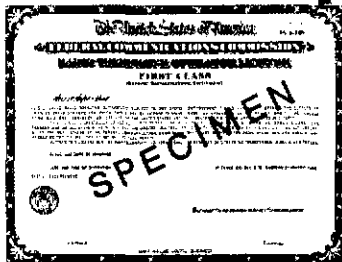
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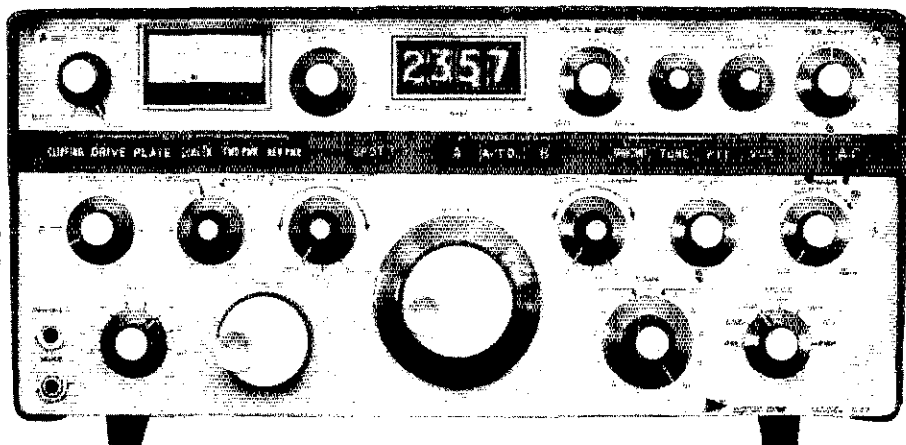
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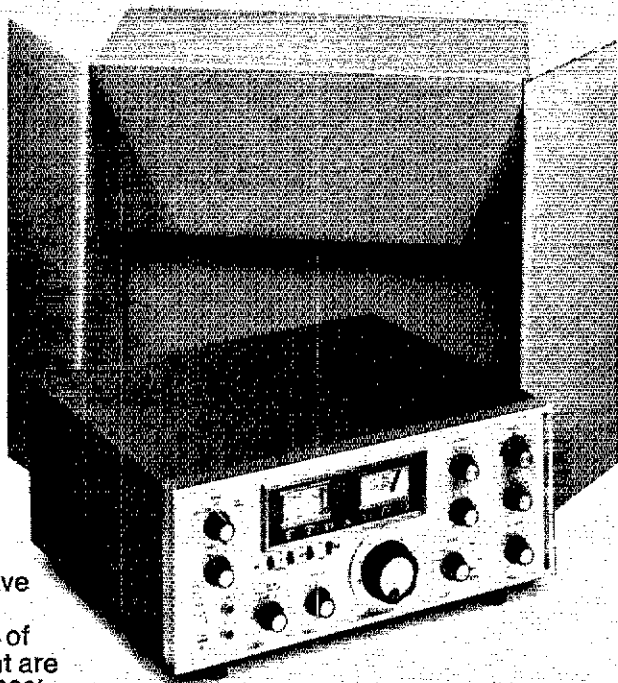
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RV-4 Remote VFO— Separate Receive and Transmit frequencies on same ham band .....	\$110.00
FF-1 Crystal-Control Adaptor	\$ 26.95
MMK-3 Mobile Mounting Kit	\$ 6.95

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