

September 196

75 Cents

# QST

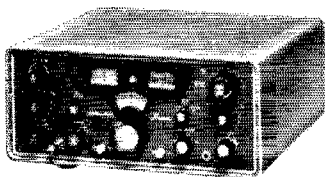
# amateur radio



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**SIMULTANEOUSLY!**



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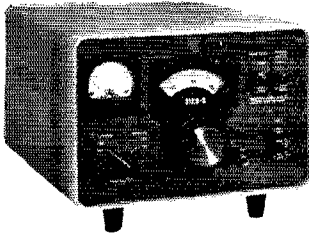
Send me complete information on Electro-Voice microphones for amateur radio.

Name \_\_\_\_\_

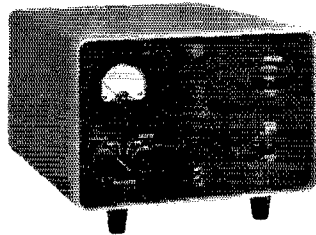
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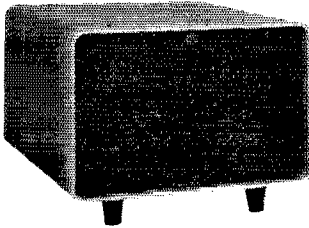
# Ham Radio at its best



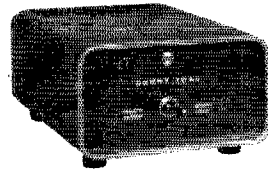
312B-5 VFO Console



312B-4 Speaker Console



516F-2 AC Power Supply



DL-1 Dummy Load

## S-Line Components and Collins Systems

Adding Collins S-Line components to a Collins system gives you ham radio at its best.

The 312B-4 Speaker Console lets you control your S-Line with the flip of a switch. Another feature is directional watt meter.

Make your KWM-2 fixed station more versatile with the 312B-5 VFO Console. Get all 312B-4 features, plus the capability of limited separation of transmitter and receiver frequencies.

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Transmitter or KWM-2 Transceiver are supplied by the 516F-2 AC Power Supply.

Fixed station, portable or mobile, Collins has a complete line of system components to put more enjoyment into ham radio. And all components, including the power supply, are styled with S-Line eye appeal.





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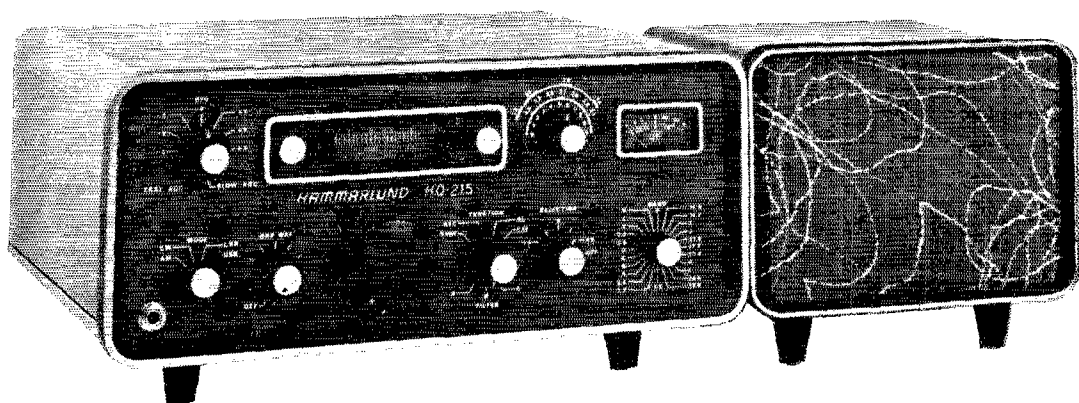
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OUR COVER  
K1QQX is adjusting the gamma on the 3-element six-meter delta-loop antenna described on page 15.



# The HAMMARLUND HQ-215

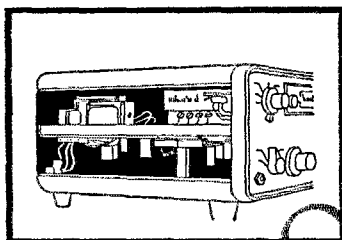
The solid state receiver for those who want to be one-up

The Hammarlund HQ-215 brings to amateur radio a fully transistorized receiver offering a new high in sensitivity, selectivity and drift-free operation. Revolutionary unitized I-beam construction coupled with modularized design provides an unusually high degree of electrical and mechanical stability. A unique carousel dial with 22" of frequency calibrations means easy reading and resetability to within 300 cycles. And heat free operation gives you long set life at peak operating condition. Here are the facts:

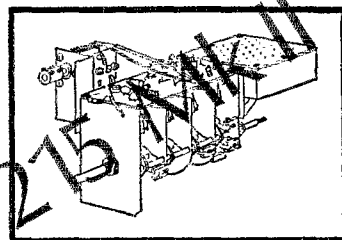
**FREQUENCY COVERAGE:** Complete ham band coverage, 80-15 meters; 28.5—28.7 mcs on 10 meters. Provision for 13 optional crystals providing 200 kc segments from 3.4—30.2 mcs built in.

**FREQUENCY READOUT:** Visual dial accuracy is  $\pm 300$  cycles on all bands.

**FREQUENCY STABILITY:** Less than 500 cycles per hour.



I-beam construction for strength



Modularized for electrical stability

**TRANSISTORS:** 26 transistors, diodes and 2 Zener regulator diodes.

**SELECTABLE FILTERS:** 2.1 kc mechanical filter supplied. Plug-in space for two optional filters. Any filter may be switch selected from front panel.

**MODE:** Selectable USB, LSB, CW, OR AM.

**SERVICE:** SSB, CW, AM, and RTTY.

**SENSITIVITY:** Better than 0.5 microvolt for 10db signal-to-noise ratio.

**SELECTIVITY:** SSB-2.1 kc mechanical filter, 2:1 shape factor.

**DIMENSIONS:** Size: 6.8" H x 15.8" W x 14" D.

**WEIGHT:** 21 lbs.

**WRITE FOR COMPLETE NEW SPECIFICATIONS ON THE NEW HQ-215 Mk II**



The **HAMMARLUND**  
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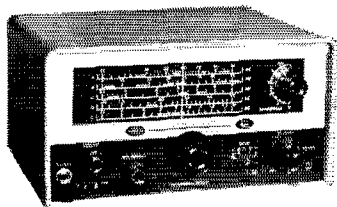
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# Just Getting Started In Ham Radio?

If your interest in ham radio has only recently developed you already know by now that there are hundreds of brands of equipment from which to choose, some costly . . . some not too costly. For years, Ameco equipment has appealed to the beginner because of its modest cost, yet with engineering and manufacturing quality you would expect to find in really expensive gear. Read about our All-Wave Receiver and Novice Transmitter below, then write for our new Ameco catalog to get complete specifications on these and other moderately priced items.

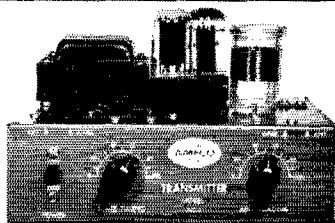
## Model R-5A Allwave Receiver



An exceptionally fine receiver for the short wave listener and beginning amateur operator. Fully transistorized-solid state. Covers .54 Mc through 54.0 Mc in five continuous bands. Includes standard broadcast band, all foreign broadcast bands, all amateur bands from 160 through 6 meters, all 27 Mc CB channels, all 2 way radio frequencies from 30 to 50 Mc including many police and fire departments. Controls include Beat Frequency Oscillator, Noise Limiter, Bandsread. Provisions for external "Q" multiplier. Compare with tube-type units costing as much!

Wired and tested .....\$99.95  
 Battery adapter kit. (permits operation from 12 VDC or eight "D" cells) .....\$ 3.95

## Model AC-1 Novice CW Transmitter Kit



The ideal kit for the beginner who requires a reliable TVI suppressed transmitter. Keying is clean and chirp-free. Crystal controlled, PI-network Output Circuit. Includes AC Power Supply. For 40 and 80 meters, CW. Fifteen watts input. Kit is simple to build and easy to operate.

Kit with coil for any 1 band, including tubes \$23.95  
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- Radio Amateur License Guide: A study guide for those preparing for the Novice, Technician, Conditional and General Classes of Amateur licenses. Contains over 200 questions and answers.  
 No. 5-01, 32 pages .....50¢
- Mastering the Morse Code: Teaches the beginner how to learn the International Morse Code.  
 No. 6-01, 32 pages .....50¢
- Ameco Jr. Code Course: Fastest, simplest way to learn code. Contains 10 lessons and one 12" record in the 33 rpm series. Sample FCC-type exams included.  
 Complete Jr. Code Course (100 series) .....\$3.95



**Division of Aerotron, Inc.**  
 P. O. Box 6527 Raleigh, North Carolina 27608

## Section Communications Managers of the ARRL

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

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\* Official appointed to act temporarily in the absence of a regular official

# For The Experimenter!

## International EX Crystal & EX Kits

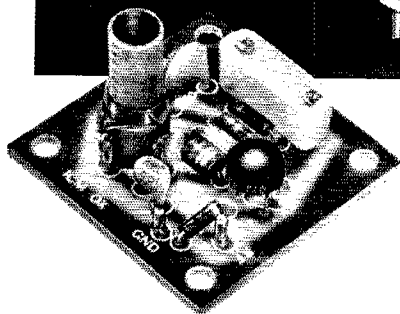
OSCILLATOR / RF MIXER / RF AMPLIFIER / POWER AMPLIFIER

### Type EX Crystal

Available from 3,000 KHz to 60,000 KHz. Supplied only in HC 6/U holder. Calibration is  $\pm 0.02\%$  when operated in International OX circuit or its equivalent. (Specify frequency)



# \$395



### OX OSCILLATOR

Crystal controlled transistor type.

Lo Kit 3,000 to 19,999 KHz

Hi Kit 20,000 to 60,000 KHz

(Specify when ordering)

# \$295

### MXX-1 Transistor RF Mixer

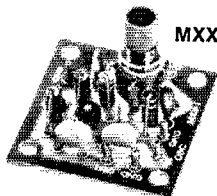
**\$3.50**

A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range.

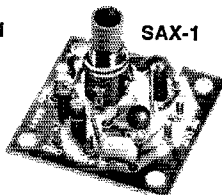
Lo Kit 3 to 20 MHz

Hi Kit 20 to 170 MHz

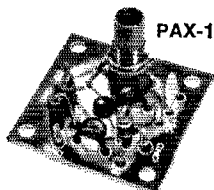
(Specify when ordering)



MXX-1



SAX-1



PAX-1



BAX-1

### SAX-1 Transistor RF Amplifier

**\$3.50**

A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output.

Lo Kit 3 to 20 MHz

Hi Kit 20 to 170 MHz

(Specify when ordering)

### PAX-1 Transistor RF Power Amplifier

**\$3.75**

A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw can be obtained depending on the frequency and voltage. Amplifier can be amplitude modulated for low power communication. Frequency range 3,000 to 30,000 KHz.

### BAX-1 Broadband Amplifier

**\$3.75**

General purpose unit which may be used as a tuned or untuned amplifier in RF and audio applications 20 Hz to 150 MHz. Provides 6 to 30 db gain. Ideal for SWL, Experimenter or Amateur.

Write for complete catalog.



**CRYSTAL MFG. CO., INC.**

10 NO. LEE • OKLA. CITY, OKLA. 73102

# THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut.



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# "It Seems to Us..."



## NEWCOMERS

PRACTICALLY all of us are sympathetic to the idea of encouraging growth in amateur radio, of bringing newcomers—particularly youth—into our ranks. When that growth levels off, as it has during the past few years, dedicated older amateurs quite properly become concerned. Discussions of the problem continue at length, and plans of attack are devised. From such appraisals have come a number of projects, not the least of which are the League's new color film for showing on TV, at schools, civic clubs, etc.; and the eventual new introductory booklet on amateur radio.

We'd like to toss in a word of caution at this point, however, that while these concepts are aimed precisely at the target, they will not accomplish their end objectives without help from many of us as individuals. It is not enough to pass a motion, and produce a film, and write a booklet. We cannot then dismiss the problem, believing that the responsibility has been shouldered, and that results will come automatically.

### Why?

Because, as concerns newcomers, over the years one point stands out: magazines, lectures, booklets and similar promotional pieces have never, *by themselves*, been identified as a major inspiration for those who join our ranks. The real exposure and the effective planting of the ham virus comes with a visit to the shack of an already-licensed friend or acquaintance. It is the personal touch which has produced real results. No writer, however skilled, can fully convey in print the thrill of DX, the excitement of a contest, the emotional impact of listening to the Eye Bank net.

So perhaps we amateurs are individually responsible for the deceleration of input. There was a time when nearly every amateur was happy to offer encouragement, assistance and even equipment to budding young hams. Are we all as quick to help others as we once were? Today, as always, many aspects of amateur radio simply cannot be gleaned from books. Inspiration—and knowledge—often must come from personal experience, or under the patient guidance of others. It can be mighty discouraging to someone with a latent amateur interest when he finds that none of the local hams will help him join what is purported to be a closely-knit fraternal group.

Our society is developing so that people have more and more leisure time. The economy is strong. An obvious conclusion is that these conditions add up to a perfect climate for the growth of a hobby like amateur radio. But "it ain't necessarily so." Prosperity means also that folks have money to undertake more ambitious dreams like boats and foreign travel. Among teenagers, the serious ones nowadays build computers and cloud chambers for a hobby; the more frivolous have cars, television and girls. So we must face the fact that ham radio is in stiff competition with many other activities.

Many radio clubs do offer formal courses in amateur radio for beginners, with club members sharing the teaching tasks. Prospective hams have been attracted to the courses by notices in the papers, in schools, at Scout and civic club meetings (and here the new film should help considerably). Now is the time for your club to start laying plans for this year's course. If help is needed, our Communications Department offers assistance in the form of code-practice schedules, extensive course outlines, and training aids. Whether or not you ask for assistance, however, the CD would like to know about your course so that other prospects in your area who contact Headquarters directly may be steered your way.

To sum up, it seems to us that we all, as amateurs, must not make the mistake of looking upon the new ARRL film as an "open sesame" to amateur radio, nor of assuming that it is a simple key for mass production of our necessary growth. It is indeed a *tool* for growth; one of many; but it becomes a useful tool only when we as amateurs follow it up. Indeed, the movie concludes—not with the cold listing of an address in Newington, Conn., but a simple suggestion to those who might have a further interest: "Ask any Ham!"

We urge all amateurs to keep in mind the continuing need for personal guidance, of invitations to visit home and club stations, to keep those code and theory classes going (or initiate them) and to follow through with personal assistance in selection of equipment, its construction, and its set-up for operation. The gratitude of the newcomers you help is only part of your reward; equally important is the satisfaction from breathing new life and continued growth into the greatest of all avocations.

QST

## League Lines . . .

Couple of years ago, FCC in effect legalized "tail ending" by requiring transmission of the other station's call sign, as well as your own, only at the end of actual QSO. A number of monitoring stations are citing violations of this requirement, catching mostly DXers in short contacts who fail to send the foreign call sign. Some time ago ARRL requested modification of rule to exempt brief contacts such as contest operation, but FCC turned deaf ear. So take care, gang.

Like the rest of us, ARRL Prexy Robert W. Denniston, WØDX, was deeply moved by the incredible accomplishments of Apollo 11. He knows that hundreds, perhaps thousands, of hams were involved in one way or another in the Apollo project, especially in the electronics and guidance phases, and would like to collect a roster of names. If you were a part of the effort, or know others who were, please record the information with him c/o Hq.

Another country -- Thailand -- comes off the banned list with withdrawal of their restrictions long ago filed with ITU. But the new rules apply to Thai nationals only. See page 80 for details.

Thousands of QSL cards, addressed to "John, Chief Fuse Blower W6XXX," or in similar fashion, are thrown away each year by the Dead Letter Office because dear John has moved to a new QTH, and the friendly mailman who delivered those cards while John lived at 7388 Zilch Street is no longer in the picture. QSLing would be 50% more successful if you'd use full name and street address every time.

A survey of new FCC amateur licensees shows that in twenty years the median age has dropped slightly (25.9 to 24.0 years). But as compared with 1949, when newcomers bulked in the age 20-30 area, there have been substantial shifts to both older and younger ages (mostly the latter) for times of initial amateur interest. In 1949, those in the age-16-or-below group comprised only 8.5% of the new licensees; today, this group of youngsters comprises 36% of the new blood in amateur radio.

The same survey also confirms the importance of personal exposure in creating first interest -- as discussed in this month's editorial. Magazines, books and leaflets continue to drop in effectiveness for promotion of new interest; more than half the respondents to our survey indicated a ham friend or relative as the spark which ignited their interest.

Last call for nominations for director posts in half the League's divisions. The election process, as in our national government, is the means of assuring proper representation. See page 76 for the formal announcement.

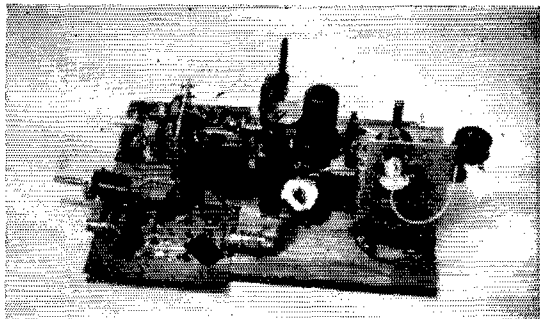
Last year the Board of Directors asked Hq. to set up a roster of coming hamfests, so that conflicts could be avoided between neighboring groups on the same weekend. With a hundred events now on our calendar, the system has had its first two successes keeping two activities in Illinois and two in Pennsylvania from colliding. But the system can't work if we don't have early notification of your hamfest date.

Quote-of-the-month from "Footprint" of the Foothills (Calif.) Radio Club, concerning a talk by a magazine editor visiting from the east: "Wayne remarked that the amateur division of FCC consists of one man who is about to retire and wants no trouble." (W3BG and his dozen or so assistants please note.)



# A Direct-Conversion S.S.B. Receiver

BY RICHARD S. TAYLOR,\* WIDAX



Experimental version of the direct-conversion s.s.b. receiver. Although the article is not intended to present step-by-step construction data, sufficient information is provided so that an experimentally-minded builder can use the principles described by the author.

**A**n article in November 1968 *QST*<sup>1</sup> inspired this effort. It is an idea that I rejected some months ago while working with broadband FET mixers because of the high audio gain required. It turns out that the audio gain is not really a problem at all, and that a really effective, yet simple, s.s.b. receiver can be built using direct conversion. Transceive operation seems simple, too.

## Receiver Operation

Basically, the receiver consists of a pair of balanced mixers operating at the received signal frequency, and a high-gain audio amplifier (Fig. 1). Local-oscillator signals 90 degrees out of phase are applied to the balanced mixers. With the proper choice of audio phase (plus or minus 90 degrees in one leg), one incoming sideband can be rejected and the other enhanced.<sup>2</sup> A quadrature hybrid network provides the r.f. phase shift, and a Barker and Williamson 2Q<sub>4</sub> phase-shift network is used in the audio combiner section.<sup>3</sup>

Sideband selection is accomplished by reversing the phase of one of the audio channels with respect to the other, as in a phasing transmitter. In fact, the receiver operates as a sort of a phasing transmitter in reverse.

All selectivity is obtained in the audio channel, so a sharp cut-off audio filter is called for.

Assuming the audio response shown in Figure 2A occurs, the r.f. responses of Figs. 2B and 2C result. Since channel balance is not perfect, a spurious response at the unwanted sideband is always obtained, but it is far below the desired

signal level. A simple analysis based on true product detection in the mixers and input signal of the form  $\cos(\omega + \Delta\omega)t + \cos(\omega - \Delta\omega)t$  will effectively show this sideband suppression property.<sup>4</sup>

## Circuits

A receiver of this type was built for the 14-MHz. amateur band. Fig. 4 shows the block diagram of this receiver. Broadband balanced mixers of standard design were used in the front end. Hot-carrier diodes were used to minimize front-end noise. (See the earlier *QST* article.<sup>1</sup>)

Signals are fed to the two mixers from the input tuner shown in Fig. 3. This tuner performs the dual function of providing front-end selectivity and dividing input power between the I and Q (In-phase and Quadrature) channels.

A Hewlett-Packard Model 606A r.f. signal generator was used for the local oscillator. Any generator capable of delivering about 0.5 volt r.m.s. to 50 ohms and covering 20 meters would do as well.

A lumped-constant 3-db. hybrid network for 14.25 MHz. provides the 90-degree r.f. phase shift (Fig. 5). This network holds a 90-degree phase shift (within the available limits of measurement) from 13.8 to 14.6 MHz. Variation in relative amplitudes between the two outputs over this frequency range is less than 0.8 db. Such

\* Project Engineer, Center for Space Research, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

<sup>1</sup> Hayward and Bingham, "Direct Conversion — a Neglected Technique," *QST*, November, 1968, p. 15.

<sup>2</sup> Norgaard, "Practical Single-Sideband Reception," *QST*, July 1948, p. 11. Also *Single Sideband for the Radio Amateur*, ARRL, p. 177 in 4th edition.

<sup>3</sup> The 2Q<sub>4</sub> phase shift network is available from Barker and Williamson, Canal St. and Beaver Dam Rd., Bristol, Pa. 19007.

<sup>4</sup> *Ibid.*

<sup>4</sup> *Single Sideband Principles and Circuits*, Papenfus, Bruene and Schoenike, McGraw-Hill, pub., 1964, p. 33.

*A recent QST article has revived an interest in the direct-conversion technique for reception of radio signals. Simplicity with quite good performance are the advantages. This article describes an experimental receiver using a novel approach to the use of direct conversion for true single-sideband reception.*

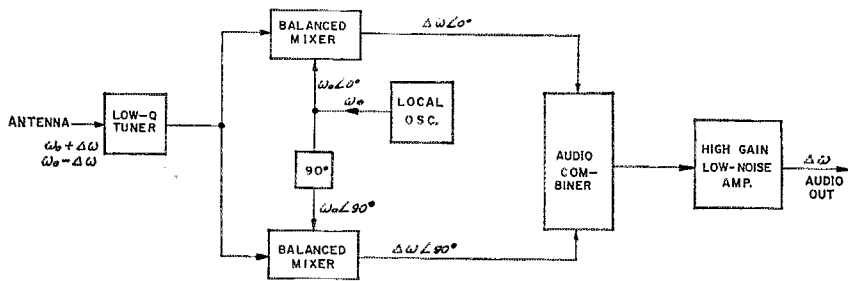


Fig. 1—Block diagram of a basic direct-conversion s.s.b. receiver.

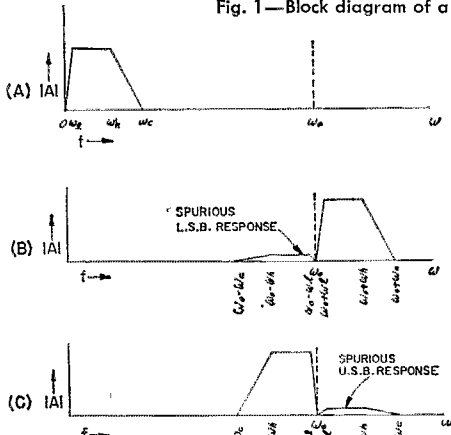


Fig. 2—Audio-to-r.f.-bandpass transformation. If the audio response is that shown at A, the resulting responses of the direct-conversion s.s.b. receiver will be those shown at B for upper sideband reception, and at C for lower sideband reception.

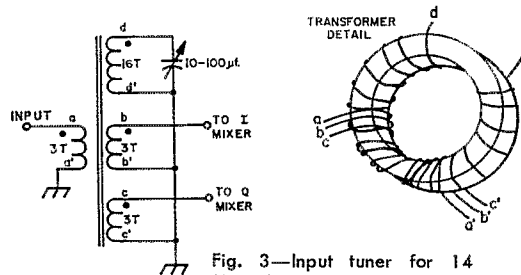


Fig. 3—Input tuner for 14 MHz. The transformer is wound as shown on an Indiana General CF-105 core (Q3 material).

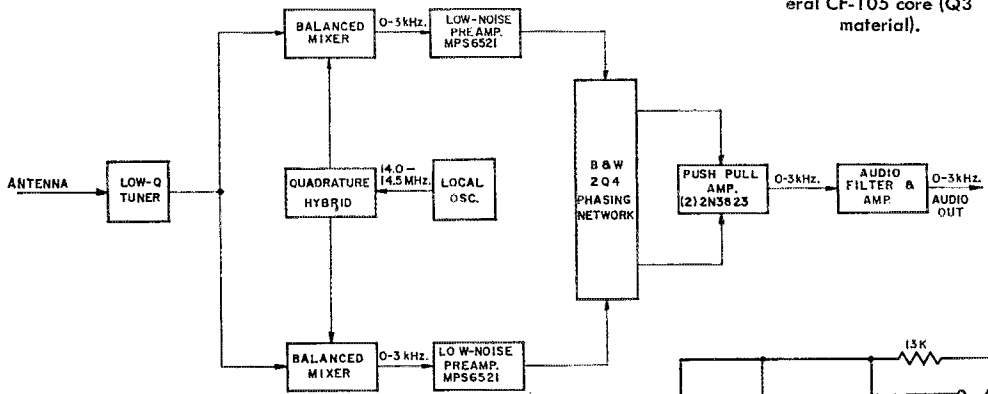


Fig. 4—Block diagram of the 14-MHz. direct-conversion s.s.b. receiver.

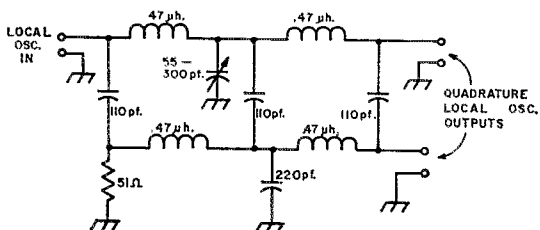


Fig. 5—14.25-MHz. quadrature hybrid network. This hybrid holds a 90-degree phase shift from 13.8 to 14.6 MHz.

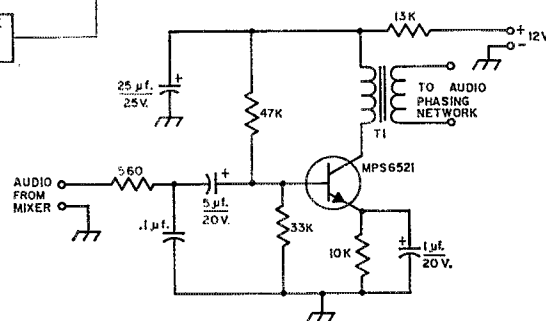


Fig. 6—Low-noise audio preamplifier. The I and Q channels are identical. Resistances are ohms, K = 1000. Capacitors with polarity indicated are electrolytic. T<sub>1</sub>—Audio transformer; primary 22,000 ohms, secondary 600 ohms. See text.

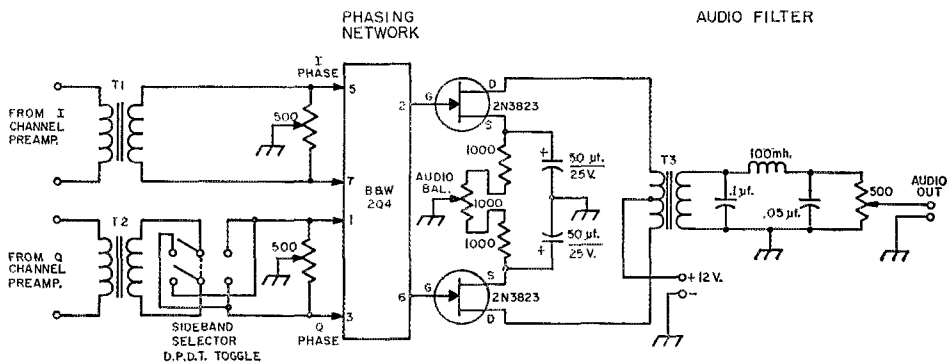


Fig. 7—Audio phasing network. See information referenced in footnote 2 for the setup procedure of a similar network. Resistances are ohms, K = 1000. Capacitors with polarity indicated are electrolytic.  $T_1$ ,  $T_2$ ,  $T_3$ —Audio transformers; primary 22,000 ohms, secondary 600 ohms. See text.

performance is adequate for a non-critical application. More stringent requirements would force one to use broadbanding techniques, discussed later.

Mixer outputs are fed to low-noise audio preamplifiers (Fig. 6). The MPS6521 transistor used in the preamplifiers is a plastic low-noise audio device selling for about \$1. With a 600-ohm source, a noise figure of about 2 db. exists at its chosen operating point. Forty db. of gain is obtained from this circuit at one kilohertz. An RC low-pass network provides initial r.f. filtering, and transformer coupling is used to match the audio phase-shift network impedance. All of the audio transformers used in the receiver are of the surplus variety often featured in tube-type sideband rigs. Any audio transformer of the correct turns ratio would do as well.

The preamplifier outputs drive the phasing network in Fig. 7. This network is similar to one described by K2OHF in his discussion of a phasing s.s.b. adapter.<sup>5</sup> The B&W 2Q4 was designed to drive a grid load, which an FET approximates nicely. The 2N3823 FET is rather expensive but can be replaced by its plastic equivalent, the 2N3819, in this application. Some device shielding may be necessary with the 2N3819, however.

The push-pull amplifier configuration allows I and Q channel summation to be made in the output transformer.

Sufficient gain is provided in the preamplifiers to prevent noise-figure degradation due to loss in the audio phasing network (the network attenuation is considerable—on the order of 30 db.).

A 500-ohm pi-network audio filter follows the mixing amplifier. An upper cut-off frequency of 2.7 kHz. is used and an ultimate roll-off of 16 db. per octave is achieved.

The two-stage audio amplifier following the filter provides more than adequate headphone

volume with high-impedance phones (Fig. 8). The overall midband gain of the audio system is 100 db. The audio response is shown in Fig. 9. This response determines the receiver's selectivity. Low-end roll-off is due primarily to the transformer transfer characteristics.

#### Setup Adjustments

The receiver setup is similar to that required for a phasing s.s.b. exciter. The audio and r.f. phase shifts must be set to 90 degrees and the audio balance adjusted for minimum unwanted sideband. K2OHF gives a good description of his setup procedure—and much of his technique is applicable here.

After those adjustments are made, listen carefully to a c.w. signal as it is tuned through zero beat. The tone on one side of the carrier will be louder than the other. Retune to the weaker tone and adjust the receiver tuning for a note of about 1 kHz. Adjust the setup controls alternately to null this tone out. Retune to the other side of zero beat to verify enhancement of the other sideband.

As with any phasing rig, some iteration in adjustment must be expected and it is possible to null the wrong sideband and get less than optimum performance. Some patience is called for in making these adjustments. If a good null cannot be obtained, retune to the other sideband and start over again.

#### Performance

The receiver performs very well considering its simplicity. There is a feeling of "transparency" or "presence," as if the listener were hearing the signals directly rather than through a receiver. This is a result of the excellent linearity and low distortion inherent in the design.

#### SENSITIVITY

A signal of 0.2  $\mu$ v. r.m.s. at 14.2 MHz. is just audible in the headphones at the maximum gain setting. This condition is equivalent to a signal-to-noise ratio of about unity.

<sup>5</sup> Buhner, "An S.S.B. Product-Detector Adapter," *QST*, August, 1961, p. 22. Also *Single Sideband for the Radio Amateur*, ARRL, p. 189 in 4th edition.

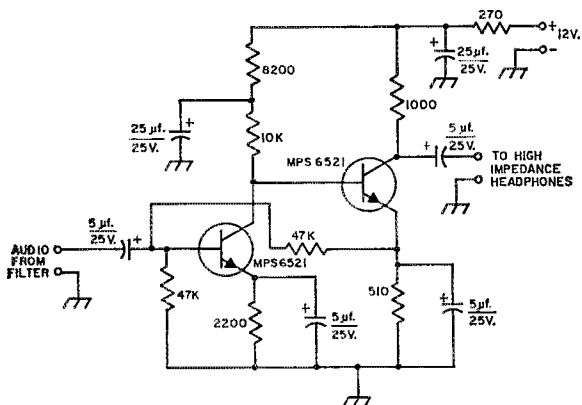


Fig. 8—Output audio amplifier. Resistances are ohms, K = 1000. All capacitors are electrolytic.

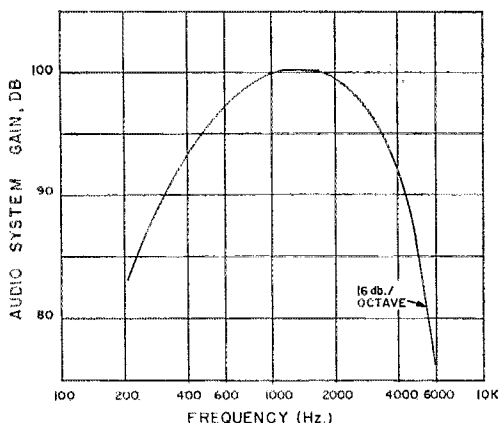


Fig. 9—S.s.b. receiver audio response. The roll-off at the lower frequencies occurs because of the characteristics of the audio transformers used.

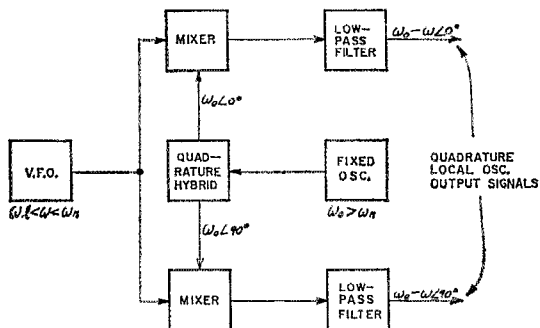


Fig. 10—Broadband quadrature local oscillator.

## SELECTIVITY

Selectivity is more than adequate, even if a less-than-optimum audio filter is used. No problems were experienced in reading adjacent weak and strong s.s.b. signals on 20 meters. The nature of the s.s.b. signal helps here, of course, because it is generally limited to a 3-kHz. bandwidth. The adjacent strong signal appears as audio components between 3 and 6 kHz. on which the mind can do some filtering.

On c.w., a narrower or more peaked bandpass would be helpful. Even without it, however, copy was generally good—particularly where the interfering station could be put on the suppressed side of the input spectrum.

## SIDEBAND SUPPRESSION

Unwanted sideband suppression is greater than 34 db on the 14.0 to 14.5-MHz. frequency range.

## CROSS MODULATION

A 10- $\mu$ v. signal was placed in the passband. An adjustable amplitude signal was placed 10 kHz. above it (same sideband). No cross modulation was noted until the interfering signal was at 0.2-volt r.m.s. amplitude.

## Broadbanding

It is only the quadrature hybrid network that limits the receiver bandwidth or effective frequency range of the receiver. The local oscillator can be broadbanded using the scheme shown in Fig. 10. Two mixers are used in a fashion analogous to the front end of the receiver. A fixed-frequency oscillator drives two mixers. A 90-degree phase shift is provided in the feed to one mixer. The difference products ( $\omega_0 - \Delta\omega$ ) are 90 degrees out of phase at the outputs and are the desired local-oscillator signals. A low-pass filter eliminates the sum component.

By using balanced mixers and broadband transformers, it would seem possible to build a local-oscillator system suitable for the entire high-frequency range (3-30 MHz.) without switching more than the v.f.o.

There are also available now a number of commercial broadband quadrature hybrids covering octave bandwidths. Any of these would broadband the receiver without the need for additional mixing.

## Transceive Operation

An s.s.b. output at the signal frequency can be provided by reversing the direction of the audio flow and applying phased audio at the output terminals of the mixers. No r.f. switching is required.

Linear amplification is required after this point, of course, as no more than 10 mw. of r.f. would be available at the mixed output.

Direct conversion is definitely a promising technique. It would be interesting to hear the experiences of others doing similar work. **QST**

## ● *Beginner and Novice*

# A Three-Element Delta Loop Beam For 6 Meters

BY LEWIS G. McCOY,\* WHICP  
AND CHARLES E. DEAN,\*\* K1QQX

THE Delta Loop beam, described in recent issues of *QST*<sup>1</sup>, has aroused considerable interest in the ham fraternity as evidenced by the mail to HQ. Shown in Fig. 1 and the photographs is a three-element Delta Loop beam for 6 meters. However, before going into the construction details of this antenna, a brief description of the Delta Loop beam is in order.

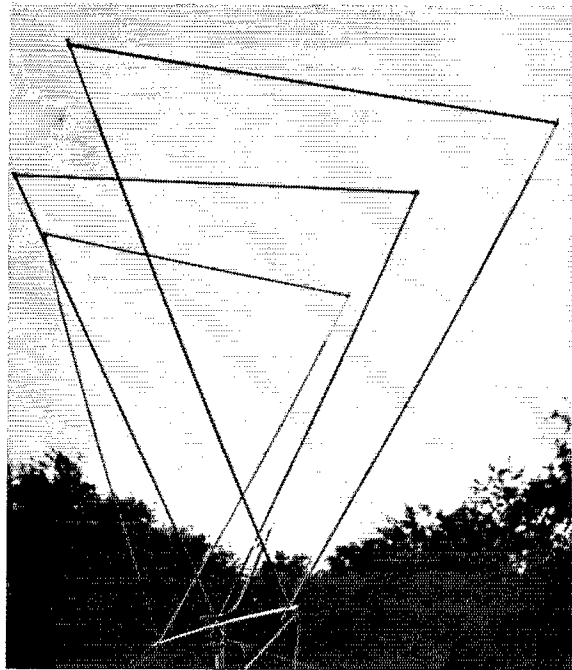
### *The Delta Loop*

The Delta Loop beam is an antenna that uses full-wave elements, the same as a quad, in contrast to the half-wave elements used in a Yagi. However, unlike the quad, the elements are in the form of a triangle rather than a square.

Anyone who has used a quad knows that it is a very difficult antenna to keep in operation, from a purely mechanical standpoint. A quad beam consists of a boom with a support structure built on the boom. This support structure is used to hold the wire elements. Such an antenna is very susceptible to wind and ice damage. One of the advantages of the Delta Loop over the quad is the fact that no support structure is necessary, and the elements are made mostly of aluminum tubing, rather than wire. The only wire in a Delta Loop is the top cross wire, which actually lends strength to the element.

Another feature is that the tubing elements are mounted directly to the boom, using no insulators. This Plumber's Delight type construction allows the entire antenna to be grounded for lightning protection, a feature that any ham should like. Also, in the quad, one half of the entire antenna is suspended below the boom; this, in many instances, puts part of the antenna directly in the field of tower and guys supporting the boom. In the Delta Loop, the entire antenna is above the boom.

Of course, the final proof of the pudding in any antenna system is performance. The gain of the



Here is a shot of the antenna under the testing setup. If the elements look slightly askew, they are; the winds were gusting to 50 mph the day we took the photo.

Delta Loop should be just about the same as a quad. As to front-to-back rejection, tests of various models of the Delta Loop have shown that it is as good or better than the quad.

### *Formulas*

The formulas used in figuring the element lengths in this 6-meter model are the same as Lindsay set down in his article.<sup>2</sup>

$$\text{Circumference of driven element} = \frac{1005}{F_{\text{MHz}}}$$

$$\text{Circumference of reflector element} = \frac{1030}{F_{\text{MHz}}}$$

$$\text{Circumference of director element} = \frac{975}{F_{\text{MHz}}}$$

The element spacing in this antenna is 44 inches, just slightly less than 0.2 wavelength. Using the above formulas, the element lengths for 50.5 MHz work out to be 239 inches for the driven element, 244 inches for the reflector, and 232 inches for the director.

### *Details*

This beam consists of a reflector, driven element, and director. The driven element can be fed with either 50- or 70-ohm coaxial cable using a gamma match at the feed point. The dimensions given in Fig. 3 for the gamma match are for 50-ohm line. An 8-foot length of 1¼-inch

<sup>1</sup> Lindsay, "Quads and Yagis," *QST*, May, 1968, p. 11.

\* Novice Editor.

\*\* *QST* Staff.

<sup>1</sup> Habig, "The HRH Delta Loop Beam," and McCoy, "The Delta Loop Beam on 15-Meters," *QST*, Jan. 1969, p. 29.

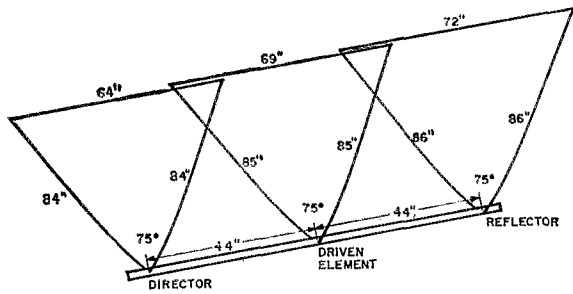


Fig. 1—This drawing shows the dimensions for the three-element Delta Loop beam. All elements are measured from where the elements enter the boom; that portion of the element extending through the boom is not counted. These measurements are for 50.5 MHz.

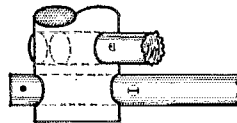
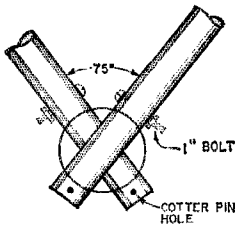


Fig. 2—This illustration shows the method of mounting the element ends to the boom.

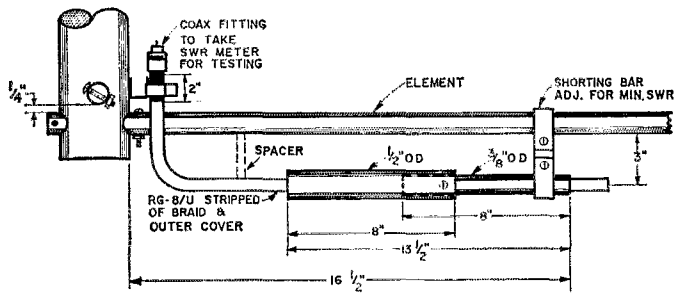


Fig. 3—Details of the gamma matching section. The spacer shown in dotted lines can be made from a piece of Bakelite or Lucite.

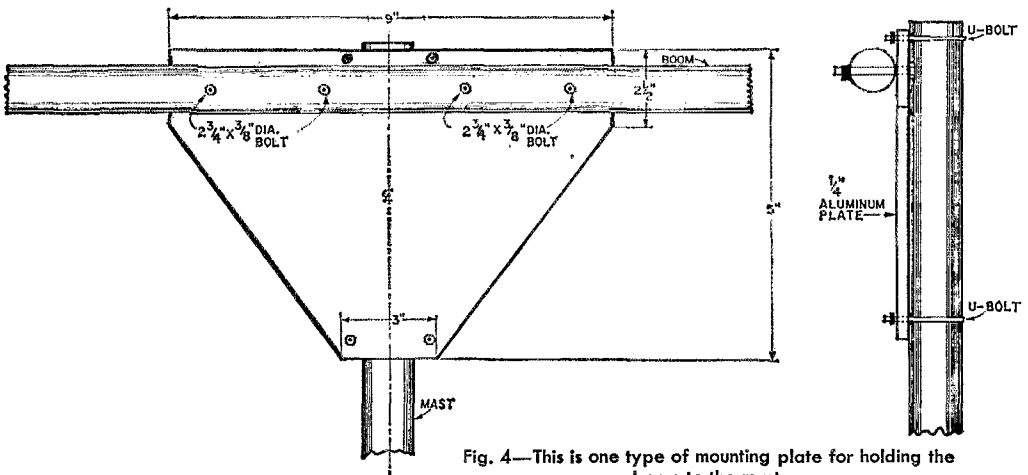


Fig. 4—This is one type of mounting plate for holding the boom to the mast.

diameter aluminum tubing with a 0.065-inch wall is used for the boom. All the elements are made from  $\frac{3}{4}$ -inch diameter aluminum tubing, 0.035-inch wall thickness.

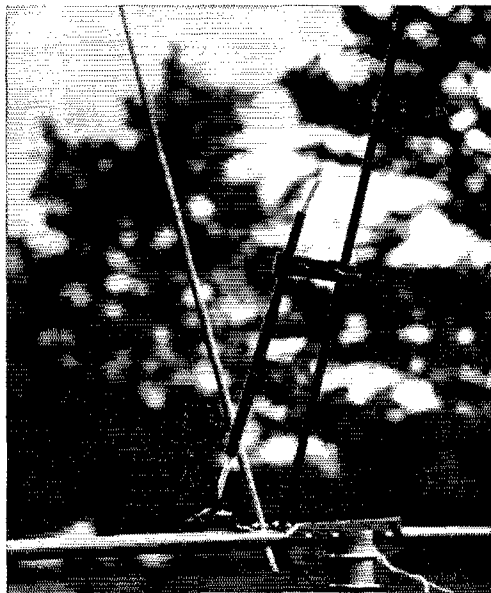
As to getting the material, there are several different places to check. The Yellow Pages in your area should show the nearest metal supplier, who will usually have, or will order, aluminum tubing. Many hardware stores stock Reynolds-Do-it-Yourself aluminum tubing. The Reynolds stock number for  $\frac{3}{4}$ -inch tubing is No. 4222 and it comes in 8-foot lengths. Also, aluminum TV masting comes in 10-foot lengths and is  $1\frac{3}{4}$ -inches in diameter, so a length of this material could be used for the boom.

### Construction

The toughest job in building the antenna is drilling the holes in the boom for mounting the elements. A jig should be made up for correct drilling of the 75-degree angle. This can be made from cardboard or thin plywood, using a protractor. Line up and drill three holes, one for each element. We used a half-inch drill and then carefully reamed the holes out to size with a  $\frac{3}{4}$ -inch reamer. Insert the elements one at a time and, using the template laid against the element, mark off and drill the remaining holes. The 75-degree angle doesn't have to be exact but you should try to make it as accurately as possible. Fig. 2 shows the method for securing the element ends through and to the boom. A cotter pin on the bottom side of the boom and a nut and bolt on the top side will hold the elements securely. We had an adequate supply of aluminum tubing so instead of wire for the cross member at the top of the loops we used tubing. However, it is cheaper and just as efficient to use wire; No. 12 or 14 solid copper should be adequate. The tops of the elements can be flattened and then drilled to take nuts and bolts for securing the top members. One trick used by many beam builders is to spray all fittings and connections with acrylic spray. This goes a long way toward preventing corrosion and rusting.

Details of the gamma match are shown in Fig. 3. The gamma capacitor consists of two sections of telescoping aluminum tubing, which makes up one half of the capacitor. The other half is made from a 27-inch length of RG-8/U with the outer vinyl covering and braid removed. The inner conductor and its insulation are left intact. Two inches of the outer braid is left exposed at the fitting end and this portion of the braid is clamped to the boom directly at the base of the driven element. If desired, a chassis-type coax fitting (SO-239) could be mounted at the clamp point instead of the male plug shown in Fig. 3.

The method of mounting the boom to the supporting mast will of course depend on your own individual requirements. We used a boom-to-mast mounting bracket as shown in the photographs and in Fig. 4. This makes a rugged installation that will withstand any wind or ice loading.



This close-up view shows the details of the gamma matching section.

### Gamma Adjustments

When the antenna is completed it should be mounted on a temporary mast, 6 to 8 feet above the ground so the feed point can be reached for the gamma adjustments. When making any matching adjustments on any antenna the SWR bridge should be installed as close to the antenna as possible. This will aid in eliminating or reducing any stray feeder currents that could get into the matching indicator and foul up the readings.

In adjusting the gamma, the figures given in Fig. 3 can be followed as a guide. These are the dimensions that gave us a perfect match at 50.5 MHz. To match the feed line to the antenna, first slide the shorting bar up or down the antenna element, looking for the lowest SWR or best match. Also, move the  $\frac{1}{2}$ -inch section up or down over the smaller tubing, all the while looking for the best match. We used a self-tapping screw on the  $\frac{1}{2}$ -inch section when making the adjustments. It should take only a few adjustments to get the beam perfectly matched.

QST

## Strays

### Feedback

You'd have some trouble with the crystal oscillator in W1QWJ's beautiful 220-MHz. transmitter, if you hooked it up as shown on page 22 of QST for May, 1969. The 47,000-ohm resistor should be connected from grid (pin 2 of  $V_1$ ) to ground, not from cathode to ground. Also, in the parts list under Fig. 1, the two diodes in the audio circuit should be called out as  $CR_2$  and  $CR_3$ . Many thanks, W4MEA, for bringing these slips to our attention.





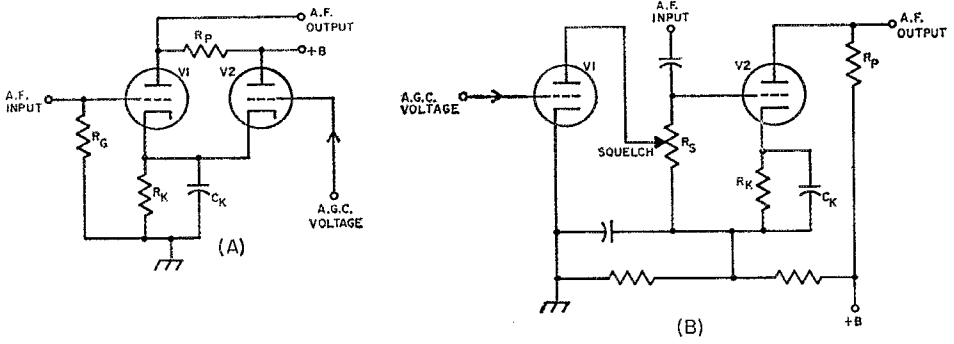


Fig. 1—Basic squelch circuits operating from automatic gain control voltage.

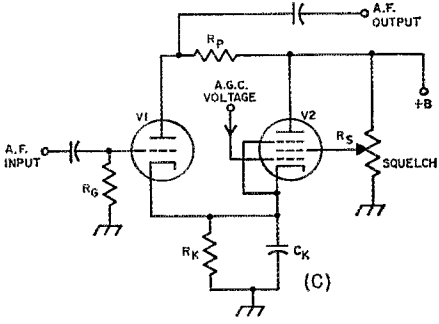


Fig. 2—A practical a.g.c.-operated squelch circuit.

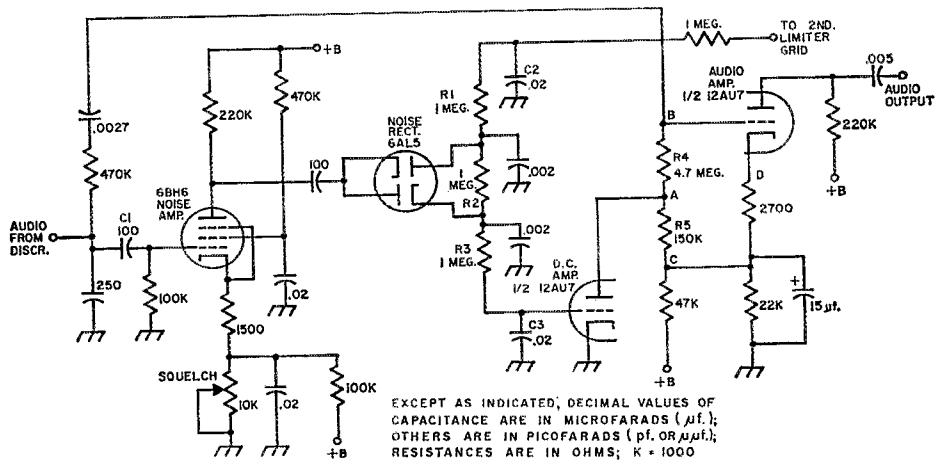
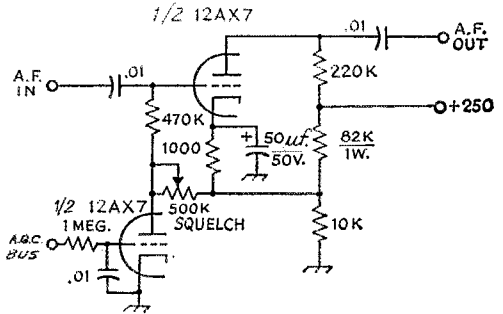


Fig. 3—Motorola squelch circuit for f.m. receivers.

## Obtaining Cutoff Bias

One charges  $C_3$  positively and the other charges  $C_2$  negatively. The negative charge on  $C_2$  is fed to the second-limiter grid, reducing the gain of the limiter and therefore reducing the noise in the system. The positive charge on  $C_3$  is fed to the grid of the d.c. amplifier, causing it to conduct. When it conducts, it applies a negative (cutoff) bias to the audio amplifier stages, preventing the audio from being heard. (More about how this cutoff bias is generated later.)

Now assume that a carrier signal is present. There is no noise in the circuit, only audio frequencies 3 kHz, and lower due to modulation. This energy has little charging effect on  $C_2$  or  $C_3$  and the positive charge on  $C_3$  drops off. The d.c. amplifier conducts less, which in turn reduces the negative bias applied to the audio amplifier. Somewhere a point is reached where the audio stage conducts. If this were the complete circuit, it would take a relatively strong signal to quiet the noise enough to deactivate the squelch circuit and activate the audio system. Something else is needed to make the circuit more responsive to weak signals.

An often-overlooked connection is a very important part of the circuit. Note the connection to the second limiter grid. In an f.m. receiver, grid-leak bias usually is used for the limiter stages, and at any incoming signal strength above the limiting (saturation) level this grid-leak bias develops to a relatively high negative level.

Applying this high negative potential to the grid of the d.c. amplifier (through the path formed by  $R_1$ ,  $R_2$  and  $R_3$ ) has the effect of cutting it off — exactly the same effect which occurs when the noise decreases. The d.c. amplifier grid is the critical point in the operation of the squelch circuit. It has two voltages applied to it: The first, a negative voltage from the second-limiter grid, becomes increasingly negative as the signal strength increases; the other, a positive voltage from the noise rectifier, becomes increasingly positive as the signal strength decreases (noise increases). The balance or algebraic sum of these two voltages determines the bias and thus the operation of the d.c. amplifier. When the d.c. amplifier grid is sufficiently negative (with respect to its cathode), the d.c. amplifier is cut off and the audio amplifier is allowed to conduct. Conversely, when the sum of the two voltages is positive with respect to the cathode of the d.c. amplifier, the stage is allowed to conduct and therefore the audio amplifier stage is cut off.

This arrangement forms a more sensitive squelch circuit than one which acts on the noise level alone. The sensitivity of the circuit is adjusted by means of the squelch control, which is merely a voltage-dividing potentiometer that acts as a gain control for the noise amplifier. This determines how much the noise is amplified, and thus the value of the positive component applied to the d.c. amplifier grid. The value of the negative component is determined by the strength of the incoming r.f. signal.

Let's examine the method by which cutoff bias is obtained for the audio stage or stages. Note that  $R_5$ , a 150,000-ohm resistor, is connected between the plate of the d.c. amplifier and the high-voltage source. This same load resistor also is connected between the cathode and grid of the first audio stage. Note, too, that the cathode of the first audio stage is *not* at ground potential.

In the absence of an incoming signal, the d.c. amplifier is conducting because of the positive voltage at its grid. Plate current flowing through  $R_5$  causes a voltage drop across the resistor, with point *A* more negative than point *C*. This drop in voltage also appears as a bias with the same polarity between the grid and the cathode of the first audio stage. When the d.c. amplifier is conducting, the drop across  $R_5$  is relatively large. Therefore a negative voltage sufficient to cut off the first audio stage is applied to its grid. Consequently it will not pass the audio information which also enters the grid of this stage through a coupling capacitor.

When an incoming signal is present, the noise quiets and the limiters develop a high negative voltage. The d.c. amplifier grid is negative and the stage no longer conducts. Now no voltage develops across  $R_5$ . The cutoff bias has been removed from the first audio stage, and it now allows audio information to be amplified.

## Solid-state Squelch Circuits

Next, let's consider a transistorized squelch circuit. Fig. 4 shows the type used in the R14X4 receiver manufactured by the Plechtron Corporation of Overton, Nebraska.  $Q_1$  amplifies the output of the discriminator. Two outputs are taken from  $Q_1$ : (1) the normal audio path from the collector load resistor and (2) a squelch audio path from the emitter resistor. This second audio signal, consisting of voice modulation and atmospheric noise, is applied to  $Q_5$ .  $Q_5$ , connected as an emitter-follower amplifier, feeds the signal to a high-pass filter, which allows only the higher noise frequencies to be applied to noise amplifier  $Q_6$ .

The noise signal then is rectified by diodes  $CR_2$  and  $CR_3$  to produce a d.c. voltage which will forward-bias  $Q_7$ . This in turn causes  $Q_8$  to saturate, which causes  $Q_2$  to cut off. Thus the normal audio path from  $Q_1$ 's collector through  $Q_2$  to the output stage ( $Q_3$  and  $Q_4$ ) is interrupted. The noise level will decrease with an incoming r.f. signal, or it may be decreased by retarding the squelch control. When the noise decreases to a level sufficient to bias  $Q_7$  and  $Q_8$  off,  $Q_2$  will be allowed to conduct and the normal audio circuit will be completed. Diode  $CR_1$ , connected to the high-pass filter, decreases the sensitivity of the squelch circuit when  $Q_2$  is conducting. This reduces interruptions when receiving weaker signals.

Another type of transistorized squelch circuit is that used by General Electric for its Transis-

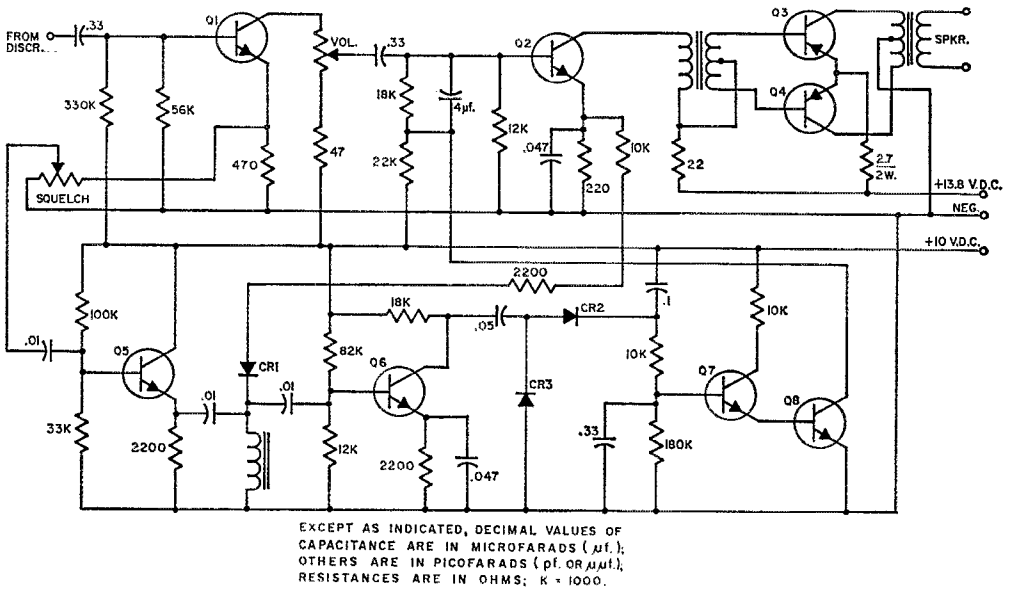


Fig. 4—Plechtron solid-state squelch and audio for f.m. receivers. The output stage,  $Q_3Q_4$ , is a Class B audio amplifier, not controlled.

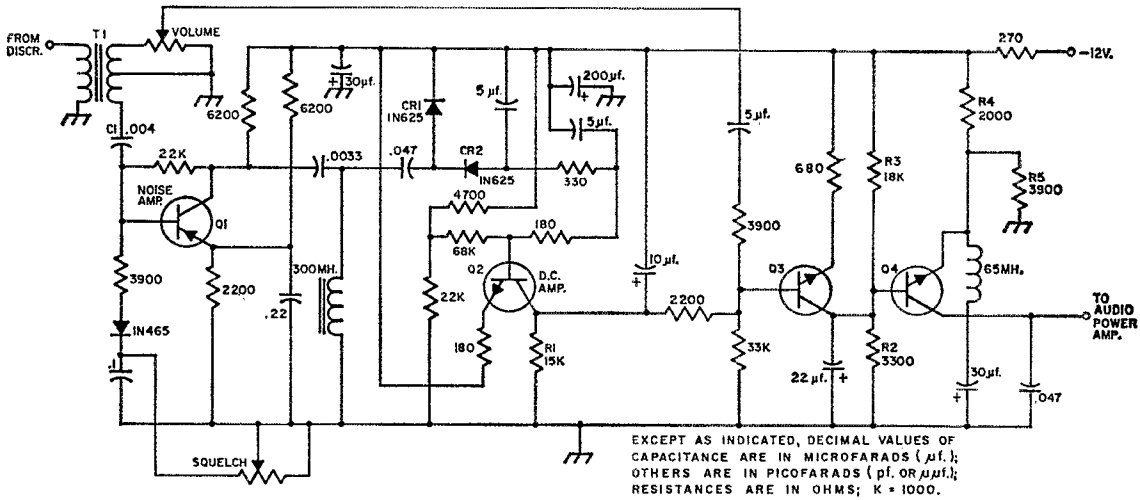


Fig. 5—General Electric solid-state squelch circuit for f.m. receivers. Transistor complement is as follows:  $Q_1$ —2N450.  $Q_2$ —GE A4003-428-1.  $Q_3, Q_4$ —2N169.

torized Progress Line receivers, type ER-31. It not only is more sensitive, but also is more complicated than the other circuits previously discussed. Fig. 5 shows the schematic of this circuit.

The audio signal from the discriminator is fed to an impedance-matching transformer with a split secondary ( $T_1$ ). One half of the secondary supplies normal audio to the volume control. The other half supplies audio to the noise amplifier,  $Q_1$ . Note that the audio is applied through  $C_1$ , a 0.004- $\mu f.$  capacitor which acts as a high-pass filter. The squelch control acts by controlling

the gain of  $Q_1$ . Diodes  $CR_1$  and  $CR_2$  rectify the noise-amplifier output. The d.c. voltage from the diodes determines the base bias for  $Q_2$ , a d.c. amplifier.

$Q_2$  is an n-p-n transistor and will be cut off when the negative output of the rectifiers is applied to its base. Conversely, when the voltage output of the noise rectifiers goes to zero (as is the case when a signal is being received),  $Q_2$  will conduct because of the positive bias it receives. The voltage drop across  $R_1$ , the collector load resistor for  $Q_2$ , is applied as bias to  $Q_3$ .  $Q_3$

**TABLE I**  
**Squelch Circuit Malfunctions**

<i>Trouble</i>	<i>Cause</i>
No squelch action, constant noise. Signal reception OK.	Squelch control misadjusted (common cause). Defective noise amplifier. Defective noise rectifiers. Open load resistor in d.c. amplifier circuit.
Squelch clamped for noise test. Squelch control has no effect. Signal reception OK.	Misaligned receiver (negative voltage from second limiter too low). Defective bypass capacitors in squelch circuit.
Squelch clamps shut on modulation peaks.	Misaligned receiver (negative voltage from second limiter too low). Defective high-pass filter is allowing modulation peaks to be applied to the noise amplification and rectification sections.
Squelch clamped shut all the time. Signal not received.	Squelch control misadjusted (common cause). Misaligned r.f. and/or i.f. stages. Defective r.f. and/or i.f. stages. Open resistor in connection to the second limiter grid. Defective bypass capacitors in the squelch or audio circuitry.

already is biased in such a way that a drop in positive bias caused by  $Q_2$  conduction cannot cause  $Q_3$  to be cut off. It does, however, go from saturation (no-signal condition) to partial conduction (signal condition). Going from saturation to partial conduction causes a reduction in the voltage drop across  $R_2$ . This voltage drop is the bias applied to the base of  $Q_4$ .

Under a no-signal condition,  $Q_3$  is saturated and negative bias is applied to  $Q_4$ .  $Q_4$  emitter bias, from  $R_4$ , will be considerably less (towards zero) than  $-12$  volts d.c. because of bleeder  $R_5$ . The base bias can be made to overcome this emitter bias and swing more negative because of the voltage-dividing resistors  $R_3$  and  $R_2$  and the collector current of  $Q_3$ . In this way,  $Q_4$  is cut off completely and the receiver audio is squelched.

When a signal is being received,  $Q_3$  is only partially conducting, which results in less of a voltage drop across  $R_2$ . This reduced bias on  $Q_4$  allows it to conduct, opening the receiver audio circuit.

### **Troubleshooting**

A word or two of caution: *Think* when troubleshooting a squelch circuit. Be certain that you understand the theory of the circuit. Remember also that voltage checks with one side of the meter grounded sometimes will seemingly point the wrong way as far as trouble is concerned. For example, in Fig. 3 a reading at point *B*, referenced to ground, will always be positive. If you consider this as a positive bias at the grid of the first audio tube, you may conclude that the tube should be conducting. Inspection of the circuit will show that the cathode is above ground by about 40 volts. Remember that the actual bias is determined by the potential between the grid and the cathode of a tube, not between the grid and ground (unless the cathode is grounded). In this case, to determine whether or not the tube should be conducting, measure the voltage from *B* to *D* or from *A* to *C* while rotating the squelch control through its entire range. The reading should vary from a high negative voltage to somewhere near zero, depending on the cathode biasing arrangement for the first audio stage.

Troubles in a squelch circuit usually take several readily-recognizable forms. Table I lists some of the common faults and some of the causes for these faults. As with all troubleshooting, remember that a close inspection of the components often will reveal the trouble immediately. Look for burned or charred resistors, gassy tubes, broken printed-circuit boards, and so forth, before breaking out the sophisticated test equipment.

The following is a step-by-step procedure for isolating trouble in a vacuum-tube-type squelch circuit, such as the Motorola circuit discussed earlier. With a few changes, the procedure can be applied to other tube-type or transistorized circuits.

Always use a vacuum-tube voltmeter or a solid-state voltmeter with a high input impedance

when troubleshooting a squelch circuit. The loading of a low-impedance volt-ohm-milliammeter will upset the circuit operation. (If an oscilloscope is available, it may be used to check the efficiency of the high-pass filter. The filter should attenuate the frequencies below 3 kHz.)

- a. Using a voltmeter, check the output of the noise amplifier with no signal present. Check it again with a signal present and note that the a.c. level drops, indicating quieting of the noise. If no quieting occurs, the trouble is *before* the squelch circuit, and probably has to do with the alignment of the r.f. and i.f. strips.
- b. Proper operation of the squelch control may be checked with no signal present. Determine that the output of the noise amplifier varies while rotating the squelch control.
- c. Using a voltmeter, check the output of the noise rectifiers. Verify that the level changes while varying the squelch control. No signal is present for this test, since the output of the noise rectifier and the second limiter grid connection usually are tied together (through

- isolating resistors) at the metering point. Any second-limiter grid voltage induced by the signal would cause a change in the meter reading.
- d. At the second-limiter grid, check the voltage developed by the incoming signal. The grid-leak bias should rise sharply as the signal level is increased and then level off as the tube becomes saturated with the stronger signal levels. Failure to obtain this indication means trouble in the r.f. or i.f. stages. Note the voltage.
  - e. Check that the same voltage obtained in step d (with no appreciable voltage drop across the isolating resistors) appears at the grid of the d.c. amplifier. (To make this test, disable the noise amplifier or rectifier by removing either tube. The positive rectified noise component at the grid of the d.c. amplifier would affect the meter. Replace the tube when completed.) Failure to observe approximately the same voltage as step d indicates: (1) excessive current caused by a faulty d.c. amplifier tube or (2) an open or changed resistor in the connection to the second-limiter grid.
  - f. Check for proper bias at the grid of the d.c. amplifier. It should be of such polarity and value as to cause the tube to conduct with no signal applied and with the squelch control set at the minimum squelch position. Observe the general precaution mentioned earlier in regard to measuring bias voltages.
  - g. To determine if the d.c. amplifier is conducting, measure the voltage drop across its load resistor. Rotate the squelch control and note

- that the value of the voltage drop across the load resistor changes.
- h. Check the bias voltage at the grid of the audio amplifier stage. Observe the general precaution mentioned earlier in regard to measuring bias voltages.
    - 1) With no signal present, rotate the squelch control and note that the value of the bias voltage changes. Set the squelch control to the maximum squelch (clamped) position.
    - 2) Apply a strong r.f. signal and note that the bias voltage changes. It should now be of such polarity and value that will allow the tube to conduct.
  - i. Since most first-audio stages are operated Class A, it should be possible to determine if the stage is conducting by observing the voltage drop across the stage load resistor, while performing the operations in steps h1 and h2.
  - j. If everything checks OK at this point, the trouble is in the audio stages following the squelch circuit.

### Summary

This article has attempted to present some typical squelch circuits together with a detailed analysis of their operation. If the circuit for *your* receiver was not included, it shouldn't be too hard to analyze its action now that you've mastered the principles behind the operation of squelch circuits. Just remember that squelch circuits must do two things: (1) generate or use an existing voltage to cut off the audio amplifier circuits and then (2) overcome this voltage when a signal is being received.

QST

## • New Apparatus

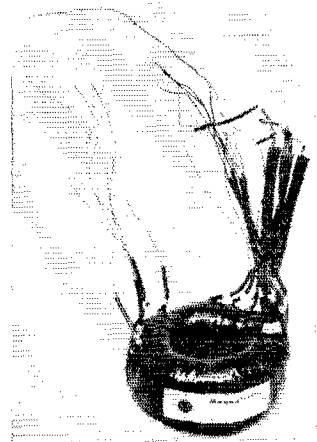
### Magnaletric Power Converter Transformer

If you have ever built a mobile supply for your s. s. b. transceiver, you know how difficult it is to find a transformer that will furnish all the operating voltages required. The toroidal power transformer, B748-B, shown in the photograph should help solve this problem. Although the transformer weighs only 2½ pounds and measures 4 inches in diameter and 1¾ inches in height, it has a volt-ampere rating of 800. If the transformer is used in the power supply circuit recommended by the manufacturer (a diagram and parts list are included with the unit), the transformer should be able to handle any equipment requiring an input of 600 watts or less.

The transformer, which was designed to be operated from 13.6 volts d.c. (typical car generator output), has three secondary windings: high voltage with a choice of four taps, low voltage with a choice of three taps, and bias. Depending on the taps chosen, for a 250-ma. load the high voltage winding will furnish approximately 1380, 1275, 960 or 800 volts d.c., while for a 125-ma. load the low voltage winding will supply about 360, 310 or 285 volts d.c. About 135 volts d.c. is available from the bias

winding. The transformer itself is capable of delivering at least 500 ma. from any tap of any winding, but whether or not this is realized depends on the transistors used in the supply and the magnitude of the input voltage.

The B748-B transformer is available from Magnaletric Corporation, 7902 E. 11th Street, Tulsa, Oklahoma 74112, for \$18 postpaid. — W1YDS



# Transistor Switching For The Micro-TO

BY WILLIAM H. FISHBACK,\* WIJE

ABOUT two years ago Chet Opal's Micro-TO keyer was described in *QST*.<sup>1</sup> Subsequently, this popular keyer was included in the 1968 edition of the *Radio Amateur's Handbook*. Rather than use the relay switching originally included in the Micro-TO, I decided to incorporate solid-state switching in my keyer. Since I planned to use this keyer with a grid-block keyed transmitter the voltage-handling capability of the new switch was an important consideration. In casting about for practical ideas, I came across Corbett's article on transistor switching.<sup>2</sup> This article, although brief, should be considered recommended reading for those interested in using transistors for high-voltage switching. Without shame, I proceeded to pirate the necessary circuitry for incorporation in the Micro-TO.

## Circuit Details

The added switching circuit is shown in Fig. 1.  $R_{18}$ ,  $R_{19}$ , and  $R_{20}$  appear directly across the key in a grid-block keying system. These series resistors serve two purposes. In respect to their being directly across the key, they tend to pull down the voltage at the key terminals during key-up conditions, which helps to protect  $Q_6$

and  $Q_7$ . Since this is a fairly high value of resistance, in the vast majority of transmitters there will be little chance of unwanted keying. Because the leakage current through  $R_{18}$ ,  $R_{19}$ , and  $R_{20}$  stemming from the negative voltage at the transmitter key is many times the cut-off leakage current from the collector to emitter of  $Q_6$  or  $Q_7$ , nearly equal voltages will appear across  $Q_6$  and  $Q_7$  in their off state. In the off state of  $Q_6$  and  $Q_7$ ,  $R_{19}$  provides positive bias for  $Q_6$ ;  $CR_9$  blocks any positive voltage which might come from the +3.6-volt supply. A reasonable voltage across  $Q_6$  and  $Q_7$  in their off state is about 150 volts.  $R_{21}$  and  $C_7$  form a timing network to aid in the turn on/off sequencing of  $Q_6$  and  $Q_7$ .

The operation of the network containing  $R_{13}$ ,  $R_{14}$ ,  $R_{15}$ , and  $CR_8$ , although basic, may be of some interest. With  $Q_4$  in the Micro-TO keyer in its off state, a voltage divider across the total 7.2 volts is formed with current flowing through  $CR_8$ . For the circuit constants shown, point A will be approximately 0.32 volt positive above ground.  $Q_7$  is biased to cutoff by this positive bias.  $Q_6$  is also cut off as a result of the positive bias which appears across  $R_{19}$ .  $CR_9$  effectively isolates the base terminals of  $Q_6$  and  $Q_7$ . When  $Q_4$  turns on, negative voltage is supplied at point A through  $R_{15}$  since  $CR_8$  isolates the rest of the circuit. A negative voltage at point A of

\* Old Comers Road, Chatham, Mass. 02633.

<sup>1</sup> Opal, "The Micro-TO Keyer," *QST*, August, 1967, p. 17.

<sup>2</sup> Corbett, "Transistor Switches in Transmitter Keying," *QST*, November, 1963, p. 58.

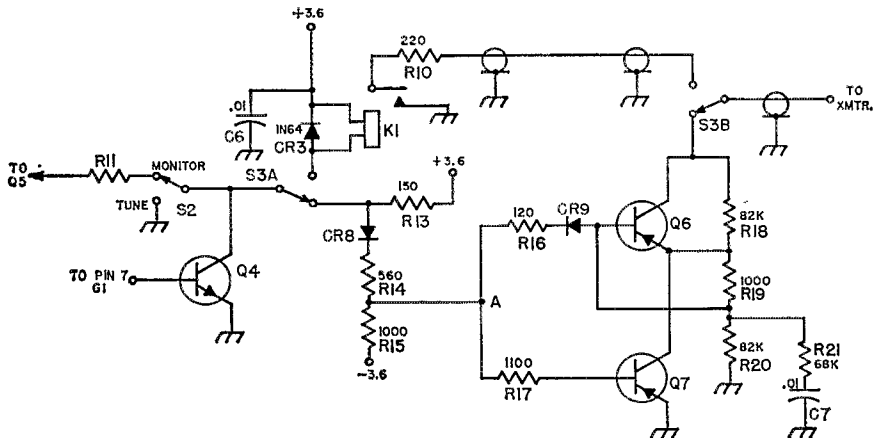


Fig. 1—Added switching circuit. Capacitances are in  $\mu\text{F}$ . Resistances are in ohms,  $K = 1000$ . Components not specified are designated in the original article (p. 17, August 1967 *QST*).  $C_6$ ,  $C_7$ —0.01- $\mu\text{F}$ , 100 volts.  $CR_8$ ,  $CR_9$ —1N459. See text.  $Q_6$ ,  $Q_7$ —Pnp, 150 VCEO; 2N398A, 2N4888 (Fairchild) or equivalent.

$R_{18}$ - $R_{21}$ , inc.— $\frac{1}{2}$ -watt, as specified.  $S_3$ —D.p.d.f.

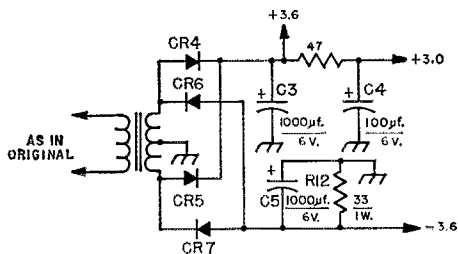


Fig. 2—Power supply. Capacitances are in  $\mu\text{F}$ . Resistances are in ohms. All components not specified below are designated in the original article.

C<sub>5</sub>—1000- $\mu\text{F}$ ., electrolytic.  
 CR<sub>6</sub>, CR<sub>7</sub>—1N4001.  
 R<sub>12</sub>—33-ohm, 1-watt.

approximately 1.1 volts is developed which allows  $Q_6$  and  $Q_7$  to become saturated sufficiently to switch on the transmitter. Some variation in voltages can be expected depending upon the open-circuit voltage of the grid-block system and the amount of current flowing through  $Q_6$  and  $Q_7$  in the conduction state. Since the currents flowing in  $R_{13}$  through  $R_{17}$  inclusive and  $R_{19}$  are somewhat interdependent, it may be necessary to juggle their values a bit. The objective of such a change is to insure equal voltages between collector and emitter of  $Q_6$  and  $Q_7$  in their off state, and equal voltages between base and emitter in their conduction state. In my situation, the key-up voltage at the transmitter is

approximately 126 volts. The key-down current through  $Q_6$  and  $Q_7$  is ten milliamperes.

In order to fully saturate  $Q_6$  and  $Q_7$  properly, a negative supply has been added to the original Micro-TO supply as is shown in Fig. 2.  $R_{12}$  approximates the load of the keyer on the positive section of the supply and also tends to keep the voltages more stable. The intention was in this instance to provide for additional negative-supply current to be used at a later date, hence the desirability at the outset for reasonable regulation in the newly-added negative supply portion.

Diodes CR<sub>8</sub> and CR<sub>9</sub> should be silicon and have a rather high back resistance along with a reasonably low forward drop. A 1N459 silicon diode should do the job although I used a Fairchild type AB which is not readily available.

QST

## • New Apparatus

### Megart Globe Plotter

To use a rotatable beam to its fullest advantage, it's necessary to point the antenna in the direction of the location to be worked. There are many ways to find the correct beam heading, a fact that is evidenced by the more than seven pages devoted to the subject in the *ARRL Antenna Book*. A direction-finding method not covered in this book, and one of the simplest we have seen, is used by the Megart Globe Plotter shown in the photograph.

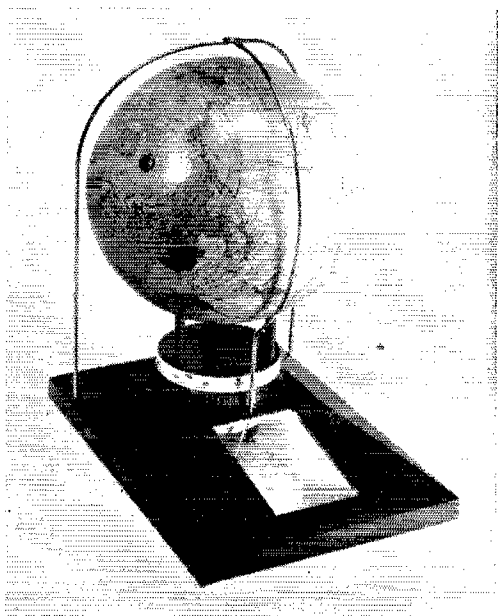
Referring to the photo, an unattached 6-inch diameter globe sits on top of three pillars which project upward from a movable circular platform that is marked off in degrees from zero to 360. A  $6 \times 8\frac{1}{2}$ -inch plastic base supports this platform and a three-legged metal structure on the outside of the globe. A  $2 \times 3$ -inch mirror is glued to the top of the base near the front of the unit.

To set up the Globe Plotter for the user's location, the degree dial (circular platform) is turned until the north bearing (360 degrees) is positioned exactly behind the metal leg (dubbed the "beam path indicator" by the manufacturer) attached to the center of the base. Then while the dial is held in place, the globe is moved about until the QTH of the user can be seen on the globe through a hole in a circular metal piece that joins the three metal legs together at the top of the device. At the same time a gray button at the north pole on the globe is lined up exactly behind the beam path indicator. Gluing the globe in this position to the three posts that extend upward from the dial completes the alignment of the Globe Plotter.

To use the device, it is only necessary to turn the dial until the location to be worked is directly behind the beam position indicator. (Areas on the

bottom of the globe can be found easily by looking at the small mirror on the base.) The number of degrees indicated on the dial at this time is the correct bearing for the antenna.

The Globe Plotter is available from the Megart Company, Box 2097, Des Moines, Iowa 50310, for \$17.95. — *W1YDS*



*Using the simple method described here, the author has been able to make large increases in crystal frequency without loss of activity.*

## Grinding Technique for Surplus Crystals

BY JOHN B. ROSENBERY,\* W9PBI

ALMOST every issue of *QST* includes at least one article describing equipment in which quartz crystals are used. (And, of course, all Novice transmitters must be crystal-controlled.) In many of the applications discussed in these articles, the crystal frequency tolerance is quite small. Although crystals may be purchased to close frequency tolerance on order, their cost is high relative to the price of random-frequency crystals that may be picked up in surplus. This may be a serious consideration in the construction of equipment, such as receivers and frequency synthesizers, which require a large number of crystals. But even for only an occasional crystal, it may be faster and more convenient to spend an hour or two changing the frequency of a crystal from the junk box than to wait for an order to be filled.

As most readers know, the frequency of a crystal depends primarily on the thickness of the quartz plate: the frequency increases as the plate is made thinner. Therefore, almost any crystal can be brought to a *higher* frequency by a "grinding" process to reduce its thickness. The grinding is done by rubbing the crystal in an abrasive "sludge." The process is faster than the etching method sometimes used, and no potentially dangerous acids are involved.

### Materials

The materials required for crystal grinding are simple and inexpensive. The surface against which the crystal is to be ground must be perfectly flat, and the material should be resistant to abrasion. The most satisfactory surface is provided by a thick piece of glass 6 inches square or larger.

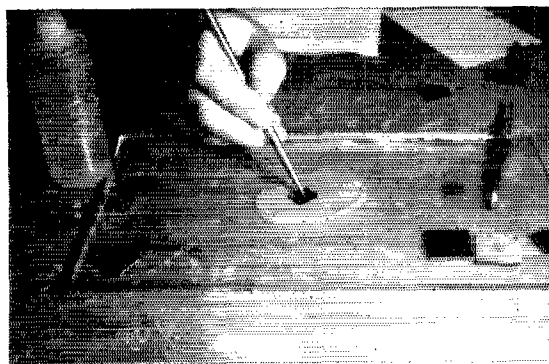
The sludge is a combination of aluminum oxide grinding powder and a small amount of water. The powder comes in various "grit" sizes. I have found that grit size 145 is a very satisfactory compromise for general grinding and for finishing. The powder may be obtained from firms listed under "Abrasives" in the yellow pages of your telephone directory. You may also be able to obtain it from an optical company, if there is one in your area.

Since only a small amount of water is used, a dispenser of some sort is desirable. I use one of the plastic squeeze bottles that are normally found serving as containers of toiletries and cosmetics.

\*147 North Cuyler Avenue, Oak Park, Illinois 60302.

### Avoiding Loss of Activity

A great amount of care must be used during the grinding process to make sure that the two surfaces of the crystal remain parallel. The slightest rounding of the corners, convexing, or any slight irregularity in the thickness will almost surely result in loss of crystal activity if, in fact, the crystal oscillates at all. If the crystal is moved around in the sludge simply with the finger tips, nonuniformity is almost certain to result. It is the prime cause of most of the frequent crystal-grinding failures. Once the surfaces have gone out of parallel, the condition is extremely difficult to correct. To avoid this problem, cut a piece of brass slightly larger than the crystal. The piece should be at least  $\frac{1}{16}$  inch thick and have at least one perfectly flat side. Using a center punch, make a slight indentation at the exact center of one surface of the plate (if one side of the plate is uneven, make the dent on this side). Be sure that the dent is not so deep that it bulges the opposite side, which must be kept perfectly flat. Then enlarge the dent a bit with the tip of a small drill. Mark one corner of the dented side with a drop of colored nail polish for future reference. Stick a piece of electrician's tape against the flat side of the plate. Don't stretch the tape as this may make the thickness of the tape uneven. Trim the edges of the tape off flush with the edges of the plate.



The crystal, stuck to a brass plate approximately the same size as the crystal, is moved around in the sludge with a center punch, or pointed stylus, engaged in a small cavity at the center of the plate. Notice the plastic water dispenser to the left, and the "normally-closed" tweezers, and brass grinding plates of various sizes, to the left.



## Grinding Procedure

It is best to practice first with a crystal that is expendable. Choose some target frequency higher than the original frequency of the crystal and see how close you can come to hitting it. If you go too far with the grinding, and miss the first target frequency, select another frequency a little higher. With a little practice, you should have no trouble in arriving at the frequency you choose.

All grinding should be done on the same face of the crystal. To keep the two faces identified, mark one corner of the crystal with a pencil dot.

Start out the grinding procedure by pouring a small amount of powder (about  $\frac{1}{4}$  thimbleful) onto the glass plate. Add only sufficient water to make a sludge of creamy consistency. Moisten the crystal and the tape on the brass plate with a small amount of saliva. Turn the crystal so that its marked corner and the marked corner of the brass plate correspond, with the marked side of the crystal toward the tape. Press the crystal lightly against the tape to expel any air. Place the assembly, crystal down, in the sludge. Use the center punch, or a pointed stylus, inserted in the indentation on the top side of the plate, as shown in the photograph, to move the crystal around in the sludge in spiral and/or figure-eight patterns, gradually increasing the pressure.

If the sludge has the right consistency, there will be very little tendency for the crystal to rotate on the center-punch pivot. However, if the sludge is too dry, or too wet, there will be a tendency for the crystal to "grab," and it will be difficult to move the crystal around in the sludge with any degree of pressure applied. It is unwise to use the same sludge mixture too long. Eventually, small balls of debris will form, causing erratic drag on the crystal. When this occurs, the glass plate should be rinsed clean, and a new start made with fresh sludge.

## Testing

Periodic checks on the crystal frequency will give you an idea of how rapidly the frequency is changing, and from this you can estimate about how much grinding you should do between frequency checks. Of course, as you approach the target frequency, the grinding periods should become shorter and shorter. After each grinding period, remove the crystal from the plate, rinse thoroughly, and dry with a soft cloth, being careful to preserve the identifying pencil dot. (If you do lose the dot, you can usually identify the side which has been ground by pinching the crystal lightly between the folds of a thin handkerchief held between the thumb and index finger. When the handkerchief is rubbed against the two faces of the crystal, the ground side will exhibit more "drag" against the cloth than the other side.)

The crystal can be checked for activity by plugging it into a test oscillator having a grid-current meter. A comparison of the grid current before and after grinding will give some indica-

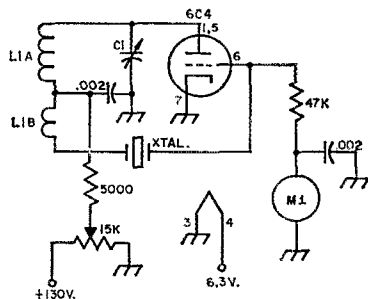


Fig. 1—Crystal testing circuit. The circuit  $L_1AC_1$  should tune to the fundamental or overtone frequency.  $L_1B$ , a turn or two, may be added, if needed, to increase feedback.  $M_1$  should have a full-scale range of 5 ma. for fundamental operation, or 1 ma. for overtone operation.

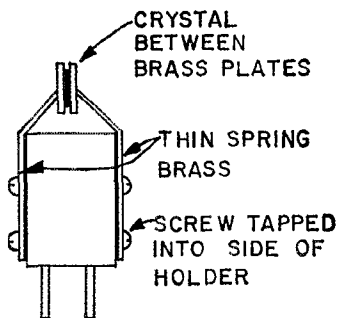


Fig. 2—Quick-change crystal holder made by fastening spring-brass strips to the edges of an old FT-243 holder. The brass plates may be taken from old holders.

tion of the activity for the same plate voltage. If the plate voltage can be varied, you can also compare the relative voltage at which oscillation starts. A simple Pierce circuit<sup>1</sup> should be satisfactory for preliminary checks of fundamental frequency. Fig. 1 shows a circuit that I use. It is suitable for checking overtone as well as fundamental operation. However, final checks should be made with the crystal plugged into the equipment with which it is to be used, since the type of circuit and its adjustment will have some influence on the exact frequency.

To avoid having to remove and replace the crystal in its holder each time a check is made, the arrangement shown in Fig. 2 may be used for all but final checking.

When the crystal is remounted on the brass plate for further grinding, it should be oriented 180 degrees from its original position, using the marks on the crystal and the brass plate as references. For the next session of grinding, the crystal should be turned 90 degrees from its previous position. For succeeding periods of grinding, the position of the crystal should be changed alternately 180 degrees, then 90 degrees,

(Continued on page 55)

<sup>1</sup> McCoy, "A Band-Spotter and W1AW Marker," *QST*, March, 1969.

# Receiver Sensitivity

What It Means . . .

How It is Measured

Does a sensitivity figure of so many microvolts for such-and-such signal-to-noise ratio tell you anything?

BY HARRY R. HYDER,\* W7IV

"SENSITIVITY 0.5 microvolt." Such a statement invariably appears in all ads for communications receivers; only the number changes.<sup>1</sup> Just how good a measure of receiver performance is this? What does it really mean? How is it measured?

This article attempts to answer these questions. Impedance matching, antennas, signal generators, transmission lines, and receiver input networks all enter into the subject.

In a sense, receiver sensitivity specifications are like automobile horsepower ratings. They merely tell you what your set is capable of under a set of rigidly defined but unrealistic conditions, not how it may perform in your hands at your station. For example, if there are several microvolts of everyday atmospheric noise across your receiver's input terminals, half a microvolt of sensitivity is obviously not usable. Stability, selectivity, and freedom from cross modulation are all generally more useful than high sensitivity, and more expensive to design into a receiver. But sensitivity seems to be the first thing the ads list, so we might as well see what it is all about.

The article will deal with receivers covering frequencies below 30 MHz., and specifically with the so-called "50-ohm input" type of set, although the principles can be extrapolated to other frequency bands and input impedances.

The first thing we had better do is review the principles of impedance matching, since this is an important factor in receiver sensitivity measurement.

## Impedance Matching

In transferring available power from a generator to a load, the load will absorb the maximum

possible amount of power when it has an impedance equal to the internal impedance of the generator.

A power source, such as an antenna, a signal generator, or even a battery, can always be represented as a constant voltage in series with a resistance. Fig. 1 shows a one-volt battery in series with a one-ohm resistor, representing its internal resistance. If we short-circuit the terminals of this battery, one ampere will flow and

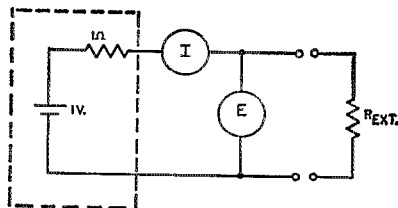


Fig. 1—To demonstrate maximum available power output as affected by internal resistance of the source.

the battery will develop one watt of power. But the power will stay inside the battery and probably ruin it in short order. If the battery terminals are left open-circuited the battery obviously develops no power at all, since no current flows.

If we load the battery with various values of resistance, we will find that the value of external resistance that absorbs the most power from the battery is one ohm, exactly the internal resistance of the battery. The maximum power that we can obtain from the battery is one-quarter watt. All this is readily verified by Ohm's Law.

Fig. 2 is a graph of "mismatch factor" versus percent of the maximum power it is possible to obtain. The mismatch factor is the load resistance divided by the generator resistance, or vice versa. The larger number always goes above the fraction bar, so that the mismatch factor is always greater than one. The mismatch factor could also be called the "v.s.w.r.", except that we have not yet introduced a transmission line, so there is nothing for the standing waves to appear on.

\* 2523 North 57th St., Scottsdale, Arizona 85257.

<sup>1</sup> In the original standards (IRE) on receivers, sensitivity was purely a measure of the *gain*, being just the input voltage required to produce a certain audio output. In recent years it has become common practice to express sensitivity of communications receivers in terms of the input voltage required for a specified "signal-plus-noise-to-noise" ratio. This is sometimes shortened to "signal-to-noise" ratio which, in practice, has to mean the same thing, because it is impossible to measure the signal independently of the accompanying noise. If a high-enough ratio is used the difference between signal-plus-noise-to-noise and signal-to-noise becomes quite small. — *Editor*.

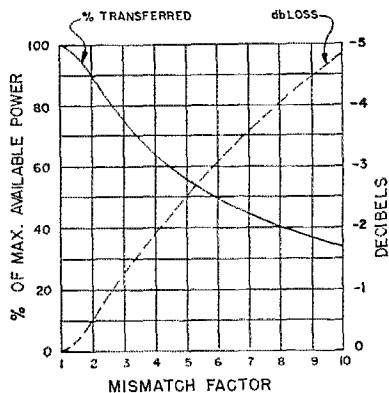


Fig. 2—Ratio of actual to maximum-available power output, from a source having constant internal resistance, as a function of "mismatch factor." This factor is defined as the ratio of load resistance to source resistance (or source resistance to load resistance, if the source resistance is the larger of the two).

The significant thing that this curve shows is that you must have a 6 to 1 mismatch before you lose one-half, or 3 db., of the maximum power obtainable. Now 3 db. may seem like a lot when you are trying to copy some weak DX signal, but all it means from a practical standpoint is that you must turn up your receiver gain control slightly. The mismatch has not changed the signal-to-noise ratio, because the atmospheric noise and QRM have also been decreased 3 db. by the mismatch.<sup>2</sup> Losing 3 db. of received signal power is not nearly as bad as losing 3 db. of your transmitter power.

### The Antenna

A receiving antenna can also be represented as a constant voltage in series with a resistance. In this case, the resistance is the radiation resistance of the antenna. While it is unlikely that many real-life antennas have a radiation resistance of exactly 50 ohms, most amateur antennas include some kind of matching device at the antenna to transform the actual radiation resistance to something like 50 ohms, particularly if the same antenna is used for transmitting. If the antenna is then connected to a transmission line having a characteristic impedance of 50 ohms, and this transmission line is terminated by a receiver having an input of 50 ohms, resistive<sup>3</sup>, the maximum possible received signal power will be transferred to the receiver. If any of these conditions are violated, less than the maximum amount of power will be delivered.

An important thing here is that while the receiver sensitivity is specified in terms of a voltage, it is actually the signal power absorbed

<sup>2</sup> There is probably no "good" modern receiver on today's market that is limited in its sensitivity below 30 MHz, by its own internally-generated noise.

<sup>3</sup> The little knob marked "Antenna Trimmer" on your receiver insures that your receiver's input impedance is resistive, if you are working from a matched antenna and transmission line. Not necessarily 50 ohms, but resistive.

by the receiver that is the important factor. Specifying a voltage is merely a measurement convenience. Signal generators are usually calibrated in terms of voltage output because the manufacturer can guarantee to supply a specific voltage from his generator, but he can not predict how much power the user's load will absorb; that is the user's problem.

### The Signal Generator

The modern standard signal generator used to measure receiver sensitivity is designed to simulate as closely as possible an ideal 50-ohm antenna system. A great deal of engineering effort is spent on insuring that the generator's internal impedance is maintained very close to 50 ohms over the entire tuning range and at all attenuator settings. The manufacturer usually specifies this in terms of a v.s.w.r. looking back into the generator. A typical v.s.w.r. is 1.05 maximum.

Of course, not all receivers are intended to operate in 50-ohm systems; 70 ohms and 300 ohms are also much in use. Low-frequency receivers are usually designed to operate from highly reactive antennas of very low resistance. To cover these situations, the signal generator manufacturers offer as accessories a variety of matching transformers and "dummy antennas."

A high-grade standard signal generator costs a lot of money; well over a thousand dollars. When you learn of the care and effort that goes into their design and manufacture, you will be amazed that they can be sold so cheaply.

Manufacturers are very specific when describing the way in which their output meters and attenuators are calibrated. These days, the most common way is to calibrate the generator in terms of voltage across a 50-ohm output termination. For the generator to read accurately, the termination must be exactly 50 ohms, resistive.

This is fine if you know what you are doing. If you do not understand it, you can get some wrong answers.

If you take a high-grade generator, terminate it in 50 ohms resistive, set the output meter and attenuator to one microvolt, and then remove the termination, what will the output meter read? It will continue to read one microvolt; in fact, it will indicate one microvolt even with the generator output short-circuited. This is because the output meter is actually reading the voltage at the *input* to the generator's attenuator. With so much resistive attenuation between the generator's r.f. source and the output terminals, the output meter cannot tell whether the termination is present or not.

But whether the output meter changes or not, if you set the generator to one microvolt, then remove the termination, the actual output will increase to *two* microvolts.

You may ask: "Then how can I ever tell how many microvolts the generator is producing across the input of my receiver unless the receiver looks like exactly 50 ohms, resistive?" Well, you

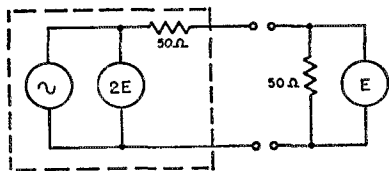


Fig. 3—Voltage developed internally in the signal generator, left, is twice the voltage,  $E$ , across the rated load when the load matches the generator resistance.

can't unless you want to make some impedance measurements on your receiver input, then go through some calculations.

Fortunately, you don't have to do this in a simple sensitivity measurement, because by definition the sensitivity of a receiver has nothing to do with the number of microvolts appearing across its antenna terminals.

The sensitivity of a receiver is defined as the number of microvolts required to produce a specific audio power output (or signal-to-noise ratio) when applied through a dummy antenna having the characteristic impedance of the antenna with which the receiver is designed to operate. In the case of a 50-ohm input receiver, the dummy antenna would be a 50-ohm resistor, and the specified signal voltage would be applied to the receiver in series with this resistor.

We do not, however, need an external 50-ohm resistor when measuring receiver sensitivity. Recall what the manufacturer said about his signal generator:

- 1) It has an internal impedance of 50 ohms.
- 2) The output metering system will indicate correctly the voltage across a 50-ohm termination.

Going back to our basic impedance-matching principles, we can draw the equivalent circuit of the signal generator as in Fig. 3. The output meter and attenuator indicate  $E$  microvolts across a 50-ohm termination. The generator's internal impedance is 50 ohms. Therefore, the generator is actually developing  $2E$  microvolts in series with 50 ohms; when the external termination is removed, the terminal voltage will rise to  $2E$ .

Our course is now clear. To measure the sensitivity of a nominally 50-ohm receiver, which can have any actual impedance, all we have to do is connect the generator to the receiver, adjust the generator output until the receiver produces standard audio output or signal-to-noise ratio, read the number of microvolts from the generator's output metering system, then multiply this number by two.

Do you feel that you have been cheated out of 6 db. of sensitivity? No; you have merely measured receiver sensitivity by the accepted method.

Now let us look at the receiver input circuit.

#### The Receiver Input Network

Why doesn't a "50-ohm input" receiver look like 50 ohms? Probably the chief reason is that

it is actually very difficult to design a highly selective network that will have a constant impedance over a wide frequency range. There are also some fairly good reasons for intentionally mismatching. Mismatching can improve the selectivity of the first tuned circuit, increasing the image rejection ratio. Mismatching can also improve the noise figure, although this is not usually an important consideration in the kind of receiver we are talking about.

Even if it were practical to design an input network that would look like 50 ohms over the entire tuning range, it would hardly be worth the effort. Suppose it doesn't look like 50 ohms; what happens? Nothing much; it just changes the gain of the receiver slightly, and if the designer has included enough reserve gain to accommodate any large mismatch, nothing has been lost. As was said before, receiver sensitivity below 30 MHz. is limited chiefly by atmospheric noise, not receiver noise figure, and antenna mismatches are relatively unimportant.

#### The Transmission Line

In the preceding discussion, the effects of the transmission line were neglected. What happens when a mismatched receiver is connected to a transmission line coming either from a well-matched antenna or an internally-matched signal generator? Does the length of the transmission line become important? Happily no; neglecting losses, which are negligible below 30 MHz. for any line of reasonable length, the receiver does not even know that the transmission line is there. The voltage across the receiver terminals is exactly the same as if the receiver were connected directly across the antenna or signal generator, with no line at all.

Which is not to say that there are no standing waves on the line; the v.s.w.r. may be very high. And the effective termination on the antenna or generator does vary widely with line length, when the line is mismatched at the receiving end. In the extreme case of a quarter-wave line open-circuited at the far end, the generator actually sees a short circuit. But the generator, supplying a definite current to this short circuit, and the line, acting as an impedance transformer, combine to produce a voltage at the far end of the line equal to the generator's open-circuit voltage. Operation will be similar for all line lengths and terminations: the voltage across the termination will always be the same as if the termination were connected across the generator with no intervening transmission line.

We can now easily see why it is so convenient to have an internally-matched signal generator. The transmission line drops completely out of the picture.

Most radio amateurs go to a lot of trouble to match their transmitting antennas to their transmission lines. When this same antenna is used for both receiving and transmitting, which it usually is, it will look like an internally-matched signal generator.

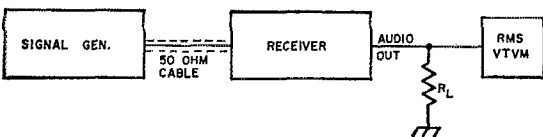


Fig. 4—Setup for measuring receiver sensitivity and signal-to-noise ratio.

### The Measurement

If you have access to a laboratory-quality signal generator, and want to see if your new receiver lives up to what the ads said, or perhaps would like to see if your old receiver still performs well, the measurement is easy to make.

The measurement is usually made at the receiver's narrowest bandwidth, since this gives the best signal-to-noise ratio.<sup>4</sup>

You will also need an audio power meter, which can be an audio v.t.v.m. across a resistor equal to the receiver's specified load resistance. The v.t.v.m. should preferably be the "true r.m.s." type.<sup>5</sup> The equipment should be connected as in Fig. 4. The signal generator output should be unmodulated, and the receiver's beat-frequency oscillator should be turned on. Turn off the a.g.c. and set the r.f. and audio gain controls wide open. Tune the signal generator and

<sup>4</sup> The dependence of noise on bandwidth makes it difficult to compare receiver manufacturers' sensitivity claims, because the noise bandwidths on which the figures are based may be quite different. Noise voltage varies as the square root of the effective bandwidth, which in turn depends on the shape of the selectivity curve. — *Editor*.

<sup>5</sup> The object here is to measure power, which requires an instrument responsive to r.m.s. values. Ordinary v.t.v.m.'s respond to peak, rather than r.m.s., voltage; the usual v.o.m. responds to average, rather than r.m.s., voltage. Neither is accurate for measuring the power in complex waveforms such as noise, but an average-responding meter is better than a peak-reading meter. See Boomer, "Noise Considerations in Receiver Design", Part II, *QST*, June, 1965 — *Editor*.

receiver to the frequency of interest, and adjust the generator's attenuator until the receiver produces an audio output of 50 milliwatts (0.4 volt across 3.2 ohms). Read the signal generator's attenuator and output meter, then double this number. This is your sensitivity in microvolts. To measure signal-to-noise ratio, turn off power to the generator (leaving it connected to the receiver), and note how many db. the audio output decreases. If the signal-to-noise ratio is too low, the signal generator output must be increased until the desired signal-to-noise ratio is obtained, readjusting the audio gain control to maintain the output at 50 mw.<sup>6</sup>

Unless you are using really high-grade equipment, the measurement is meaningless. One thing that adds greatly to the cost of a good generator is the elaborate shielding that is necessary to make the signal leakage power less than the lowest attenuator setting. There are some inexpensive and otherwise useful signal generators that have minimum outputs of 5 to 10 microvolts, regardless of what the dials say. They can make an insensitive receiver look good.

### Conclusion

So if you would like to measure the sensitivity of your receiver, go ahead, if you can get the equipment. But there is a qualitative measurement that is just as informative. Just switch your receiver input between your antenna and a resistive dummy load. If, when you switch from the dummy load to the antenna the noise level increases noticeably, you have about all the sensitivity you need or can use. QST

<sup>6</sup> This method of signal-to-noise measurement is used for c.w. and s.s.b. receivers. For a.m. receivers the signal generator should be modulated — usually 30% at 400 Hz. — and the receiver's b.f.o. turned off, for measuring sensitivity. To measure signal-to-noise ratio the signal generator is left on and the modulation is switched off.

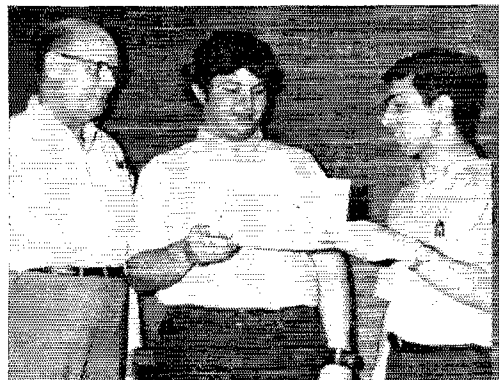
## Strays

Listen for the Lincoln (Neb.) ARC during the Nebraska State Fair, August 29 through September 4. The club has a special commemorative call sign, K0NEB to promote the State Fair and the State of Nebraska. Intended frequencies of operation will be:

S.S.B. (MHz.)	C.W.
3.980	approx. 50 kHz.
7.225 ± 25 kHz.	from low edge,
14.235 ± 25 kHz.	80 through 10
21.300 ± 50 kHz.	meters.
28.600 ± 100 kHz.	

A special commemorative QSL will be sent to those working the station. Send QSLs to ARS K0NEB, Box 1033, Lincoln, Nebraska 68501.

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.

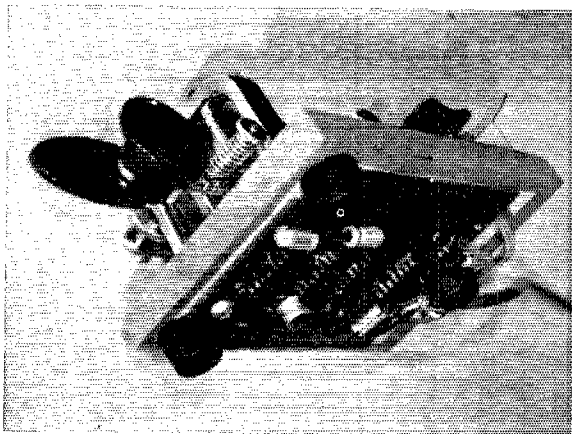


OA4SO (center) a Pennsylvania State University student, is shown receiving an honorary life membership certificate for his father, OA4OS, from Penn State ARC president, WA3CFU. The membership was granted OA4OS in appreciation of the gifts he made to the club during the past year. Looking on is W3LNW, trustee of the club's station.

# Microcircuit Electronic Key

## Combined Keyer and Audio Monitor

BY MARVIN JAHN,\* K2ERI



**S**TANDARD time relations exist for the dot, dash, space between dot and/or dash in a character, space between characters, and space between words. Thus it is possible to use digital techniques to generate the necessary timing characteristics that can be used in an automatic keying device.

This article discusses a simple keying circuit that will automatically produce a series of dots with the required 50-percent duty cycle, or a corresponding series of dashes with the 75-percent duty cycle. This makes it possible to combine the two series to produce the desired character. With the criterion of keeping the cost of the initial version low (under \$10), the logic necessary to produce letter- and word-space elements has been deleted.

The operation of the unit, consisting of a coherent gated astable multivibrator oscillator,<sup>1</sup> several NOR gates and a JK flip-flop, is as follows (see Fig. 1):

### Dot Formation

The key, operated in the dot position, grounds the input of gate  $U_{2C}$ . This allows the astable multivibrator to start in a coherent manner.

As the output of gate  $U_{1C}$  rises, the gated astable multivibrator, consisting of  $U_{1B}$  and  $U_{1C}$ , commences to oscillate.  $U_{1D}$  maintains symmetry in the astable oscillator configuration, i.e., it corresponds to  $U_{2C}$ . Always starting with the same phase, the output of gate  $U_{1C}$  is a positive signal which feeds gate  $U_{3A}$ .

The output from gate  $U_{1C}$  holds the output of gate  $U_{1A}$  at low state (via gates  $U_{3A}$  and  $U_{3B}$ ) through the first half cycle, producing a dot. To produce a series of dots, the key is held closed during the dead time between the first and second dot. Again, after the second dot is

<sup>1</sup> See Appendix at end of article.

\* Sperry Gyroscope Division, Sperry Rand Corp., Great Neck, New York 11022.

The author's keyer is mounted on the under side of a Vibro-Keyer. The dual speed control is mounted on an aluminum bracket fastened to the Vibro-Keyer base.

initiated, it is self-completing. In this way any desired string of dots is produced with the 50-percent duty cycle.

A timing diagram of the various signals to produce the dot is shown in Fig. 2.

### Dash Formation

When the dash side of the key is closed, again the oscillator is turned on through  $U_{2D}$ . In addition, the output of gate  $U_{2A}$  goes to the low state, and is combined, in gate  $U_{2B}$ , with the output of gate  $U_{1B}$ , to produce a signal that causes the JK flip-flop to toggle at the time a dot ends. This produces a positive signal at the input to gate  $U_{3A}$ . The input to gate  $U_{3A}$  continues to hold the astable oscillator in an oscillatory state (via gates  $U_{1A}$ ,  $U_{3A}$ , and  $U_{3B}$ ). The input to gate  $U_{3A}$  now forces the circuit to finish the dash that was initiated. Note that it is not necessary to hold the key closed after the JK flip-flop toggles; the dash is self-completing. The gated oscillator continues on its cyclic action, and causes a signal to pass through gate  $U_{2B}$  to make the JK flip-flop transfer again; this terminates the dash.

The dot and the output of the JK flip-flop are combined in gate  $U_{3A}$  to produce the actual output dash with the required 75-percent duty cycle. To produce a series of dashes, it is only necessary to hold the key closed until the last dash in the desired string has been initiated.

Fig. 3 shows a timing diagram for two dashes.

The output of gate  $U_{3A}$  is used to gate another astable multivibrator running at about 550 Hz. for a side-tone oscillator.

The range of code speed available from this system is approximately 8 w.p.m. to 40 w.p.m., making it suitable for the Novice as well as for

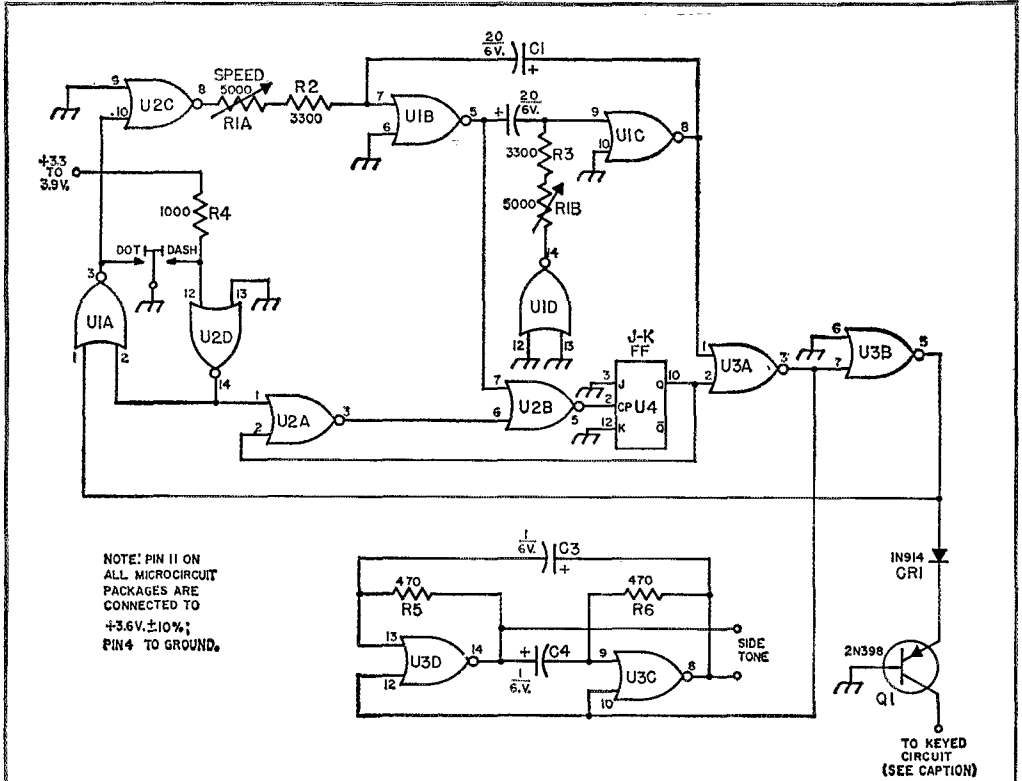


Fig. 1—Wiring diagram of the microcircuit keyer. Capacitances are in microfarads, and resistances are in ohms. Note: For the specified switch transistor (Q1), the keyed voltage should not exceed 100; the keyed current should not exceed 2 ma.

- C<sub>1</sub>, C<sub>2</sub>—20- $\mu$ f. 6-volt 10-percent electrolytic (Lafayette 99T 6075)
- C<sub>3</sub>, C<sub>4</sub>—1- $\mu$ f. 6-volt 20-percent electrolytic (Kemet K1C35; Lafayette 99 T 6070, 2  $\mu$ f., is also suitable).
- CR<sub>1</sub>—1N914, or any small-signal silicon diode.
- Q<sub>1</sub>—2N398 p-n-p transistor.
- R<sub>1</sub>—Dual 5000-ohm linear control (IRC 45-D502-MD-502-10, or similar).
- R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>— $\frac{1}{4}$  watt, 10-percent.
- U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub>—Quad two-input gate (Motorola MC-724P).
- U<sub>4</sub>—Single JK flip-flop (Motorola 723P).

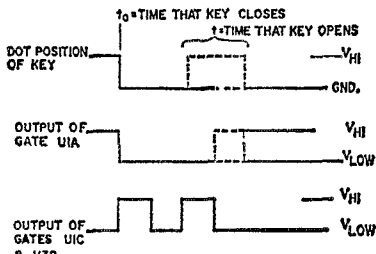


Fig. 2—Timing chart in the production of dots.

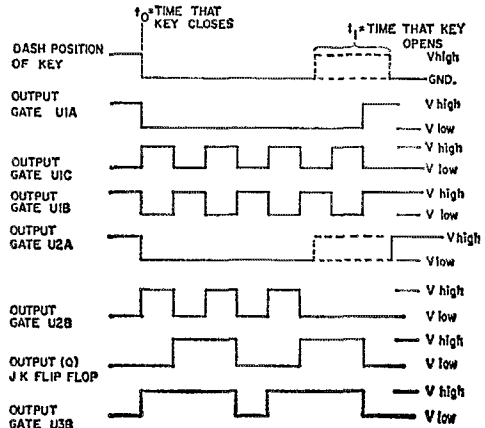


Fig. 3—Timing chart in the production of dashes.

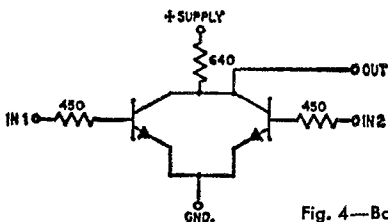


Fig. 4—Basic gate circuit.

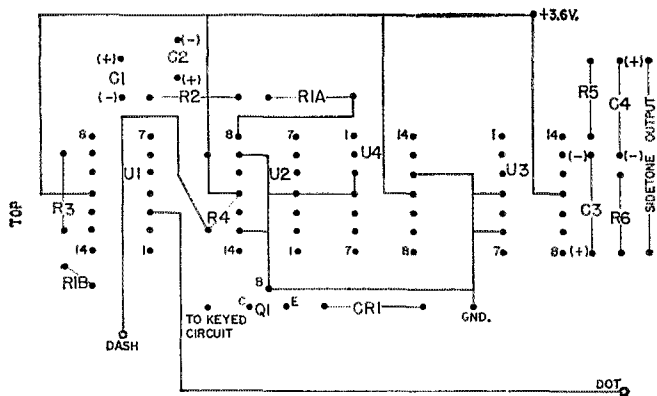
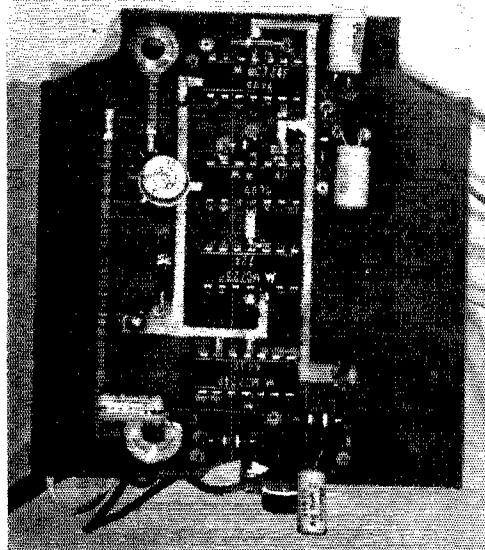
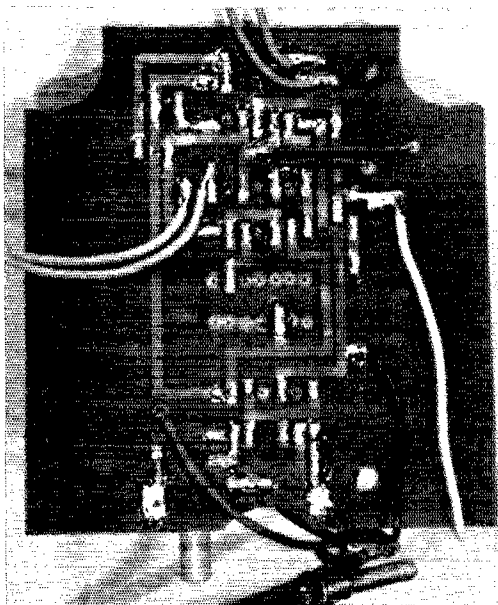


Fig. 5—Printed-circuit layout pattern for component side of board. Scale is actual size.



Component side of keyer board.



Solder side of keyer board.

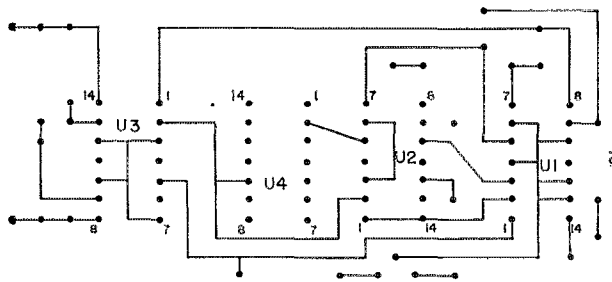


Fig. 6—Printed-circuit layout for solder side of board. Scale is actual size.

reasonably high speeds. If desired, the frequency of the gated oscillator could be increased by decreasing the values of the two 20- $\mu$ f. capacitors,  $C_1$  and  $C_2$  simultaneously. A change in speed does not affect any of the required timing relations for character formation.

The mechanization of the circuit was done with Motorola MC 724P and 723P integrated microcircuits. The basic building block uses RTL (resistor-transistor logic), as shown in Fig. 4, in each gate block.

The JK flip-flop is a configuration that can be steered by the *J* and *K* inputs. It changes state only with a negative-going pulse into the CP (clock pulse) input if the *J* and *K* inputs specify such action.

The output of gate  $U_{3B}$  can be used to operate a keying relay, or it could be interfaced with the transmitter, using additional transistorized circuitry for blocked-grid keying as used in the author's transmitter (National NCX-3), and shown in Fig. 1.

The most interesting aspect of a design using digital techniques is the ability to expand the logic to incorporate the other spacing elements mentioned in the opening paragraph.

Figs. 5 and 6 suggest a printed-circuit-board layout for double-clad board. The accompanying photos show views of each side of the completed board, and how the board was mounted on the under side of the Vibro-Keyer.



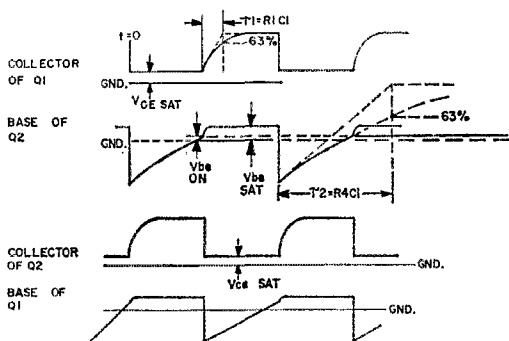
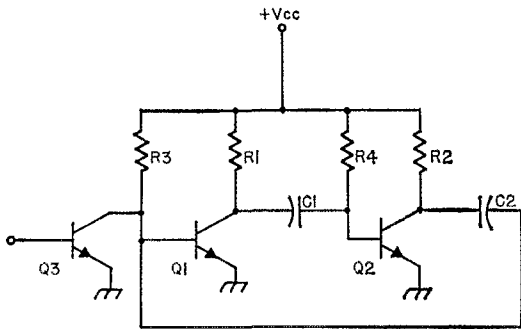


Fig. A1—Circuit and normal operating wave forms for astable multivibrator.

### Appendix

In a footnote attached to an article in an earlier issue of *QST*,<sup>2</sup> the opinion was stated that, "It is virtually impossible to key an astable multivibrator without making an extra-long first dot: the first 50 w.p.m. dot from silicon transistor astable multivibrators can be as long as a dash!" This author is in complete disagree-  
<sup>2</sup> Opal, "The Micro-TO Keyer," *QST*, August, 1967.

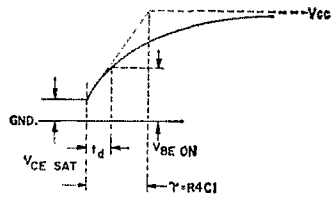


Fig. A2.

ment. In any starting procedure, the undesirable transient can be eliminated if all of the energy-storage elements are preset to the proper initial conditions. Fig. A1 shows the normal operating wave forms for the commonly-used nonguaranteed self-starting astable multivibrator. To maintain the conditions just prior to  $t = 0$ , the potential and current into the base of  $Q_1$  must be maintained just below  $V_{BE ON}$ , the point where the loop gain equals unity. Such is undesirable from a practical circuit aspect in that the noise immunity is zero, and undesired starts could and would occur. Hence, the initial condition potential for the base of  $Q_1$  is some level below  $V_{BE ON}$  that provides adequate noise immunity. A convenient practical level is  $V_{CE SAT}$  of another transistor used in the gating circuitry. When transistor  $Q_3$  is saturated, the preset conditions exist. At  $t = 0$ , transistor  $Q_3$  is turned off and the base potential of  $Q_1$  rises from  $V_{CE SAT}$  toward  $V_{BE ON}$ , at which time regeneration occurs with the first pulse being the same duration as any pulse later in time. A slight delay occurs before regeneration occurs and it can be computed as follows, referring to Fig. A2:

$$V_{BE ON} - V_{CE SAT} = (V_{CC} - V_{CE SAT}) \left(1 - e^{-\frac{t_d}{\tau}}\right)$$

Solving for  $t_d$  yields,

$$t_d = \tau \log_e \frac{V_{CC} - V_{CE SAT}}{V_{CC} - V_{BE ON}}$$

**QST**

## Strays

Around the World on 80 Meters . . . Cliff Tait, ZL1AKI in a solo round-the-world trip in his made-in-New Zealand airplane, the Flying Kiwi, an Airtourer 115. Traveling from west to east, Cliff uses his aircraft i.f. rig on 80-meter c.w. to communicate with hams who are providing a helping hand along the route. The list of stations lined up for the trip looks like a DXCC! His anchor man at home is ZL1KN; VE3BF handled relays when Cliff was enroute through Canada. If you're interested in listening in, ZL1AKI's crystals are on 3750 and 3850 kHz. After Canada, he goes on to Iceland, England, France, Italy, India, Singapore, Australia and on to home in New Zealand. Good luck and God speed, Cliff.



*This a.f.s.k. generator for RTTY can be built for under \$10. But its low cost should not be used as a measure of its performance. The author's generator was given some rather grueling tests in the ARRL lab regarding output frequencies, and we found that, after adjustment was made as described in the text, it was necessary to use a frequency counter with tenth-Hz. resolution to measure the frequency drifts encountered. Even if you never plan to transmit a.f.s.k. signals, because of the low cost of this device you may wish to build it for use as a test generator for your f.s.k. demodulator.*

## A Simple Two-Transistor A.F.S.K. Generator

BY BEN ANTANAITIS, JR.,\* WB2RHM

WHEN the construction of this a.f.s.k. generator was planned, there were six basic requirements. It had to (1) be small — a transistor design; (2) be reliable and stable; (3) be multi-purpose — it should be able to drive either the transmitter or the local loop; (4) be inexpensive — as few parts as possible, with no toroids or other inductors; (5) provide either 850- or 170-Hz. shift; and (6) have provision for narrow-shift c.w. identification.

With about ten hours of research reading, six hours of breadboarding, and a few dollars worth of components, the six requirements were met. The resulting unit is the subject of this article.

### The Circuit

The heart of the generator is shown in Fig. 1. This is the RC Twin-T transistor oscillator. The oscillator used is similar to the one used by W3LOE.<sup>1</sup> The basic Twin-T circuit has been discussed by Maynard in great detail.<sup>2,3,4</sup> The component values used in the oscillator were selected using Maynard's guidelines ( $R_2 = 0.1R_1$ ;  $C_2 = 2C_1$ ;  $C_1^2 \approx 1/[8\pi^2 f^2 R_1 R_2]$ ). The value for twin resistors  $R_1$  was chosen to provide the best biasing for the 2N2923 transistor used in the oscillator. Once the Twin-T is designed, varying the value of  $R_2$  will change the frequency of oscillation over a limited range. The frequency change is inversely proportional to the resistance change in  $R_2$ . In other words, make  $R_2$  smaller and the frequency of oscillation is greater, and vice versa.

\* No. 9 Hilltop Apts. Simmons Park, Saugerties, N. Y. 12477.

<sup>1</sup> Cheek, "A Simple Two-Tone Test Generator," *QST*, August, 1966.

<sup>2</sup> Maynard, "Twin-T Oscillators, Design & Application," *Electronics World*, May, 1963.

<sup>3</sup> Maynard, "Twin-T Oscillators for Electronic Musical Instruments," *Electronics World*, June, 1964.

<sup>4</sup> Maynard, "Twin-T's: Designs & Applications," *Electronics World*, August, 1968.

The schematic of the a.f.s.k. generator is shown in Fig. 2. In this circuit, the method of changing the frequency of oscillation is to change the equivalent value of  $R_2$  as shown in Fig. 1. This is easily done in all cases of interest:

1) With the keyboard contact circuit closed and the c.w. key open, the silicon diode  $CR_1$  is back-biased and the resistance combination of  $R_3 + R_4$  is the effective  $R_2$  of the Twin-T. This is the circuit for the mark tone, 2125 Hz.

2) When the keyboard circuit is closed and the c.w. key is closed, the effective  $R_2$  is the combination of  $R_5$  in parallel with  $R_3 + R_4$ . This is the narrow-shift c.w. identification circuit, providing a tone of about 2225 Hz.

3) When the shift-selector switch,  $S_2$ , is in the 170-Hz. position, the c.w. key open, and the keyboard circuit is open, the diode  $CR_1$  is forward-biased. The bias voltage is determined by resistance values of  $R_6$ ,  $R_7$  and  $R_{15}$ . In this case the effective  $R_2$  is the combination of  $R_3 + R_4$  in parallel with  $R_{15}$  + the forward resistance of  $CR_1$ . This is the circuit for the narrow-shift space tone, 2295 Hz.

4) When the shift selector is in the 850-Hz. position, the c.w. key open, and the keyboard contact circuit open,  $CR_1$  is forward-biased as determined by  $R_8$ ,  $R_9$ , and  $R_{15}$ . With a higher bias voltage than is used for the 2295-Hz. tone, the diode will conduct harder, displaying the equivalent of a lower resistance. The effective  $R_2$  is now the combination of  $R_3 + R_4$  in parallel with  $R_{15}$  + the lower forward resistance of  $CR_1$ . This is the circuit for the normal-shift space tone, 2975 Hz.

The waveform at the junction of  $R_1$ ,  $R_2$ , and  $C_3$  is an undistorted sine wave. This signal is fed through  $C_4$  into the next stage.  $Q_2$  is an amplifier for the high-impedance output, and an emitter follower for the low-impedance output.

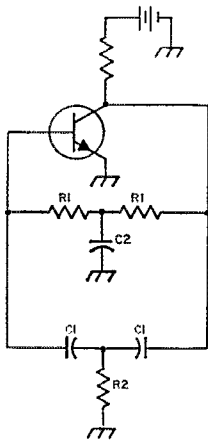
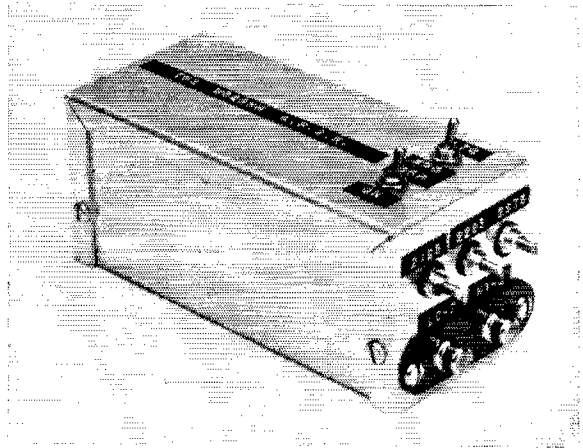


Fig. 1—Basic circuit of the Twin-T oscillator.



The complete a.f.s.k. generator built into a Minibox. All adjustment controls and switches are available from the outside. The key jacks for the RTTY keyboard circuit and for c.w. identification are located on the opposite end of the box, being hidden in this view.

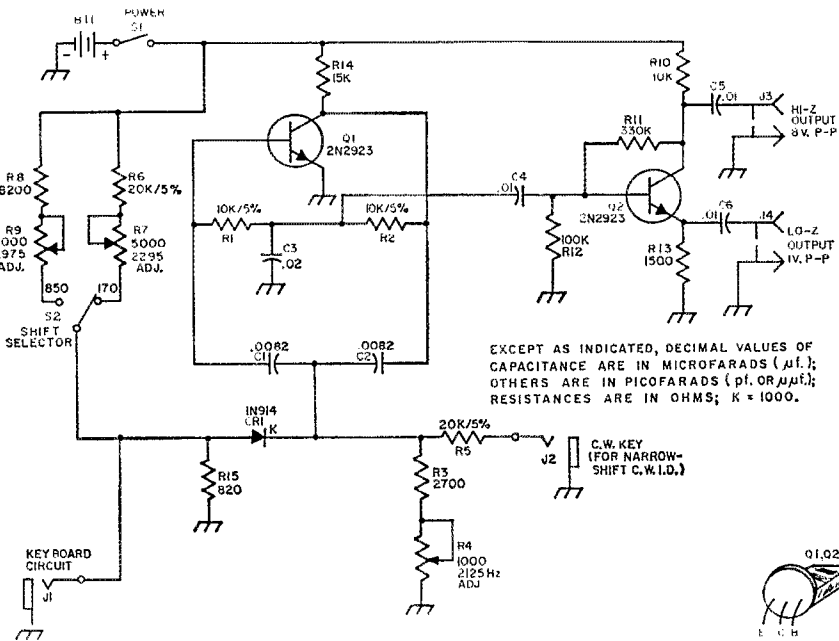


Fig. 2—The transistorized a.f.s.k. generator. All fixed resistors are  $\frac{1}{4}$ -watt, 10% tolerance, unless otherwise marked. Components not listed in the parts list below are for text reference and circuit board identification. The K at CR<sub>1</sub> identifies its cathode end for circuit-board orientation.

- BT<sub>1</sub>—9-volt transistor radio battery.
- C<sub>1</sub>, C<sub>2</sub>—0.0082  $\mu$ f. paper or Mylar, 100 volts.
- C<sub>3</sub>—0.02  $\mu$ f., paper or Mylar, 100 volts.
- C<sub>4</sub>, C<sub>5</sub>, C<sub>6</sub>—0.01  $\mu$ f., ceramic disk, 1000 volts.
- CR<sub>1</sub>—Small-signal silicon diode (1N914 or similar).
- J<sub>1</sub>, J<sub>2</sub>—Single-circuit phone jack.
- J<sub>3</sub>, J<sub>4</sub>—Phono jack.

- Q<sub>1</sub>, Q<sub>2</sub>—A.f. amplifier transistor, n-p-n silicon (GE 2N2923 or similar).
- R<sub>1</sub>—1000-ohm linear-taper carbon control; subminiature (Lafayette 32T7354 or equiv.).
- R<sub>7</sub>, R<sub>9</sub>—5000-ohm linear-taper carbon control, subminiature (Lafayette 32T7355 or equiv.).
- S<sub>1</sub>—Miniature s.p.s.t. toggle.
- S<sub>2</sub>—Miniature s.p.d.t. toggle.

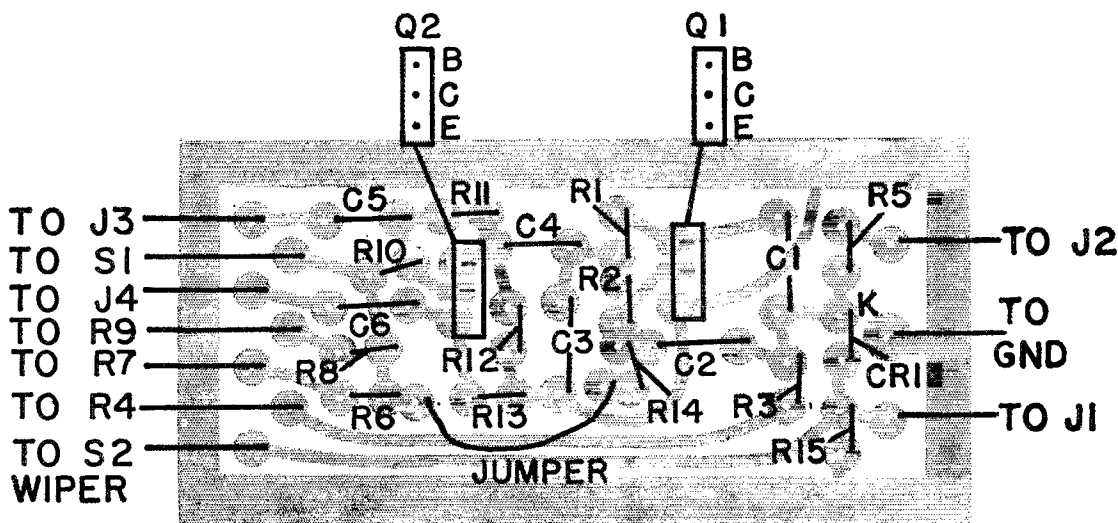
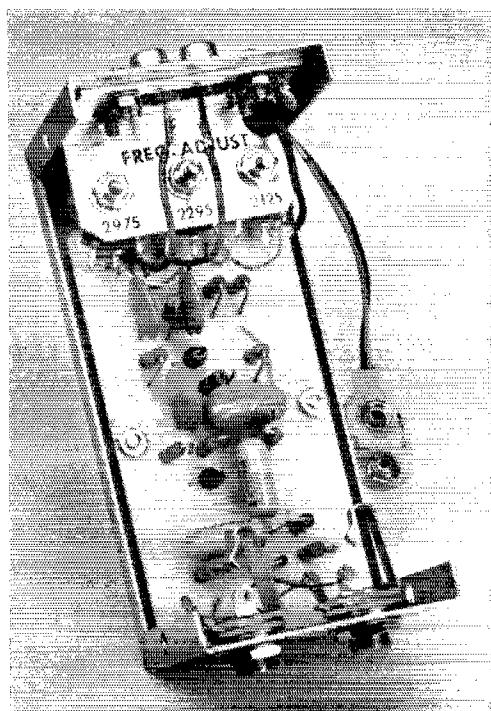


Fig. 3—The etching pattern for the a.f.s.k. generator as seen from the copper side of the board. The pink area represents the copper which remains after etching. The ten connections made externally to the board are for the keying and audio-output jacks, switches, frequency-adjusting controls, and for chassis ground.



This version of the a.f.s.k. generator uses the circuit-board pattern of Fig. 3, and a home-made bracket for mounting the frequency-adjusting controls inside the Minibox. The resistors are mounted vertically on the etched board.

### Construction

Most of the parts were mounted on a 2 × 4-inch etched circuit board. A suitable board pattern is shown in Fig. 3. The circuit board, the battery, the switches, and frequency adjusting controls were mounted in a 5 × 2¼ × 2¼-inch aluminum Minibox.

Care should be used when putting the 2N2923s into the circuit. The lead arrangement is not the common one that you normally find for transistors. Look at the basing diagram in Fig. 2 when you are working with Q<sub>1</sub> and Q<sub>2</sub>.

Care should also be used when hooking up the battery leads; get the polarity right. You may not destroy the transistors, but the circuit will not work properly should you make a mistake with the polarity.

When everything is finished and adjusted, if you find some r.f. sneaking into the circuit, bypass the input and output connectors with capacitors of appropriate value. Use just enough capacitance to get rid of the r.f. but not enough to affect the output.

### Adjustment

Once the generator is assembled and checked with an oscilloscope to see that it really is oscillating, you can set the frequencies. If you don't have a frequency counter, you can use an accurately tuned terminal unit and an oscilloscope or a semi-counter<sup>5</sup> to set up the frequencies. The generator should be calibrated under actual operating conditions, rather than isolated on a test bench, because variations in the resistance of the keyboard circuit or in the load impedance

<sup>5</sup> Hoff, "Checking RTTY Shifts," *QST*, May, 1966.

The generator uses a relatively small number of parts, as evidenced by this photograph. The use of an etched circuit board simplifies the construction.

will have some effect on the frequencies of operation.

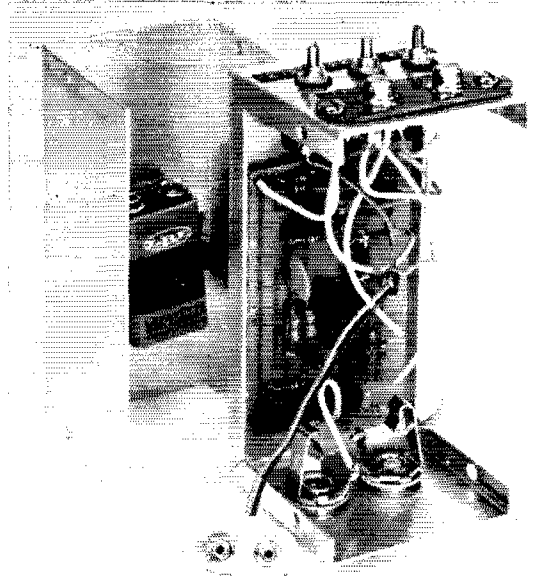
Feed the output of the unit to your t.u. and measure the voltage across the tuned circuits in the t.u. You should see the voltage peak up as you reach the desired frequency.

There are three frequencies to be set on this a.f.s.k. generator. First set the mark frequency. Leave the c.w. key open and close the keyboard circuit. Adjust  $R_4$  until the standard frequency of 2125 Hz. is reached.

Next set the narrow-shift space frequency. Leave the c.w. key open and open the keyboard circuit. Be sure that the shift-selector switch is in the 170-Hz. position. Adjust  $R_7$  until the standard frequency of 2295 Hz. is reached.

Then set the normal-shift space frequency. Leave the c.w. key and the keyboard circuit open, and place the shift selector in the 850-Hz. position. Adjust  $R_9$  until the standard space frequency of 2975 Hz. is reached.

If possible, you should check to see that the narrow-shift c.w. ID gives a shift of at least 100 Hz. If the shift is less, make  $R_5$  a lower value resistance. Increasing the value of  $R_5$  will reduce the c.w. ID shift.



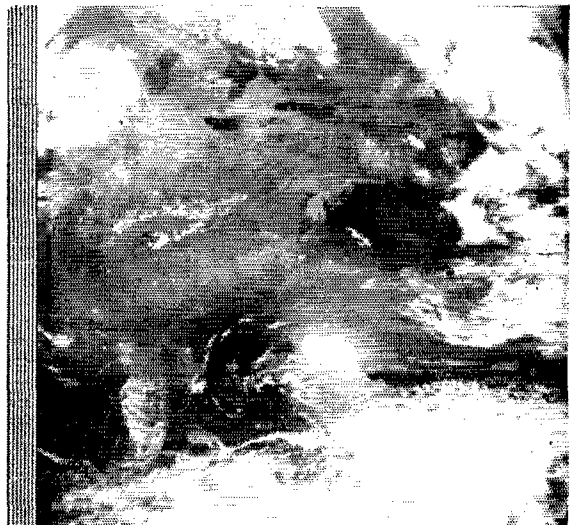
The current drain of the generator is about 2 ma., so shelf life may be expected for the battery.

As it was stated in the beginning of this article, the device described has lived up to the six starting requirements, and has led the way to many hours of fun on RTTY. I would like to express thanks to my professor, Mr. Arthur Seidman, K2BUS, for his very useful suggestions in preparing this article. QST

## Strays

We have received word that the 0.5-inch diameter ferrite rods used in many *QST* and *ARRL Handbook* projects — linear amplifiers, receivers, etc., are no longer available from Lafayette Radio Electronics. Rods of the same dimensions are manufactured by Indiana General Corp., Keasbey, N. J. 08832, and are sold by Newark Electronics of Chicago, Illinois at \$2.50 each. Another distributor for Indiana General Corp. is Perm Mag Corp., 88-06 Van Wyck Expressway, Jamaica, N. Y. 11418. — *WICER*

Once in a while the cloud cover thins out enough so land masses really show up in weather-satellite pictures. W4-TNT got the photograph above on such a day. The area covered is from the southern tip of Florida to the Great Lakes, all five of which are visible at the top left. The Atlantic coast line shows up clearly, with the Chesapeake region at about the center of the picture. Even the mountain ranges can be discerned!





## An Inexpensive Ten-Minute Timer

BY ROBERT B. KOEHLER,\* W2HZZ

**H**ERE is a piece of peripheral ham-shack gear that should be of particular interest to the rag chewer and the round-table participant. It is the result of recent experiments conducted to develop an all-electronic, versatile, inexpensive timer that would have sufficient accuracy and repeatability to fulfill FCC requirements for station identification at ten-minute intervals. Some of its more important features include the following:

1) Economy: The six components that the average ham is least apt to have in his junk box should cost less than eight dollars.

2) Versatility: A wide variety of power supplies, indicators and set/reset systems may be employed.

3) Calibration: The time interval can be set in one or two cycles.

4) Silence: Operation creates no audible or electrical noise.

### Circuit Operation

Fig. 1 shows the circuit of the timer in schematic form. The voltage-doubling power supply provides an open circuit output of about 22 volts<sup>1</sup> from  $T_1$ , a 6.3-volt filament transformer.  $C_1$  and  $C_2$  are large enough to maintain the output at 15 volts when  $K_1$  is energized—the maximum load condition. (A 24-volt relay is specified for  $K_1$  because most units of this type will operate reliably at close to half their rated voltage.<sup>2</sup>) When  $S_1$  is switched to SET-RESET,  $C_3$  charges through  $R_3$  to about 9.1 volts in five time constants. Zener diode  $CR_3$  regulates the charging circuit supply at about 10 volts. The time constant of the charging circuit, which consists of  $C_3$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$ , is about 13.4

\*R.D. 4, Box 21, Hopewell Junction, New York 12533.

<sup>1</sup>Such a high reading was measured because the open circuit voltage of the filament transformer was higher than its loaded voltage rating, and the transformer was operated from a higher line voltage than its design value. — Editor.

<sup>2</sup>A model of this circuit was built in the ARRL lab. In order to get consistent operation when a 24-volt relay was used, it was necessary to stretch the relay return spring. — Editor.



A 3×4×5-inch Minibox houses the components of the ten-minute timer. Once the TIME DELAY control has been properly set, the indicator light on the top of the unit will begin to glow ten minutes after the toggle switch next to the lamp has been thrown to SET-RESET.

minutes, making it possible for the ten-minute point to occur on a steeper portion of the charging curve than it would if the time constant were shorter. This, in combination with the Zener regulator, tends to minimize time interval variations on successive cycles.

A typical SCR fires when its gate potential is about one-half volt positive with respect to its cathode. Because the voltage across  $C_3$  is on the order of three volts at the end of ten minutes, the resistive divider,  $R_4R_5R_6$ , across this capacitor is used to provide the  $Q_1$  firing voltage. The proper potential is picked off the arm of control  $R_5$ . When  $Q_1$  fires, relay coil  $K_{1A}$  draws current and relay contacts  $K_{1B}$  close, connecting pilot lamp  $I_1$  across the transformer secondary.

Placing  $S_1$  in the OFF position turns off  $Q_1$ , deenergizes  $K_{1A}$ , extinguishes the lamp, and rapidly discharges  $C_3$  through  $R_1$  in preparation for the next cycle.

$CR_4$  is connected across  $K_{1A}$  to prevent voltage spikes from damaging  $Q_1$ , and  $C_4$  is placed between the SCR gate and cathode to prevent spurious firing of the SCR when  $S_1$  is switched to start a time cycle.

### Construction

The assembly of the components in a suitable enclosure is shown in the photographs. However,

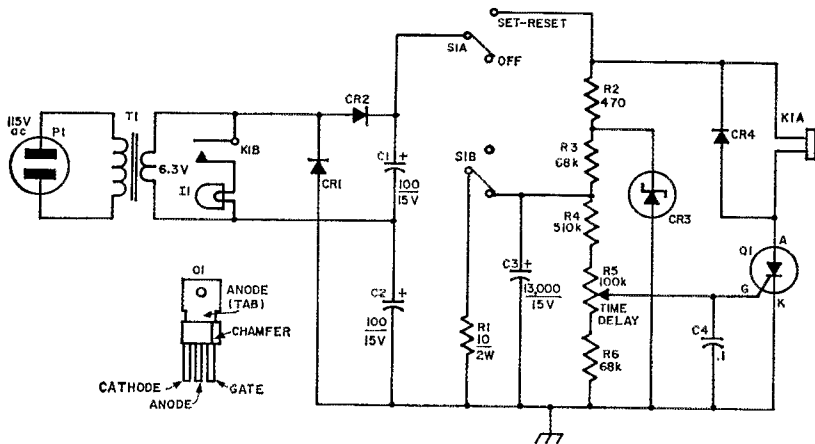


Fig. 1—Schematic diagram of the ten-minute timer. Capacitance values are in  $\mu\text{F}$ ; resistances are in ohms,  $k=1000$ ; resistors are  $\frac{1}{2}$ -watt composition unless specified otherwise.

$C_1, C_2$ —100- $\mu\text{F}$ , 15-volt electrolytic.

$C_3$ —13,000- $\mu\text{F}$ , 15-volt electrolytic (Sprague type 36D, part No. 133G015AC).

$C_4$ —0.1- $\mu\text{F}$  disk ceramic or paper.

$\text{CR}_1, \text{CR}_2$ —Silicon diode, 50 PIV, 100 mA.

$\text{CR}_3$ —Zener diode, 10 volts, 250 mW (Sarkes Tarzian VR10A).

$\text{CR}_4$ —Silicon diode, 100 PIV, 100 mA.

$I_1$ —Pilot lamp, 6.3 volts, 150 mA (No. 47).

$K_1$ —Spdt relay with 24-volt dc, 600-ohm coil (Knight KN105-1C-24D).

$P_1$ —Fused line plug,  $\frac{1}{4}$ -ampere fuses.

$Q_1$ —SCR, 2 amperes, 30 volts (GE C106Y1).

$R_1, R_2, R_3, R_4, R_6$ —For text reference.

$R_5$ —100,000 ohms, linear taper.

$S_1$ —Dpdt toggle.

$T_1$ —Filament transformer, 6.3 volts, 0.6 ampere.

since the placement of parts is completely arbitrary as far as the operating characteristics of the timer are concerned, the builder is free to construct the unit in any form that will suit his individual needs. No heat sink is required for the SCR because the relay current is only about 25 mA.  $C_3$  is the largest single component, measuring  $1\frac{1}{16}$  inches in diameter by  $4\frac{1}{2}$  inches in length.

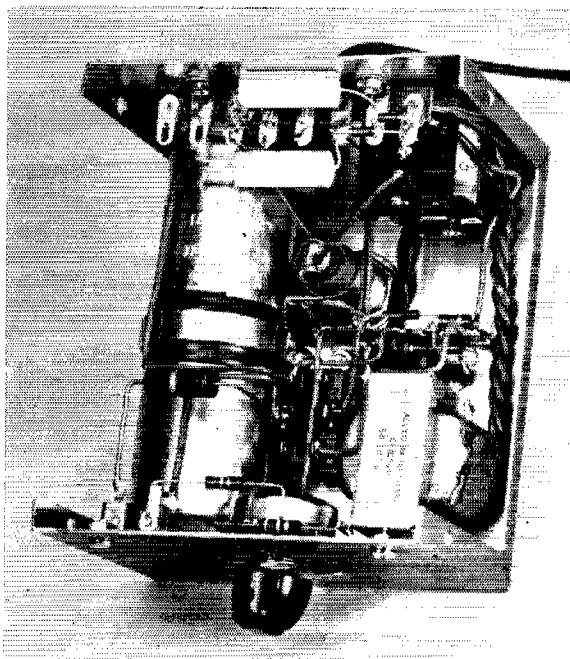
### Setting the Time Interval

After setting the arm of  $R_5$  for minimum output voltage, turn  $S_1$  to SET-RESET. When nearly ten minutes have elapsed, slowly rotate the control arm until  $Q_1$  fires.<sup>3</sup> Because there is a tendency to overshoot the correct setting during rotation, it may be necessary to touch up the adjustment on a subsequent cycle. To insure that inherent time cycle variations will not result in periods in excess of ten minutes, it is suggested that the time be set five or ten seconds short of the full ten minutes. The first cycle after the timer has been idle for an extended period is usually the longest; therefore, it should be used to initially set, or subsequently adjust, the time interval.

Once set, the timer will repetitively produce intervals of from nine and one-half to ten minutes in duration. It will do so in close sequence or from day to day. This cannot be compared with the accuracy obtainable from an electric clock or a frequency divider chain driven from a 60-Hz

(Continued on page 76)

<sup>3</sup> The firing voltage required by the SCR specified in Fig. 1 may be any value in the 0.4- to 0.8-volt range. In case no setting of  $R_5$  will cause the SCR to fire at the end of a ten-minute interval, try increasing  $R_6$  while decreasing  $R_4$  by the same amount. — Editor.



Interior view of the timer.  $Q_1, R_2, R_3, \text{CR}_3$  and  $\text{CR}_4$  are mounted on the terminal strip that is located between the pilot lamp assembly and the toggle switch. At the top of the photograph (along the rear wall of the unit) are  $C_1, C_2, \text{CR}_1, \text{CR}_2$  and  $K_1$ .

# Modern Filter Design for the Radio Amateur

BY EDWARD E. WETHERHOLD,\* W3NQX

THE superiority of the modern filter design procedures, compared to the traditional and now obsolete image-parameter design procedures, has been demonstrated to the radio amateur in several articles which were published during the past three years.<sup>1, 2, 3</sup> In addition, it has been previously mentioned that a particular type of modern filter,<sup>4</sup> the elliptic-function (also known as "Cauer-Chebichev"), is particularly well suited for amateur radio applications because of certain useful performance characteristics. But because of the lack of conveniently accessible design data, the superior modern filter design procedures have not yet been widely adopted by the amateur radio fraternity. The purpose of this article is to change this situation by presenting a selected group of elliptic-function filter data, derived from the references listed in the appendix, which will allow the reader to immediately apply modern techniques in the design of filters intended for amateur applications in both the audio and radio frequency spectrums. Examples of the procedures employed in the design of low-pass filters are included to demonstrate the unusual simplicity of the calculations.

The radio amateur usually designs a typical image-parameter filter by cascading constant- $k$  and  $m$ -derived sections having the proper attenuation and image characteristics until the desired attenuation response is achieved. In comparison, when using the modern filter design procedure, a normalized filter having the desired performance characteristics is chosen from a series of designs which have been precalculated and cataloged in a handbook format by the filter network specialist. These precalculated filter designs have been "dehydrated," so to speak, and stored in a catalog form to await the designer who will add "water" in the form of data specifying the cutoff frequency and termination resistance to scale the normalized filter to the desired cutoff frequency and resistance terminations.

Two low-pass elliptic-function filter catalogs are presented in this article. One catalog is for a two-section low-pass filter and the other for a three-section filter. The data of both catalogs

have been normalized for a cutoff frequency of one hertz and termination resistances of one ohm. The catalog of the two-section filter is comprised of six tables, the first three intended for r.f. filter applications and the last three for audio filter applications. The three-section filter catalog is also comprised of six tables but all are intended for the more stringent r.f. filtering requirements where the performance of the simpler two-section filter may not be adequate. Using this data, it is possible to obtain a complete low-pass filter design with two possible configurations.

## Response Characteristics of the Cataloged Filters

The important characteristics of the low-pass filter response are shown by the attenuation-versus-frequency curve included with each catalog. Also, the two possible filter configurations are shown in the schematic diagrams, Figs. 1 and 2, which appear above and below the tabulations. Referring the two-section response curve, note that there are two attenuation peaks ( $f_1$  and  $f_2$ ) which are associated with the two parallel-tuned resonant circuits of Fig. 1 and the two series-tuned resonant circuits of Fig. 2. The resonant circuits are comprised of capacitors and inductors having the same reference number as the attenuation peak; for example,  $C_2$  and  $L_2$  are responsible for the  $f_2$  attenuation peak. For the three-section filter catalog, a similar relationship exists between the three attenuation peaks of the response curve and the three resonant circuits of the schematic diagrams.

The maximum attenuation in the passband, the minimum attenuation in the stopband, and the frequency where the minimum stopband attenuation is first reached are all indicated in the filter response curve by  $A_p$ ,  $A_s$ , and  $f_s$ , respectively. Note that the normalized cutoff frequency of one hertz has been chosen to occur not at the usual 3 db. but where the attenuation response first exceeds the maximum value of the passband attenuation; consequently, the attenuation value at  $f_{co}$  will vary depending on the value of  $A_p$  of the particular filter selected.

After the desired cutoff frequency has been chosen, the frequencies of  $f_s$  and the attenuation peaks may be calculated by multiplying their corresponding tabular values by the cutoff frequency. This simple procedure permits the important frequency parameters of the filter response to be conveniently determined immedi-

\* Honeywell Inc., Annapolis Operation Test Instruments Division, P.O. Box 391, Annapolis, Md. 21404

<sup>1</sup> Welsh, "An Effective Lowpass Filter," *QST*, January 1966, p. 16.

<sup>2</sup> Wetherhold, "An Amateur Application of Modern Filter Design," *QST*, July 1966, p. 14.

<sup>3</sup> Stutz, "New Filter Designs," *Electronics World*, April 1968. Kyle, "Lowpass Audio Filters," 73, March 1966.

<sup>4</sup> Wetherhold, "Inductance and  $Q$  of Modified Surplus Toroidal Inductors," *QST*, September 1968, p. 36.



A CATALOG OF TWO-SECTION ELLIPTIC-FUNCTION FILTERS  
 NORMALIZED FOR A CUTOFF FREQUENCY OF ONE HERTZ  
 AND TERMINATIONS OF ONE OHM\*

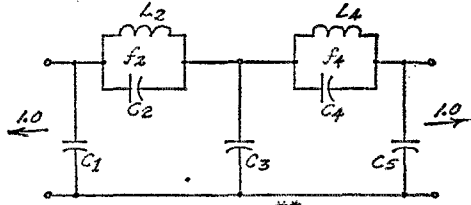
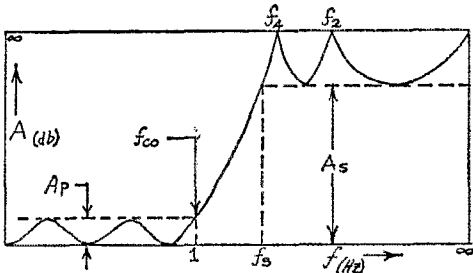


FIGURE 1\*\*

REFLECTION COEFFICIENT, VSWR, & Ap	As	fs	f1	f2	C1	C3	C5	C2	L2	C4	L4
dB	dB	Hz	Hz	Hz	FARAD	FARAD	FARAD	FARAD	HENRY	FARAD	HENRY
<b>TABLE 1-1</b>	70	3.24	3.39	5.42	110.4	235	103.5	4.34	199.0	11.72	187.5
	65	2.92	3.07	4.88	109.6	233	101.0	5.39	197.9	14.67	183.7
$\rho = 4\%$	60	2.56	2.68	4.24	108.2	229	96.9	7.20	195.8	19.88	177.3
VSWR = 1.08	55	2.37	2.48	3.90	107.2	227	93.8	8.57	194.3	23.9	172.7
Ap = .0069db	50	2.13	2.23	3.48	105.5	223	88.6	10.88	192.0	31.0	164.7
<b>TABLE 1-2</b>	70	3.07	3.22	5.13	118.3	243	110.8	4.73	203	12.78	191.0
	65	2.79	2.92	4.64	117.4	241	108.3	5.82	202	15.82	187.2
$\rho = 5\%$	60	2.46	2.57	4.06	116.0	237	104.0	7.67	200	21.2	180.7
VSWR = 1.11	55	2.28	2.39	3.75	115.0	234	100.8	9.07	198.5	25.3	175.9
Ap = .01146	50	2.06	2.16	3.36	113.2	230	95.6	11.43	196.0	32.4	168.1
<b>TABLE 1-3</b>	70	2.79	2.92	4.64	138.4	262	129.6	5.59	210	15.09	196.4
	65	2.56	2.68	4.24	137.4	259	126.9	6.75	208	18.32	192.4
$\rho = 8\%$	60	2.28	2.39	3.75	135.9	255	122.4	8.72	206	23.9	185.7
VSWR = 1.17	55	2.06	2.16	3.36	134.2	251	117.4	10.98	204	30.6	178.4
Ap = .028db	50	1.887	1.970	3.05	132.2	245	111.8	13.55	201	38.4	170.3
<b>TABLE 1-4</b>	55	1.701	1.773	2.71	217	317	190.8	18.03	191.5	49.7	162.3
	50	1.556	1.617	2.44	213	306	181.3	22.8	187.3	63.8	151.9
$\rho = 25\%$	45	1.440	1.493	2.22	209	295	170.6	28.3	182.7	80.9	140.5
VSWR = 1.67	40	1.325	1.369	1.988	203	279	155.8	36.4	176.0	108.0	125.1
Ap = 0.28db	35	1.236	1.273	1.802	195.9	262	139.2	46.4	168.2	144.3	108.3
<b>TABLE 1-5</b>	55	1.618	1.690	2.56	248	348	214	21.3	181.4	58.7	151.0
	50	1.481	1.540	2.30	249	336	210	27.4	174.9	76.7	139.3
$\rho = 33\%$	45	1.369	1.416	2.08	244	318	197.5	34.7	169.2	99.8	126.5
VSWR = 2.00	40	1.270	1.308	1.878	238	299	177.3	44.4	161.7	133.7	110.8
Ap = 0.50db	35	1.186	1.222	1.700	229	280	163.3	57.0	153.9	177.6	95.5
<b>TABLE 1-6</b>	55	1.528	1.591	2.39	314	401	276	28.3	156.9	77.5	129.1
	50	1.407	1.459	2.16	308	381	260	35.5	153.3	99.6	119.4
$\rho = 45\%$	45	1.245	1.313	1.898	306	365	247	46.6	150.7	135.0	108.9
VSWR = 2.67	40	1.217	1.250	1.755	296	341	227	59.2	138.9	176.2	92.0
Ap = 1.00db	35	1.145	1.174	1.597	284	315	203	75.4	131.6	237	77.7
	As	fs	f1	f2	L1	L3	L5	L2	C2	L4	C4
	dB	Hz	Hz	Hz	HENRY	HENRY	HENRY	HENRY	FARAD	HENRY	FARAD

\* All tabulated data of C and L must be multiplied by  $10^{-3}$ ; for example, in Table 1-1, the normalized value of  $C_1$  is  $110.4 \times 10^{-3}$ , for  $A_s = 70$  db.

\*\* In the above tabulation, the top column headings pertain to Figure 1 while the bottom column headings pertain to Figure 2.

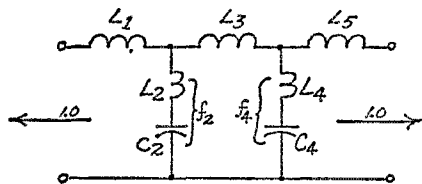


FIGURE 2\*\*

A CATALOG OF THREE-SECTION ELLIPTIC-FUNCTION FILTERS  
 NORMALIZED FOR A CUTOFF FREQUENCY OF ONE HERTZ  
 AND TERMINATIONS OF ONE OHM\*

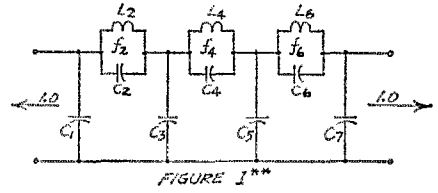
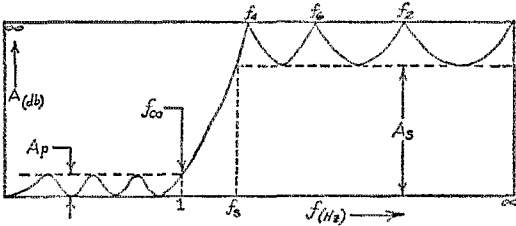


FIGURE 1\*\*

REFLECTION COEFFICIENT, VSWR, & $A_p$	$A_s$ dB	$f_0$ Hz	$f_1$ Hz	$f_2$ Hz	$f_3$ Hz	$f_4$ Hz	$C_1$ FARAD	$C_3$ FARAD	$C_5$ FARAD	$C_7$ FARAD	$C_2$ FARAD	$L_2$ HENRY	$C_4$ FARAD	$L_4$ HENRY	$C_6$ FARAD	$L_6$ HENRY
TABLE 2-1 $\rho = 1\%$ VSWR = 1.02 $A_p = 43 \cdot 10^{-3}$ dB	70	2.00	2.04	2.49	4.35	79.6	209	201	63.1	7.42	180.2	30.9	196.4	26.3	155.2	
	64	1.836	1.876	2.27	3.95	78.3	204	194.8	58.2	9.10	178.4	39.4	187.6	33.0	148.3	
	60	1.743	1.780	2.15	3.72	77.3	200	190.3	54.5	10.35	177.1	44.1	181.4	38.2	143.5	
	55	1.624	1.657	1.990	3.41	75.8	194.2	183.5	48.5	12.42	175.2	53.8	171.4	47.2	135.6	
	50	1.524	1.554	1.854	3.15	74.1	187.8	174.3	41.8	14.75	172.8	65.3	160.7	58.0	127.1	
TABLE 2-2 $\rho = 2\%$ VSWR = 1.04 $A_p = 17 \cdot 10^{-3}$ dB	70	1.836	1.876	2.27	3.95	93.8	222	212	75.7	8.34	194.8	35.8	201	29.4	167.0	
	64	1.701	1.737	2.09	3.61	92.5	216	205	70.7	10.08	193.1	43.8	191.6	36.2	160.0	
	60	1.624	1.657	1.990	3.41	91.5	212	200	67.1	11.35	191.6	49.8	185.1	41.3	154.8	
	55	1.524	1.554	1.854	3.15	89.9	206	192.7	61.1	13.47	189.4	60.0	174.8	50.2	146.7	
	50	1.414	1.440	1.702	2.86	87.5	196.9	182.1	52.2	16.70	186.1	76.4	160.0	64.8	135.0	
TABLE 2-3 $\rho = 3\%$ VSWR = 1.06 $A_p = 3.9 \cdot 10^{-3}$ dB	70	1.743	1.780	2.15	3.72	104.2	230	219	84.7	9.06	203	39.7	201	31.8	172.5	
	65	1.624	1.657	1.990	3.41	102.8	224	211	79.7	10.84	201	48.1	191.8	38.7	165.4	
	60	1.524	1.554	1.854	3.15	101.2	217	203	74.1	12.86	198.3	57.8	181.6	46.8	157.5	
	55	1.440	1.466	1.737	2.92	99.5	211	194.8	67.9	15.12	195.9	69.0	170.8	56.3	149.1	
	50	1.367	1.391	1.636	2.73	97.6	203	186.2	61.2	17.65	193.1	82.2	159.2	67.5	140.1	
TABLE 2-4 $\rho = 4\%$ VSWR = 1.08 $A_p = 6.9 \cdot 10^{-3}$ dB	70	1.701	1.737	2.09	3.61	113.0	236	224	93.0	9.37	208	41.6	202	32.7	175.0	
	65	1.589	1.621	1.942	3.32	111.6	230	217	88.0	11.18	205	50.2	192.3	39.6	170.0	
	60	1.494	1.523	1.813	3.07	110.0	224	208	82.4	13.20	203	60.0	181.9	47.6	161.9	
	55	1.414	1.440	1.702	2.86	108.3	217	199.6	76.3	15.47	201	71.4	171.1	57.0	153.4	
	50	1.325	1.347	1.576	2.61	105.6	206	187.5	67.3	18.94	196.9	89.7	155.6	72.2	141.3	
TABLE 2-5 $\rho = 5\%$ VSWR = 1.11 $A_p = 11 \cdot 10^{-3}$ dB	70	1.662	1.696	2.04	3.51	120.6	242	229	99.9	9.77	211	43.9	201	33.9	179.4	
	65	1.556	1.586	1.897	3.23	119.2	235	221	94.9	11.61	209	52.7	191.1	40.9	172.0	
	60	1.466	1.494	1.774	3.00	117.6	228	212	89.3	13.67	206	62.8	180.8	49.0	164.1	
	55	1.367	1.391	1.636	2.73	115.2	219	199.7	81.0	16.81	203	78.8	166.2	61.9	152.7	
	50	1.255	1.271	1.576	2.61	113.8	213	193.4	76.5	18.57	201	88.2	159.3	69.5	146.6	
TABLE 2-6 $\rho = 8\%$ VSWR = 1.17 $A_p = 28 \cdot 10^{-3}$ dB	70	1.556	1.586	1.897	3.23	139.7	252	237	116.2	11.30	214	52.0	193.4	39.1	180.0	
	65	1.466	1.494	1.774	3.00	138.1	245	228	110.9	13.30	212	61.9	183.5	46.6	172.5	
	60	1.390	1.415	1.668	2.79	136.3	238	218	105.0	15.54	210	73.2	173.0	55.3	164.4	
	55	1.325	1.347	1.576	2.61	134.4	230	208	98.6	18.05	207	86.3	161.9	65.4	155.8	
	50	1.252	1.271	1.471	2.39	131.4	218	193.9	89.2	21.9	202	107.3	146.1	81.6	143.4	

\* All tabulated data of C and L must be multiplied by  $10^{-8}$ ; for example, in Table 2-1, the normalized value of  $C_1$  is  $79.6 \times 10^{-8}$ , for  $A_0 = 70$  db.

\*\* In the above tabulation, the top column headings pertain to Figure 1 while the bottom column headings pertain to Figure 2.

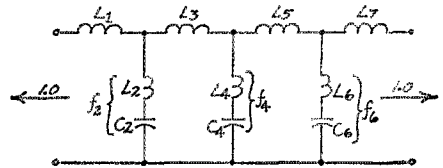


FIGURE 2\*\*

ately after choosing the desired cutoff frequency. If the first filter calculated does not have the desired placement of attenuation peaks, it is a simple matter to search among the tabular data until a satisfactory response is obtained.

### Applications of the Filter Catalogs

Because of their low values of reflection coefficient and v.s.w.r., the tables 1-1, 1-2, and 1-3 of the two-section filter catalog and the tables 2-1 through 2-6 of the three-section filter

catalog are best suited for r.f. filtering applications where power must be transmitted through the filter. The slope of the attenuation response of the two-section filter is relatively gradual and the stopband attenuation level ( $A_s$ ) is not achieved until a frequency ( $f_0$ ) which is two to three times that of the cutoff frequency. If a more abrupt attenuation slope is desired for the r.f. filter response, then one of the three-section filter tables (2-1 through 2-6) should be used. In this case, the stopband attenuation

level may be reached at a frequency only 1.25 to 2 times greater than  $f_{\infty}$ . The values of stopband attenuation,  $A_s$ , were chosen to be between 50 and 70 db. because minimum attenuation values in excess of 70 db. are generally not necessary and values less than 50 db. are usually inadequate for the typical r.f. filtering requirements encountered by the radio amateur.

Tables 1-4, 1-5, and 1-6 of the two-section filter catalog are intended for audio-frequency filtering applications where the transmission of appreciable power is not required and consequently the filter response may have a much higher value of v.s.w.r. and passband ripple without adversely affecting the filter performance. If the higher passband ripple is acceptable, a more abrupt attenuation slope is possible. This can be seen by comparing the different values of  $f_s$  at 50 db. in tables 1-4, 1-5, and 1-6, which have passband ripple peaks of 0.28, 0.50, and 1.0 db., respectively. The values of  $A_s$  for the audio filters were selected to be between 35 and 55 db. as this range of stopband attenuation was believed to be optimum for most of the audio filtering requirements.

### C and L Tabular Data

The  $C$  and  $L$  tabular data are used to calculate the values of the similarly-numbered capacitors and inductors in the filter schematic diagrams. Note that the top line of the column headings is used in calculating the component values of the filter depicted in Fig. 1 and the bottom line of the column headings is used in calculating the component values of the filter shown in Fig. 2. Also, all the  $C$  and  $L$  tabular data must be multiplied by a factor of  $10^{-8}$  when using the data in the scaling calculations, which will be demonstrated later. The tabulated  $C$  and  $L$  data give the actual capacitance and inductance values of a low-pass filter having a cutoff frequency of one hertz and termination resistances of one ohm. Of course, the normalized filter component values are quite unreasonable, but these values will become more practical after they have been scaled to produce a filter having the desired cutoff frequency and resistance terminations. As might be expected, the values of  $C_2$  and  $L_2$ ,  $C_4$  and  $L_4$ , and  $C_6$  and  $L_6$  may be used to calculate independently the attenuation peak frequencies although these frequencies are already provided under the  $f_2$ ,  $f_4$ , and  $f_6$  tabular headings.

With one exception, all the  $C$  and  $L$  tabulated data of each table have a consistent but unequal increase or decrease in value. This is a characteristic of most computer-derived filter tables which assists in the checking of the data for the presence of obvious errors. If the tabular data presented is closely examined, one exception to the orderly progression will be noted in Table 1-5,  $A_s = 50$ , column  $C_1$ . This exception is not an error but is the consequence of a minor change which was required in the original computer program to eliminate nonrealizable component values.

### How to Use the Filter Catalog

One would be well justified in viewing with suspicion the row upon row of catalog data, wondering how a filter design could be hiding in that apparently uncoordinated mess! In order to allay the reader's suspicions, two examples of filter designs will be given to prove that filters can actually be made to appear from the catalog tabulations.

For the first example, assume that a low-pass audio filter is desired for the purpose of attenuating the audio speech frequencies above 3 kHz. Also, a minimum attenuation of 40 db. is desired for all frequencies above approximately 3.8 kHz. For this particular example, the filter is to be terminated in resistive loads of 1.63 kilohms. Although a resistance of 500 to 600 ohms is usually used to terminate audio filters, the odd value of 1.63 kilohms is used here merely for convenience in demonstrating the design procedure.

The normalized filter of Table 1-5 for  $A_s = 40$  db. is chosen as it will provide the desired response. The schematic diagram of Fig. 1 is selected for the low-pass filter configuration as this particular configuration has the minimum number of inductors. Because inductors are more costly and have higher losses than capacitors, the filter designer usually attempts to minimize the number of inductors in an audio filter.

The desired filter parameters are as follows:  $f_{\infty} = 3.0$  kHz,  $A_s = 40$  db.,  $R = 1.63$  kilohms. From the desired parameters and the catalog tabulated data (Table 1-5,  $A_s = 40$ ), other frequency parameters and all the component values are determined as demonstrated in the following Calculation Example No. 1.

### Calculation Example No. 1

In the following calculations, the numbers with the prime (') are the frequency and component values of the final filter design; the numbers without the prime are from the filter catalog.

1) Calculate the frequency parameters  $f'_2$ ,  $f'_4$ , and  $f'_6$  of the filter attenuation response:

$$\begin{aligned} f'_2 &= f_2(f_{\infty}) = 1.27 \quad (3) \text{ kHz} = 3.81 \text{ kHz} \\ f'_4 &= f_4(f_{\infty}) = 1.308 \quad (3) \text{ kHz} = 3.92 \text{ kHz} \\ f'_6 &= f_6(f_{\infty}) = 1.878 \quad (3) \text{ kHz} = 5.63 \text{ kHz} \end{aligned}$$

2) Calculate the factors  $1/Rf_{\infty}$  and  $R/f_{\infty}$  which will be used in the determination of the capacitor and inductor values:

$$\begin{aligned} 1/Rf_{\infty} &= 1 / (1.63 \times 10^3) \quad (3 \times 10^3) \\ &= 1 / (4.89 \times 10^6) \\ &= 0.2045 \times 10^{-6} \\ R/f_{\infty} &= (1.63 \times 10^3) / (3 \times 10^3) = 0.543 \end{aligned}$$

3) Calculate the component values of the desired filter by multiplying all the catalog

tabular values of  $C$  by  $1/Rf_{co}$  and  $L$  by  $R/f_{co}$  as shown below:

$$\begin{aligned}
 C_1' &= C_1(1/Rf_{co}) \\
 &= (238 \times 10^{-3}) (.2045)10^{-6} \\
 &= .0487 \mu\text{f.} \\
 C_3' &= C_3(1/Rf_{co}) \\
 &= (299 \times 10^{-3}) (.2045)10^{-6} \\
 &= .0612 \mu\text{f.} \\
 C_5' &= C_5(1/Rf_{co}) \\
 &= (177.3 \times 10^{-3}) (.2045)10^{-6} \\
 &= .0363 \mu\text{f.} \\
 C_2' &= C_2(1/Rf_{co}) \\
 &= (44.4 \times 10^{-3}) (.2045)10^{-6} \\
 &= .00908 \mu\text{f.} \\
 C_4' &= C_4(1/Rf_{co}) \\
 &= (133.7 \times 10^{-3}) (.2045)10^{-6} \\
 &= .0273 \mu\text{f.} \\
 L_2' &= L_2(R/f_{co}) \\
 &= (161.7 \times 10^{-3}) (.543) \\
 &= 87.8 \text{ mh.} \\
 L_4' &= L_4(R/f_{co}) \\
 &= (110.8 \times 10^{-3}) (.543) \\
 &= 60.1 \text{ mh.}
 \end{aligned}$$

These calculations, which are conveniently performed with a ten-inch slide rule, complete the design of the desired filter. The schematic and measured attenuation response are presented in Table 1 and Fig. 2 found on pages 15 and 16 of the July 1966 issue of *QST*.<sup>3</sup>

### Calculation Example No. 2

The second design example given is for the reader who desires additional practice in calculating the frequency parameters and component values of a filter. The filter to be calculated is the three-sectional-elliptic-function filter depicted on page 17 of the January 1966 issue of *QST*.<sup>1</sup> The design parameters of this filter are:  $f_{co} = 30$  MHz., termination resistances = 50 ohms, v.s.w.r. = 1.11, and  $A_s = 51.5$  db. If the calculation procedures of the first example are followed, the reader should have little difficulty in duplicating the attenuation peak frequencies and the component values of the three-section filter. Of course, the data of Table 2-5 for  $A_s = 51.5$  should be used in the calculations.

### Realization of the Filter Design

The design of filters has been greatly simplified by the use of modern filter design techniques; however, the problem of "realization" of the filter, that is, the satisfactory construction of the filter, still remains. It should be emphasized that all the elliptic-function filter catalog data is based on the use of lossless components and purely resistive filter terminations. Therefore, components of the highest possible  $Q$  should be used and precautions taken to assure that the filter is properly terminated. Also, the tolerance of the components used to form the filter resonant circuits should preferably be within  $\pm 3\%$ .

The 44- and 88-mh. surplus toroidal inductors<sup>4</sup> are inexpensive and satisfactory for use in filters covering the one- to forty-kilohertz frequency range. (Note that due to an increase in price, the inductors now cost five/\$2.00 postpaid from Buchanan on the West Coast and Van W2DLT on the East Coast.<sup>5</sup>) Hand-wound toroidal core inductors<sup>6</sup> and hand-wound solenoid-type inductors are usually satisfactory for the low-to-medium and medium-to-high r.f. ranges, respectively. For the capacitance ranges of zero to 1000 pf., 1000pf. to 0.01  $\mu\text{f.}$ , and above 0.01  $\mu\text{f.}$ , the ceramic NPO (TCZ), polystyrene, and mylar\* types, respectively, are recommended, although certain limitations of the capacitor types must be respected.

When a filter is used in the transmission line of an r.f. power amplifier, both the source and load should be adjusted to provide the proper resistive terminations to the filter if optimum performance is to be obtained from the filter. For audio filters, which usually are not required to transmit power, the proper resistive terminations of the audio filter are conveniently assured by using resistive pads of 3 to 6 db. between the filter and source or load if there is some doubt as to the exact nature of the termination impedance. The signal losses incurred by the resistive padding can usually be easily compensated by increasing the voltage output of the device driving the filter.

In the event a three-section r.f. filter is going to be constructed from a normalized design taken from the catalog and the builder would like some assurance that the catalog data is not in error, it is suggested that the filter be scaled to a cutoff frequency and termination resistance of 3 kHz. and 500 ohms, respectively, instead of the customary 30 MHz. and 50 ohms. After quickly constructing the audio "checkout" filter (breadboard construction is quite satisfactory in this case), its response can be easily measured using inexpensive audio frequency test equipment such as a Heathkit audio oscillator and a.c. VTVM. If the catalog tabular data is correct and some care is taken to obtain close-tolerance filter components, the measured attenuation response of the audio checkout filter should very closely match the expected attenuation response curve. The more difficult construction of the desired r.f. filter may then proceed with the assurance that the correctness of the catalog tabular data has been verified.

### Appendix

1. *Simplified Modern Filter Design*, Philip Geffe, John F. Rider Publisher, Inc., New York City, 1963.

2. *The Design of Filters Using the Catalog of Normalized Lowpass Filters*, R. Saal, published by Telefunken GMBH, Western Germany, 1966.

**QST**

<sup>3</sup> Surplus toroidal inductors are still available five for \$1.00 ppd from Weinschenker, P.O. Box 353, Irwin, Pa. 15642.

<sup>6</sup> DeMaw, "Toroidal-Wound Inductors," *QST*, January 1968, p. 11.

\* Dupont Trademark.

# Australis-Oscar 5

*. . . progress report*

PREPARATION of the Australis-Oscar 5 satellite package for launch into earth orbit is progressing well. The electronics have undergone rfi tests, telemetry sensor calibration, and vibration and thermal tests. At the same time, Amsat (Radio Amateur Satellite Corporation) continues to pursue a launch commitment from the U.S. government. Further news, as it occurs, will be reported by W1AW bulletin and in subsequent issues of *QST*.

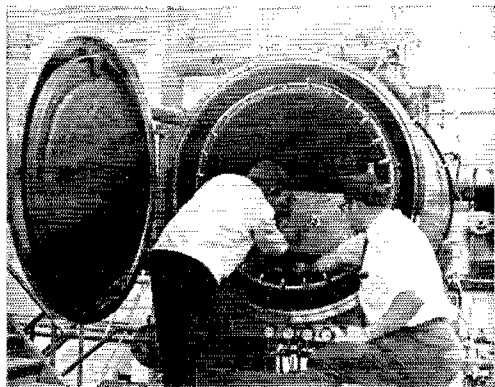
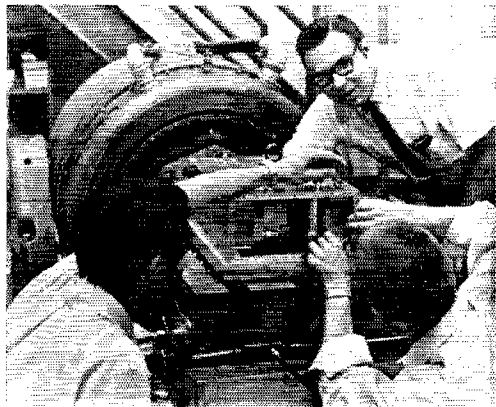


In 1967, these members of the Project Australis team brought the satellite they helped construct to Project Oscar Headquarters. From left are Owen Mace, Richard Tonkin, and Paul Dunn, VK3ZPD.



Above, Australis-Oscar 5 is prepared for vibration testing by W3FUO and K8VTR (Amsat's Australis-Oscar Project Manager).

Below, the post-test examination is conducted by K8VTR, W3FUO, and W3HXF.



Thermal-vacuum test preparation of Australis-Oscar 5. From left are W3FUO and W3HXF.

## *Australis-Oscar 5 Bibliography*

- "Australis-Oscar arrives in U.S." *QST*, July, 1967 p. 58.
- Soifer, "Antipodal Reception of Oscar Signals" *QST*, November, 1968, p. 32.
- Klein and Tynan, "AMSAT, the Radio Amateur Satellite Corporation" *QST*, June 1969, p. 54.
- Belair and Howard, "Australis-Oscar, Its Design, Construction and Operation" *QST*, July 1969, p. 58
- Dunkerley, "Australis-Oscar 5 and You!" *QST*, August 1969, p. 69.
- Belair and Howard, "Obtaining Data From Australis-Oscar 5" *QST*, August 1969, p. 70.

# Technical Correspondence

## ACCURACY IN FREQUENCY MEASURING TESTS?

Technical Editor, *QST*:

For weeks before the recent Frequency Measuring Tests I had brayed to my friends on the air about how I would make a concerted effort to place high on the FMT results list. I had built a separate mixer, fed by my Drake twins' oscillators and followed by an outboard t.r.f. amplifier. The amplifier gives out a signal on whatever frequency is being tuned, directly into my newly acquired Hewlett-Packard 5216A frequency counter. With no interpolations involved, nothing could go wrong, I asserted.

I was busy most of the day of the FMT preparing for the two runs that evening. The Tektronix 547/1A1 dual-trace scope was set up to afford envelope or sine presentations of the receiver's 50-kHz. i.f., as well as to monitor the counter's time base against WWV (from a second receiver), and to peak the signal going to the counter. It was disturbing to discover that receiver dial backlash and frequency drifting were a real problem at those last hours, when attempting to tune and maintain zero phase difference, so I haywired a multiturn vernier capacitor across the receiver p.t.o. With a large knob attached, I was able to "ride" a calibration marker quite well.

That evening, at the start of the first FMT run, I was "loaded for bear," so I thought. All equipment was properly warmed up; I had attempted to stabilize the house temperature all day and had just closed all windows to prevent drafts. I was skeptical about receiving W1AW on 80 meters while it was still daylight here on the west coast, but there it was, right on schedule. However, the received signal on the scope was all fuzzed up with noise, and was bouncing from a nearby c.w. QSO. Tightening the bandwidth and using rejection tuning helped somewhat, but I still could not discern zero frequency clearly, much less ride zero phase as I had practiced earlier with a nice clean calibration signal.

When key thumps informed me W1AW would now shift to 40 meters! I was horrified and thought aloud, "Wait! I'm not finished yet!" But I wheeled everything up to the next approximate frequency, and there was a beautiful, clean signal. But just as I was ready to take some readings, some clown came on with dashes in unison with W1AW, and nearly zero beat. The 20 meter run was received well, except that by then I was so spooked I may have booted that reading also.

The second FMT run at 0430 GMT that evening was also chaotic here at W6FP. I never heard W1AW on 80 meters, not one peep. I had a good crack at a 40-meter reading, but the 20-meter transmission was hopelessly covered by heavy, con-

<sup>1</sup> W1AW does not shift frequency during the FMT. The entire transmission is sent by all transmitters simultaneously. However, the "umpire" measures the frequencies in the order indicated in advance announcements. Actually, the frequency seldom drifts more than a few cycles during the entire transmission period, so any significant differences will be noted only when precision measuring equipment is in use. — *Editor*.

tinuous RTTY. By the end of the second FMT run, I was crushed by the enormity of my failure.

I know I must improve my antennas in order to have more of a received signal to play with, especially on 80 meters. This will give me a cleaner scope readout. And I must groom my receiver regularly, not just wait until total outages force me to service it. Periodic tube checks, performance tests, and realignments "by the book" were let go here to my detriment. I subsequently observed.

With a clean enough signal at the receiver i.f. output, perhaps I can phase-lock my h.f.o. I have tried mixing the received i.f. back to the signal frequency and counting this, with only marginal success. Perhaps with more work, this idea of measuring "regurgitated" received signals directly might be the answer — to use the receiver as a tunable window only. Thanks to the ARRL for the FMTs as a challenging program, and watch out for us next time! — *Dick Carpenter, W6FP, 6634 Ampere Ave., North Hollywood, Calif. 91606.*

## MATERIALS FOR PRECISE CRYSTAL OVEN

Technical Editor, *QST*:

Mr. E. E. Pearson, W3QY, published an article in July 1969 *QST* detailing a construction project for amateur radio hobbyists, "An Inexpensive Precise Crystal Oven." The items used in Mr. Pearson's oven are unusual to find on the surplus market. We have some items in stock which are superior for the purpose to those listed in Mr. Pearson's article, and cheaper as well. Mr. Pearson lists a source for No. 24 Duplex Iron-Constantan Thermocouple wire. We can offer No. 26 Duplex Iron-Constantan Single Glass Covered parallel-laid conductors with single glass insulation overall to any address in the U.S., at ten cents per foot for 50 feet or more (100 feet \$8.00, or 1000 feet \$50.00), postpaid.

The No. 24 I-C wire is proposed by Mr. Pearson for use as a bifilar heater wire to minimize inductive effects in crystal (and other) heater ovens. The No. 24 wire pair he states to have approximately 40 ohms resistance for 45 feet requires 12 volts, 3.6 watts operating power. Our No. 26 wire has about 1.405 ohms per foot total resistance (Iron: 0.255 ohms per ft., Constantan: 1.15 ohms per ft.), about 63.2 ohms for 45 feet. A 23½-ft. length could be used instead for 40 ohms for using the 12-volt transformer proposed, or 15 volts (approximately) could be applied to give the same heating power with 45 feet of the No. 26 wire. With only 0.3 amp. current, however, it would seem more economical to substitute a 336-ohm series resistor for the transformer for dropping the 120-volt line voltage to 105 volts. The resistor would consume only 30 watts (use a 30- to 40-watt 120-volt lamp).

Mr. Pearson uses a 35-degree C. (95-degree F.) mercury-glass thermoregulator costing about \$10.00. This temperature seems to be too low a control point, as the ambient temperature may rise above 95 degrees F. around operating equipment, and control would be lost. We have mercury-glass thermostats totaling 6 inches in length with a right-angle bend in the center, control point 60 degrees C. (140 degrees F.), which is the accepted standard for such ovens. We will sell these for \$8.00 each, postpaid, to any address in the U.S. Like the wire offered, these were manufactured by top-quality manufacturers to highest government specifications, all unused perfect material. — *Charles C. Littell, Jr., Engineering Associates, 434 Patterson Road, Dayton, Ohio 45419.*

## ELECTRONIC PARTS FOR CONSTRUCTION PROJECTS

Technical Editor, *QST*:

There seems to be some problem in finding parts for homebrew projects, particularly in rural areas. Possibly I can suggest a remedy. The local TV repair and sales shop has access to almost any part that we would need — the problem is to give the operator a part number to order. Here we come to the point of personalities.

First, the commission salesman: To live, he must sell large items. Don't waste his time.

The repairman (salaried): You want to get to know the man in the repair section. His boss expects him to get out the backlog of work without delay because all customers are anxious for their sets, but he occasionally has some slack time in the beginning of the summer. This is when to get to know him. Try to avoid Saturdays — things are hectic then.

The one-man shop: The boss is a combination salesman-repairman. Here you must be ready to wait while he attends to prospective customers.

What you want to be able to do is look at his library of manufacturer's manuals, and search until you find the listing of the part that meets your requirements. Get the part number, and order it through the repairman. Expect to pay the retail price.

Getting familiar with each manufacturer's manuals will take time, but my experience is that when you need a part, you can get it. Most manufacturers are anxious to keep their dealers, and will supply parts as quickly as possible so that they and the customers will be satisfied.

For our younger readers — the books cost money, and the shop needs them. They stay in the shop. Explain yourself fully; tell what you need, and that you will look up the part number yourself and pay in advance. TV people put those who come in the shop into three classes — customers, friends, and

problems. Don't become the problem. Also, don't mark in the books!

Almost any part you need made for American equipment (even radar ovens) can be obtained through the local dealer. It may take a week or so, but if he sells brand X sets and if the part is used in anything made by brand X, he can get it — if you can find the brand X part number. I hope this helps. — *Patrick E. Hamel, W0LXI, 540 Orchid Lane N., Wayzata, Minn. 55391.*

## L MATCHING NETWORKS FOR MOBILE WHIP ANTENNAS

Technical Editor, *QST*:

I am a staunch believer in matching the source to the load whenever it is practical. This is especially true for mobile setups.

Table I is a computer run-off of the popular L network for stepping down from 50-ohm coaxial line to a resonant mobile whip. Both configurations are included, though I prefer the shunt coil since it seems to materially reduce precipitation static. The two configurations are shown in Fig. 1. — *Edwin R. Knowles, K6OX, ex-W6AIS, 2510 Tune Place, Lancaster, Calif. 93534.*

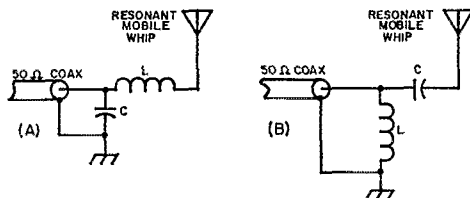


Fig. 1—L networks. The network at A uses the coil in a series arrangement, while at B the coil is used in a shunt arrangement. Values for L and C are given for the five h.f. amateur bands in Table I.

ANT RES OHMS	PARA REACT OHMS	SERIES REACT OHMS	PARALLEL REACTANCE PICO FARADS					SERIES REACTANCE MICROHENRIES					PARALLEL REACTANCE MICROHENRIES					SERIES REACTANCE PICO FARADS				
			75	40	20	15	10	75	40	20	15	10	75	40	20	15	10	75	40	20	15	10
10	25.0	20.0	1633	879	447	299	221	0.82	0.44	0.23	0.15	0.12	1.03	0.55	0.28	0.19	0.14	2041	1098	559	374	276
11	26.5	20.8	1538	827	421	282	208	0.85	0.46	0.24	0.16	0.12	1.09	0.59	0.30	0.20	0.15	1971	1060	540	361	267
12	28.1	21.4	1453	782	398	266	197	0.88	0.47	0.24	0.16	0.12	1.15	0.62	0.32	0.22	0.16	1912	1029	523	350	259
13	29.6	22.0	1378	741	377	252	187	0.90	0.49	0.25	0.17	0.13	1.22	0.66	0.34	0.23	0.17	1862	1001	510	341	252
14	31.2	22.5	1309	704	358	240	177	0.92	0.50	0.26	0.17	0.13	1.28	0.69	0.35	0.24	0.18	1819	978	498	333	246
15	32.7	23.0	1247	671	341	228	169	0.94	0.51	0.26	0.18	0.13	1.34	0.72	0.37	0.25	0.19	1782	959	488	326	241
16	34.3	23.4	1190	640	326	218	161	0.96	0.52	0.27	0.18	0.13	1.41	0.76	0.39	0.26	0.19	1751	942	479	321	237
17	35.9	23.7	1138	612	311	208	154	0.97	0.53	0.27	0.18	0.14	1.47	0.79	0.41	0.27	0.20	1724	927	472	316	233
18	37.5	24.0	1089	586	298	199	147	0.98	0.53	0.27	0.18	0.14	1.54	0.83	0.42	0.29	0.21	1701	915	466	311	230
19	39.1	24.3	1043	561	285	191	141	1.00	0.54	0.28	0.19	0.14	1.60	0.86	0.44	0.30	0.22	1682	905	460	308	228
20	40.8	24.5	1000	538	274	183	135	1.01	0.54	0.28	0.19	0.14	1.67	0.90	0.46	0.31	0.23	1667	897	456	305	226
21	42.5	24.7	960	516	263	176	130	1.01	0.55	0.28	0.19	0.14	1.74	0.94	0.48	0.32	0.24	1655	890	453	303	224
22	44.3	24.9	921	496	252	169	125	1.02	0.55	0.28	0.19	0.14	1.81	0.98	0.50	0.34	0.25	1645	885	450	301	223
23	46.1	25.0	885	476	242	162	120	1.02	0.55	0.28	0.19	0.14	1.89	1.02	0.52	0.35	0.26	1638	881	448	300	222
24	48.0	25.0	850	457	233	156	115	1.02	0.55	0.28	0.19	0.14	1.97	1.06	0.54	0.36	0.27	1634	879	447	299	221
25	50.0	25.0	817	439	223	150	111	1.03	0.55	0.28	0.19	0.14	2.05	1.10	0.56	0.38	0.28	1633	879	447	299	221
26	52.0	25.0	785	422	215	144	106	1.02	0.55	0.28	0.19	0.14	2.13	1.15	0.59	0.39	0.29	1634	879	447	299	221
27	54.1	25.0	754	405	206	138	102	1.02	0.55	0.28	0.19	0.14	2.22	1.19	0.61	0.41	0.30	1638	881	448	300	222
28	56.3	24.9	724	389	198	133	98	1.02	0.55	0.28	0.19	0.14	2.31	1.24	0.64	0.43	0.32	1645	885	450	301	223
29	58.7	24.7	695	374	190	127	94	1.01	0.55	0.28	0.19	0.14	2.40	1.30	0.66	0.44	0.33	1655	890	453	303	224
30	61.2	24.5	667	359	182	122	90	1.01	0.54	0.28	0.19	0.14	2.51	1.35	0.69	0.46	0.34	1667	897	456	305	226
31	63.8	24.3	639	344	175	117	87	1.00	0.54	0.28	0.19	0.14	2.61	1.41	0.72	0.48	0.36	1682	905	460	308	228
32	66.6	24.0	612	329	168	112	83	0.98	0.53	0.27	0.18	0.14	2.73	1.47	0.75	0.50	0.37	1701	915	466	311	230
33	69.6	23.7	586	315	160	107	79	0.97	0.53	0.27	0.18	0.14	2.85	1.54	0.78	0.53	0.39	1724	927	472	316	233
34	72.8	23.4	560	301	153	103	76	0.96	0.52	0.27	0.18	0.13	2.98	1.61	0.82	0.55	0.41	1751	942	479	321	237
35	76.3	23.0	535	288	146	98	72	0.94	0.51	0.26	0.18	0.13	3.12	1.68	0.86	0.58	0.43	1782	959	488	326	241
36	80.1	22.5	509	274	139	93	69	0.92	0.50	0.26	0.17	0.13	3.28	1.77	0.90	0.60	0.45	1819	978	498	333	246

Table I—Circuit constants for an L matching network. From the antenna resistance, given in the column at the left, the parallel and series arm reactances may be determined from the next two columns. These reactances are transposed into picofarads of capacitance and microhenries of inductance for the h.f. amateur bands in the remaining columns.



# Hints and Kinks

For the Experimenters



## CLEANING EQUIPMENT

THE equipment cleaning suggestion that appeared in the "Hints & Kinks" column of *QST* for February 1969 recommended that extremely dirty equipment be cleaned by dunking it in a homemade solution, washing it off, and then drying it in the kitchen oven. However, one could easily use the wrong proportions in making the solution, and the temperature of an oven is often higher than the setting of the heat control. In one case, a young ham went badly astray while using this hint and had to send his equipment to the manufacturer for repair. Reproduced below are excerpts from a letter by Joseph H. Brunzo, W8GTZ, service manager of the R. L. Drake Company, concerning the damaged unit:

"While attempting to repair the TR-3 for the young fellow, we noted that all plastic components in his transceiver suffered damage not only from the acetone but from the heat of the oven. (See Fig. 1.) Of course, the Mr. Clean and ammonia solution did an excellent job of removing the smoky residue, but it also removed all lubricants from switch contacts and the VFO lead screw. Oxidation, by the way, had already started to set in by the time we received the radio.

"Our primary concern is to caution all amateurs against the hazards of heat and total immersion. I had one of my service department technicians completely rebuild the TR-3 for the young man and, with the exception of possible long term damage from corrosive action, he should be able to operate for many years with his transceiver."—*W1YDS*

## SALVAGING COMPONENTS FROM SURPLUS CIRCUIT BOARDS

AN easy way to salvage components from many surplus circuit boards is to use a motor driven sander and sand off all the soldered connections on the foil side of the board. Use a hot pencil soldering iron to poke out any leads that do not just fall out.—*Charles M. Cotterell, W0SIN*

## PREVENTING TAPE SLIPPAGE IN DYMO LABELMAKERS

DYMO labelmakers are frequently used to print labels for amateur equipment. However, sometimes the tape slips in the embosser, resulting in overprinted characters. To cure the problem, remove any tape from the labelmaker, apply a couple of drops of "Phono Non-Slip Compound" (GC No. 86-2, Walsco No. 144-02) to the neoprene feed roller, and turn the roller a few times to spread the compound. Like-new operation should be obtained.—*Bill I. Latta, Jr., W4FIN*

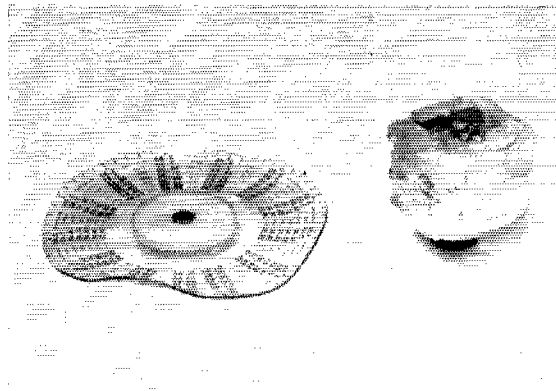


Fig. 1—A few components removed from an improperly cleaned TR-3 indicate what a combination of heat and acetone will do to plastic products.

## CLEANING COMPONENTS

MANY times I have tried to clean parts removed from military surplus equipment that was filthy, but I was never completely successful. Then the other day I tossed a dirty tube socket in the silverware compartment of the dishwasher, and the result was a cleaner socket than I had ever seen before. Some experimentation showed that anything that *could* be subjected to water and high temperature came out clean and shining. For those dishwashers whose silverware compartments are too small or are otherwise inadequate, a convenient sized basket can be made from  $\frac{1}{8}$ - or  $\frac{1}{4}$ -inch mesh hardware cloth. Best results will be obtained by loosely packing the parts so that the water and steam can get between the components.—*Bill Johnston, W16MCU/5*

## PRESERVING THE WRITING ON QSL CARDS

WHEN QSL cards are addressed with certain type ball-point pens, the ink often runs or becomes smudgy because of handling, or rainy weather when delivery takes place. To overcome this difficulty, spray your QSL cards with clear acrylic lacquer after they have been filled out and addressed.—*A. J. Peterson, W2MPS*

## SHIPPING FRAGILE ITEMS

WITH the advent of latex paints, it is quite easy to clean an empty paint can and use it to ship tubes or any other small fragile item. Of course, packing compound should be used between the item or items and the can.—*Andrew C. Mueller, W19BPG*



## MONIMATCH MODIFICATION FOR OPERATING EASE

If you have an SWR bridge or intend to buy or build one, here is a small change you can make to the indicating section to greatly increase the ease of using the bridge for transmatch adjustment. It will provide a difference reading in addition to the usual readings of reflected and forward voltage. This difference reading may not mark the zero reflected voltage point, but it will mark, without a lot of switch flipping and sensitivity adjustments, the maximum forward to minimum reflected voltage condition of the bridge. The suggested change is applicable to any reflectometer that uses separate diodes for the forward and reflected voltage indications.

The development of the modification is illustrated in Fig. 2. Part A shows the dc portion of a typical Monimatch. Forward voltage is developed across leg AC, and reflected voltage is developed across leg BC.  $S_1$  is used to switch  $M_1$  across either leg.  $R_1$  and  $R_2$  are terminating resistors and, although their ohmic value may vary with the individual bridge, both are equal in resistance.

Obviously the reflected reading can never be greater than the forward reading. Therefore, what is needed is a circuit in which the reflected

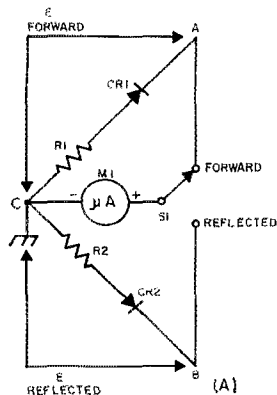


Fig. 2—(A) Dc portion of a typical Monimatch, and (B) the circuit modified to indicate the difference between the forward and reflected voltages. Component designators are for text reference.

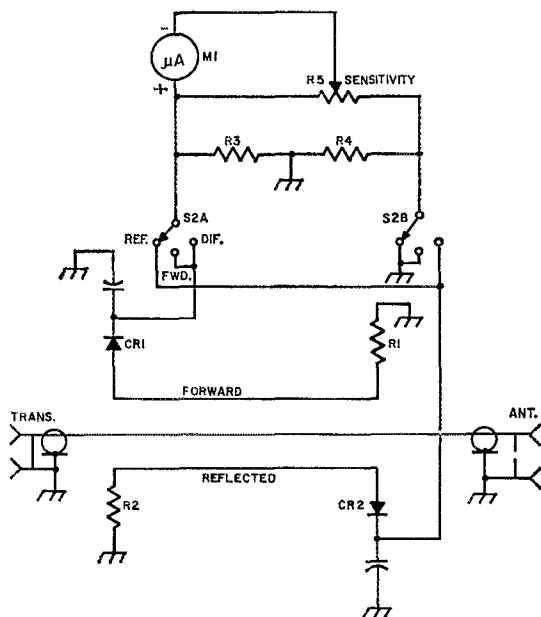
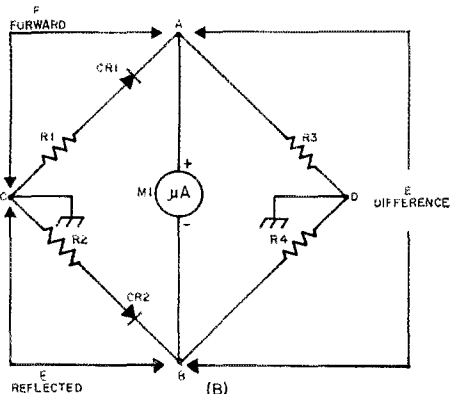


Fig. 3—Modified SWR bridge for ease in adjusting a transmatch.  $M_1$  is a 50- $\mu$ A dc meter or the meter existing in the Monimatch.  $R_3$  and  $R_4$  are 1000-ohm,  $\frac{1}{2}$ -watt composition.  $R_5$  is a 10,000-ohm linear taper potentiometer or the sensitivity control existing in the reflectometer. The remaining components are those already existing in the unit. Component designators  $CR_1$ ,  $CR_2$ ,  $R_1$  and  $R_2$  are for text reference.

de can oppose the forward dc, and the difference be indicated by a meter. Such an arrangement is shown in part B of Fig. 2.  $R_3$  and  $R_4$  have been added to the circuit of part A, and  $M_1$  has been moved to a new position.  $R_3$  and  $R_4$  must have the same ohmic value, although it is not important what that value is.

With  $R_3$  and  $R_4$  in the picture, the voltage developed in leg AC will cause a current to flow through leg AD, and the voltage developed in leg BC will cause a current to flow through leg BD. The  $IR$  drop across  $R_3$  will determine the voltage at point A, and the  $IR$  drop across  $R_4$  will determine the voltage at point B. The difference in voltage between point A and point B will cause a current to flow through  $M_1$ , and the meter reading will be greatest when the maximum forward voltage coincides with the minimum reflected voltage.

Fig. 3 shows the complete circuit using a two-pole, three-position wafer switch to replace the original single-pole, double-throw switch found in most SWR bridges. Part values and construction and testing details for the reflectometer are not given since they can be found elsewhere.<sup>1,2</sup> Note that the addition of  $R_3$  and  $R_4$  will slightly decrease the sensitivity of the Monimatch.—*C. E. Edmonds, K2JTM*

<sup>1</sup> McCoy, "A Versatile Transmatch," *QST*, July, 1965.

<sup>2</sup> Anderson, "The Economatch," *QST*, July, 1967.

The

# Outstretched Hand



COMPILED BY PERRY F. WILLIAMS,\* WIUED

**T**HE Amateur is Friendly . . . friendly advice and counsel to the beginner, kindly assistance and cooperation . . . these are marks of the amateur spirit." — *The Amateur's Code*, by Paul M. Segal.

"No physical infirmity is a bar to the issuance of amateur operator and station licenses, provided the applicant can qualify. . . ." — *The Radio Amateur's License Manual*, page 7.

Join the two quotes, and you come up with a program to help the blind, shut-ins and the handicapped to widen their worlds through amateur radio. Some dozens of projects are going on right now, from the Aleutians to the Keys, from Labrador to Lihue. To recognize all amateurs engaged in such works, and to encourage others to start, we shine the spotlight here on three groups with diverse approaches to the opportunity and challenge expressed in the opening remarks.

First, let's quote VE7XQ:

"During June, 1967, Canadian Pacific Air Lines Amateur Radio Society was formed with some 32 members. . . . The project of the Society was not to form another club or group for social purposes but to provide a working force of teachers and instructors to offer help and assistance to those handicapped persons desiring

\* Senior Assistant Secretary, ARRL

and aspiring to become more closely related with amateur radio.

"The first project that the Society has undertaken was to teach a group of paraplegic and quadruplegic patients in the Pearson Poliomyelitis Centre in Vancouver, British Columbia. This group consisted of eleven members all with various forms of handicaps. After some six months of instruction, five successfully passed the rigid examination given by the Department of Communications for the Amateur Operator Certificate of Proficiency. . . .

"Through the kindness and help of Canadian Pacific Air Lines Employees Charitable Donation Fund, the Pearson Hospital, the Poliomyelitis Rehabilitation Centre and the five new amateurs, \$1000 was raised and a complete radio station, VE7PAR, was set up in the hospital, with a console donated by the air lines itself."

Leaders of the CPAL Amateur Radio Society are president A. M. Craig, VE7XQ; vice president G. Brechin, VE7AMQ; treasurer C. Matheson, VE7CM; secretary J. Goodridge, VE7RZ and projects manager Harry Beardsell, VE7ZQ.

Disabled people from all around Minnesota have flocked to join the "Handi-Ham" system, described here in passages swiped from *The Flyer* of the Rochester Amateur Radio Club.

"A group of plain ordinary garden variety ham operators conceived the bright idea of making an attempt to interest and educate the handicapped in amateur radio. Right off, we ran into some scraggly snags. Many of the handicapped, even more than the rest of us, have no money to spare. Those who had some means were understandably reluctant to gamble \$100 to \$200 on their interest holding firm and on being able to master code and theory.

"Some of us approached Piconet, the amateur radio emergency network covering 13 counties in Southeastern Minnesota. Would Piconetters donate used receivers and transmitters? Yes, indeed, they would: with true ham generosity they scraped their shacks clean of spare gear.

"Our approach to handicapped prospects became: 'We'll loan you a receiver and code oscillator and work with you. When your Novice license comes, we'll loan you the c.w. transmitter, and when you qualify for General Class we'll



Here are the first graduates of the Canadian Pacific Air Lines Amateur Radio Society's class at the Pearson Hospital: from left, Chester McKellar, Brian Cruikshank, Bryan Forshaw, John Walford and Brian Fitzgerald.

exchange the transmitter for one capable of phone operation.'

"This worked. Edna, WAØRRA and Charlene, WAØQWE, were first, followed by Helen, WAØSVD, Alta, WNØVDA Sister Alena, WNØUWT and Scott WAØVUA.

". . . In answer to an urgent request from HH students for some kind of big brother help, **Handi-Hams** was organized by Clarence, WAØMMV, to bring personal help to any handicapper who needs it.

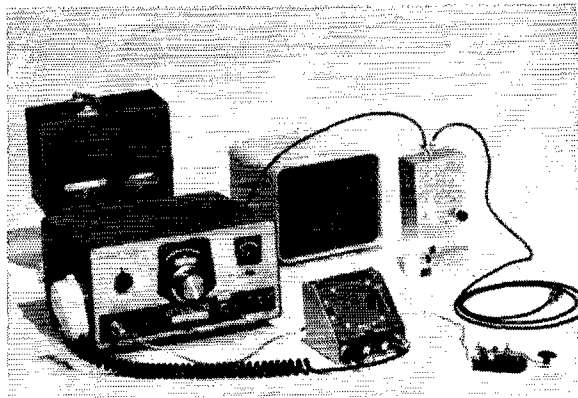
". . . On the money side, the Minnesota Society for Crippled Children and Adults loaned us tape recorders and receivers and gave us \$200 worth of code oscillators and books. One of the Handi-Hams, Al, KØBDD, dubs our seven reel code course over and over. We gathered up 'white elephants' from neighbors and odd-lot merchandise from Rochester stores, and held an auction. Sister Mary WAØJIE rounded up donations of two Novice stations and \$300 in cash from anonymous sources. Ward Jensen of Electronic Center, Minneapolis, donated three receivers and three transmitters, and procured at dealer net a transceiver for the Minnesota State School for the Blind in Faribault. Dick Lindquist at Minneapolis Radio Shack furnished 16 receivers, code oscillators, keys and magnetic tape at cost. All this gear is out on loan now, and the waiting list is building up again!



Brian Cruikshank operates a typewriter at VE7PAR by using a mouthstick. A special mouth-operated key is used by the paraplegics, too. Ideas on ways to handle other equipment problems are sought by members of the CPALARS.

"Now we're in the process of incorporating Handi-Hams, after which we'll apply for formal affiliation with the Minnesota Society for Crippled Children and Adults . . . We cannot emphasize enough how much the wonderful people in this humanitarian organization are helping us and this is only a tiny fraction of their total efforts."

The hams behind Handi-Hams are: Charlene Mott, WAØQWE, Ralph Carlson, KØZRC; Ned Carman, WØZSW; Everett Cheney, WAØKYG; Donald Johnson, WAØEPX; Sister Lauren, WAØRRJ; James Marshall, WAØEWK; Wesley



This is the station furnished to the Whitecaners in Ontario—Heath HW12AC or HW32A transceiver with its power supply to the rear; c.w. modification unit, speaker and relative power reader, for final tuning by ear. All of this equipment has labels and controls in Braille.

McAnally, KØHGO; Alta Mitchell, WAØVTZ; Edna Thorson, WAØRRA; Robert Russ, KØGKI; Jack Sheldon, KØPSI; Sister Alverna, WAØSGJ; and Sy Steele, WAØCCA.

"Operation Whitecane" in Ontario seeks out blind people, explains amateur radio to them, finds a "sponsor" ham to help with studies and with installation of a station, and loans or rents (for the absurdly-low fee of \$15 to \$25 per year!) s.s.b. equipment specially modified for the use of the sightless. Tuning is done through Swail relative power readers. Incidentally, the number of blind homes in Ontario has grown from 22 in 1967 to 52 today.

It's a cooperative effort of the Canadian National Institute for the Blind, the CNIB Amateur Radio Club, the Radio Society of Ontario and a good dozen clubs affiliated with RSO. A number of individual hams and half a dozen manufacturers have also contributed time, parts, material and moral support. Some \$10,000 in cash donations has been garnered from hams, from clubs and from the Tippet Foundation to buy equipment. But all the equipment bought is out on loan or spoken for — and some two-score blind students are getting ready for the tests. The fund drive, therefore, continues: donations go to CNIB Amateur Radio Club c/o David Lloyd, VE3AW, 16 Hawthorne Avenue, Toronto 5. Bill Choat, VE3CO is chairman of the Sponsors Committee — to volunteer your services, write him at 38 Grenview Blvd. North, Toronto 18, Ontario.

The "Operation Whitecane" movement is spreading too — the provincial societies in Newfoundland and British Columbia are undertaking the support of CNIB Amateur Radio Club activities in their respective provinces. And *QST*'s thanks to the RSO magazine, *The Ontario Amateur*, the CNIB Amateur Radio Club *Bulletin* and VE3AW for the story on this project.

(Continued on page 55)



## Outstretched Hand

(Continued from page 53)

Canadian Amateur Radio Teletype Group, C.A.R.T.G. Sponsors The 9th World-Wide RTTY DX Medallion Sweepstakes.														
ZONE		STATION LOG OF												
B A N D	SENT			RECEIVED			S O R E			COUNTRY	PTS.			
	HR	DMY	✓	HR	DMY	Cont.	✓	✓	✓					

DATE \_\_\_\_\_ SHEET No. \_\_\_\_\_

EXCHANGE POINTS.....times MULTIPLIERS.....multiplies.....  
For Computer Use Only. Total  Score: \_\_\_\_\_

I certify, on my honour, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my ability.

POWER INPUT \_\_\_\_\_ (operator signature and call) \_\_\_\_\_  
(Use separate sheets each band.)

THE CARTG has standard log forms available to facilitate your entry. A large self-addressed envelope sent to CARTG, 85 Fifeshire Road, Willowdale, Ontario, Canada, will bring you free forms. Here's an idea of what form your own log should take if you elect to use your own sheets.

envelope for CARTG standard log forms to facilitate computer checking.

7) A multiplier of one is given for each country worked, including one's own, on each band, e.g., if one country is worked on 3 bands, then 3 points is given.

8) The total number of exchange points multiplied by the number of countries worked, multiplied by the number of continents contacted (maximum of six) equals the final score. Example:

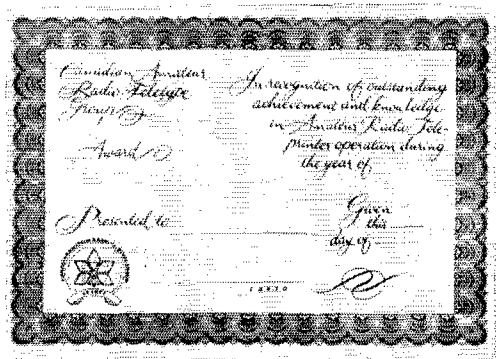
3.5 MHz. — 5 countries  
7 " 1 "  
14 " 18 "  
21 " 10 "  
28 " 3 "

Total of 40 countries

Exchange points = 2020  
Continents = 5

$2020 \times 40 \times 5 = 404,000$   
CLAIMED SCORE

9) Logs must be received no later than November 30, 1969 and should be sent to the CARTG, 85 Fifeshire Road, Willowdale, Ontario, Canada.



Here's a sample of the CARTG Merit Award, awarded annually on a world-wide basis to the outstanding contributor to amateur radio teletype. In January of 1969 their Merit Award Committee presented the first award to Sid Burnett, VE3GK.

The outstretched hand is also extended by: Byron Sharpe, W9BE, the Hadley School for the Blind 700 Elm Street, Winnetka, Illinois, 60093 and William Welsh, W6DDB, the LERC Amateur Radio Club, 2814 Empire Avenue, Burbank, California, 91504, both of whom have free correspondence courses on ham radio for the blind; Ray E. Meyers, W6MLZ, the Handicappers Net, Box R, San Gabriel, California and the Handicappers Information Net, c/o Kathleen S. Wilson, WA5QQR, 661 Odeneal Drive, Dallas, Texas 75217 who provide encouragement and fellowship to handicapped amateurs over a wide area; Bob Gunderson, W2JIO and his Braille Technical Press, 980 Waring Avenue, Bronx, New York 10469 and Tom Benham, W3DD, Science for the Blind, 221 Rock Hill Road, Bala-Cynwyd, Pennsylvania 19004 which design and produce literature and equipment for the blind; the Telephone Pioneers, who read QST onto talking books for the Library of Congress, and the thousands of amateurs who have helped a handicapped person to spread his horizons through ham radio. Hq will act as a clearinghouse for information on these activities; please keep us informed on your work.

**QST**

## Grinding Technique for Surplus Crystals

(Continued from page 27)

until the grinding is finished. This will tend to average out any uneven pressure on the crystal during the grinding process.

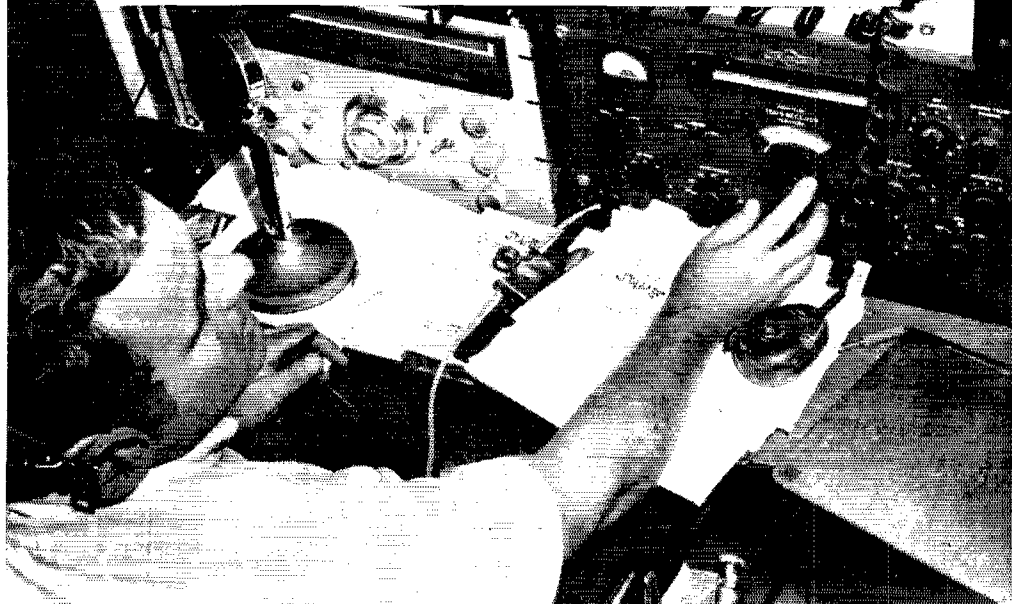
As the crystal frequency comes close to the target frequency, the washing of the crystal should be more thorough, using kitchen cleanser, and allowing the crystal to stand in distilled water for a while before drying with a soft cloth. Thereafter, the crystal should be handled only with tweezers. The type of tweezer that is normally closed and opens on squeezing is recommended. With the normally-open type, there is the possible danger that the crystal may be pinched tight enough to cause fracture.

Following the foregoing procedure, I have had no trouble with loss of activity, even with large frequency changes. Some time ago, at his request, I ground an 8-MHz. surplus crystal to work on the fundamental at 12.25 MHz. for QST's DX Editor, W9BRD. The rock is still going strong.

Although I have micrometers that could be used to check for surface irregularities, as usually recommended, I have not found it necessary to use them since adopting the brass-plate mounting. Also, no edge grinding or other fussing around has been required to maintain good activity.

**QST**

## Results, June V.H.F. QSO Party



REPORTED BY AL NOONE,\* WAIKQM/WB6SAZ

*"Six meters surpassed our wildest expectations"—K3MTK/3*

FROM virtually every corner of the U.S.A. and Canada came reports such as the one above attesting to the exceptional conditions found on 50 MHz. over the June contest weekend. Lengthy sporadic-E openings, some multi-hop and reliable scatter communications were the rule, rather than the exception, throughout many sections of the country. Activity on 144 MHz. was fair, good band conditions were there in some instances, but signals weren't.

Some 410 logs were received here (112 multi-op entries) representing a slight drop over last year. However, activity was more widespread, as can be seen from a total of 69 sections submitting logs. September 15 will see the mailing of 68 single-op and 15 multi-op certificate awards.

In the single-op multiband category, our congrats to **KIAGB** in EMass, with a score of 20,022 (ABCD). Although Ed's score was by no means phenomenal (**K3IPM** holds the record with 37,989 in 1968), he does have a record high with 71 sections worked.

The rest of the top-10 lineup looks like this: **W2CLL** 18,693 (ABCD); **K9HMB** 16,472 (AB); **W4SRX** (**K1WYS**, opr.) 12,650 (AB); **W2CNS** 11,610 (ABCD); **WA4NJP** 11,328 (AB); **WA0-**

**AUB** 10,764 (AB); **W9YT** (**K9OXY**, opr.) 10,506 (AB); **K1ZGB/1** 10,471 (AB); and **W8VP** (**WA8FHF**, opr.) 9840 (AB).

Single band leaders were (50 MHz.) **K4AYO\*** 19,176; **K5AGI** 15,141; **W5RAG** 14,400; **W0PFP** 11,076; and **K1DKX** 9589. On (144 MHz.) **W2AQT** 2363; **WA2AGI** 1980; **W3BHG** 1207; **W1FJH** 1170; and **WB2YRM** 1143. In Canada, **VE6OH** with 2100 was high scorer on 50 MHz. while **VE2JB/2** with 116 takes honors for 144 MHz.

In the highly competitive multi-operator category, **W2JKI** emerges victorious with a whopping score of 63,609 (ABCD). Finishing a close second was **W1DC/1**, the 1200 Radio Club, with a total of 63,163 (ABCDE). It is interesting to note that while **W1DC/1** had 83 more QSOs, **W2JKI's** 8 additional sections made the difference. Other excellent scores were contributed by **W3CCX/3** 50,049 (ABCDE); **K1PXE/1** 38,532 (ABCD); **W1MX/1** 36,576 (ABCD); **WB2GKE/2** 34,398 (ABCD); **K8MMM** 28,443 (ABD); **K1YLU/1** 24,120 (ABCD); and **WA2CJK/2** 21,868 (ABC). Pacing Canadian entries again this year is **VE3-FIB** with 17,248 (ABCD).

Acknowledgement is hereby given to the outstanding performance of **XE2XN**, whose 306

\* Communications Assistant, ARRL.

QSOs in 40 sections on 50 MHz. for a score of 12,240, has really added spice to an excellent contest weekend. This joint effort by K5HVC, W5ETG and XE2XN, operating from the home QTH of Don Roman Garcia Castro, was brought about solely with the intent of stimulating interest in 50 MHz. activity from Northern Mexico and to give W/VE stations a new XE2 confirmation. Congratulations to Bert, Terry and Don Roman for a fine effort. QRX for a most attractive QSL card.

B C N U in September, don't forget to attach some good action shots of your station activity along with the log entries!

### Soapbox

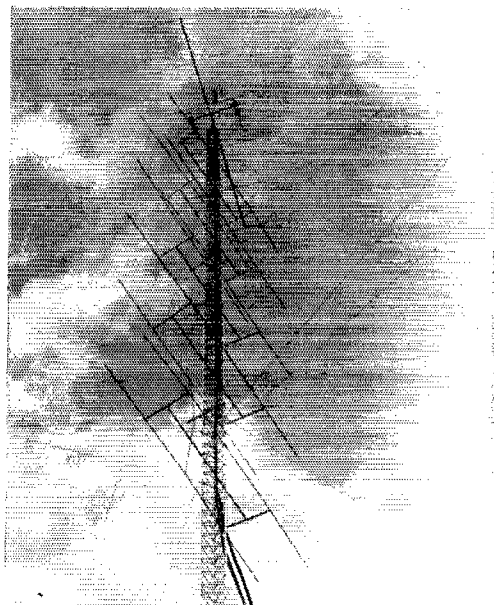
"Heard most of the Eastern half of the country on 6 but was only able to work 4 DX states. I always enjoy the V.H.F. parties, keep up the good work."—WA1GDR, EMass. "Truly a team effort, down east is not down out for v.h.f."—W1DC/1, Maine. "Six meters good to excellent with a short opening in late afternoon. Two meters poor to fair with QSB and large attenuation towards EMass area."—W1CMV/1, N.H. "Better than last year for me, still waiting for a chance at Vermont, Delaware and West Virginia after 17 years."—W7JRG, Mont. "Marginal sporadic—E conditions on 6, biggest thrill was hearing and working VE2 & VE3 coming through at 0800 GMT."—W7FN, Wash. "Besides being threatened by 50-m.p.h. winds, rattlesnakes and one of the operators eating all the soft drinks, we had a good time."—W6PIY/6, SCV. "I think there should be separate awards or scoring for s.s.b., and a.m. boys."—WB4KIB, N.C. "The east coast was in here on 2-meter sporadic—E about 0005 GMT June 15th. Activity lasted about 20 minutes with signals running about S7 but all you guys, including W1AW had your beams south working Fla. and other seaboard states."—W7VDZ, Wyo. "None of the openings from this section were strong and solid, typical of summer 50-MHz. Es, but the band kept shifting well throughout the country."—K4AYO, EFla. "Never saw so darn many v.h.f. logs."—Donna. "I have only one comment, and that is, this was my first contest and though I only came out with 164 points, a sprained tongue and a firm belief that the SNJ section moves into NNJ for a contest, I had a great time, and I would like to tell the guy who thought up this idea. Thanks and 73."—WB2GYK, NLI. "Band conditions great, not much 2-meter phone, probably because of 6-meter band openings."—WA1IOJ, Conn.

"Where were the KH6s, heard ZK1AA from 1630-1850 GMT on Saturday. Happy to see XE2XN on six."—WA8LOW, Ohio. "Without c.w. it would not have been a contest."—W3BHG, Del. "Was I the only Novice in the Central Division?"—WN9AUJ, Ind. "Weather conditions limited our operating to 10 hours and we were finally forced to retreat from the mountains."—WA5TJB/5, Ark. "Located in the Smokies, on the outskirts of the park, at an elevation of 2800 feet. Things were wild at times on 6, activity on 2 leaves a lot to be desired."—W4SGI, Tenn. "Enjoyed the contest very much, worked my first KP4."—K8AJC, Mich. "A good combination of groundwave and Es made it a fine contest."—W3BWU, WPa. "Fantastic conditions, 6 meters can be fun after all."—WA9JYR (G3PAC, opr.) Ill. "I haven't had this much fun on 6 since I got my license 7 years ago."—WA8DWM, Minn. "Worked 5 new states."—WA5LTA, La. "It is always enjoyable to work the v.h.f. contests, as usual the operating practices by all were commendable. Highlight was working XE2XN."—W8EKB, Nebr. "I wish the stations in the other parts of the country would point their beams my direction, heard over 60 sections in all call areas except KH6, most of those stations were rag chewing and wondering where the DX was."—K7WXW/7, Ore. "After 13 years on 6 meters, finally heard and worked my 1st VE4."—K6RNO, EBay. "Very good contest and enjoyed myself very much, but no 2 meter activity in this area."—WA5LXT, Okla. "Conditions on 2 meters very bad at this location. Enjoyed the contest and looking forward to September."—VE3SAU. "All in all this was a great year at an excellent site with enough openings to make it interesting and challenging."—

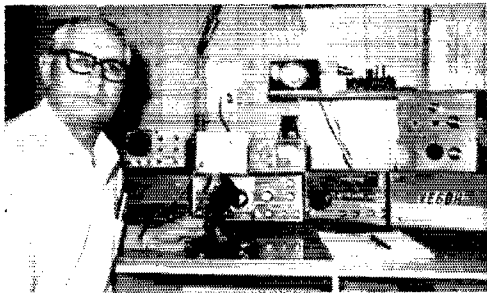
### DIVISION LEADERS

Single Operator		Multioperator
W2CNS	Atlantic	W3CCX/3
K9HMB	Central	WA9SDC
WA8DWM	Dakota	.....
K5AGI	Delta	WA5NOB/5
W8VP	Great Lakes	K8MMM
W2CLL	Hudson	W2JKI
W6PFP	Midwest	WA6NQA
K1AGB	New England	W1DC/1
K7WXW/7	Northwestern	K7BBO/7
K7ICW	Pacific	WB6NDJ/8
K4SUM	Roanoke	K2ERT/8
K5EFW	Rocky Mountain	WA6PHZ/6
K4AYO	Southeastern	WB4GZV
WA7BBM/7	Southwestern	K6BPC
W5RAG	West Gulf	.....
VE3CUA	Canadian	VE3TIB
.....	Foreign	XE2XN

K6BPC, Org. "Congratulations on a wonderful contest."—WA7JTM, Ariz. "Operated from the top of 4000 ft. Otay mountain."—W6VON, SDgo. "Very poor local response for this contest."—VE2BMH. "Two meter c.w. really came through with those extra sections for me, great contest, lots of activity."—WA3MLK, MDC. "I think that the 28 consecutive hour rule should be eliminated."—W5RAG, STex. "It was a lot of fun even though it was interrupted by a wedding, spotty band conditions and spasmodic power line hash of twenty over nine."—VE4MA. "Fortuitous conditions on 50 MHz. Once in a decade opening to VE2 and VE3 land was a unique experience. New England



W2JKI and friends far surpassed their June '68 score with a total of over 63K. This included 621 QSOs in 91 sections, quite sufficient to take the No. 1 spot in the the 170-foot tower can be found a 16-element 432 MHz multi-op category. Pictured on the opposite page is W2JKI at the 220 MHz. position, while to the right we have a mighty impressive radiating system. From top to bottom on the 170-foot tower can be found a 16-element 432 MHz. collinear, two 4-over-4 J Slots side by side for 220 MHz., plus both a 6-element Telrex and a 20-element, non-rotating collinear for 50 MHz. The center of the array is 130 feet above ground.



**VE6OH**, our lone Alberta entry, gave some 84 W/K stations a new section and multiplier. He comments that most all call areas were heard but he worked only a few. Let's swing those beams north gang!

sections were easier to work than Calif."—**K7ICW**, Nev. "I understand 6 was wide open but I didn't have a receiver. Oh well, wait 'til September."—**WA9HHH/1**, Conn. "Great fun to be the "DX" on 50 MHz."—**WIHOY/KP4**. "We feel, in addition to the present scoring system, awards for high scorer on each band per section would encourage hams with gear for only one of the four bands to participate in the contest."—**WB2LZD/3**, EPA. "Glad to be back on 6, pleased to see a couple of good E2 openings during the

contest."—**VE5AAA**. "The only disappointments were the broken 432-MHz. beam and not being able to raise **K7ICW** on 6 meters. Apparently some double hop E skip, very erratic."—**W2UFT**, ENY. "May I suggest that the policy of not awarding a multi-op certificate unless there are 3 logs sent in seems rather arbitrary."—**W1MX/1**, VT. "It was terrific to hear all the c.w., activity on 2, 220 and 432. I like the 28-hour rules, 1296 MHz. QSOs should be worth 5 points for more of an incentive, 220 and 432 should be 3 points."—**K1YLU/1**, WMass. "Conditions on 2 meters were excellent here but interest seems to be nil in this area."—**W7FQE**, Wash. "My 1st contest, worked 11 sections on 6 meters before contest started, band was in very good shape."—**K4SAO**, SC. "Good contest, band open somewhere most all of contest period."—**K7ZOK**, Nev. "The six meter band was really in fine form for contest operation with three major E/s band openings and reliable scatter communications over paths up to 300-miles long. Two meters gave every indication of being in good shape, but there was a definite lack of signals in east central Illinois."—**K9GWT/9**, Ill. "Band conditions in this area great through out the contest, heard all call areas plus **VE1** thru **VE5**, Mexico and Puerto Rico."—**WB8BGY**, Mich. "Six meters was open to really like the section total and 432 MHz. showed increasing activity."—**W1EUJ**, EMass. "Shocked by the lack of activity on 2 meters any more. More stations were on during Field Day last week than there was during the QSO Party."—**W6QED**, SDgo. "Thanks for arranging the contest so we could have the best band opening I have ever seen on 6 meters."—**WB4LDO/4**, NC. "First v.h.f. contest, doesn't anyone like c.w."—**W6KQG**, SCV. "Six meters had three short band openings

Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections					
30 15 4 3 2						30 15 4 3 2						30 15 4 3 2						30 15 4 3 2					
Band (MHz.)	50	144	220	432	1215	Band (MHz.)	50	144	220	432	1215	Band (MHz.)	50	144	220	432	1215	Band (MHz.)	50	144	220	432	1215
K1AGB	38	14	9	10		WA2CJK/2*	46	22	3			K4GL	32	7				W8VP*	32	3			
K1DKX	43					WA2DIR	19					K4IUV	32					W8WEN	36	16			
K1HTV		20		8		WA2BLM	39	10				K4PKV/4*	33	5				WA8LOW	34	4			
K1ORF/1*		15				WA2EUS	9	3	3	4		K4SAO	31			7	2	WA8PLZ*	36	10			6
K1PXE/1*	37	19	13	7		WA2FGK/2	39	14		12		K4SUM	24	11		7		K2RTH/8*	33	16			4
K1SFF*	30	7				WA2VTR					2	2	W4FJ	15	3			K9GWT/9*	38	4			
K1YLU/1*	34	14	9	10		WA2WZP	37	11				W4PAR/1*	35	1				K9HMB	53	5			
K1YON	22	6	7		1	WB2FKJ/2*	40	18	12	6	2	W4SGI*	35	6				K9KFR	38				
W1DC/1*	44	17	10	10	2	WB2GKE/2*	35	20	1	7		W4SRX*	49	1				K9QCB	31	5	1	1	
W1EUJ	30	14		9		WB2MZE	31	13				WA4XM	34					W9YT	45	6			
W1FJH		18				WB2QLP	36					WA4CGA	33	5		2		WA9JYR	35	6			
W1MX/1*	37	18	7	10		WB2RBG	32	6				WA4CQG/4*	38	7		1		WA9SDC*	36	3			
W1YK	36					WB2YZV*	35	10	2			WA4GLO	32	1		3		K9MBC	43				
WA1FSZ/1*	30	10				K3MBQ/2	42					WA4MDW*	32	4				K9TLM	47	2			
WA1HHN	37	11				K3HKK/3*	37	19	5	7		WA4NJP	43	5				W9EKB	50				
WA1IED*	38	18	6	6		K3JRO/3*	31	10				WB4BND	38					W9IPB	47	2			
WA1HOX*	39	16	8	5	5	K3LNZ/3	32					WB4CXC*	32	1				W9JCO	40				
WB2HPW/1*	30	8				K3MTK/3*	41					WB4ENN/1*	34	3				W9PPP	52				
K2BGU*	33	14	2	3		K3TUN/3*	33					K5AGI	49					W9TVK/9*	34	1			1
K2CQG				15		K3ZTJ	36	4				K5EPW	34					WA9AUB	50	2			
K2OJD*	41	17	5	5		W3ARW*	16	5	6			W5OQN	34					WA9DWM	30				
K2UYH*				15	2	W3BHG	17					W5RAG	48					WA9MRH	41				
K2VBB/2*	40	14		3		W3CCX/3*	40	20	11	9	3	WA5IYX/5	37					WA9NQA*	36				
W2AQT		17				W3CGV	4	5	5	5		WA5LTA	40	1				WA9PBO*	33	3			
W2CLL	35	18	4	10		W3KMV	33					WA5NOB/5*	52	1				WA9PHZ/9*	34	1			
W2CNS	34	13	4	3		W3LUL		15				WA5OUU	40	1				WA9SKH/9*	34	2			1
W2DZA	3	4	4	3		W3PGA/3*	31	13				WA5PDD	36					WA9SYS/8	32				
W2GTF/2	18	18				WA3ADN	36	9				K6BPC*	14	5	3		2	VE2DFO/2*	45	11	1	1	
W2JKI*	45	19	13	14		WA3JMR/3*	34	5				WB6NDJ/6*	17	8	4	4	1	VE2HW*	7	11	3	4	
W2OJ/2*	24	18	9	4	3	WA3JXU	33					K7ICW	39	5				VE2RM	35	14		1	
W2SEU	22	10	3	4		W2AD/3	31					W7VDZ	30					VE3CUA	34	2			
W2SZ/2*	30	13	5	6		WB2LZD/3*	42					WA7BBM/7	32	1				VE3FIB*	36	15	2	3	
W2UFT*	42	21	9	4	1	K4AYO	51					K8MMM*	46	7		4		VE3SUA*	34	5			
WA2BBS	37					K4FKO	39	3				W8CCI*	49	8	1	1		XE2XN*	40				

\*Multioperator Station.



in northern California, 220 MHz. at an all time low in this area. Suggestion for the contest committee, give awards for the top single and multi-op stations in each division besides the section awards you give now."—**WB6NDJ/6**, EBay. "Highlight was a last minute 432 MHz. QSO with VE7BVG in Vancouver, who was using his 192-element moonbounce antenna. We couldn't count it though—it was outside the 28-hour window."—**K7AUO/7**, Oreg. "Conditions here in New England on 6 were phenomenal. Two lengthy sporadic-E sessions, some multi-hop, should substantially increase the scores of all participants who made effective use of the band. Conditions on 2 were par for the June contest period."—**K1AGB**, EMass. "Worked all call areas of the US including such rare ones as Arizona and Washington. Saturday afternoon tropo conditions were average. Sporadic E was very good, but the QRM was fierce. One interesting note is that very few a.m. stations were heard here even at the peak period."—**VE2DFO/2**. "Have yet to work a W1 from here in three years."—**WA5IYX/5**, STex. "I enjoyed the ARRL VHF QSO Party very much."—**WB2TJE**, NLI. We were not prepared for the amount of c.w. operation on two that occurred. All included, it was an excellent contest with very good ground wave conditions and enough skip to keep us busy."—**K4PKV/4**, Tenn. "Six meters was fairly good with consistent sporadic E and fair scatter. Two meter tropo conditions were below average with brute force bringing home the sections. Will be back in Sept, hope more activity will be the rule."—**W6NGN/6**, Org. "Double skip on 6 meters Sunday made the contest very interesting and enjoyable, however . . . I would like to see the contest operation restricted to the first two megacycles of 6 and 2 meters. This would hopefully restrict the use of repeater frequencies for obtaining contest points."—**VE3CUA**. "What happened to all the locals. Still my best VHF QSO Party yet."—**WB2ZDP**, WNY. "I am a 12-year-old general and this was the first contest I ever worked. (got 3 new states for my WAS)."—**WB8AYC**, Ohio. "Where was SNJ."—**WB2YRM**, ENY. "We climbed 3 miles uphill to our Qth, only to be greeted by another elub. What QRM! The high point of the contest was when WB2JXE was 20 feet up in a tree adjusting the 6-meter Yagi and WB2LOO chopped 3 inches into the tree with his axe. Pouring rain all weekend took much of the fun out of it, but we'll be back."—**W2GTF/2**, ENY. "Very fine contest this time, best band opening we have had at this Qth for a QSO Party."—**WA4MDW**, NC. "If you can arrange for a band opening like this one next time, I guarantee to do better."—**WB4-BND**, EFla. "I was one of the few stations who worked CO2DC."—**WA9ZCE**, Ind. "A very strong inversion layer prevented the 10 GHz Qso until late Sunday afternoon. This layer was visually observed by K7AUO/7 to lift above their elevation."—**W7UDM**, Oreg.

### SCORES

In the following tabulation, scores are listed by ARRL divisions and sections. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multiplier scorer receives a certificate award. Asterisk following call indicates Headquarters staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz.; B, 144 MHz.; C, 220 MHz.; D, 432 MHz.; E, 1215 MHz. and above.

#### ATLANTIC DIVISION

*Delaware*  
**WA3JXU** 5247-159-33-A  
**W3BHG** 1207- 71-17-B  
**W3CGV** 608- 21-19-ABCD  
**W3K0I** (K3RBU, opr.)  
 600- 60-10-AB  
**WA3HWC** 240- 30- 8-B  
**W3ZNF** 60- 10- 6-B  
**WA3HD** 15- 5- 3-B

*Eastern Pennsylvania*  
**WA3ADN**  
 9180-204-45-AB  
**K3IPM** 8474-212-38-ABCD  
**K3ZTJ** 7120-178-40-AB  
**K3PGB** 3013-131-23-A  
**W3RTB** 2772-154-18-AB  
**K3TMV** 1660- 83-20-A  
**WA3BHE**  
 1404- 52-27-A  
**K30JH** 1071- 51-21-A  
**WA3HIT** 1035-115- 9-AB  
**WA3LTM** 765- 51-15-A

**WA3BGN/3**  
 726- 66-11-AB  
**W3DYL** 592- 37-16-AB  
**WA3HET** 370- 37-10-A  
**K3BKG/3** (WA3ATX, opr.)  
 192- 32- 6-A  
**WA3HEB** 160- 32- 5-A  
**WA3AP1** 34- 11- 2-A  
**WA3ATX** 1- 1- 1-A  
**W3CCX/3** (26 oprs.)  
 50,049-515-83-ABCD  
**K3HKK/3** (8 oprs.)  
 24,140-319-68-ABCD  
**K3MTE/3** (5 oprs.)  
 16,638-354-47-AB  
**WR2LZD/3** (4 oprs.)  
 11,224-244-46-AB  
**W3AWA/3** (12 oprs.)  
 9916-268-37-AB  
**W3ARW** (K3CQ, W3ARW  
 (GF) 9487-161-53-ABCD  
**K3TUN/3** (5 oprs.)  
 8464-180-46-ABCD  
**W3AD/3** (5 oprs.)  
 8066-218-37-AB



No, your ears weren't deceiving you! The Communications Club of New Rochelle managed to stir up 2 meters a bit here in the East with the exotic call **VK1ZAR/W2** (shown operating). That's K2S1J, Eastern New York SCM assisting.

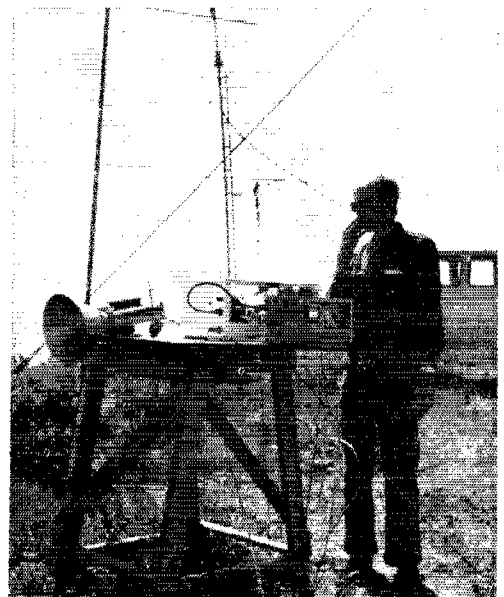
**WA3IUD** (8 oprs.)  
 4760-170-28-AB  
**W3BBS/3** (4 oprs.)  
 3360-112-30-AB  
**WA3HDL/3** (4 oprs.)  
 2603-137-19-AB  
**WA3HFU/3** (WA38 FCZ  
 IFU) 1995-133-15-AB  
**W3LP** (K3IWX, W38 (GFN  
 JUZ) 605- 55-11-AB

*Maryland-D.C.*  
**WA3APQ** 5809-157-37-AB  
**K3LNZ/3** 5698-153-37-AB  
**W3KAV** 4719-143-33-A  
**W2AD/3** (WA3LFI, opr.)  
 3348-104-31-AD  
**WA3AIK**  
 2200-100-22-AB  
**WA3CBC** 1764- 84-21-AB  
**WA3DMD** 799- 47-17-A  
**WA3HEN** 790- 79-10-B  
**W3HB** 684- 57-12-B  
**W3M8N** 640- 40-16-A  
**W3LQY** 540- 54-10-B  
**W3LUL** 525- 35-15-B  
**WA3GBK** 506- 46-11-B  
**W3GN** 324- 27-12-B  
**W3QU** 315- 35- 9-AB  
**WA3LU** 50- 25- 2-B  
**WA3JMR/3** (4 oprs.)  
 11,310-290-39-AB

**W3PGA/3** (7 oprs.)  
 9416-214-44-AB  
**K3NDM** (4 oprs.)  
 627- 57-11-AB  
**W3PZK** (W3PZK, WN38  
 LFG LTI)  
 520- 39-13-ABC

*Southern New Jersey*  
**K3MBQ/2**  
 6678-159-42-A  
**WB2YHP**  
 1239- 59-21-AB  
**WB2PLQ** 660- 44-15-AB  
**K2VNS** 120- 24- 5-B  
**K2BWR** (K28 BWR ZRJ)  
 12,060-201-60-AB  
**W2ZQ** (5 oprs.)  
 6970-205-34-AB  
**WA2DRI** (6 oprs.)  
 6075-225-27-AB  
**WA2ETC** (WA28 AXF FTG  
 FVU) 3427-149-23-AB

*Western New York*  
**W2CNS** 11,610-201-51-ABCD  
**WA2TFY** 2610- 90-29-AB  
**WA2KND**  
 1254- 64-19-ABD  
**K2RFQ** 969- 51-19-AB  
**WB2ZDP** 240- 24-10-AB  
**WA2HYK** 216- 21- 9-B



Perched high atop a 3000-ft. mountain, we find the **K7AUO/7** gang with **W7ADV** operating the 3.3 GHz. Polaplex. The Tektronix Club effort netted 117 QSOs in 26 sections, a fine showing from the Pacific Northwest.

WA2CJG/2 (WA2s CJK UJM, VE2MY) 21,568-301-71-ABC  
 WA2JOQ (4 oprs.) 1817- 79-23-A  
 K2LFB/2 (K2LFB, WA2GJA) 1050- 68-15-ABD  
 WB2MXS/2 (WA2s IKO YHY, WB2MXS) 910- 65-14-A  
 WB2VPY (6 oprs.) 270- 31- 9-A  
 W2TRS/2 (W2TRS WA2YGG) 138-46- 3-AB  
 Western Pennsylvania  
 W3BWI 3904-121-32-ABC  
 W3DJM 572- 44-13-A  
 WA3KY 130- 26- 5-B  
 WA3BGE 15- 15- 3-A  
 WA3JDT 6- 3- 2-A  
 K3JRO/3 (6 oprs.) 9676-236-41-AB  
 WA3AWO (5 oprs.) 390- 26-15-AB

**CENTRAL DIVISION**  
 Illinois

K9HMB 16,472-284-58-AB  
 WA9JYR (C3FAC, opr.) 9307-227-1-AB  
 WA9SDT 1040- 52-20-AB  
 W9DJZ 638- 58-11-AB  
 WA9HEU 518- 74- 7-B  
 WA9QPM 392- 98- 4-B  
 W9IVI 152- 38- 4-B  
 WA9ZGF 128- 46- 3-B  
 WA9NRI 96- 32- 3-B  
 W9GYN 64- 32- 3-B  
 K9YHB (4 oprs.) 6060-202-30-AB  
 K9GWT/9 (4 oprs.) 5628-134-42-AB  
 W9DY (W9DY, WA9YUH) 420-105- 4-B  
 WA9QAD (WA9s QAD VJQ) 330- 66- 5-B

Indiana

K9QCB 8664-226-38-ABCD  
 K9KFR 7182-189-38-A  
 WB9ALZ 2233- 77-29-A  
 WA9ZHE 279- 31- 9-A  
 WN9AUJ 72- 18- 4-B  
 WA9SMO/9 (4 oprs.) 940- 47-20-A

Wisconsin

W9YT (K9OX, opr.) 10,506-206-51-AB  
 W9CGU 2880- 96-30-AB  
 WA9ZLM 616- 40-14-AB  
 WA9EZU 50- 10- 5-A  
 W9TUW/9 (WA9TNE, opr.) 7- 7- 1-B  
 WA9SDC (WA9s SDC TTD) 6472-166-39-AB  
 W9BCH/9 (K9REB, W9BGH, WA9LWJ) 816- 48-17-A

**DAKOTA DIVISION**

Minnesota  
 WA9DWM 2910- 97-30-A  
 WA6SIE 1044- 58-18-A  
 K9GYO 882- 49-18-A  
 North Dakota  
 K8CLA/Ø 1274- 49-26-AB  
 South Dakota  
 WA9PBJ/9 1800- 75-24-A

**DELTA DIVISION**

Arkansas  
 WA5NOB/5 (6 oprs.) 12,614-238-53-AB  
 WA5TJB/5 (WA5s TJB UNIP, WN5YHN) 1394- 82-17-AB  
 Louisiana  
 K5AGI 15,511-309-49-A  
 WA51TA 5576-136-41-AB  
 WA5QBX 3728- 88-31-AB  
 WA5GGQ/5 2117- 73-29-A  
 WA5VCF 1728- 72-24-A  
 Mississippi  
 WA5RMS 714- 42-17-A

WA8VJE 2632- 94-28-A  
 W8NOE 2160- 90-24-AB  
 WA8VHG  
 K8EFS 1407- 65-21-ABD  
 K8AEM 1281- 61-21-A  
 K8AEM 931- 49-19-AB  
 W8ONL 825- 55-15-AB  
 WA8ETB 824-105- 8-B  
 WA8ZUI 688- 59-13-A  
 WA8PST 572- 52-11-AB  
 WA8YVW 535-107- 5-B  
 WA8MJY 168- 42- 4-B  
 K8AJC 130- 26- 5-A  
 WA8RQJ 66- 11- 6-B  
 WA8WQZ 63- 21- 3-B  
 WA9ULU/8 40- 10- 4-B  
 WA8ZPF (WA8ZPF, WB8BGQ) 300- 25-12-AB

K2CQG 1140- 38-15-D  
 WA2VTR 124- 12- 4-DE  
 W2LH 102- 17- 6-B  
 W2JKT (6 oprs.) 63,609-621-91-ABCD  
 WB2FKJ/2 (16 oprs.) 57,954-660-78-ABCDE  
 W2UFT (7 oprs.) 50,204-12-77-ABCDE  
 W2SZ/2 (6 oprs.) 16,524-272-54-ABCD  
 K2BGU (7 oprs.) 14,976-275-52-ABCD  
 W2GTF/2 (16 oprs.) 9540-265-36-AB  
 WA2FUZ/2 (WA2s FUZ YJF) 2059- 71-29-AB  
 WA2TEQ (6 oprs.) 1640- 82- 20-A  
 VK1ZAR/W2 (4 oprs.) 568- 71- 8-B  
 W2KZN (W2KZN, WA2s GSB HVH) 108- 18- 6-AR

New York City — Long Island

WB2MZE 8536-194-44-AB  
 WA2BBS 8362-226-37-A  
 WB2QLP 5652-157-36-A  
 W2SEU 5543-121-39-ABCD  
 WA2FX 2068- 94-22-AB  
 WA2AGI 1980-132-15-B  
 WB2WSS 1102- 58-19-AB  
 WA2DPF 1010-101-10-B  
 WA2EUS 969- 42-19-ABCD  
 W2DPA 886- 44- 9-B  
 K2LCK 336- 48- 3-B  
 WB2TJE 288- 72- 4-B  
 W2KXG 276- 46- 6-B  
 WB2TUT 200- 50- 4-B  
 WB2GYK 164- 41- 4-B  
 WB2YIG 8- 27- 3-B  
 W2ZGF 52- 13- 4-B  
 K2RLW/2 24- 8- 3-B  
 WB2GWU 22- 11- 2-B  
 WB2YZV (WB2s DIN YZV) 14,758-309-47-ABC

Northern New Jersey

W2CLL 18,693-241-67-ABCD  
 WA2WZP 14,640-305-48-AB  
 WA2FGR 14,625-200-65-ABD  
 WA2VAZ 4454-131-34-AB  
 W2AQT 2363-139-17-B  
 W2CJW 804- 61-12-ABD  
 W2DGA 743- 37-14-ABCD  
 WB2HYF 289- 47- 6-B  
 WB2MLX 135- 27- 5-B  
 WB2GKE/2 (8 oprs.) 34,398-502-63-ABCD  
 W2OJ/2 (7 oprs.) 30,334-451-58-ABCDE  
 K2OJD (K2OJD, WA2s KIK PNF) 29,580-411-68-ABCD  
 K2VBB/2 (7 oprs.) 23,158-479-57-ABD  
 K2GXX (K2GXX, WA2s AN1 BCN) 6148-212-29-AB  
 WA2WIL/2 (7 oprs.) 5160-150-20-ABD  
 K2UYH (K2s 1BF UYH, WB2SZW) 1989- 56-17-DE

**MIDWEST DIVISION**

Iowa  
 W9PFP 11,076-218-52-A  
 W9IIG 3072- 74-28-B  
 K9GEY 232- 29- 8-B  
 Kansas  
 W9IPB 7301-149-49-AB  
 WA91BO (WA9s PBO PIG) 4392-122-36-AB



In the words of WA9AUB, "This will have to go down as one of the greatest VHF contests I have ever seen." Craig made an impressive showing from Missouri with 207 QSOs in 52 sections, 50 of them on 6 meters. He notes that on Sunday the band was open to most every part of the country except the Northwest.

Tennessee  
 K4FKO 7518-179-42-AB  
 WA4CGA 5880-140-40-ABD  
 K4IUV 4064-127-32-A  
 WB4HLL 2415-105-23-AB  
 WA4BXZ 2349- 87-27-AB  
 K4UWH 432- 36-12-AB  
 W4SGI (4 oprs.) 8328-208-41-AB  
 WB4ENN/4 (W4s TJC TZG) 7585-205-37-AB  
 K4PKV/4 (K4P'KV, WA4s UMTU YWM) 5700-150-39-AB  
 WB4CXC (4 oprs.) 4488-136-33-AB  
 WA4ZTH/4 (WA4s ZTF ZZM, WB4TLX) 2184- 84-26-A

**GREAT LAKES DIVISION**

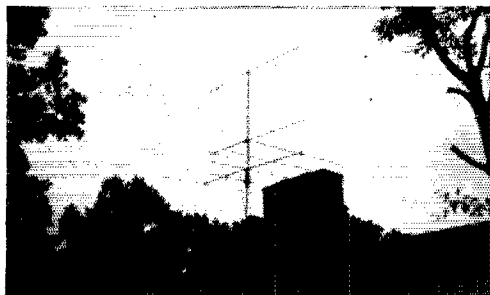
Kentucky  
 WA4AXM 3740-110-34-A  
 WA4CQG/4 (WA4CQG, WA5TF) 11,592-251-46-ABD  
 Michigan  
 WB8BGY 4020-134-30-AB  
 W8SH (WA3GBU, opr.) 3584-112-32-AB

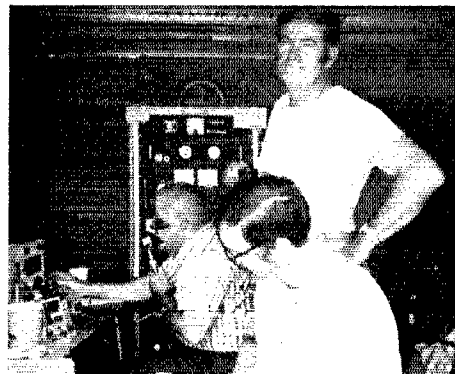
Ohio  
 W8VP (WA8FHF, opr.) 9840-246-40-AB  
 WASLOW 5168-136-38-AB  
 WBSAHY 2860-130-22-A  
 WASSTX 1380-115-12-AB  
 WBSAYC 1176- 98-12-A  
 WASRON 1125- 75-15-A  
 W8WEN 1120- 70-16-B  
 WA8YHN 696- 58-12-AB  
 W8JRN 688- 60- 9-ABCD  
 WASKPN 470- 47-10-A  
 W8HQI 297- 33- 9-A  
 W8BVK 144- 24- 6-A  
 W8SAEP 84- 28- 3-AB  
 W8ZST 20- 10- 2-A  
 K8MNM (4 oprs.) 28,448-492-57-ABD  
 W8CCI (11 oprs.) 25,547-427-59-ABCD  
 WA8PLZ (11 oprs.) 23,348-438-52-ABD

**HUDSON DIVISION**

Eastern New York  
 WA2BLM 18,444-348-53-AB  
 WB2RBG 4028-106-38-AB  
 WB2YRM 1143-127- 9-B

The multi-op effort of WA1JDR (WA1s DPP JDR) netted 71 QSOs in 23 sessions from East Mass. Dave, WA1JDR is shown operating the 6-meter position and comments on how much c.w. helped him on that band. Antennas include a 5-element Cush Craft beam on Ø, and two stacked 11-element beams on 2 meters.





Looking to the South, we have **W4SRX**, the Eglin Amateur Radio Society with **K1WYS** at the mike. Harry pulled through some 253 stations in 50 sections for a fine showing from Florida.

**W3CCX/3**, the Mt. Airy Radio Club, with an all-band multi-op effort of 515 QSOs in 83 sections, led the Atlantic Div. Shown is their 2-meter position with **K3DLS** operating, **WA4PNH** logging and **K3IGX** looking on.

*Missouri*  
**WA0AUB** 10,764-207-52-AB  
**K0TLM** 8967-183-49-AB  
**W0UCK** 133- 19- 7-A  
**WA0NQA** (6 optrs.)  
 6156-171-36-A

*Nebraska*  
**W0EKB** 8850-177-50-A  
**WA0MRL** 5781-141-41-A  
**K0MBC** 5676-132-43-A  
**W0JCO** 3640- 91-40-A

*Vermont*  
**K1GYT** 6392-188-34-AB  
**W1AIX/1** (7 optrs.)  
 36,576-477-72-ABCDE  
**W1ALCH** (W1As KJI LCI,  
 WNILCO)  
 464- 29-16-A

*Western Massachusetts*  
**W1AHHN** 9792-294-48-AB  
**K1DKX** 9589-223-43-A  
**W1YK** (W1As JQ, opr.)  
 6516-181-36-A  
**K1PYX** 1200- 50-24-A  
**W1FJH** 1170- 65-18-B  
**W1UCB** 48- 8- 6-AB  
**W1ALKF** 48- 8- 6-A  
**W2NG/1** 32- 8- 4-A  
**K1YLU/1** (10 optrs.)  
 24,120-328-67-ABCD

*Montana*  
**W7JRG** 2697- 93-29-A  
**W7EGN** 364- 26-14-AB

*Oregon*  
**K7WXX/7**  
 1340-140-31-AB  
**W7UDM** 1500- 68-20-ABCDE  
**W7TYR** 228- 36- 6-ABC  
**K7WWR** 42- 21- 2-B  
**WN7MDB** 5- 5- 1-B  
**K7AUG/7** (10 optrs.)  
 3432-117-26-ABCDE  
**WA7GCS/7** (WA7s GCS  
 (GEP) 3003-143-21-AB  
**K7JZP/7** (K7JZP, W7GUIL,  
 WA7LDZ)  
 2783-121-23-AB  
**W7ZLR** (K7HSW, W7ZLR)  
 175- 24- 7-ABC

**K7DBR** 1692- 34-18-AB  
**W7PQE** 24- 12- 2-B  
**K7BBO/7** (5 optrs.)  
 11,205-379-27-ABCDE  
**K7IEY/7** (4 optrs.)  
**W7DZO/7** 1680-112-15-AB  
 (DZO T88)  
 679- 97- 7-AB  
**W7PRW/7** (6 optrs.)  
 350- 70- 5-AB  
**W7HFL/7** (5 optrs.)  
 136- 34- 4-AB

**NEW ENGLAND**

*Connecticut*  
**W1AW** (K6OSO, opr.)\*  
 3952-104-38-AB  
**W1AIQJ** 3625-125-29-AB  
**K1YGN** 3528- 85-36-ABCE  
**K1HIV** 3360-110-28-B1D  
**W1HSD** 1106- 79-14-AB  
**WA1GTP** 540- 28-18-ABC  
**W1GQI** 513- 57- 9-B  
**K1QXN/1\***  
 160- 20- 8-A  
**W1CIRS/1**  
 126- 14- 9-A  
**WA9HHH/1\***  
 102- 17- 6-B  
**W1JJP** 39- 13- 3-AB  
**W1ISE** 36- 12- 3-A  
**W1NBP** 35- 7- 5-B  
**K1PXE/1** (6 optrs.)  
 38,532-470-76-ABCD  
**W1IOX** (8 optrs.)  
 31,390-390-73-ABCDE  
**W1IED** (8 optrs.)  
 21,488-290-68-ABCD  
**K1ORF/1** (K1s ORF SVN)  
 2220-148-15-B

**NORTHWESTERN DIVISION**

*Idaho*  
**WA7BTG/7**  
 1026- 57-18-A

*Washington*  
**W7FN** 3920-140-28-A  
**K7VNU/7**  
 3108-148-21-AB  
**K7GWE** 2992-136-22-AB

**PACIFIC DIVISION**

*East Bay*  
**K6RNG** 1872- 72-26-AB  
**WB6NDJ/6** (9 optrs.)  
 10,506-289-34-ABCDE

*Neuada*  
**K7ICW** 7920-180-44-AB  
**K7ZOK** 1534- 59-26-AB

*Sacramento Valley*  
**WA6GER**  
 1160- 51-20-ABDE

*San Francisco*  
**WB6TJO** 884- 68-13-AB

*San Joaquin Valley*  
**WB6UYG**  
 2910- 97-30-AE

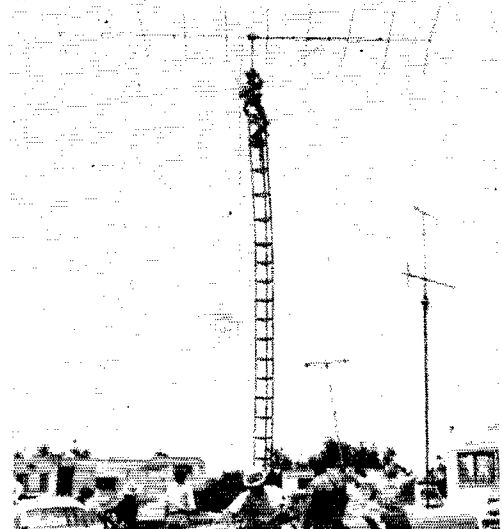
*Santa Clara Valley*  
**WA6FAC** 2715-181-15-AB  
**WB6CKT**  
 1950-139-15-AB  
**K6DTR** 1084- 72-15-ABCD  
**WB6KQG** 324- 36- 9-A  
**WB6YUQ** 102- 34- 3-B  
**W6CHA** 10- 5- 2-B  
**K6GSS/6** (K6GSS, WB6KBZ)  
 4048-176-23-AB  
**W6PIY/6**  
 (6 optrs.)  
 504- 84- 6-AB

*Eastern Massachusetts*  
**K1AGB** 20,022-248-71-ABCD  
**W1EUI** 13,409-237-53-ABD  
**W1AFCB**  
 1332- 74-18-AB  
**WA1GDR** 602- 43-14-AB  
**W1LMZ** 364- 28-13-B  
**K1HBY** 80- 20- 4-B  
**WA1CEO/1** 70- 14- 5-B  
**K1BFF** (K1s LOG 8FF)  
 4958-123-37-AD  
**W1AJDR** (W1As DPJ JDR)  
 1633- 71-23-AB

*Maine*  
**W1YTW** 935- 50-17-BC  
**W1DC/1** (18 optrs.)  
 63,163-704-83-ABCDE

*New Hampshire*  
**K1ZGB/1**  
 10,471-283-37-AB  
**K1PMM** 4134-150-26-AB  
**W1JMI** 797- 57-14-B  
**W1QHS** 312- 26-12-AB  
**W1AJSZ/1** (W1SHJ, W1A-  
 FSZ, WN1DLS)  
 7920-198-40-AB  
**W1CMV/1** (K1HDO, W1-  
 CMV, K2QV)  
 5428-236-23-AB

*Rhode Island*  
**K1TPK** 7245-207-35-AB  
**W1POU** 1577- 83-19-AB  
**WB2HPW/1** (5 optrs.)  
 6194-163-38-AB  
**WA1CPX/1** (5 optrs.)  
 2412-134-18-A



Here's part of the reason that **K6BPC** has been consistently leading the Southwestern Division multi-op entries. Above, we see Jim, **WA6KVS**, balancing a 10-element 6-meter Yagi prior to placing it on the rotator with the rest of the gang looking on somewhat anxiously. 440 QSOs in 24 sections plus the fact that W1s were heard in the LA. area for the first time this year adds further proof to the fact that this was indeed a good contest weekend.

**ROANOKE DIVISION**

*North Carolina*  
**WB4INE** 2262- 87-26-A  
**K4GMP** 1845- 71-26-A  
**WB4KIB** 915- 61-15-AB  
**WA4BVW**  
 810- 54-15-AB  
**WB4DBB** 420- 35-12-AB  
**W4EFP** 377- 29-13-A  
**W4DGF** 333- 37- 9-AB  
**K4DFI** 14- 14- 1-B  
**W4PAR/4** (K4HGK, WA48  
 HAZ JVD)  
 5616-156-36-AB  
**WA4MDW** (WA48, BDW)  
 5436-151-26-AB  
**WB4LDO** (WA4YKI, WB4-  
 LDP) 3240-108-30-AB  
**WB4CES** (WB4s CES IW)  
 976- 61-16-AB

*South Carolina*  
**K4GL** 1560-113-40-ABD  
**K4SAO** 3038- 98-31-A

*Virginia*  
**K4SUM** 8712-178-44-ABDE  
**WA4GLO** 7848-212-56-AB1J  
**W4EJ** 1500- 43-25-ABD  
**W4KMS** 144- 16- 9-A

(Continued on page 75)

# 1968 VE/W Contest Results

COMPILED BY T. C. CUNNINGHAM,\* VE2CK

**T**he Montreal Amateur Radio Club is pleased to present the complete results of the 1968 VE/W Contest.

Scores are grouped by sections. The station first listed in each section is the certificate winner for that section. Likewise, the "power factor" is indicated by A or B: A indicates power input up to and including 200 watts (multiplier of 1.5); B indicates power input over 200 watts (multiplier of 1). The total operating time to the nearest hour is indicated by the fourth figure.

Example of listings: VO1AW 89,526-506-59-16-A, or, final score of 89,526, 506 stations worked, section multiplier of 59, total operating time of 16 hours, and power factor of 1.5.

## Contest Comments

"The W gang should send a special award to W90KN/VE8 for handing out NWT contacts."—K8CGD. "All the antennas I used were inside the attic, and their highest point was not more than 12 feet off the ground."—K5MIE. WA1FHU is ex-VE2AZQ (10 years ago). "First time I entered the contest and it was a lot of fun."—WA0RUE. "Great Contest! Congrats to MARC for fine hands-across-the-border Contest."—K0TIV. Carter Glass III W4JUK finally worked all Canadian Sections, after many years of W/VE Contest activity. "The operating of the VE stations was superb! Thanks for a wonderful test."—W8QHW. "I got more fun than points out of this contest. Thank you."—OH3UQ/W6. WN0UBJ worked 5 Canadians on 21 MHz. "First time I've been in this contest and enjoyed my limited time."—K2KGE/5. "Had a very wonderful time operating in my first W/VE contest—disappointed not to hear Yukon station."—WA8ROB. WN7JAV worked 6 Canadians on 3.7 MHz. "Conditions very good on 14 MHz, with lots of activity. Enjoyed it a lot."—VE1AR. "Great Contest—Try to make logs available to Wa."—WA6JAN. (Daystrom please note). K7NHV/0 was mobile in Colorado in 1967 Mustang, and all c.w. contacts were made while in motion. "I'll be back next year."—WA0PRS. "I had a fine time."—WA0PKE. VE2DKJ received license only 8 days before contest. "When

\* Address all correspondence to 445 Hyman Drive, Dollard Des Ormeaux 980 P.Q., Canada

it comes to power restriction think we here in Newfoundland are at a disadvantage on the lower frequency bands."—VO1AW. "Always look forward to working the VE gang during the W/VE parties."—W6BIP. VE2DCJ operated with 20-watts input. "Some mighty fine VE ops in the group—enjoyed the party—but should do better."—W9WEN. "Another fine contest."—W2DKM. VE2DGS is ex-GM3GUT. "Never did hear a Yukon station—10 meters was open but no operation."—W6GEN. "Thank you—I enjoyed the contest again this year."—W2BBX. K4JSZ logs were processed by computer—sure easy for our log-checkers! "I wanted WAVE and WACAN on 20—made it except for PEI—Had fun, good ops."—WA9UGI. That hot operator you heard or worked at VE5DZ was XYL Ebba. "Disappointed with phone activity."—K7RLS. "Wait 'til next year."—VE3DDU. Yukon tough—any? "Great satisfaction to work KP4BBN to finish up."—VE3AYR.

## TO ARRL:

*I combined my vacation this year with a DX-pedition to the Northwest Territories. My operation took advantage of the fact that all islands in Hudson and James Bays are part of the District of Keewatin, NWT. My QTH was Big Stone Island, near the southern end of James Bay. It is about 30 miles from Moosonee, and a very treacherous voyage to get there, owing to large waves and many boulders lying just below the surface of the water.*

*This island is only about 1/2-mile across, and has only 1 tree on it. That tree is about 3-feet high. The island is mostly rocks and gravel, covered with driftwood. The wind blasts in directly from the north at 30 to 50 m.p.h. constantly. This made it difficult to keep my operating tent from blowing into the ocean and to keep my antenna mast up. The gravelly soil would not hold the tent pegs down so the tent was tied to driftwood logs. The noise of the surf and wind makes operating difficult, even with headphones. Often it was impossible to hear the gasoline generator to tell if it was running correctly. Due to the rocks, the operating table and my stool were unstable and would shift around when the wind blew the tent sides in. In short, I loved every minute of it.*

*Unfortunately, I could only work the contest for 16 hours due to physical exhaustion from fighting the wind, etc. and thus many contacts were lost. Due to the nearness of the U.S.A., however, many contacts were possible on 3.5 and 7 MHz., apparently to the great surprise of those who had never heard a VE8 on these bands before. I called one CQ on 1.8 MHz., but there was no reply.*

*Equipment was a Drake R4A revr., T4X xmr., 80 thru 10 trap dipole, 40-foot collapsible mast, Hallcrafters TO-Keyer, and a Sears 1250-watt gas alternator.*

73, Bob  
W90KN/VE8  
N.W.T.

## 1969 VE/W Contest

Starts                      Ends  
Saturday Sept. 27      Monday Sept. 29  
2300 GMT              0200 GMT  
See rules, p. 65 August QST

# CANADA

## Newfoundland

c.w.

VO1AW 89,526-506-59-16-A  
VO1HH 61,056-384-53-10-A  
VO1IL 41,233-233-59-11-A

## Prince Edward Island

c.w.

VE1AJK 79,605-435-61-20-A  
VE1ATJ 16,740-155-36-12-A

## Nova Scotia

c.w.

VE1AI 109,804-600-61-20-A  
VE1ZT 87,120-484-60-17-A  
VE1AUI 77,604-446-58-15-A  
Vf1VI 69,801-439-53-19-A  
VE1EK 40,338-249-51-11-A

phone

VE1ZH (5 oprs.)  
12,510-139-30-18-A

## New Brunswick

c.w.

VE1RU 60,363-353-57-16-A  
VE1AIT 50,976-288-59-17-A  
VE1AMR 50,568-301-56- -A  
VE1AE 20,988-159-44- -A

## QUEBEC

c.w.

VE2BVY 119,133-651-61-20-A  
VE2DFR 110,340-613-60-19-A  
VE2AYU 105,834-569-62-20-A  
VE2IZ 103,280-546-63-20-A  
VE2ASU 65,946-379-58-11-A  
VE2AV 65,844-372-59-12-A  
VE2HV 60,184-340-59-14-A  
VE2AQU 33,708-212-53- 8-A  
VE2DGS 31,953-213-50-13-A  
VE2DCJ 23,103-175-14-14-A  
VE2CMR 19,845-14-15-15-A  
VE2HN 3816- 5-3-24- -A  
VE2DKJ 2880- 4-2-24- -A  
VE2UN (VE2DCW, WA2UPC)  
152,623-807-63-20-A

phone

VE2DFE 5307- 61-29- 7-A

## Ontario

c.w.

VE3BJK 112,362-614-60-20-A  
VE3EEW 97,173-531-61-17-A  
VE3BQX 76,864-427-60-18-A  
VE5LV/3 71,548-577-62-17-B  
VE3BQL 61,710-374-55-19-A  
VE3MI 60,876-356-67-20-A  
VE3GCE 59,808-356-56-11-A  
VE2BGJ/3 50,868-314-54-12-A  
VE3DMU 46,800-312-50-16-A  
VE3ERU 42,864-304-47- -A  
VE3DDU 40,704-256-53- 8-A  
VE3AYR 33,390-210-53-15-A  
VE3FDP 32,448-200-52-15-A  
VE3GHO 30,996-282-41-16-A  
VE3FQE 29,187-207-47- -A  
VE3GMZ 28,204-200-47- 7-A  
VE3AQT 27,004-200-45- 9-A  
VE3DGB 26,464-210-42-10-A  
VE3UX (VE3GLD, opr.)  
24,252-172-47-11-A

VE3DH 23,046-167-46- 6-A  
WA9VZS/VE3  
20,976-152-16- 6-A  
VE3GLA 19,984-140-45- 5-A  
VE3YV 18,720-160-39- 7-A  
VE3CWB 17,523-177-33-17-A  
VE3EUG 14,847-101-49-12-A  
VE3CKW 9324-111-42- 4-B  
VE3WW 4455- 55-27- -A



Using a 2-watt input transistorized transmitter, a Collins 75S-3C receiver and an indoor dipole, **W0QZR** in Iowa managed 31 QSOs in 10 sections for a score of over 9K.

VE3BOF 3933- 57-23- 5-A  
VE3AQJ 2109- 37-19- 2-A  
VE3DPA 1596- 28-19- 1-A  
VE3HYC (5 oprs.)  
66,861-391-57-19-A  
VE7AHD 167,706-847-66-18-A  
VE7BAV/7 12,051-103-39- 7-A

VE3HAM (VE3GCO, opr.)  
45,900-255-60-12-A  
VE3BUC 18,090-134-45-11-A  
K9JLR/VE3  
14,835-115-43-10-A  
VE3FFX 6237- 63-33- 5-A  
VE3EFI 3150- 45-35- 3-B  
VE3CAA 2706- 41-22- 5-A  
WA9VZS/VE3  
2484- 36-23- 2-A

## Manitoba

c.w.

VE4ZX 92,700-515-60-20-A  
VE4FQ 37,296-222-56- 8-A  
VE4UX 17,388-126-46- 5-A  
VE4UM (VE4s AY 1A)  
68,712-409-56-20-A

phone

VE4SK 10,400-130-40- 4-A

## Saskatchewan

c.w.

VE5US (VE5UP, opr.)  
153,657-813-63-19-A  
VE5XJ 63,336-364-58-10-A  
VE55C 54,000-300-60-10-A  
VE5DZ 35,802-234-51-15-A

## Alberta

c.w.

VE6ABV 20,736-144-48- 9-A  
VE6ATH 9720- 81-40- 3-A

## British Columbia

c.w.

VE7BDJ 193,245-991-65-20-A  
VE7LB 131,502-707-62-20-A  
VE7QH 114,762-617-62-20-A  
VE7IQ 71,283-396-63-19-A  
VE7QQ 65,490-370-59-18-A  
VE7AC 42,003-253-56- 8-A  
VE7IG 31,845-193-55- 9-A  
VE7AGN 28,512-198-48- 9-A  
VE7BLO 27,540-170-54- 9-A  
VE7BAV/7 23,001-187-41- 9-A  
VE7XF 22,080-163-46- 4-A  
VE7TO 16,080-134-40-15-A  
VE7GG 12,285-105-39- 3-A  
VE7RZ 6208- 97-32- 2-B  
VE7AZG 2967- 43-23-13-A  
VE7UBC (VE7s ANP BGE BRY)  
136,269-721-63-20-A

phone  
VE7AHD 167,706-847-66-18-A  
VE7BAV/7 12,051-103-39- 7-A

## Northwest Territories

c.w.

W9OKN/VE8  
91,440-558-60-16-A

## Vakon

c.w.

VE8DS 1377- 27-17- 1-A

## U.S.A.

Alabama  
c.w.  
W1GRG 2880- 12-12- 2-B  
phone  
W4ZNI 5280- 22- 8- -A  
Arizona  
c.w.  
WA7IFD 68,250-175-13-13-A  
W7AYY 42,120-108-13- 7-A  
K7AL 34,840-134-13-17-B  
K7TVS 25,740- 78-11-14-A

## Arkansas

c.w.

WA5SOQ 3040- 19- 8- 2-B

## Colorado

c.w.

W6LRW 53,040-136-13-13-A  
K0JJB 23,760- 66-12-13-A  
K7NHV/0 4410- 21- 7- 1-A

phone

K0TIV 5250- 25- 7- 4-A

## Connecticut

c.w.

W1ACR 52,650-135-13-13-A  
W1TS 47,190-143-11-12-A  
W1ETU 36,000-100-12- 6-A

## Delaware

c.w.

W3TRC 11,520- 48- 8- -A  
K3YBW 8000- 40- 5- 6-A

## East Bay

c.w.

W6AFI 61,560-171-12-20-A

## Eastern Florida

c.w.

WB4IAI 21,300- 71-10-19-A  
W4HOS 3320- 16- 9- 2-A

## Eastern Massachusetts

c.w.

K1HVV 36,720-153-12- -B  
K2GLQ/1 29,880- 83-12- 5-A  
WA1FHU 29,520-123-12-14-B  
W1AX 19,800- 55-12- -A  
W1WMM 3600- 30- 6- 3-B

phone

WA1BFD 720- 6- 4- 1-A

## Eastern New York

c.w.

W1BGD/2 114,840-319-12-20-A  
K2AHQ 46,860-142-11-13-A  
W2EY 43,200-120-12-14-A  
WA2HBN 13,200-10-11- 3-A

## Eastern Pennsylvania

c.w.

W3ATX/375,960-211-12-20-A  
W3QOT 17,640- 49-12- 7-A  
W3ABN 17,100- 57-10-15-A  
W3CNS 12,960- 54- 8- 4-A  
W3ADE 10,800- 40- 9- 4-A  
W3MDO 9600- 32-10- -A  
K3NPC 9000- 25-12- 6-A  
K3RFB 7920- 33-12- 5-B  
W3PNL 2250- 15- 5- 3-A  
WA3HMU 1260- 14- 3- 1-A  
K3O10/3 900- 20- 3- 3-A

phone

W3PNL 60- 2- 1- 1-A

## Georgia

W4HYV 19,440- 54-12- 6-A  
K4TBN/4 12,600- 42-10- 4-A

phone

K4PIC 600- 5- 4- 2-A

## Idaho

c.w.

W7IUO 21,300- 71-10-11-A

phone

K7RLS 4680- 26- 9- 5-B

## Illinois

c.w.

K9VLZ 46,800-130-12-14-A  
W9FFQ 32,040- 89-12- 9-A  
WA9SW5 21,900- 73-10-12-A  
W9TCU 18,720- 52-12- 6-A  
W9JCK 17,400- 58-10- 2-A  
K9BJM 9570- 29-11- 4-A  
W9WR 7920- 36-11- -B  
W9DU 7200- 20-12- 4-A  
W9QQG 1680- 12- 7- 1-B

## Indiana

c.w.

K9KLR 72,000-200-12-20-A  
W9JOO 43,560-121-12-12-A  
WA9VBG 36,360-101-12-14-A

phone

WA9UGI 7830- 29- 9-11-A  
K9GEL 5460- 26- 7- 7-A

## Iowa

c.w.

WA0SDC 66,960-186-12-10-A  
K0WNV/0 35,970-109-11-12-A  
K0AZJ 31,320- 87-12- 5-A  
WA0PKC 23,760- 72-11- 8-A  
W0QZR 9300- 31-10-10-A

## Kansas

c.w.

WN0UBJ 450- 5- 3- 1-A

<i>Kentucky</i> c.w.	<i>W0RLI</i> 61,920-172-12-18-A <i>K9IOZ/B</i> 60,840-169-12-20-A <i>WA0EPG</i> 40,320-112-12-13-A <i>K0EKR</i> 37,080-103-12-7-A <i>WA0PZH</i> 14,520-44-11-10-A <i>W0KUI</i> 640-8-4-2-B	<i>N.Y.C.-L.I.</i> c.w.	<i>WA5TPO</i> 30,960-86-12-18-A <i>WA9IAT/5</i> 10,800-36-10-8-A
<i>K4KSB</i> 67,320-187-12-15-A <i>K4NAX</i> 36,000-100-12- -A <i>W4YOK</i> 19,080-53-12-5-A <i>WB4FDK</i> 450-5-3-1-A	<i>W0GNHW</i> 6120-34-9-17-B <i>W0PAN</i> 5280-22-8-3-A <i>WA0RUE</i> 5280-22-8-12-A <i>K0WVX/B</i> 3960-22-9-6-B <i>WA0PRS</i> 120-2-2- -A <i>WA0EPG</i> 60-2-1- -A	<i>4X4LO/W2</i> 51,480-143-12-18-A <i>W2DSC (WB2TUL, opr.)</i> 51,120-142-12-20-A <i>WA2UWA</i> 42,960-179-12-9-B <i>W2MT</i> 42,120-117-12-10-A <i>W2DKM</i> 41,910-127-11-12-A	<i>Tennessee</i> c.w.
<i>W4YOK</i> <i>phone</i> 120-2-2- -A	<i>W0GNHW</i> 6120-34-9-17-B <i>W0PAN</i> 5280-22-8-3-A <i>WA0RUE</i> 5280-22-8-12-A <i>K0WVX/B</i> 3960-22-9-6-B <i>WA0PRS</i> 120-2-2- -A <i>WA0EPG</i> 60-2-1- -A	<i>WB2YUL</i> <i>phone</i> 1760-22-2- -B	<i>K4PUZ</i> 90,000-250-12-17-A <i>K4J8S</i> 51,840-144-12-14-A <i>WB4FNN</i> 14,580-54-9-8-A
<i>Los Angeles</i> c.w.	<i>Mississippi</i> c.w.	<i>Oklahoma</i> c.w.	<i>Vermont</i> c.w.
<i>WB6PKA</i> 118,170-303-13-14-A <i>WB6OLD</i> 69,420-178-13-13-A <i>W6GEN</i> 60,120-167-12-19-A <i>WA6CFE</i> 33,990-103-11-8-A <i>W6RCV</i> 25,200-105-12-8-B <i>K6BEP</i> 18,480-84-11-8-B <i>W6ZSU</i> 18,300-61-10-9-A <i>WA6JAN</i> 11,880-44-9-7-A <i>W6EYQ</i> 7840-29-9-10-A <i>OH3UQ/W6</i> 7560-42-9-9-B <i>WB6TQS</i> 5130-19-9-2-A	<i>K4RIN/5</i> 90,480-232-13-18-A <i>W5AMZ</i> 55,080-153-12-16-A <i>WA5OYU</i> 20,640-86-2-15-B	<i>K5OCX</i> 39,600-120-11-8-A <i>W5MIE</i> 5400-20-9-9-A <i>K2KGE/5</i> 3630-11-11-3-A	<i>WAIGRR</i> 16,800-70-12-8-B <i>W1PEG</i> 15,620-71-11- -B <i>W2PXL/1</i> 9240-44-7-9-A <i>W1MRW</i> 4140-23-6-5-A
<i>WA6VKY</i> <i>phone</i> 2640-22-6-3-B <i>W6GEN</i> 1800-12-5- -A	<i>W5SVC</i> 22,500-75-10-12-A <i>WA5OXU</i> 160-4-2-1-B	<i>Ohio</i> c.w.	<i>Virginia</i> c.w.
<i>Louisiana</i> c.w.	<i>Missouri</i> c.w.	<i>W8QHW</i> 88,920-247-12-19-A <i>W8GOC</i> 65,520-182-12-17-A <i>WA8LVT</i> 39,600-110-12-8-A <i>WA8LWH</i> 18,720-52-12-5-A <i>WA8MFF</i> 12,960-54-8- -A <i>WA8IXI (WA4RLJ, opr.)</i> 4200-20-7-2-A	<i>W4CRW</i> 78,480-218-12-20-A <i>K4PQL</i> 70,200-195-12-19-A <i>WB4JEZ</i> 45,000-125-12-14-A <i>W4JUK</i> 23,400-60-13-8-A <i>W4KMS</i> 20,880-58-12-3-A <i>W4TFX/4</i> 2790-31-3-3-A <i>W4OBE</i> 2700-15-6- -A
<i>W5WMU</i> 80,640-224-12-15-A <i>W5BUC</i> 41,580-126-11-13-A <i>K5ARH</i> 32,340-98-11-10-A <i>W5ERR</i> 24,200-110-11-11-B <i>W5MPX</i> 13,020-31-7-6-A	<i>K7KHA</i> 23,760-72-11-7-A <i>K0VSH</i> 16,500-50-11-6-A <i>W0BV</i> 3600-20-6-3-A <i>WA0TKV (WA6s PUL TTV, WN0UVM)</i> 14,700-49-10- -A	<i>W8YXE</i> 5040-24-7-4-A <i>WA8MFF/8</i> 1050-7-5- -A <i>WA8LXI (WA8RWZ, opr.)</i> 720-6-4-2-A	<i>W7IEU</i> 24,920-74-11-11-A <i>WA7JCB</i> 23,760-66-12-12-A <i>K7VPF</i> 19,800-55-12-9-A <i>W7GYF</i> 7200-30-8-1-A <i>WA7JPC</i> 3360-14-8-5-A
<i>WA5QBO</i> <i>phone</i> 9990-37-9-7-A	<i>Nevada</i> c.w.	<i>Oregon</i> c.w.	<i>Washington</i> c.w.
<i>Maine</i> c.w.	<i>K7KHA</i> 33,600-140-12-14-B <i>WA7JIG</i> 27,720-84-11-14-A	<i>K7WWR</i> 43,920-122-12- -A <i>WN7JAV</i> 360-6-2-3-A	<i>W7IEU</i> 24,920-74-11-11-A <i>WA7JCB</i> 23,760-66-12-12-A <i>K7VPF</i> 19,800-55-12-9-A <i>W7GYF</i> 7200-30-8-1-A <i>WA7JPC</i> 3360-14-8-5-A
<i>W1GKJ</i> 41,910-127-11-15-A <i>WA1KDC</i> 29,400-98-10-11-A <i>K1GAX</i> 11,880-54-11-4-B <i>WA1JNC</i> 1440-12-4-2-A	<i>WA7BAV</i> 3000-30-5-10-B	<i>Rhode Island</i> c.w.	<i>Wisconsin</i> c.w.
<i>Montana</i> c.w.	<i>Nebraska</i> c.w.	<i>K1QFD</i> 42,480-118-12-15-A <i>WA1JHW</i> 1080-12-3-13-A	<i>K9BNF</i> 59,730-181-11-19-A <i>W9WEN</i> 47,160-131-12-17-A <i>WA9TPQ</i> 12,900-43-10-12-A <i>W9LFG</i> 3960-22-6-5-A <i>K9GDF/9</i> 3600-20-6- -A
<i>WA7BQS</i> 6720-32-7-6-A	<i>New Mexico</i> c.w.	<i>San Diego</i> c.w.	<i>Western Florida</i> c.w.
<i>WA7BQS</i> <i>phone</i> 120-2-2-1-A	<i>W5QNY</i> 40,920-124-11-19-A <i>W5DZA</i> 5400-18-10-3-A <i>K5MAT</i> 3630-11-11-4-A	<i>K6SDR</i> 49,280-224-11- -B	<i>W4YWW</i> 12,480-52-8-7-A <i>WA4V1Y</i> 11,070-41-9-20-A
<i>Maryland-D.C.</i> c.w.	<i>W5RGI</i> 6240-26-8-10-A <i>W5QLC</i> 2340-13-6-5-A	<i>Santa Barbara</i> c.w.	<i>W4YWW</i> <i>phone</i> 6240-26-8-5-A
<i>K4GSU/3</i> 100,800-280-12-17-A <i>W3HQU</i> 54,600-140-13-13-A <i>W3GN</i> 34,560-144-12-8-B <i>WA3IUR</i> 22,200-74-10-11-A <i>WA3DNH</i> 9000-30-10-6-A	<i>W5RGI</i> 6240-26-8-10-A <i>W5QLC</i> 2340-13-6-5-A	<i>W6GEB</i> 33,840-94-12-9-A	<i>Western Massachusetts</i> c.w.
<i>WA3IUR</i> <i>phone</i> 150-5-1-1-A	<i>New Hampshire</i> c.w.	<i>W6GEB</i> <i>phone</i> 180-3-2-1-A	<i>W1EZD</i> 24,640-112-11-8-B
<i>Michigan</i> c.w.	<i>W1DTY</i> 27,120-113-12-11-B <i>W1EEF</i> 3920-28-7-2-B	<i>Sacramento Valley</i> c.w.	<i>WA1CJR</i> <i>phone</i> 9900-33-10-12-A
<i>W8SH (K1ZND, opr.)</i> 97,920-272-12-19-A <i>K8CGD</i> 60,120-167-12- -A <i>WA8ZDT</i> 52,292-147-12-14-A <i>WA8USU</i> 50,760-141-12-17-A <i>WA8ZFM</i> 33,840-94-12- -A <i>WA8VRB</i> 26,400-80-11-11-A <i>W8WVU</i> 2400-20-4-1-A <i>WA8WWS</i> 1650-11-5-3-A	<i>Northern New Jersey</i> c.w.	<i>K4UEE/6</i> 630-7-3-1-A	<i>Western New York</i> c.w.
<i>W8MFU</i> 4200-20-7-4-A <i>W3TBF/8</i> 3220-23-7-12-B <i>WA8VRB</i> 360-4-3-1-A	<i>W2RRK</i> 78,480-218-12-15-A <i>WA2BZV</i> 49,680-138-12-14-A <i>WA2AMM</i> 44,280-123-12-10-A <i>WA2BEJ</i> 30,960-86-12-10-A <i>WA2EUX</i> 15,600-65-8-15-A <i>K2UUT</i> 13,200-40-11-6-A <i>WB2NSV</i> 1980-33-2-3-A	<i>W6GEB</i> <i>phone</i> 120-3-2-1-B	<i>W2MTA</i> 54,450-165-11-16-A <i>K2DJD</i> 47,520-198-12-16-B <i>W2TOP</i> 22,000-100-11-10-B <i>WB2YME</i> 17,400-58-10-12-A <i>WB2OYE</i> 15,120-63-12-3-B <i>WB2BX</i> 13,800-46-10-8-A <i>WA2FRR</i> 12,000-50-8-10-A <i>WA2SSJ</i> 1500-10-5-2-A
<i>Minnesota</i> c.w.	<i>W2FCR</i> 2250-15-5-2-A <i>WA2BZV</i> 60-2-1-1-A <i>WB2RKK</i> 60-2-1-1-A	<i>San Joaquin Valley</i> c.w.	<i>W2VQG</i> 960-7-4-2-A <i>WB2HDM</i> 540-9-2- -A
<i>K0ZXE</i> 69,480-193-12-19-A	<i>Northern Texas</i> c.w.	<i>K6DNY</i> 25,560-71-12-7-A <i>K6OZL</i> 4500-25-9-2-B	<i>Western Pennsylvania</i> c.w.
	<i>K5YAA</i> 48,240-134-12-10-A <i>W5QGZ</i> 43,200-120-12-14-A	<i>South Carolina</i> c.w.	<i>K3HZL</i> 63,000-175-12-18-A <i>WA3ENR</i> 31,920-133-12-9-B
	<i>K5JEF</i> 4480-32-7-6-B	<i>South Texas</i> c.w.	<i>West Virginia</i> c.w.
		<i>K4QPH/4</i> 21,240-59-12-4-A	<i>WA8RQB</i> 31,680-88-12-8-A <i>WA8YTM</i> 5220-58-3-14-A <i>(Continued on page 76)</i>
		<i>K2EIU/5</i> 106,920-297-12-19-A	

# AMATEUR RADIO PUBLIC SERVICE

## NTS RACES AREC

*In the Public Interest, Convenience, Necessity* HRH

CONDUCTED BY GEORGE HART,\* WINJMJ

### What Is Membership?

The term "member" is defined (a la Webster) as "one of the individuals composing a group." Simple enough, and yet there has been a lot of nit-picking going around about whether or not one is a "member" of something or other. There seems to be a feeling that membership is something formal and binding, requiring a pledge and usually the dishing out of a certain sum of money. Does not membership in ARRL require a statement of interest in amateur radio? Does not membership in a civic club or lodge require some sort of pledge of allegiance?

We are all "members" of the human race, of society, of various ethnic or nationalistic groups, whether we want to be or not. Nothing formal about any of that. And yet, when it comes to ARRL, AREC, NTS, RACES, OTC, some kind of formalization is required. When it comes to DXCC, A-1 Op and BPL a certain type of achievement is required. When you say that a member is "one of the individuals composing a group," the requirements for membership depend entirely on what kind of group you are talking about — and whether by individual you mean a person or some other kind of single entity. Specifically, for the purposes of this discussion (yes, we are finally getting to the "nitty-gritty"), whether it is a person or a *net*, and what the relationship is between "membership" and such expressions as "affiliation," "part of" and "belonging to."

For example, we often say that a club is "affiliated with" the League. Does this make it some kind of a group member? If so, why can't other kinds of groups be affiliated as well? We say that a net is a "part of" NTS. Is this the same thing as affiliation? And we say that an individual amateur "belongs to" the local AREC group. Can we mix up all this terminology and still make sense? Can a net be "affiliated with" the League? Can a club "belong to" ARRL? Can an individual amateur be a "part of" the League. In a general sense, the answer to all these questions is yes. In a definitive sense, however (which dictionaries make less and less, these days) there are differences. Let's not generalize if by interpretation we can retain a useful distinction. Let's keep things straight.

Thus, a club *affiliates* with ARRL, a net is a *part of* NTS or ARPSC, an individual is a



A meeting of the Pacific Area Staff was held in Sacramento, California, on June 14. The PAS consists of the managers of the Region Nets, the Area Net manager, and the TCC Director in the Pacific Area, plus three members at large. The purpose of the Area Staffs (there is one in each NTS Area) is to discuss traffic problems and keep the Communications Manager advised on local traffic problems. Attending were, left to right in back row, WA6ROF, W6ZRJ, W6BGF, W7DZX, WA6BRG and W6HC. Kneeling are W7BQ and K7NHL.

*member* of ARRL or AREC. Membership is for individuals, affiliation is for groups. Since, in ARRL parlance, we use "affiliation" as applying to clubs, let's not use it as applying to nets; so a net is a "part of" NTS or the League's public service program, as the case may be. As for individual membership, this connotes a signing up; thus, an individual may be a member of ARRL or AREC but he is not a member of NTS because NTS is a system of *nets*. An individual may be a member of a net that is part of NTS.

Can an AREC net be part of NTS? First, let's determine exactly what an AREC net is. Well, you say, naturally it's a net consisting of AREC members. True, but can a net that consists only partially of AREC members be considered an AREC net? We'd say yes, provided it operates under the jurisdiction of an appointed EC. Can it be a part of NTS? Absolutely, and we hope it will be, by providing liaison to an NTS net, such as the section net. Is not, then,

\*Communications Manager, ARRL.

an AREC member who belongs to an AREC net that is a part of NTS in effect a member of NTS? Well, yes, if you want to put it that way. It's like saying that a citizen of a state that is a part of the union is a member of the union. It's true in a sense, but strictly speaking the citizen is of the state, while the state is of the union. The individual amateur is of AREC while the net of which he is a member is a part of NTS.

Why is all this explanation necessary? Because the entire concept of AREC-NTS-RACES-ARPC is foggy in the minds of many amateurs, and this is not as it should be. AREC is an emergency preparedness group sponsored by ARRL that any licensed amateur can be a member of by signing up with his local EC. RACES is similar to AREC but is sponsored by local civil defense and requires that the amateur sign up in civil defense. NTS is a system of nets sponsored by ARRL. ARPC is the overall name applied to AREC, NTS and (by recognition) RACES — the whole ball of wax, you might say. Anybody who participates in any one of these is a part of the overall concept of ARPC. AREC is for individuals, NTS is for nets. How does an individual become a part of NTS? By participation in an NTS net. — *WINJAM*.

### Traffic Talk

The schedule we announced in this column in July *QST* regarding the commencement of the ARPC Honor Roll was a little optimistic. It would be pushing things to have the first Honor Roll column appear in the November issue, because this issue would reflect August activities. This means that from the time of this writing a decision regarding points would have to be made, SCMs would have to be educated, possible new forms made up and distributed, and criteria announced — all prior to August 1, a little over a week away.

So we are taking the liberty of advancing the "first listing" issue to the January '70 issue of *QST*. This will permit more leeway. Criteria will be announced in the next (October) issue and Honor Roll reporting to SCMs would commence with October activities.

Meanwhile, we are getting some mighty useful and helpful comments in reply to the July *QST* inquiry (p. 63). You may be interested in the direction some of them are taking, although by the time you read this it will be too late for your comments to have any effect on *initial* criteria.

Nearly everyone agrees with the basic concept — that of giving credit to functions in traffic work other than originating, receiving, relaying and delivering messages. There is more divergence, however, when it comes to consideration of specifically what functions should get how many points — and how many should be required to "make" the Honor Roll. There have been (disappointingly) no suggestions for a name, so it looks as though ARPC Honor Roll is satisfactory to all (except the undersigned, whom it leaves cold). Most commenters agree on the basic point functions — reporting into nets, being NCS, being liaison, handling phone patches, participating in emergency communications. The majority seem not to favor *any* points for handling traffic or making BPL, preferring to keep this as a strictly separate function. Most of those commenting have also mentioned that they felt 10 points, on the basis outlined in July *QST*, was entirely too few,

that the Honor Roll should be harder to attain than this.

WB2YEE suggested five check-ins be required for the first point and an additional point for each check-in thereafter. WA6LFA suggested that operators be penalized for having *too many* obligations, the idea here being to discourage "iron men" and encourage versatility by limiting the number of points that could be gained by any one type of function. K4KNP says "it would be foolish to omit traffic volume as a factor in either (i.e., either the BPL or the new Honor Roll) and equally inane to include it in both." He proposes that we simply "correct the inherent inequities in the BPL." W0LCE says our proposal makes the Honor Roll far too easy, that the required points per our July *QST* basis should be at least 50. WA3JDT feels that one point should be added for reporting to the SCM. W4OYI wants it limited to ARRL appointees, and asks that we take pity on the poor SCMs. W1LE suggests a point or two for editing or publishing a net bulletin.

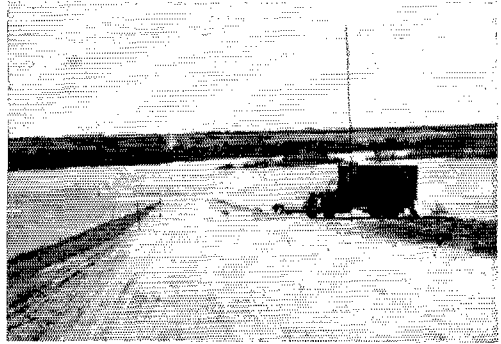
Other suggestions include such things as limiting the number of points that can be racked up on both c.w. and phone — so that a strictly-phone or strictly c.w. trafficker, for example, can get only, say, two points a month for NCSing, while an operator using both modes might be able to get as many as four. Another suggestion is that we limit the point system to NTS, at least as a beginning. Still another is that we grant a set number of points per month for "making" BPL, regardless of the total.

So the input of ideas and suggestions has been heavy, and this is as it should be. That the suggestions do not show any great degree of unanimity (except for approval of the basic concept) is not surprising. The next step is to make the decision as to just what sort of functions should be given points, based on the comments received, how many points for each type of function, and how many points will be required to make the Honor Roll. After that, SCMs must be informed exactly what is expected of them and any special forms required devised and distributed. Then the *QST* announcement of criteria. Meanwhile, here at the Salt Mine, we'll be buzzing about administrative procedures for han-



WA0UNS, left, and WA0JRA operated from the Granite Falls (Minn.) fire hall for two weeks during the flooding. WA0NQH and WA0VHU also helped out at WA0JRA/Ø. W0HPN operated a station at Clarkfield, W0QEI operated from Marshal and W0GBF was in Montevideo. All of the stations helped supply vital river stage information.





The Mouse River west of Sherwood, N. D., overflowed its banks during the floods. Photo at left shows EC WA0UKD (left) and K0MSP in the van from which hourly river level reports were sent for thirteen days. Right photo shows the flood waters surrounding the WA0UKD/D set up. (USDA photos.)

dling the whole matter and *QST* format for presenting it monthly as a box somewhere in this column.

A lot of ruckus for a simple *QST* column? You said it, and this is one of the reasons it has been so long coming. Both the SUMs and the headquarters have more than they can handle now, without this additional load; therefore, it must be set up precisely and work smoothly. No doubt experience will indicate some changes as we go along, so whatever system is set up should provide for it.

One thing is for sure, this new Honor Roll will have to be conducted 100% on the honor system. You say you were NCS of a net, we believe you; we don't conduct fullscale investigations to determine whether or not you are cheating or lying. Therefore, those without honor are requested not to participate. The surest way to kill the whole idea is for accusations of loading monthly point scores and demands for investigation to start flying. If we keep it strictly on the up-and-up, this will not happen. If not, may those who make the Honor Roll by fraudulent claims get the amount of satisfaction they deserve out of the "achievement." — WINJ.M.

**National Traffic System.** W1EFW reports that vacations are beginning to cut into 1RN schedule and that with the absence of the high school and college crew things are kind of rough. W2FR says 2RN will look better the rest of the year; that is about the only direction things can go. Third Region is just about holding its own according to manager K3MVO. Had a nice visit with Pres when he dropped into headquarters a few weeks ago. Beginning August 31, 8RN will be using 3636 kHz. according to W8CHT. W9HRY wants to know how often a Region Net has been controlled by a mobile station. Bob also issued a 9RN certificate to WA4VUE. EAN manager K2KIR is disappointed at the low traffic, poor representation and the fact that EAN went below a 1.0 rate for the first time in two years. CAN has begun using 7090 kHz. as regular frequency for the summer months. W6VNU has resigned as manager of PAN after several years of leadership; W6BNX has taken over the post.

In addition to the above comments, nearly all the managers mentioned the poor conditions, the early start of the QRM season, etc. Cheer up, gang. Things could be worse!

**June reports:**

Net	Ses-sions	Traffic	Rate	Aver-age	Represen-tation (%)
1RN	60	371	.299	6.2	90.7
2RN	60	429	.570	7.2	96.7

3RN	60	546	.417	9.1	99.6
4RN	47	348	.333	7.4	69.4
RN5	60	457	.325	7.6	86.7
RN6	60	787	.646	13.1	96.7
RN7	56	313	.358	5.6	31.1
SRN	58	332	.304	5.7	88.3
9RN	54	523	.490	9.7	89.4
TEN	56	320	.351	5.7	56.8
SCN	53	170	.234	3.2	74.9
TWN	54	143	.180	2.6	53.0
EAN	30	1282	.912	42.7	93.3
CAN	30	912	.729	30.4	100.0
PAN	30	954	.892	31.8	100.0
TCC Eastern	120 <sup>1</sup>	886			
TCC Central	90 <sup>1</sup>	491			
TCC Pacific	120 <sup>1</sup>	815			
Sections <sup>2</sup>	1921	10079		5.2	
Summary	2689	20,158	EAN	13.9	—
Record	3242	23,817	1,149	15.9	—

<sup>1</sup> TCC functions, not counted as net sessions.

<sup>2</sup> Section and local nets reporting (55): GSN (Ga.); NCN, SCN (Cal.); TTN, TEX (Tex.); ILN (Ill.); GN, VBN, PNTN, WFPN, TPTN, QFN, FPTN (Fla.); KTN (Ky.); VSBN, VN (Va.); BUN (Utah); WSN (Wash.); OZK (Ark.); SSZ, OLZ (Okla.); QIN (Ind.); MDCTN (Md.-D.C.); RISP (R.I.); QAIN, WSSB (Mich.); NCNL, NCNE (N.C.); OSSB, BN (Ohio); MSN, MJN (Minn.); WMN, EMIN, EMNN (Mass.); CN, CPN (Conn.); NYS (N.Y.); WBSN, WSSN, WLN (Wis.); PPTN, EPAEPTN, EPA, PFN (Pa.); QKS (Kans.); OQN (Ont.-Que.); LAN (La.); AENB, AEND, AENMI, AENR, AENT (Ala.); TN (Tenn.); BCEN (B.C.).

**Transcontinental Corps.**

**May Reports:**

Area	Func-tions	% Suc-cessful	Traffic	Out-of-Net Traffic
Eastern	120	91.6	1397	886
Central	90	92.2	1060	491
Pacific	120	95.0	1630	815
Summary	330	92.9	4087	2192

The TCC Roster: Eastern Area (W3EML, Dir.) — W1s BJG NJM YKQ, K1ESG, W2s FR GKZ PU, K2RYH, W4s GHN BLV UWA, W3EML, N3MVO, W4s NLC SQO UQ ZM, K1KNP, WB4DX, K6CAG/1, K8KNQ, W4s POS ZOC, VE3GI, Central Area (W0LXC, Dir.) — W4GG, K4AT, WB4AN, W5s MI RHF, W9s CXY DND VAY ZHN, W1As BWY RAK VZM, W0s HI INH LCX, K0AEM, W1As IAW MLE RVR, Pacific Area (W7DX, Dir.) — W0s BGF BNK EOT IPC IPW VNQ VZT, K6DYX, W1As BRG LFA ROF, WB6HVA, W7KZ, K7HLL, WA7CLF, K0JSP.

**Public Service Diary**

Elsewhere in this issue is presented an article on how amateurs in Minnesota, North Dakota and Wisconsin prepared for floods that were sure to occur during the spring thaw. Of necessity, this general

description excludes many of the details of local operations. The Diary will give further information as it was received from SECs and ECs on the state and local level.

Preparations for the possible flooding in North Dakota began in January, but it wasn't until March 21 that the Army Corps of Engineers issued the first list of river level monitoring sites. More than half of the first 48 sites, located in the Red River Basin, were soon covered and reports were beginning to file into Corps headquarters. Another list of thirty sites was soon issued making a total of 78 river level gauges of which 56 were monitored.

In some cases readings were telephoned to amateurs, but in most instances the hams made the daily readings themselves. The readings were increased to three times daily and eventually many were read hourly. For five weeks the readings continued.

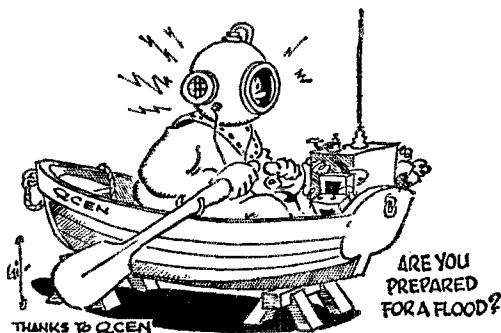
The Red River of the North is one of very few rivers in the U. S. that flows northward. When the ice and snow melts in the south, the northern reaches are still frozen, causing much ice jamming and flooding. The first area to be hit was the Wahpeton, N.D. — Breckenridge, Minn., area. Hourly readings were originated from the area by a group of amateurs headed by WØLW and KØGGL.

At Abercrombie, N.D., where the Wild Rice River flows into the Red River, WAØRWM maintained her station, practically isolated by water, for more than a week, the river at that point being estimated at nearly thirty miles wide. Operations then shifted to the Fargo-Moorhead, Minn., area where record-breaking crests eventually passed. KØSPH maintained his home station with the help of WØRRW and KØQYP while KØKAG manned the Civil Air Patrol communications van. At Fargo, amateurs also sent river information to the Weather Bureau. At Grand Forks, WAØJXT/Ø was operated from a CAP van and served as a relay point for traffic destined for Fargo and St. Paul.

When the Souris River overflowed its banks at Minot, KØAJW, the Minot ARC station, was immediately activated. A number of portable stations, manned mainly by Air Force personnel, were set up



Left to right, WØTK, WØCSC, WAØJIW and WØCXM at Mankato, Minn. Emergency rigs on 80, 40, 6 and 2-meters were installed at Red Cross Headquarters with backup units at Civil Defense Headquarters and at the Lehillier Flood Control Center. Everything was in readiness, but fortunately no emergency developed in the Mankato area. (Red Cross photo.)



in the "boondocks" to give hourly readings along a 150-mile stretch of river.

It should be noted that in North Dakota there is a very strong RACES program while in Minnesota the AREC is dominant; thus the flood operation is the perfect illustration of two groups cooperating in a common cause. — WAØAYL, SEC North Dakota.

Operating within Wisconsin are three major phone traffic nets all operating on the same frequency. When the necessity for a special communications system arose, it was decided that the existing nets would be helpful for delivering traffic, but that a separate net should be set up so normal operations would not be completely disrupted.

The Wisconsin River Traffic Net began operations on 3990 kes, on April 4 and remained active until April 18, although when the North Dakota Net (on the same frequency) went on 24-hour emergency operations, a change in frequency to 3980 was made to avoid interference. By the 18th, Wisconsin river levels were nearly back to normal and gauge readings were no longer required.

WØKYG and WAØEJ handled direct liaison from the Wisconsin net to St. Paul Corps headquarters while WØESJ, WØIRZ, KØTWE, WAØJOV and WAØSUY kept in touch with the American Red Cross. — WØESJ.

Overall coordination for the flood effort was handled by WAØMZV, Minnesota SEC. Outstanding cooperation was given by both the Wisconsin and North Dakota SECs, WØNGT and WAØAYL, as well as by the Minnesota Army MARS Director, WØBBY. A control station to monitor both amateur and MARS frequencies was set up at the Army Corps of Engineers office in St. Paul. The call WØAA/Ø was used and the station was on the air 18 hours a day from March 26 to April 19 under the direction of WAØMIQJ. Much traffic was routed directly to the control stations, but WØKYG, KØMVF, KØSPH, WAØEJ and WAØVAS picked up some traffic from various nets in the tri-state area.

WAØMZV made a tour of several of the hardest hit areas. The first stop was at Chaska where WAØRWT, EC of Carver County, was on the scene working closely with city and county officials. Additional communications were needed between Chaska and Carver so WAØDWM, the VHF-PAM of Minnesota, was contacted. In a short time a group of operators were on the scene and dike watch patrols were started.

At Granite Falls, WAØJRA and WAØUNS were operating from the town fire hall for the second week



Several Section Emergency Coordinators met with West Gulf Division Director W5EYB on April 12. Left to right are W5JSM, North Texas; WA5FSN, Oklahoma; K5QQG, South Texas; and Director Albright.

of 24-hour-per-day operations. Communication was supplied for civil defense and city and county officials as well as for the Corps of Engineers.

At Montevideo, Corps personnel were making hourly checks on river conditions while amateurs relayed the data to St. Paul. It appeared as if things were quieting, but it was learned that Minot, N.D., was about to be inundated by flood waters. Arrangements were made to supply a.c. generators to the area so remote stations could be set up.

In all, more than 330 amateurs participated in the flood control operation in the tri-state area. — W0PAN, SCM, Minnesota.

Soon after the request went out for communications at Carver, W0KGW, W0HWY, K0HAQ and WA0DWM were on the way with two mobile stations and emergency equipment. One station was set up at Carver C.D. headquarters and a second station was set up at the Chaska Sheriff's Office so direct communications could be established. Regular shifts were set up for operators of the various stations. The operation continued for four days after its April 12 beginning. — WA0DWM, VHF-PAM, Minnesota.

No fewer than sixteen reports of car accidents in which amateurs were of assistance have been received from VE2ALE, SEC Quebec, covering the last few months. There is no intention to belittle the fine work being done by these dedicated amateurs, but it would be repetitive and wasteful of valuable space to summarize each of the incidents in this issue. Keep up the fine work!

At 2050 GMT on May 10, W8OUU, SEC Ohio, was contacted by W8ILC to report that a tornado had struck at Monroe, Ohio. The Ohio SSB Net was immediately called into emergency session and the Buckeye Net was alerted to stand by. The storms were apparently limited to a relatively small area between Cincinnati and Dayton.

The SEC contacted the Cincinnati Red Cross through the Queen City Emergency Net, notifying them of the damage and possible injuries. Red Cross requested amateurs on the scene. WASYRE and W8CKB left for the two areas of known damage. Later the two amateurs helped summon and direct Red Cross Canteens from Hamilton and Middletown to the disaster scenes. OSSB remained in emergency session until 2245 when the normal session was to begin. More than twelve amateurs participated in the operation. — W8OUU, SEC Ohio.

At 1530 GMT on May 11, WA0MZW, SEC Minn., was contacted by W0TLE. Two men had started across Lake of the Woods in a small boat, from Kenora, Ont., to Warroad, Minn. and were long overdue. The Royal Canadian Mounted Police were requesting communications aid in the search.

Eventually, airplanes were used in the search for the missing boat, while amateur radio was used to keep the authorities in touch. The search was ended at 2050 when the two men were found off Oak Island suffering from exposure, but otherwise well. The boat was wrecked. — WA0CEL, EC Koochiching Co., Minn.

During the first heavy rain of the season, on May 19, Wonderland, a suburb of Columbus, Ohio, became partially flooded. AREC and RACES organizations were alerted for possible service. K8EHU manned the emergency operations center while W8ERD proceeded to Wonderland carrying 6 and 10-meter gear and other emergency equipment.

A number of homes were evacuated using amphibious "ducks" provided by the civil defense. A station using an emergency generator was set up to furnish communications for the rescue service, civil defense and to facilitate vehicle dispatching.

By midnight, the rain had stopped and the waters had crested. All homes in immediate danger had been evacuated, so the emergency was declared over. — W8ERD, EC/RO Columbus, Ohio.

On May 23, K2QBW answered a "CQ W2" on 14 Mcs. c.w. by CE3AET in Santiago. A six-year-old girl was in need of some medication that couldn't be located in Chile. The manufacturer of the drug was contacted and it was learned that there was a supplier in Chile who had a small supply of the medication. Armed with the name of the supplier, CE3AET was recontacted, the information was passed and the medicine was obtained. — K2QBW.

On May 24, WA5ROW came upon an accident in which a car had collided with a gasoline tank truck near Espanola, N. M. The Espanola Fire Department had exhausted its supply of foam necessary for fighting the blaze. K5QIN and W5NDW were contacted on 2-meter f.m. and arrangements were made for the Los Alamos Fire Department to send a supply of foam to the fire which was then quickly extinguished. — K5QIN, Asst. EC, Los Alamos, N.M.

Thirty-seven SEC reports were received for the month of May representing 14,598 AREC members. This is a whopping seven fewer reports and nearly 2500 fewer members than in 1968. What did we say about things looking up? Sections reporting: Ala, Alta, Ariz, Ark, Colo, EFla, EMass, EPa, Ind, Iowa, Kans, Ky, Mar, Mich, Minn, Mo, Mont, Nebr, Nev, NLI, NTex, Ohio, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, and WNY.

Independent Net Reports:

Net	Sessions	Check-ins	Traffic
All Service	5	68	48
Northeast Traffic	30	366	659
Hit and Bounce	30	334	459
7290	42	1485	1678
Mike Farad E & T	25	278	233
Eastern U.S. Traffic	29	109	63
20 Meter ISSB	22	420	8076
North American SSB	25	545	876
Clearing House	25	323	102



# AMATEURS IN THE SPRING FLOODS

BY LARRY J. SHIMA,\* W0PAN

**I**n any emergency operation, the background of organization is as important as the actual communications performed. In Minnesota, the job done by the amateurs was not just spontaneous. Its general theme was outlined far ahead of time.

It all started with the appointment of Harley Hicks, WA0MZW, as ARRL Section Emergency Coordinator for Minnesota, in late 1968. Minnesota is subjected to quite a few vagaries of nature each year. These severe weather conditions necessitate the availability of auxiliary communications. Harley contacted state and local officials to determine how we could best help them. Even the governor was contacted. Through these discussions it became quite apparent that the most urgent problem facing the citizens was the spring floods which were being predicted as record breaking.

## Telephone Back-Up

Discussions with the St. Paul District, Army Corps of Engineers, revealed that during the 1965 floods the telephone system into Corps Headquarters became so entangled that vital information became hopelessly delayed. Regardless of the number of phones installed, the overall system just couldn't handle the load. The Corps asked if we amateurs could provide a backup communications system for them.

A list of amateurs in key cities in the state was collected and a plan developed. A field engineer would call the amateur and would then be phonepatched to a station set up at Corps headquarters in St. Paul. This was the backup that they needed. The state Army MARS director assisted the SEC in this venture.

## River Gauge Readings

Shortly after this the chief hydrologist for the Corps called the SEC and posed another problem. During previous floods, the Corps provided river level readings to the U. S. Weather Bureau in St. Paul. From these readings, the Weather

\*Section Communications Manager, Minnesota.



No. Dak. SEC Dave Beach, WA0AYL (l.) discusses tactics with Polk County (Minn.) EC WA0AVE (middle) and Grand Forks County EC K0RSA, with flood waters in background. That's WA0LZD rowing the boat to his flooded home.

Bureau issued predictions as to flood crest height and arrival times at various down-river locations. The Corps needed assistance in terms of manpower in securing readings at a few essential gauges so accurate predictions could be made. Thus, Task 2 was formulated.

This was quite an undertaking. When I took office in mid-March we had a total of twenty county emergency coordinators and a handful of active AREC members. I published a letter to all ARRL members in the state soliciting volunteer assistance in this major task. Along with the letter, we sent AREC application blanks. The response was tremendous; within two weeks we had over 200 new AREC members who were ready, willing and able to provide the service needed. During the 2-week interval, the SEC recruited ECs in the counties where the flood levels were expected to be most severe. The SEC printed a set of instructions on how to read

*The purpose of this article is to explain what the amateurs in Minnesota recently accomplished in the public service area in cooperation with amateurs in North Dakota and Wisconsin. It is hoped that the reader may gain a few ideas to use in his area to further the public service capability of the amateur.*

the various types of gauges and provided sample message formats. Liaison was established with the SECs in North Dakota (WAØAYL) and Wisconsin (W9NGT). A concerted effort was just about underway, with tri-state cooperation. Basically our plan was to read the river gauges and report the results to the Corps in St. Paul by formal message.

Keys to unlock the various river level gauges had to be sent out to our volunteer "readers." The first 100 or so didn't fit quite right (Murphy) so with a little amateur ingenuity and the assistance of some files, most of the keys were made to fit. Typical of our initial readings was the comment of WØBUC: "First, the Department of Fisheries at Brainerd gave the highway patrolman assigned to take the reading the wrong key. Today the patrolman has the right key. If he doesn't have any difficulty taking the readings and recording them, I should be able to send my first daily reading today on the noon MSPN net."

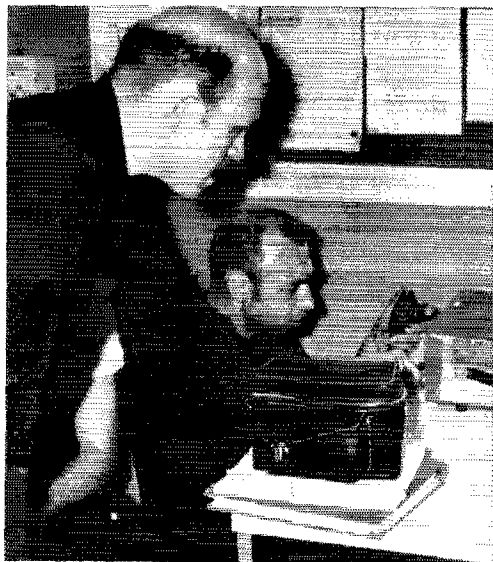
During the early stages of our river level reading project, the paperwork was extremely heavy. Hundreds of letters were sent out, the message traffic increased significantly on all section nets, and we even resorted to "landline" use where necessary. Of all the amateurs contacted for specific help, only one flatly refused. By the end of March when the spring thaw was just beginning, we had 70 percent of the 170 gauges in Minnesota covered. During this early stage all the traffic was routed to the Twin Cities on the section nets. Four stations picked up the traffic and phoned it to Corps headquarters.

#### Outside Assistance

While we were getting organized in Minnesota, Dave Beach, WAØAYL, the North Dakota SEC, had mustered his AREC organization and within a few days had 85 percent of the 200



WAØJXT/Ø inside the communications trailer at Grand Forks, No. Dak., was manned 24 hours per day from April 10 thru April 19. Operators are WAØRFG and WAØOVV.



The portable station at Carver, Minn., was operated by WØKGW (1.) and KØHAQ.

gauges in North Dakota covered. (What a difference when you have a going organization!) At the same time, Sherman Carr, W9NGT, the Wisconsin SEC, had most of his sites covered in a few days. Some of the Minnesota gauges were located in an area close to the North Dakota border, so Dave took responsibility for them. Information on these sites went to Fargo and St. Paul. Arrangements were made to have Minneapolis/St. Paul amateurs check into the other state nets to pick up the traffic. As the number of readings increased, a station was set up at Corps headquarters in St. Paul.

#### WØAA/Ø

Some of you may have heard WØAA/Ø operating on 3910 kHz. Jim Bristol, WAØMQJ was responsible for maintaining the operating and operator schedules at this station, which was on the air from 0800 to 2200 (or longer when necessary) 7 days a week. Two operators were on duty at all times: one to log and one to operate. This station also monitored the Army MARS telephone backup system.

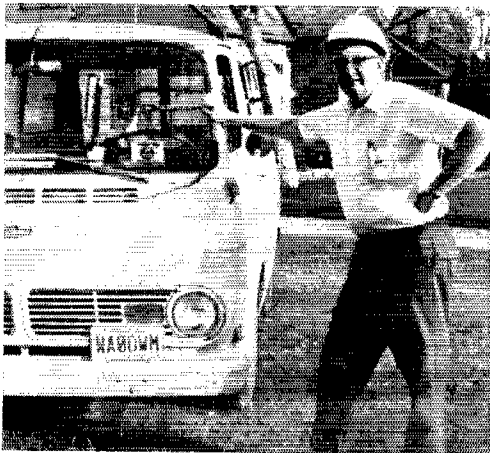
WØAA/Ø had a few problems. The first "shack" was located across from a bank of telephone company relays and the noise level was too much, so the "shack" was shifted to another location. The antenna was located about 200 feet above the street level, great for DX but not so good for local work at times; so relay stations were used.

#### Relay Techniques

A little amplification of the relay techniques is in order. For example, Otis Rood, WØDFP, read a gauge on his way to and from work each



The crew that manned Forx Amateur Radio Club station WA0JXT/Ø in Grand Forks, No. Dak., consisted of (l. to r.) WA0RFG, WA0AVE, WA0OVW, WA0OFZ, WA0AYL (SEC No. Dak.), W0DM (SCM No. Dak.), WA0BIT, K0RSA, W0TUF. Also active but not in picture were WA0TXZ, WA0TYA, K0OSL and W2BJT.



EC Ron Clabo, WA0DWM, alongside his emergency communications vehicle.



Harley Hicks, WA0MZW, SEC of Minnesota, was presented with a certificate "in recognition for devoted performance of duty, unusual cooperation, and individual contribution in support of the 1969 Flood Emergency Mission." Presenting the award is Colonel Richard J. Hesse, Commander of the St. Paul District, Army Corps of Engineers.

day; he gave the information to his secretary who in turn phoned the report to W0HEN who in turn passed the message to W0AA/Ø. The 70 year-old father of WA0LAC (EC Swift County) placed himself in personal danger while reading a gauge that was under water; his relative readings were extremely valuable to the Corps. K0GYO (MSTN manager and PAM) tied a rope around his waist to read one gauge. In another part of the state a sheriff read a gauge while on patrol and relayed the report to his dispatcher who in turn phoned the information to an amateur who transmitted the message to the Corps. This same type of relay technique was accomplished with CB operators relaying to base stations.

In the true sense of the word amateur radio operators, Army MARS operators, and CBers performed a public service that helped prevent property damage and personal injuries through an early warning system. Only the people living in the path of flood waters can adequately explain how much this advance information meant to them personally.

How did the section nets respond to this significant increase in traffic load? To quote WA0VAS (traffic count 1356 in April): "It didn't take long to learn the right way to handle traffic — bad technique would have stopped the whole show." Many of us learned a lot from this experience and are better operators for having become involved.

During a "breather" at Chaska, Minn. are (l. to r.) WA0DWM, W0HWY, K0HAQ, W0KGW and WA0RWT (EC).

## More Floods

Just as we thought the flooding was under control and the rivers were dropping, Minot, North Dakota, began to have the worst flood since the early 1900s. Arrangements were made with the Strategic Air Command to have twelve amateurs released from their official duties to help civil defense and Army Corps of Engineers personnel with communications. In cooperation with the Naval Air Station in Minneapolis a C-54 was flown to Minot with essential a.c. generators. Amateurs set up portable stations in remote areas and provided continuous gauge readings to officials in Minot. This was done 24 hours a day for two weeks.

### Summary

While the results of our efforts cannot be precisely measured, suffice it to say that over 300 amateurs in three states operating as a team read 383 river gauges daily for thirty days for a minimum total of 6,000 messages. Over 3200 pieces of traffic were handled by W0AA/Ø with the rest being handled by relay stations calling in direct. These amateurs had the fortitude to get involved and can be personally proud of what they accomplished.

The secret to our success? Very simple — ask an amateur to do something *specific* that will help his neighbor and you will have a willing hand when you need him.

Additional details on the AREC efforts during the floods are covered in the Amateur Radio Public Service column in this issue.

### What Next?

We in Minnesota are presently working up a severe weather warning network that will provide specific local weather information to the U. S. Weather Bureau with supplementary weather data that can help improve the severe



DEPARTMENT OF THE ARMY  
ST. PAUL DISTRICT, CORPS OF ENGINEERS  
1210 U. S. POST OFFICE & CUSTOM HOUSE  
ST. PAUL, MINNESOTA 55101

IN REPLY REFER TO  
NCSDE

9 May 1969

Mr. Harley B. Hicks  
11316 Harrison Road  
Minneapolis, Minnesota 55431

Dear Mr. Hicks:

This is to express my sincere appreciation for the invaluable contribution you made to the St. Paul District, Corps of Engineers, in the recent flood emergency on the Upper Mississippi River and Red River of the North during March and April 1969.

When you volunteered your services as Section Emergency Coordinator, State of Minnesota, American Radio Relay League, I did not fully realize the tremendous assistance and critical public service you and your organization were capable of rendering. Through your efforts, an emergency communications system, manned 24 hours daily, supported the Corps of Engineers, transmitting vital flood information to the Flood Emergency Center and relaying emergency messages essential to the success of "Operation Foresight". Expansion of the system to the states of North Dakota and Wisconsin, including "phone patching", provided complete and unusually prompt logistics for the Hydraulic Engineers in this office and enabled them, in turn, to furnish exceptionally accurate predictions of the rising flood waters so that the best technical assistance and advice could be furnished to all the communities concerned.

Please convey my appreciation to the owners and operators for their generosity in volunteering this valuable public service at the expense of personal sacrifice of time, money, and effort.

In recognition of your diligent efforts, a certificate is inclosed.

Sincerely yours,

1 Incl.  
as

RICHARD J. HESSE  
Colonel, Corps of Engineers  
District Engineer

The above letter from the district director, Army Corps of Engineers, to the SEC points out what the amateurs accomplished in the way of public service during the floods.

weather warning system. Weather intensity can be more accurately pin-pointed and forecasted based on these on the spot observations.

It's only a beginning! Watch our smoke. Where's yours? QST



### September 1944

... A goodly portion of this issue is devoted to the U.S. Army Signal Corps. Editorially, K. B. Warner starts off with the why and wherefore of these articles and leads one into a desire to read them even though they take up some forty pages! Here, starting with a message to all radio amateurs from the Chief Signal Officer, is all the dope explaining in great detail how the military communications networks function. This explanation, copiously illustrated with official photographs, should be of great interest to most amateurs and especially to those in the service who might wonder who the guy with the walkie-talkie is talking to and to what purpose. There is no doubt whatever about what the Signal Corps people think of the contributions of amateurs to the war effort: they've been doing a swell job. Of course, the other services, such as artillery, have their own networks but these articles give the whole picture. It is a first-class essay.

... Warner also talks about the formation of automatic relay nets on u.h.f., foreseeing the day when these may ex-

tend coast to coast. We know right now, of course, that two meter f.m. nets are functioning all over the country.

... Using 6V6GTs in a m.o.p.a. circuit, getting seven-watts output, Dawkins Espy, W6UBT, has still another WERS rig. He tells the story of its development and the tricks employed to get satisfactory operation out of this much-abused receiving tube.

... The ham bands are still not open and great hue and cry is being raised to find out why the Navy, which was in charge of communications during the war is holding off. Secretary Daniels is in Hawaii and assistant secretary Franklin D. Roosevelt promises to send him a telegram right away. It doesn't say just who called on FDR. All this, of course is itself from "25 years Ago" and has to do with WW1.

... "Tiny Tim," QSL-sized receiver was developed and is described by Paul J. Palmer, W8UGH. It employs but one tube, a dual triode called a 1D8GT. Everything is self-contained except the antenna.

... Many amateurs have been indiscriminately using the terms kw and kVA, as though they meant the same thing. Henry B.O. Davis, W4HZL, has a nice simple article with just enough math to explain that there may be a vast difference between the two and explains why power transformers are rated in kVas and not in Kws.

... A little note from George Bailey, President of the ARRL, posted in Washington, says, "From recent developments here, I firmly believe amateur radio will go back on the air after this war is over." The man was right — of course he didn't say just when. — W1ANA



**ARRL ROANOKE DIVISION CONVENTION**  
**Huntington, W. Va.                      October 10-12**

Summer's over. The 1969 conventions, ham-fests, picnics and such out this way are pleasant memories. There's one yet to go — The Roanoke Division get-together at the Hotel Frederick in Huntington, W. Va.

Cruise down the Ohio River, fly, drive, or bicycle to Huntington; enjoy the most unusual scenery; and meet the friendliest people in the country. We promise you a different type of convention. There will be the usual meetings, forums, displays and events but with the West Virginia accent and flavor. We've imported speakers and officials from throughout our division and borrowed from our neighboring divisions as well as from League Headquarters, but when it comes to fun and entertainment, that will be strictly from beautiful, wild, West by gosh Virginia!!

The fun starts Friday night for early arrivals. Free baby-sitter service will be provided so the ladies can go out too. Saturday, while the hams enjoy their favorite phase of the convention, the ladies will see lovely glass items blown and shaped into works of art right before their eyes; take a tour through 3 states in a matter of

**COMING A.R.R.L. CONVENTIONS**

- August 29-30 — Great Lakes Division, Louisville, Kentucky.**
- September 13-14 — Georgia State Convention, Augusta.**
- October 11-12 — Roanoke Division, Huntington, West Virginia.**
- October 17-19 — Southwestern Division, San Diego, California.**

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

minutes; visit a modern art gallery and just have a wonderful day with or without the children. (The baby-sitters will have color TV, movies and games to entertain the little ones. They'll also feed 'em for you.)

Complete advance registration is \$13. At the door — \$15. Contact Percy Hysell, W8SQO, P. O. Box 1295, Huntington, W. Va., 25715. Y'all come, ya hear?



**California** — The Monterey Park ARC picnic is scheduled for Sept. 21. Contact W6IDF.

**California** — The San Gabriel Valley RC Auction is October 7.

**District of Columbia** — See Maryland.

**Iowa** — September 14 — Third Annual Jester Park Hamfest sponsored by the Des Moines Radio Amateur Assn. For more information contact DMRAA, Box 88, Des Moines, Iowa 50301.

**Illinois** — The Peoria Area ARC will hold its 12th Annual Hamfest Sunday, September 21, at Exposition Gardens (same place as last year), located on the northwest edge of Peoria, Ill. Food will be available. Plenty of activities for the family, beginning with the campsite opening the preceding evening. Free coffee and donuts, 9:00 to 9:30 A.M. CDT. Free swap and shop section, parking, contests, cartoons for the kiddies, and the many eyeball QSOs. Registration is \$1.50 advance, \$2.00 at the gate. Write L. Ferrel Lytle, W9DHE, 419 Stonegate, Peoria, Ill. 61614.

**Illinois** — The Second 160-meter Reunion, sponsored by the Chiburban Radio Mobilers, will be held at the Joliet Beach Club on Rowell Ave. in Joliet, Ill. on Sunday, September 14. Food will be available on the grounds. For more information contact Barry Boothe, W9UCW, Route 1, Minooka, Ill. 60447 (tel. 815-462-5893).

**Kentucky** — The Blue Grass Amateur Radio Club will hold their Hamfest on September 21 at Lexington Trotting Track, South Broadway at Virginia Ave., Lexington, Ky. Plenty of food, auction, and more. 10:00 A.M. to 5:00 P.M. For more information write W4TPB, Blue Grass ARC, 341 Colony Blvd., Lexington, Ky. 40502.

**Maryland** — The annual Hamfest for the Washington, D. C. metropolitan area, sponsored by the Foundation For Amateur Radio, will be held at the Gaithersburg Fairgrounds in nearby Gaithersburg, Md., on Sunday, September 21, from 1000 until 1700 hours.

**Massachusetts** — The New England DXCC will hold its annual meeting Saturday, October 4, at Valle's Steak House, Route 93 at River Road, Andover, Mass. A fine

SEPTEMBER						
1969						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

program has been arranged and a choice of lobster or sirloin steak is available at \$7.75 per person. Members and guests welcome. For reservations contact and make checks payable to Robert A. Wallace, W1HHI, 146 Westford Street, Chelmsford, Mass. 01824.

**Michigan** — The Western Michigan University, Dept. of Physics and the Dept. of Engineering and Technology, in conjunction with the University ARC and the Student Chapter of IEEE, are sponsoring the 15th Annual V.H.F. Conference on Saturday, October 4 at the University in Kalamazoo. The program starts at 8:00 A.M. with a swap and shop. The program includes talks on v.h.f. topics including f.m. repeaters. Dinner is at 6:45 p.m. followed by the speaker, Mr. Dick Eberline from the Zerox Corp. who will give a demonstration and explanation of the "Telecopier."

**Ohio** — The 32nd Annual Stag Hamfest will be held September 28 at Stricker's Grove, Compton Rd., Mt. Healthy, Cincinnati, Ohio. Lots of food, flea market, model aircraft flying, contests. \$5.00 covers everything. For further information contact John Bruning, W8DSR, 6307 Fairhurst Ave., Cincinnati, Ohio 45213.

**Pennsylvania** — The Uniontown ARC will hold its 20th Annual Gabfest on the club grounds, Saturday, September 13. To get to the grounds, turn off Route 51 at the signs just north of Uniontown. Follow signs to the club grounds. Swap and shop cars please park in the front row to display your goodies. Free coffee. Registration is \$2.00.

**Pennsylvania** — The Skyview Radio Society is having its 9th Annual Hamfest and Swap-and-Shop on Sunday, September 14.



**Rhode Island**—The National Amateur Historical Radio Conference, sponsored by the Antique Wireless Assn., will be held on October 3 and 4 at the New England Wireless Museum, East Greenwich, R. I. OOTC meeting Friday p.m., continuous program Saturday with well known pioneers plus demonstrations of early equipment ending with a banquet and old time entertainment in the evening. Antique gear contests and auction Sunday morning. Send for program. Registration \$3.00. Registration, lunch, and banquet only \$11.00. Deadline September 30. Mail checks to Robert Merriam, Tillinghast Rd., East Greenwich, R. I. 02818.

**Texas**—The Texas Instruments Radio Club is planning a Hambozee and Swapfest for September 13 and 14 and it will be held at the Texas Instruments Activity Center located on North Central Expressway in Dallas. Activities will start at 9:00 a.m. and continue until 5:00 p.m. Registration is \$2.00 per person. Contact John Zagrodniak, W5LWH, 3823 Antiqua Drive, Dallas, Texas 75234.

**Virginia**—See Maryland.  
**Washington**—The Walla Walla Valley ARC will hold its 23rd Annual All-Family Picnic and Hamfest September 21, at Jefferson Park in Walla Walla. Swap and shop, games and awards and dealer's displays and the annual meeting of MINOW. Lunch will be served at 12:30 and will be pot-luck, coffee and punch furnished. Free registration all day. Talk-in frequencies are 3.960, 29.6, and 146.60 MHz. For more information write W8DP, P.O. Box 321, Walla Walla, Wash. 99362.

**QST**

## An Inexpensive Ten-Minute Timer

(Continued from page 41)

source. However, considering the timer's simplicity, cost and ease of operation, the unit is still completely adequate for its intended purpose.

### Some Possible Variations

For a more commanding visual signal, the relay points can be wired to connect a large lamp across the 115-volt ac line. Alternatively, a buzzer or bell can be actuated for an audible warning.

For the economy-minded, the price of a relay (about three dollars) can be saved by connecting a 2-volt, 60-mA pilot lamp (No. 49) and an appropriate series dropping resistor in place of the relay coil.

The SET-RESET/OFF function could be provided by relay contacts actuated by the send/receive circuits controlling a transmitter.

Relay points could be wired to control an automatic identifying device which, without operator intervention, would reset the timer to start a new interval at the end of a cycle.

The shortest obtainable time period using the voltage at the junction of  $R_3$  and  $R_4$  as the firing voltage is somewhat less than three minutes. A second potentiometer could be substituted for  $R_4$ , and a single-pole, double-throw switch used to connect the gate of  $Q_1$  to either the arm of the new control or the arm of  $R_5$ . This arrangement would allow the selection of either three- or ten-minute intervals.

**QST**

## June VHF QSO Party

(Continued from page 61)

W4FJ 1500-45-25-ABD	<b>ROCKY MOUNTAIN DIVISION</b>
W4KMS 144-16-9-A	
<i>West Virginia</i>	
W4RZLP 570-38-15-AB	<b>Colorado</b>
K2RTH/8 (4 oprs.)	
13,091-241-53-ABD	WA0SYS/0
W4SFSE/8 (4 oprs.)	W0AJY 2301-96-24-AB
2507-109-23-AB	K0CLJ 658-47-14-AB

WA0PHZ/0 (6 oprs.)	6405-133-35-AB
WA0SKL/0 (4 oprs.)	6068-161-37-ABD
W0TVK/0 (W0TVK, WA0-MJR)	4932-134-36-ABD
<i>New Mexico</i>	
K5EFW 4794-141-34-A	
W5LXR/5	1064-76-14-A
<i>Wyoming</i>	
W7VDZ	3990-133-30-A

### SOUTHEASTERN DIVISION

<i>Alabama</i>	
K4WHW 2737-119-23-A	
WB4GZW (W4KUP, WB4-GZW)	820-41-20-A
<i>Eastern Florida</i>	
K4AYO*	19,176-376-51-A
WB4BND	6498-171-38-A
W4OJU 3000-100-30-AB	
WB4HDZ	2976-96-31-AB
K4IXG 1342-61-22-A	
WB4LNH	1000-50-20-A
W4PBA	90-10-9-A
<i>Georgia</i>	
WA4NJP	11,328-236-48-AB
W4CAH	416-26-16-AB
W4ISS	54-9-6-B
<i>West Indies</i>	
WIHOY/KP4	1656-72-23-A
<i>Western Florida</i>	
W4SRX (K1WYS, opr.)	12,650-253-50-AB

### SOUTHWESTERN DIVISION

<i>Arizona</i>	
WA7BRM/7	3762-114-33-AB
WA7JTM	2222-101-22-AB
<i>Los Angeles</i>	
K6SSN 3197-139-23-AB	
W6QCV 2159-127-17-AB	
WB6UZY 1040-65-16-A	
WB6CGZ 342-38-9-A	
WA6TNK 200-50-4-B	
<i>Orange</i>	
K6YNB/6	3308-167-19-ABC
WA6FIT 360-39-4-B	
WB6YXY 300-60-5-B	
WB6PHO 112-28-4-AB	
WA6MKN 64-16-4-B	
K6BPC (18 oprs.)	11,136-440-24-ABCE
W6NGN (67 oprs.)	10,080-288-35-AB

<i>San Diego</i>	
W6QED 752-47-16-AB	
WA6COE/6	12-6-2-B
W6VON (5 oprs.)	2134-194-11-AB
<i>Santa Barbara</i>	
WB6QLY/6	96-24-4-B

### WEST GULF DIVISION

<i>Northern Texas</i>	
W5OQN 4862-143-34-A	
<i>Oklahoma</i>	
WA5OUU	5002-122-41-AB
K9DKW/5	2291-79-29-A
WA5WRC 760-38-20-A	
WA5LXT 300-31-10-A	
W5VTM	85-17-5-B
<i>Southern Texas</i>	
W5RAG	14,400-300-48-A
WA5IYX/5	6734-182-37-A
WA5PDD	4212-117-36-A
WA5ONI	4-4-1-B

### CANADIAN DIVISION

<i>Quebec</i>	
VE2JB/2	116-29-4-B
VE2BALH	32-8-4-A
VE2DFO/2 (5 oprs.)	16,240-278-58-ABCD
VE2RM (9 oprs.)	9600-187-50-ABD
VE2HW (3 oprs.)	1650-55-25-ABCD
<i>Ontario</i>	
VE3CTA 3276-91-36-AB	
VE3CRU/3	910-91-10-AB
VE3FIB (VE3S ASO EW FIB)	17,248-299-56-ABCD
VE3SAU (6 oprs.)	5538-142-39-AB
<i>Manitoba</i>	
VE4MA 1404-54-26-A	
<i>Saskatchewan</i>	
VE5AAA (VE5GG, opr.)	532-52-16-A
<i>Alberta</i>	
VE6OH 2100-84-25-A	
<i>British Columbia</i>	
VE7XF 1022-73-14-AB	
VE7ASM/7 (7 oprs.)	531-59-9-AB
<b>FOREIGN</b>	
XE2XN (K5HVC W5ETG XE2XN)	12,240-306-40-A

**QST**

## 1968 VE/W Contest Results

(Continued from page 64)

<i>Wyoming</i>		<i>Orange</i>	
	c.w.		c.w.
WA7FKD	6480-36-9-7-B	W6KNE	58,320-162-12-18-A
W7VJI	6000-25-8-7-A	WB6VYU	37,800-105-12-16-A
<i>phone</i>		<i>phone</i>	
K7QGV	6000-25-8-9-A	WB6VYU	3600-15-8-6-A
WA7FKD	450-5-3-1-A		
W7VJI	30-1-1--A		
<i>Santa Clara Valley</i>		<i>Utah</i>	
	c.w.		c.w.
K6CQF	63,720-177-12-15-A	WA7FBL	7290-27-9-5-A
WB6YNK	51,840-144-12-18-A		
WB6TNU	42,900-130-11-11-A		<i>phone</i>
W6GBY	12,540-38-11-10-A	WA7GWU	6090-29-7--A
<i>San Francisco</i>		<i>Check logs: c.w., W1JE, W2ICO, W3NB, WA8MCQ phone, W4-HOS</i>	
	c.w.		<b>QST</b>
W6BIP	35,880-138-13-14-B		
WB6YMW	14,100-47-10-17-A		

# Happenings of the Month

## ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1970-1971 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candi-



John Haungs, WA8STX looks on as Mayor Eugene P. Ruehlmann of Cincinnati, Ohio, signs the proclamation naming June 22 to 28 as Cincinnati Amateur Radio Week. Mayor Kenneth H. Morgan of Evendale, Ohio, and Mayor Philip S. White, Jr., of Forest Park, Ohio, similarly proclaimed Amateur Radio Weeks for their cities. The proclamation was sponsored by the AVCO Amateur Radio Club, the Evendale Amateur Radio Society, the Greater Cincinnati Amateur Radio Association, the Northern Kentucky Amateur Radio Club and the Queen City Emergency Net. Haungs is president of EARS, vice president of GCARA and treasurer of QCEN.  
(WA8COA/WA9FEW photo)

### OVERSEAS AND ABSENTEE BALLOTS

All ARRL members who are licensed by FCC or DOC but are temporarily resident outside the U.S. or Canada are now eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 20 will be able to vote this year where elections are being held.

Even within the U.S., Full Members temporarily resident outside the ARRL division they consider home may now notify the Secretary prior to September 20, giving the current QST address and the reason why another division is considered home (e.g., holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern, but your QST goes elsewhere because of a different residence, please let the Secretary know, as soon as possible but no later than September 20, so you'll receive a ballot for your home division.

date for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

#### Executive Committee

The American Radio Relay League  
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the ..... Division, hereby nominate ..... of ..... as a candidate for director; and we also nominate ..... of ..... as a candidate for vice-director; from this division for the 1970-1971 term.  
(Name Call City Zip Date)

The signers must be Full Members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No

person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or implementation, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 20th day of September, 1969. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 8 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Atlantic*: Gilbert L. Crossley, W3YA and Harry A. McConaghy, W3EPC. *Canadian*: Noel B. Eaton, VE3CJ and Colin C. Dumbrille, VE2BK. *Dakota*: Charles G. Compton, W0BUO and John M. Maus, W0MIBD. *Delta*: Philip P. Spencer, W5LDH/W5LXX and Max Arnold, W4WHN. *Great Lakes*: Alban A. Michel, W8WC and Charles C. Miller, W8JSU. *Midwest*: Summer H. Foster, W0GQ and Ralph V. Anderson, K0NLI. *Pacific*: J. A. Doc Gmelin, W6ZRJ and G. Donald Eberlein, W6YHM. *Southeastern*: Charles J. Bolvin, K4KQ and Albert L. Hamel, K4SJH.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1969

JOHN HUNTOON  
*Secretary*

## Herbert Hoover, Jr., W6ZH/K6ZH

With the deepest regret, QST must report the death, on July 9, of Herbert Hoover, Jr., W6ZH/K6ZH, 65, who was president of ARRL and the International Amateur Radio Union from 1962 to 1966.



"Herb" had an outstanding career in business, engineering and international affairs, culminating in service as Undersecretary of State during the Eisenhower Administration. He taught briefly at Harvard and California Institute of Technology; he was a founder and first president of Aeronautical Radio, Inc. ("ARINC," the non-profit corporation which handles communications for many airlines); a founder and first president of United Geophysical Company; and consultant to the government on petroleum problems, notably in the British-Iranian oil dispute of 1953-1954, to name just a few of his activities. His interest in education and the general public welfare led to his service as a director or trustee of the University of Southern California; Claremont Men's College; Freedoms Foundation; Boys' Clubs of America; the Business Council and the California State Chamber of Commerce. Scientific interests were partially expressed by membership in the American Institute of Mining Engineers; American Association of Petroleum Geologists; Society of Economic Geologists; Seismological Society of America and the Society of Exploratory Geophysicists.

Herb started in amateur radio at the age of 12 or so with a Ford spark coil, galena detector

### WHO THE DEVIL IS WHO?

17th in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	Was	Now	Was	Now	Was	Now	Was
W1KF	W1JHR	K4KB	W4LBU	K6EN	W6QIT	W8JC	W8GSE
W1MN	W1MPK	K4KI	W4ZXR	K6MQ	W4PJY	W8JP	W8UWN
W3TR	W3LGE	K4KX	W4FEY	K6OD	W6JAI	W8JS	W8SXQ
W3UN	K3GHF	K4LE	W4JFW	K6PJ	W6LMZ	W6JM	W6ARL
W3VG	W3KOA	W4UK	K4KXK	K6PQ	W6JAO	W6LC	W6OCN
W3VQ	W3BYF	W5LG	W5YXG	K6PV	W6WCQ	W6LH	W9ODT
W3YM	W3PSR	W5NM	W5NOH	W7PJ	W7YWA		

## Behind the Diamond Number 18 in a Series



Here "pursuing my favorite work" — that of representing ARRL at conventions, hamfests and radio club meetings — is "Mr. V.H.F.", Edward P. Tilton, W1HDQ, V.H.F. Editor of *QST* and author of ARRL's *The Radio Amateur's V.H.F. Manual*.

Ed received his license in June 1933 and headed immediately for the five-meter band. His first *QST* article, ironically, featured an "all-band" exciter — but of course including provision for 56 MHz. operation (July, 1938 — "Look for Me on — Kc."). Ed started ARRL's first regular coverage of the v.h.f. scene at the end of 1939 as a by-mail contributing editor of the column, "On the

Ultra Highs."

During World War II, Ed served as a naval radar field engineer. After the war he joined the headquarters staff as full-time v.h.f. editor. He continued to edit the monthly column under its new name of "The World Above 50 Mc." until 1960, but has kept a watchful eye on it since then.

W1HDQ holds 70 MHz. WAS No. 9 and was at the U.S. end of the first transAtlantic v.h.f. QSO on November 24, 1946, with G6DH at the other end. He has pioneered in tropospheric bending, sporadic-E skip, auroral propagation and meteor scatter; and was one of the more successful initiators of Oscar III.

All this v.h.f. work led to his appointment to Commission III (Ionospheric Propagation) of the International Scientific Radio Union, at meetings of which he has represented the ARRL for years. This year, the Western New York Hamfest and V.H.F. Conference conferred "Amateur of the Year" honors on Ed. That, incidentally, is where our photograph was snapped.

Ed has a well-equipped station for 50 through 432 MHz. at his home atop a hill in Canton, Conn., and operates as portable and mobile on 6 and 2 meters a great deal while on the road for ARRL; his wife Mildred has accompanied him on many tours in the past.

and Quaker Oats box tuning coil. Postwar he was assigned the call 6SR; and then 6ZH, 6AE, 6XH, 3ZH, W4SR and K6EV at various times.

His father, the late President of the United States, was never a ham himself, but gave strong support to the fraternity, especially when he was Secretary of Commerce in the early twenties. The "Hoover Bands" of frequencies established on a gentleman's agreement basis in the absence of effective national law are the foundation on which our current harmonically-related bands are based.

Herb resided in Pasadena, California and had a summer home in Carpinteria. He was active at various times on 160 through ten meters a.m., s.s.b., and c.w., and on two meters RTTY. A Charter Life Member of ARRL, honorary member of the Quarter Century Wireless Association and member of the A-1 Operator Club, Herb was also a strong advocate of international understanding and cooperation in amateur affairs, and of the idea that amateur radio is a great privilege, carrying with it the responsibility of service and competence in return.

Survivors include his widow, Margaret Watson Hoover; a son, Herbert III ("Pete", W6APW); two daughters, Mrs. William Vowles and Mrs. Richard Brigham (Margaret, WA3GTW; her husband is WN3KPT); eleven grandchildren and a brother, Allan.

## NOVICE QUESTION CHANGED

Study question 48 for the Novice examination has been changed to read:

"48. What two elements are most commonly used in the fabrication of transistors? What do the terms 'alpha' and 'beta' of a transistor mean? Draw the schematic diagram of a transistor."

This correction will be made in the next revision of the *License Manual* (63rd edition).

## GROUP STATIONS TO USE FORM 610-B

The Federal Communications Commission has produced a new application form to be used for club and military recreation stations. All such applications filed on or after September 1, 1969, must be on the new form 610-B. Individuals continue using form 610; editions dated earlier than July 1966 may no longer be used.

Section 97.41 of the amateur rules is amended to read:

"(a) Each application for an individual station license shall be made on the FCC Form 610, and each application for a club or military recreation station shall be made on an FCC Form 610-B." A similar phrase has been added to Sections 97.43(b) and (b) (6); 97.47 (a) and (b); 97.95 (a) and (a) (2).

## RULES FOR LIFE MEMBERSHIP

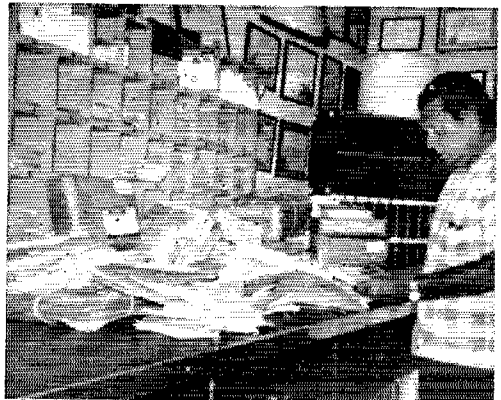
1. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
2. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
3. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
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.



Governor Calvin L. Rampton signs the proclamation for Utah's first Amateur Radio Week, June 30-July 6, 1969, citing hams for leadership in technical advancement and for unselfish community service. Looking on, from left, are: Jim Jorgenson, K7RAJ, prexy of Brigham Young University ARC; Tom Miller, W7QWH, Utah SCM; Jerry Peterson, W7LEB, president, Utah DX Assn.; John Sampson, W7OCX, Utah Army MARS director and Morley Naylor, W7CYH, vice president, UDXA. (Photo by K7DEQ)



For his work with the blind (see page 52), David Lloyd, VE3AW, won the RSO's 1968 trophy in memory of Clifford Marsh, here presented by Cliff's father Lloyd, VE3PT, right. Ken Andras, VE3UU, left, presents a Tippet Foundation check for \$3,000 to buy equipment for the "White Caners."



The QSL Bureau job demands a great deal from its volunteer operators. The stack of mail at right greeted Hurley O Saxon, K5QVH, when he returned from vacation. Pat Parrish, K4HXF sent us the photo at the left of a "dead file cleanup"—a reminder to all of us to keep an envelope on file with our ARRL call-area QSL manager!

# 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

## CURACAO EMERGENCY

During the recent emergency in Curacao, amateurs were able to provide much-needed communications channels. The following is an account by Bill Tavolga, WB2HBD:

"On May 30, many of the active PJs (PJ2CQ, PJ2CE, PJ2CR, PJ9HH, PJ2CA, PJ2VD, PJ9VR, PJ2CD) assembled on 21.336 MHz. to handle emergency calls. PJ2CE and PJ2CQ alternated as net controls, and WB4EHX in Sarasota, Florida, and myself (WB2HBD) and my wife (WB2GXT), served as U. S. contacts, and primarily monitored the frequency to keep it clear for emergency traffic. Telephone service on Curacao was partially and, at times, completely disrupted. PJ2CR went mobile to relay messages from the Red Cross station in Willemstad. For all intents and purposes, ham radio was the only contact Curacao had with the rest of the world for a period of at least 48 hours.

"For the emergency, the Curacao government relaxed its third-party restrictions to permit their hams to relay messages to friends and relatives to reassure them that visitors, tourists, etc. on the island were all well. These messages went mostly to the U.S., Netherlands, and Surinam, but other countries were also involved.

"After the 15-meter band closed, they shifted to 14.190, and occasionally one of the PJs moved up into the U.S. phone band to relay specific traffic. This went on at least through Sunday, June 1.



Here are several prominent figures in international amateur radio attending the recent ARRL National Convention in Des Moines. From left is K7UGA, pioneer of U. S. reciprocal operating legislation; WØDX, ARRL/IARU President; W5NW, ARRL/IARU Vice-president; and, EL2S, Liberian Radio Amateur Association President.

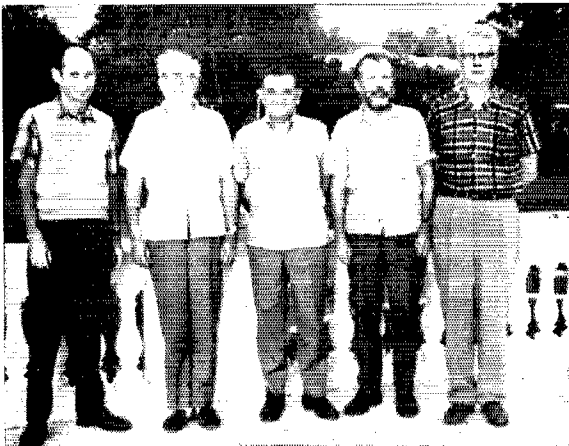
"I am certain that there were large numbers of U.S. hams monitoring the situation, and they certainly deserve a great deal of credit for their forbearance and their assistance when there was traffic to relay. Other hams also cooperated magnificently, especially the PAOs, since there were many Dutch who had friends and relatives in Curacao." — WB2HBD

## SOVIET COURTESY LICENSES

The *Radio Sports Federation* of the USSR reports that amateurs visiting the Soviet Union may apply for permission to operate there. Individuals interested in obtaining permission should write their IARU society (e.g. ARRL for U.S. and Canadian amateurs) who will in turn certify the application to *RSEF*. Applicants should indicate the dates and locations for which permission is sought. Permission will allow the operator to use his home call sign with a portable indicator.

## THAI BAN WITHDRAWN

The FCC has released the following information: "The ITU has been recently informed of the withdrawal of restrictions regarding radio communications between amateur stations in Thailand and those in other countries. Authorization will be granted for the Thai nationals only. However, for any foreign national a reciprocal agreement is required." This information updates the DX restrictions list which appeared last month.



Here in informal dress, are some of the IARU Region II (North and South America) executive committee at a meeting in Jamaica. From left are LU3DCA, XE1CCP, OA4AV, WØDX (dig that beard!), and VE3CJ.

## CONTESTS

The Pan Americano Peru 1969 Contest sponsored by the *Radio Club Peruano* will begin at 1200 EST, Saturday, September 27, and end at 2400 EST, Sunday, September 28. All bands from 3.5 to 28.0 MHz., a.m. or s.s.b. may be used; the contest is open to all amateurs in the Western Hemisphere. Count one point for each complete contact. A multiplier of 2 is given for each band used and each American republic contacted. Stations will exchange a five digit number consisting of a signal report (RS) and QSO number (starting with 001). Logs should be sent to the *Radio Club Peruano*, Manzana E-1, Urbanizacion el Palomar San Isidro, Casilla Postal 538, Lima, Peru.

## ARRL QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope, about 4½ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. **Boldface** indicates changes since last listing.

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

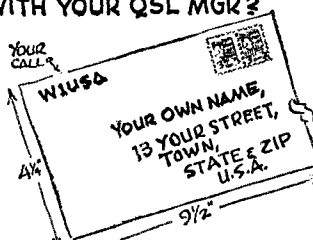
- W1, K1, WA1, WN1 — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.
- W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Bailey Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4 — H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4 — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 — Hurlley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.
- W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.
- W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 — Paul R. Hubbard, W8CXV, 921 Market St., Zanesville, Ohio 43701.
- W9, K9, WA9, WN9 — Ray P. Birren, W8MSG, Box 519, Elmhurst, Illinois 60126.
- W0, K0, WA0, WN0 — Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.
- KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.
- KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.
- KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S., VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
- VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

The Idserda Memorial H.f. C.w. and Phone Contest will be held from Friday, September 19, 0001 GMT until Sunday, September 28, 2400 GMT. All bands from 160 to 10 meters, a.m., s.s.b., or c.w. may be used. Participants call "CQ IDZ Test." Dutch stations will use the prefix PD3 for the contest and will transmit signal reports and contact numbers. Other participants need not transmit contact numbers. Each contact with a PD3 station counts one point per band. The object is to work as many PD3 stations as possible. Participants should submit a log showing date, time in GMT, station worked, band, mode, signal report sent and received and total points to: Traffic Bureau *VERON*, P.O. Box 9, Amsterdam, The Netherlands. **QST**

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.  
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's Newf.  
VO2 — Goose Bay Amateur Radio Club, P.O. Box 232 Goose Bay, Labrador.  
SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

These bureaus prefer 5 × 8 inch or #50 manila envelopes.

## IS YOURS ON FILE WITH YOUR QSL MGR?



## Strays

### Stolen Equipment

My Swan 400 was stolen from my apartment on New York's lower east side in June. Although the serial number is not available, the equipment did have a few identifying idiosyncracies. The loading capacitor plates rubbed over part of their rotation. The v.f.o. vernier rubbed slightly at one point of its rotation. There was occasionally some internal arcing when tuning up (due to some troubleshooting in the final amplifier box and not returning the parts back to their original positions). The v.f.o. tuning was off a few kHz., even when the tuning adjust button was positioned for closest tracking. The carrier null control was slightly noisy. A reward is offered for the return of the complete unit in working condition. Edmund V. Haffmans, K3VLD/2, 234 East 4th St., New York, N.Y. 10009.



# Correspondence From Members-

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

## MORNING CODE PRACTICE

☐ To me this is an excellent addition to your regular services. During the summer months I have a complete code-practice schedule. Wake up at 8:00 A.M. for an hour of W1AW code practice, return to my receiver at 6:30 P.M. for the half-hour practice, and the following bulletin, and finally retire for the night after an hour at the late session. It provides a pleasant schedule for me. Good job!—*Richard Bruder, WNSAZY, Dearborn Heights, Mich.*

☐ I would like to express my thanks. I am a senior citizen, and I think it goes for a lot of senior citizens who might like to hit the hay around the 0230 GMT practice time. I am retired and this gives me a little something to do.—*F. F. Percival, W2DP, Flushing, N. Y.*

☐ Those of us who have to be at work or other obligations at 9:00 A.M., or especially at 9:45 A.M. when 20–25 w.p.m. practice comes on, are unable to take advantage of this additional code practice. How about changing it to 1000 or 1100 GMT?—*R. L. Gale, WB2TFN, New York, N. Y.*

☐ The code practice sessions at 1300 GMT are a great help to us students. The transmissions on 7020 kHz. came through like a blockbuster and the low level of QRN and QRM makes it a joy to copy.—*Stephen Powlowicz, Philadelphia, Pa.*

## TEEN-AGE BOOKLET

☐ I am writing to comment on the revision that I understand is now planned for the ARRL introduction to amateur radio booklet. I got my Novice license at the age of thirteen with the help of League publications and the Henderson, Ky., ham club, so I am quite interested in training aids. Also, I now teach English Composition and World Literature at the University of Georgia, and am thus interested in teaching.

Here are my suggestions:

- 1) Use color despite expense.
- 2) Use plenty of graphics—photos, drawings, and designs.
- 3) Appeal to readers' idealistic natures.
- 4) Point up permanent vocational opportunities; use actual case histories with pictures.
- 5) Stress the "elitence" and honor of the amateur fraternity.

My suggestions could go on, but I think that this list may contain some keynotes that the young people (age 9–13) we are aiming at need to see. My plea for graphics and color is based upon my observations of a new, coming "eye" age that McLuhan and others too have seen. League publications tend, on the whole, to be 1940s in their "look." Even *QST* has that "last generation look" of dark photos, dull copy, and formal layout. . . .—*Charles Harpole, K4UVD, Bogart, Ga.*

☐ The League and its administration is too far removed from the younger people. I don't mean just the 12–16 age group; I'm including 0–25. If you want to do something for the young people why don't you ask *them* what to do instead of some bottled-up, half-conscious executive? Even the school teachers and Scoutmasters that you appealed to are too much removed from the younger people unless they are under 25. . . .—*Richard Kramer, WA1JVT, Sharon, Mass.*

☐ I'm no grey-haired Scout Counselor; my pimples are just beginning to clear. However, a "young squirt" might be of some assistance.

I have found that the most chronic anxiety a newcomer faces is how to get a rig. Homebrewing from scratch is almost impossible for someone who has had no prior experience with small projects and who is unable to buy exact parts. There is a solution to this dilemma which has not received much attention in either *How to Become a Radio Amateur* or in *QST*. I am referring to information on how to convert old s.w. and b.c. receivers for use in the 80- and 40-meter Novice bands. A good proportion of neophytes either have one of these sets in their own home or can obtain one from a junk yard. . . .—*Charles Schueck, WB2SEZ, Bricktown, N. J.*

☐ Being a member of the 12–16-year-old age group, I find it difficult to comprehend the need for an introductory booklet intended for my contemporaries. Any person twelve years or older, and many who are younger, is quite capable of reading and understanding *How to Become a Radio Amateur* and any other League publication. If not, he is certainly of below-average intelligence and would be incapable of obtaining an amateur ticket, anyway. The publication of this new booklet would certainly be an unjustified expenditure of League funds, and would be an unrealistic appraisal reflecting little faith in the intelligence of today's youth. . . .—*David Johnson, WB4JTT, Norfolk, Va.*

☐ . . . Encourage the beginner to see and talk to hams that live nearby. This can be one of the most useful experiences anybody can have. Perhaps the local radio club would be the place to go. Usually in a town of any size at all, there is at least one ham somewhere. All it takes is a little searching. . . .—*William Feist, III, WB8BZH, Portage, Michigan.*

☐ . . . About the introductory booklet for amateur radio directed at the 12–16 group—some of ARRL's past activities has created this need. These roadblocks are: the lack of articles covering beginner's projects, too much club and DX awards space, too few "Hints & Kinks," too few letters from readers. Look in this (July) issue—what is there that a beginner can grasp fully?—only the cartoons! Comic books (old ones) bring a \$1000 price—they carried a message! A pictured story is the only way to start with this age group.—*Robert Misenheimer, W4YKI, Durham, N. C.*



☞ Your standard publications appear to be too difficult and cause young minds to be discouraged quickly. — *G. Jerry Plotke, WA6TES, Scoutmaster, Los Angeles, Ca.*

☞ The biggest mistake you could make would be to "talk down" to these young people. I think we can visualize that these teenagers will be highly motivated, intelligent, with a scientific turn of mind, and with very high reading skills. With these general characteristics in mind, I feel that the booklet should be attractive enough to hold their attention and presented in doses small enough to make easy their assimilation. You should not be too afraid of presenting technical data. Many of these teenagers are extremely competent in the technical fields as is demonstrated at any high school science congress. The reading level used should be somewhat below that used in the technical articles in *QST* but above all, it should not be at a level that would appear childish to a bright teenager. — *E. S. Cook, Jr., W4OYX, Atlanta, Georgia.*

☞ . . . As for incorporating the teaching of code, I would say no to that. Learning the code is a boring, tedious task to most youngsters of this age. Some, I admit, pick it up so quickly and easily so it is no chore — in fact, fun — but they are the exceptions. Let them get the feel for the thrill of the game first. If it is great enough to "turn them on," they will get the code. . . . — *M. L. Peterson, W2FMX, Waterville, N. Y.*

☞ It is my opinion that a book covering 12-16 is a rather difficult thing. In these days of "generation gaps," it is very evident that there are also other gaps, one of which would certainly be between 12 and 16 years old. Those 15 and 16 are very close to adult thinking while 12, 13 and some 14s are still pretty much children. Not only do they travel in different circles but also attend separate schools. This would also pose a distribution problem. To appeal to the young group a book would have to stress the adventure, the mystery, the call of far away and strange places. The older ones would lean more toward the usefulness, the service, the technology and perhaps the pride of being an amateur. What I am trying to say is that there are two needs and perhaps two booklets would do better. . . . — *Frank Portune, WA6BCO, Gardena, Ca.*

## APOLLO 11

☞ With the idea of colonization of the moon, it may be appropriate to add the moon to the DXCC list and who knows, maybe a DXpedition in some future year will go there. — *John Bandy, WA0UTT, Wichita, Kansas.*

☞ On a hunch that 99.999% of the U.S. amateur radio population had deserted their ham rigs for the TV set during the period when our two astronauts were busy on the moon, I made a quick scan of the 20- and 40-meter bands at about 2300 EDST on July 20. Sure enough these bands, normally packed and hectic bands at this time of evening, were nearly empty. One foreign phone signal, followed by four U.S. s.s.b. signals, were between 14,200 and 14,350 kHz. On 40 meters, much the same story. Nothing on up to 7200 kHz., then a few scattered carriers including the usual foreign broadcast stations above 7200 kHz. Pretty spooky! — *B. B. Blackburn, Jr., W4TA, Vienna, Va.*

☞ It's a good thing AT & T filed its tariffs in January — before President Nixon called Tranquility Base, eh? — *Richard Wanat, W4SLX, Madison, Alabama.*

## JULY QST CORRESPONDENCE

☞ Please don't let Bonadio resign (page 90). Fire him immediately! — *Len Brenner, K3NPC, Malvern, Pa.*

☞ A misprint on page 91? The fellow from Coos Bay, Ore. — should the 4th letter of his last name have been a "w" vice "m"? — *Otto Freytag, K4QFM, W. Palm Beach, Fla.*

## W6ZH

☞ It is with great personal regret that I note that Silent Keys will record the passing of W6ZH/K6ZII. It has been my deep pleasure to have known Herb for some 40 years. It will be impossible to chronicle all the things he did for amateur radio. We will all miss his counsel and interest in our hobby.

We are all much better off for the interest in his hobby and in all of us. — *Douglas Watson, W6DW/W6VW, Palo Alto, Ca.*

## THE "SILENT" MAJORITY

☞ In renewing, I express a deep conviction which for the past years I have not mentioned often enough. It is more than gratifying to know there are these people who know what a democracy truly stands for, and, what it takes to keep a democracy just that — a democracy! That minority which invokes to force its will upon the majority surely must not realize the very thing they are professing to improve; by their own selfish, self-righteousness and narrow-sightedness they will destroy.

Keep up the unselfish work and leadership; the majority are behind and beside you. — *Marvin Bronstein, K2VHW, South Plainfield, N. J.*

☞ Here is my renewal. Please keep in mind that there are a lot of us that have been amateurs for a long time but do not write often who wish for you to do all you can for the best interest of amateur radio and to uphold our high standards on the air as well as off. — *James Taylor, W5CLT, Abilene, Tx.*

☞ In renewing, I say thanks for another FB year — from those of us in the silent majority. — *Thomas W. Gloystein, W8PBU, Cincinnati, Ohio.*

## FUGITIVE INK

☞ For most of us, it takes a long time to earn awards like DXCC. Therefore, a QSL must be of permanent nature to keep its record intact over a period of years. Unfortunately, many QSLs are not around that long because of the use of fugitive inks.

A YO2 sent me a card, a few years ago, utilizing a stock printed form on gray card which carried his call and personal data via a rubber stamp in violet ink. Today, not a trace of that stamp remains. It has disappeared!

There are many managers and individuals who try to write "artistically" in red, violet, light blue, etc., to match their cards. There is only one lasting ink, the so-called permanent black. I urge all hams to use it. — *Jim McDonough, W3CY, Rockville, Md.*



CONDUCTED BY BILL SMITH,\* K4AYO

## Record Breaking Tropo

IN mid July a large high-pressure area and associated stationary front formed between the midwest and New England, touching off one of the best tropo sessions ever. At this writing, I do not have complete details of the four-day opening, but we do know that a new 432 two-way terrestrial record was established, exceeding the 1965 work over the Gulf of Mexico, from Texas to Florida. During the early-morning hours of July 16, W0DRL, Topeka, Kansas, worked K2CBA, Petersburg, in extreme eastern New York, over an 1185-mile path. K2CBA's a.m. signals in Kansas were S9+. On the same date, W4FJ at Richmond, Virginia, became the first to work 20 states on 432 MHz. A c.w. contact with WA1JTK in New Hampshire did it for Ted. WA1JTK runs but 3 watts output!

Further details of this outstanding tropo session received prior to deadline appear in the Operating News section of this column.

## More Contests?

The very thought is sure to make some throw up their hands, yet more contests and different formats are called for by a small but vocal minority. Or is it a minority? Do we need more contest-type activity on the v.h.f. bands? If so, what kinds, and for what objectives? We receive a small but steady flow of requests for additional operating activities, and after each contest there are protests over scoring systems, charges that present forms favor the densely-populated East Coast, and so on.

We know that the v.h.f. contest rules don't please everyone, but no one has come up with workable alternatives. The key point here is that contests set up on a national basis can never be entirely fair. For this reason, ARRL v.h.f. contests offer competition and awards only within one's own ARRL Section. Except for the club gavel award in the V.H.F. SS, there is no national winner. The June and September contests offer special incentives to users of the bands from 220 up. Novice operators get special recognition. Is there some new approach? Perhaps.

A possible answer lies in a combination of suggestions from many quarters that we organize special single-band operating nights at regular intervals. This would skip 50 MHz. and start with 144 and higher bands. During months other than the three (January, June and September)

\* Send reports and correspondence to Bill Smith K4AYO, ARRL, 225 Main St., Newington, Conn. 06111.

when the regular weekend v.h.f. contests are scheduled, the first Saturday night of the month would be devoted to 144 MHz., the second to 220 MHz., and the third to 432 MHz. There could be a "u.h.f. and microwaves night" later, if interest warrants.

The activity period would extend from 6 P.M. Saturday to 2 A.M. Sunday, local time. Exchanges would be left to the individual operators, so long as identification and exchange of some information are secured. There would be no multipliers, no scoring, no awards and no winners. We would report the results as sent in by active stations, giving number of stations worked, and best DX.

The key to keeping this interesting is prompt reporting. You'd have to send in your reports within a day or two, and we'd process them as regular column material. This could provide periods of concentrated activity that would be interesting and useful to many of us, without the hectic atmosphere of a contest weekend. The idea should be especially useful to those whose interests lie mainly in the higher bands.

Let's give the idea try, at least. September is a contest month, so we'll start in October. The 144-MHz. night will be Oct. 4, 220 night Oct. 11, and 432 night Oct. 18. Plan to be on — and report your results promptly. Also, let us know what you think of the idea.

## A Letter from ZK1AA

The 50-MHz. beacon signal of ZK1AA from the Cook Islands in the South Pacific was widely heard in North America this past spring. By comparison, few contacts were made, because of time differences and ZK1AA's work schedule. Stuart Kingan, ZK1AA, is to be commended for his interest in six meters. Here are the highlights of a lengthy and detailed letter recently received from ZK1AA:

"The beacon transmitter has 150 watts input, our maximum permissible power in this area. It feeds a 2-element antenna beamed north. The antenna is 60 feet high and is located on the northeast coast of Rarotonga. The beacon is 3½ miles from the receiving location at my home. There is a small ridge separating the two locations and the beacon signal is fairly weak on my home receiver. Some Japanese stations and XEIGE have been 20 db. stronger, and most of the others I have worked were stronger than the beacon signal. Whenever I am home I keep a loudspeaker watch on my own signal and breakers are generally heard promptly.

The beacon has been on the air for an average of 12 hours daily since September, 1968, a total of over 4000 hours and more than a normal ham transmitter will do in a lifetime. Maintenance of the transmitter and keying unit is not negligible, al-



This fellow is best-known on 50 MHz., but Don, W7FN, is shown here with a Swan prototype 432 antenna. The antenna has a claimed bandwidth of 50 MHz.

though most trouble has occurred in the mechanical parts such as the blower motor and keying relay. The cost of operation is high in this location. It costs about \$400 a year to operate the beacon, but I hope to keep it on the air for several more years.

From March to May, I worked 51 stations in Japan, Mexico, Grand Cayman, Hawaii, and the United States. (15 stateside stations were worked. ZK1AA's best DX was to ZF1AA on Grand Cayman and W4GDS on Florida's east coast.) The only confirmed Southern Hemisphere report came from 5W1AR, 900 miles away. One report from Argentina reached me second hand as did another from Australia.

Since April, 1966 I have been monitoring 50 to 100 MHz. in connection with a study of transequatorial (*TE*) propagation. I have frequently received Japanese 6-meter beacons and channel 2 television from Central America, the U.S., Hawaii, New Zealand and Australia by normal ionospheric *F*-layer paths. When the sound channel of a Central American t.v. station comes through on 59.75 MHz. in the morning or afternoon, as frequently happens, then one would expect a good opening on six. But this seldom occurs. There are either too few hams operating on six in the right places, or too little knowledge of when to listen. This is where the beacon is valuable.

From 7 P.M. local time (0530 GMT) every night I record on a chart all signals received from 50 to 100 MHz. These normally consist of channel 2 and 4 from Honolulu. These are received via *TE*. During the last 1163 nights, *TE* has occurred on 60 percent, or 693 nights. There is no confusion between *TE* and normal *F*-layer propagation. *TE* normally comes in rapidly, builds to a certain strength and declines after a few hours. There are few irregular variations in signal strength, but there is rapid flutter. The upper frequency limit is affected by the power of the signal, and the sensitivity of the receiver, and is related to the strength of lower-frequency *TE* signals.

*TE* occurs only during darkness and rarely before 7:30 P.M. local time. It usually drops off before midnight, but as the t.v. stations monitored close soon after midnight, it is difficult to say what happens after that.

In contrast, normal *F*-layer has little flutter, but much fading is observed. It also exhibits a well-defined upper frequency limit at any time. The reception of channel 2 picture on 55.25 MHz. with no sign of the sound carrier at 59.75 MHz. is very frequent with regular *F*-layer signals, but practically never occurs with *TE*.

Stuart, thank you for the interesting letter. I'm certain we all enjoyed it and look forward to future reports — and contacts with ZK1AA!

### Little Arcibo

Sam Harris, W1FZJ/KP4, Puerto Rico, has completed his backyard copy of the giant dish at the Arcibo Observatory. Sam's antenna is actually square, 100 feet on a side, and has a movable and changeable feed. The movable feed allows tracking the moon plus or minus 12 degrees of the Zenith. The antenna can "see" the moon about 15 days each month. The changeable feed permits the antenna to be used on 144 and 432 MHz., and I'd guess 1296 in the future. Gain over a dipole should be in excess of 30 db. at 2 meters and 40 db. on 432.

During the early months of this year, Sam got his 432 system working well and had one e.m.e. contact, with WIBU, near Boston. Sam heard a number of other stations. Beginning in mid-summer, Sam started work on the 144 system and will probably be ready for schedules in late fall.

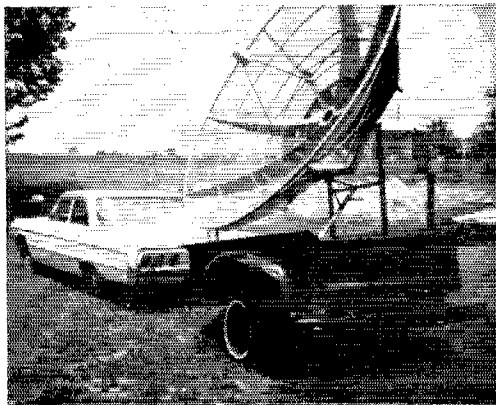
Because of the size of Sam's antenna, some of us with smaller antennas should be able to work him. Arrays having honest gains of 17 to 20 db. should work. A kilowatt input is assumed, as is a 3-db. converter. Such systems should provide good signal levels.

Much work in a hot and humid climate has gone into Sam's antenna, as stateside and Canadian visitors to Sam and Helen's island home have found. During a recent contact with Helen on six meters, she said 15 banana trees, 3 coconut palms and a large assortment of other trees were cleared to

### RECORDS

#### Two-Way Work

- 50 MHz.: LU3EX — JA6FR  
12,000 Miles — March 24, 1956
- 144 MHz.: W6NLZ-KH6UK  
2540 Miles — July 3, 1957
- 220 MHz.: W6NLZ — KH6UK  
2540 Miles — June 22, 1959
- 420 MHz.: WØDRL — K2CBA  
1185 Miles — July 16, 1969
- 1215 MHz.: W6DQJ/6 — K6AXN/6  
400 Miles — June 14, 1959
- 2300 MHz.: W2BVU/1 — K1DRB/1  
225 Miles — Aug. 30, 1968
- 3300 MHz.: W6IFE/6 — W6VIX/6  
190 Miles — June 9, 1956
- 5650 MHz.: WA6KKK/6 — WB6JZY/6  
179 Miles — October 15, 1966
- 10,000 MHz.: W7JIP/7 — W7LHL/7  
265 Miles — July 31, 1960
- 21,000 MHz.: W2UKL/2 — WA2VWI/2  
27 Miles — Oct. 24, 1964
- Above 30,000 MHz.: W6FUV/6 — W6ICJ/6  
2.3 Miles — Feb. 9, 1969



WA4HGN takes his 2300-MHz. mountain-topping seriously. Bill built this 10-foot Prodelin parabola on a trailer made from the bed of an old pickup truck. The reflector is constructed from Reynolds aluminum with expanded aluminum for the mesh. It weighs 90 pounds. The gain is estimated at 34 db.

make room for the 10,000 square-foot screen. But certainly this effort will lead to wider use of e.m.e. communication.

### Tornado Noise at 50 MHz.?

The Environmental Science Services Administration (ESSA) of the U.S. Department of Commerce is studying a theory that the presence of tornadoes may be detectable as "sferic" (atmospheric) noise at 50 MHz.

John W. Townsend, Jr., W3PRB, Deputy Administrator at ESSA's Washington Science Center, is searching for reports of intense electromagnetic radiation from very severe thunderstorms and tornadoes. The most likely occurrences would be near squall lines and under conditions when the Weather Bureau has issued severe storm watches. Anyone having such information may submit it in detail to Mr. Townsend at ESSA, Washington Science Center, Rockville, Maryland, 20852.

### OVS and Operating News

50-MHz. news will be short this month because of the variety of other news. *E.* continued to be disappointing through mid summer. While the number of openings has been less, the number of multi-hop openings seems greater—something in the order of 3-to-1 compared to last summer. K7ICW says the openings this summer have been a blueprint of the summer of 1959. Al also says regular Sunday morning scatter schedules with W7FN over a near 1200-mile path are a "cinch."

Skipping around the country, we note these exceptional contacts. K6RNQ worked KL7FNM on June 10. WA6HXM worked multi-hop to K1ABR on June 15, while K6QEH was working New York stations. On June 22, WA6HXM and K6QEH worked W1HOY/KP4. On June 20, KL7GLL was heard in Los Angeles, but there were no contacts.

From Alaska, KL7GLL writes of contacts with W7FIV, Washington, on June 18. On June 20, KL7GLL was heard by W0EKB in Nebraska, but Gene heard no signals in Sitka. Gene's best opening came on June 26. He worked Alberta, British Columbia, Washington, Oregon and Montana. He

noted another good opening to California July 11, but could raise only W7DNU/6 and W6YKM.

W1HDQ was on 6 in several hard-to-get western states in late June and early July, but had trouble being heard. Even while mobile in Wyoming, Idaho and Montana, many openings resulted only in unanswered calls! Too many operators apparently listen only for S9-plus signals. With his 3-element portable beam, results were better. During Saturday night of Field Day, Ed worked all over the Middle West, and just before the end of the FD on Sunday he worked 30 California stations. This was from Signal Mountain, in Grand Teton National Park, Wyoming, with 50 watts s.s.b. and generator power.

On June 15, WA1DFL, Revere, Mass., worked WA7FPO, Arizona, while neighbor WA1DPX was working XE2XN and W1HOY/KP4. On June 21 VE2A10 caught a rare opening to K7ICW and WA6DYX.

We also acknowledge, with thanks, reports from WB2VFX, W6DPD, W6YKS, K7ZOK, WA7GFP, WSSH and W0PFP.

John, KH6GHC, has left Hawaii for a stateside job with Motorola. John expects to do much traveling, possibly including some in South America. He will be carrying a six-meter transceiver with him and hopes to get in some operation from DX loca-

### 2-METER STANDING

W1JSM...35	8	1400	W5HJV...27	10	1285
K1ABR...34	8	1478	W5MCC...25	8	1430
W1AZK...34	8	1412	K5PTK...18	6	1330
K1WFT...31	8	1300			
K1HTV...30	8	1310	W6GDO...17	4	1326
K1VHS...29	8	1300	W6WSQ...15	4	1390
K1UGG...29	8	1280	K6HAA...13	4	1380
K1BKJ...28	7	1275	W6NLZ...12	5	2540
W1HDQ...24	7	1040	K6HMS...11	4	1258
W1VTU...22	8	1296	K6JYO...11	4	1240
W1FTH...21	7	1075			
K1MTJ...20	7	1225	W7IRG...27	6	1320
K1JIX...18	6	800	K7NIL...24	5	1290
K1RJH...17	7	1450	K7ICW...16	4	1246
W3NLY...37	8	1390	W8PT...41	9	1260
W3CXY...37	8	1360	K8DEO...32	8	—
W2ORI...37	8	1320	W8DTP...31	8	1150
W2BLV...36	8	1150	W8LDU...27	8	1150
W2AZL...36	8	1380	W8NOH...26	8	1165
W2ZPGK...33	8	1340	W8TIU...24	8	1000
K2RTH...32	8	1245	K8ZES...22	8	675
W2CRS...26	8	1270	W8VHG...13	6	465
W2CNS...23	8	1150			
W2DWB...23	6	860	K9SGD...42	9	1300
W2EMB...22	8	1335	WA9DO...41	9	1303
K2DNR...22	7	1200	K9AAJ...41	9	1200
W2PFB...21	6	915	K9ULF...41	9	1150
K2YCO...20	7	750	W9AAG...39	9	1200
W2PMW...19	6	1000	W9FA...33	8	1060
			W9YF...33	8	1050
W3RUE...36	8	1100	W9PBP...32	8	820
W3KWH...35	8	1335			
W3KCP...32	8	1108	W0BFB...45	10	1380
K3CFA...25	8	1200	K0MQS...44	10	1590
W3BDP...25	8	1100	W0NKF...42	10	1326
W3BHG...22	8	1140	W0DXY...41	9	1300
W3HVB...21	8	1110	W0LFE...38	9	1040
K3OBT...21	7	930	W0LER...36	9	1250
W3LHF...19	6	719	W0EYE...35	9	1380
W3GPL...19	6	625	W0ENC...33	9	1334
W3TFA...18	8	1342	W0LGN...28	8	1000
			W0DRL...25	9	1295
W4HJQ...39	9	1150			
W4WNH...38	9	1350	F8DO...1	1	5100
W4FHK...38	9	1280	KH0UK...2	2	2540
K4JIG...37	8	1125	OH1NL...1	1	5850
K4IXC...36	8	1403			
K4QIP...35	8	1225	VE1AUC...7	2	500
W4CKB...34	8	1325	VE2BJ...7	6	975
W4FJ...34	8	1150	VE3HW...11	9	800
K4GLL...33	8	1275	VE2DFO...12	4	600
W4VHH...33	8	1100	VE3ECC...33	8	1283
W4AWS...29	8	1350	VE3AIB...29	8	1340
			VE3ASO...28	8	1285
W5U7O...42	10	1398	VE3EV...25	8	1100
W5RCL...42	9	1289	VE3RN...25	7	1250
K5VXZ...36	10	1450	VE7BQ...6	2	1248
W5GLG...33	9	1360			
W5UKQ...29	8	1150			
W5LO...28	7	1254	VK3ATN...3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised May, 1963.

tions. The KH6EQF beacon has been shut down, but hopefully will be activated again this fall. John and Bert, K7DTH/KH6GRU, worked 10 states and 15 countries during the past year from Hawaii. John says the W6s were especially helpful during stateside openings. When he requested the W6s to standby so he could search for other states, there was dead silence from California. Such operating conduct allows effective use of band openings.

Bert, KH6GRU, remains in Hawaii, but according to John, was recently married and will probably be off the air for awhile. Undoubtedly, however, Bert will be active again in time for the fall and spring openings coming up.

Around mid June, a Seattle operator reported working into Japan during the evening. As could be expected, the rumor spread. An airmail letter to the operator involved requesting details of the "contact" has gone unanswered. M.u.f. information gathered for the particular time involved indicates it unlikely 50 MHz. was open between the U.S. and Japan. Serious six-meter DXers find such claims contemptible and those who foster them should take note it is not difficult to determine their authenticity.

144-MHz. tropo has been generally good all summer, but especially during July. On the 8th, K1HTV, Connecticut, worked W8WEN, Ohio, with S8 signals, as did W1FJH, Mass. Later that night, K2RTH, New York worked WA9DOT in Wisconsin and numerous 8s. Six-hundred mile contacts were common on the 9th. W1FJH worked W8WEN again, plus W8YIO in Michigan, and VE3BIG across the river from Detroit. K1HTV worked W8WEN, W8YIO, W8IDU, W8IDT and VE3BIG.

On the 13th, conditions began to again improve and on the 14th, K1HTV worked Michigan, Ohio and Indiana with ease. A few miles south of K1HTV, W1VTU worked W0BVR in Iowa, but the Iowa station was unreadable at K1HTV. July 15th, K1HTV worked WA9DOT, Wisconsin, and W9MAL in Illinois. K2RTH worked Ohio, Michigan, West Virginia and many 9s, all with good signal levels. And on the 15th, W1FJH, near Boston, worked K9UIF, Indiana, W9MAL and WA9DOT.

In Minnesota, W0RLI found conditions excellent during the same period. He worked stations in Indiana, Ohio and Michigan. There were many other unreported contacts made over distances in excess of 1000 miles from July 13 to 16.

A couple of late reports on June tropo. At 0300 GMT on the 15th, WA3JDT at Greenville, Pennsylvania, reports hearing W0ECJ in Iowa. This could have also been E<sub>s</sub>. WA3JDT was using a Twoer and said W0ECJ's signal strength exhibited much fluctuation. There have been no confirmed instances of E<sub>s</sub> on 144 this summer.

June 21 produced an extremely rare tropo opening between Boulder, Colorado and central Texas. K5PTK, K5WXZ and W5GVE worked K0RZJ. The paths are around 1000 miles and tropo from the Colorado mountains is almost unheard of.

The Perseid meteor scatter period has passed, and we hope to have a report next month. But we do have these m.s. notes. W1FJH, ex K2HLA, is going strong from the Boston area. Dick, who worked 36 states from east Long Island, is up to at least 21 worked from Massachusetts. He worked K4GL, South Carolina, and K0MQS, Iowa, on m.s. June 8th. Dick runs 600 watts and a 40-element collinear and will schedule. Write him at 4 Carter Road, Westminster, Mass. 01473. K0MQS also reported the W1FJH contact. Dick said it was made on a series of short bursts with many pings noted.

In addition to W1FJH, K4GL worked W1AZK, New Hampshire, and heard K7NII, Arizona, the same day.

Much random m.s. is taking place, but it's a shame it isn't being reported. These reports would encourage newcomers to try m.s. during non-shower periods, which, at times, are most productive.

My prediction that K0MQS would soon reach 2-meter WAS will have to wait. Dick has received a promotion, necessitating that he move from Cedar Falls to Oskaloosa, Iowa. As you read this, Dick was looking for a rural homesite and says he will be active again shortly. However, he will have to start over on his states worked.

VE7BQH continues e.m.e. plans from Vancouver, British Columbia. Lionel has run into mounting and aiming problems with his 80-element collinear array, and the Canadian telephone strike caused him to cut short his activities because of long work hours.

W6KJD, Gary, better known for his work at W3KWH, is working on an e.m.e. project with K6JYO. They have a 4CX1000A amplifier followed by an array of sixteen 20-element collinears on a polar mount. They hope to have the 320-element system ready for schedules this fall.

The Westcom noise blanker has been generally successful, but a few problems have been found. W4FJ tried using a variable power supply on the 14- to 24-volt d.c. model, and found that at 11½ volts the blanker worked extremely well, completely blanking radar and auto ignition noise. At 10 volts and above 12½ volts, results were poor. K7ICW, taking a hint from K3OPB, cured overload problems with his 28-MHz. i.f. six meter converter by installing a 22-MHz. parallel trap at the input of the blanker. Al says the 22 MHz. oscillator in the converter put out enough signal to overload the noise blanker's front end, rendering it useless.

W1FJH says W2AZL is back on 144 after rebuilding his 44-element array lost in a winter storm. I was wondering why you had been so quiet, Carl. We understand K4IXC will soon leave Florida. John's powerful signal on 144 through 432 will be missed. Good luck to you, John, wherever you land.

220 MHz. served up only one report this month, but it is an interesting one. WB6NMT, back stateside after a one-year Navy assignment in Viet Nam, is preparing for e.m.e. schedules with KH6EEM.

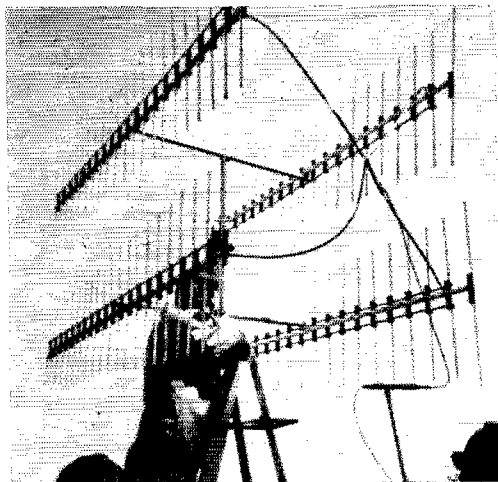


What would be an antenna contest without some trickery? But the Fresno group found this aluminum step-ladder to have more gain at 432 MHz. than some of the antenna entries! The actual gain figure wasn't quoted, but we would guess the supporting structures fatigue before the "antenna" does.

WB6NMT has sixteen 10-turn helices on a polar mount and will begin schedules in September. Louis also asks if anyone else is equipped for 220 c.m.e.

**432-MHz.** has been *the* band for thrills this summer. As reported earlier in this column, previous records fell by the wayside as a large high-pressure area and stationary front formed July 13, from southern Colorado to the New England states. WØDRL, Topeka, Kansas now shares the two-way DX record with K2CBA, 1185 miles, set early the morning of July 16. But Al says the opening began on July 13, when he worked as far east as Michigan and Ohio. Conditions were nearly the same on the 14th, but things really got rolling on the 15th. WØDRL had contacts with K8DEO and K8REG, Ohio, in the early evening followed by a 900-plus mile contact with VE3DKW, Ontario. Then Al added to his states total by virtue of a contact with K2ACQ in New York. Two more New York contacts quickly followed — those with K2CEH and the record-breaker to K2CBA, near the Vermont-New York state line. Al says the duct apparently was only some 100 miles wide, but he's sure he could have worked into New England had someone been on the air. Telephone calls netted none of the prominent 432 New England operators at home. Al apparently didn't know about the activity of WA1JTK in New Hampshire, but W4FJ worked the New Hampshire station for state number 20 on 432. W4FJ thus became the first to break the 20-state barrier on 432. Ted had predicted earlier this year that someone would reach 20 states this year.

In the Twin Cities, WØLCN and WØLER found conditions good throughout July. But John, WØLER, says the week beginning the 13th was the best. WØLCN, following a contact with K4EJQ on 144, asked the Tennessee station to try 432. K4EJQ was heard for about one minute, but faded before a contact could be made. That is nearly 900 miles. WØLCN was up early the next morning and worked WØEYE for what is probably the first Minnesota-to-Colorado 432 contact. WØLCN also worked seven Illinois stations before going to work, and



At the recent Fresno Vhf Conference in California, antenna designs by Oliver Swan were the main center of attraction. Here Swan prepares to test an array of four 21-element 432-MHz. Yagis. (All Conference photos by K7ICW.)

### E.M.E. Two-Way Records

144 MHz.: SM7BAE — ZLIAZR  
 11,055 Miles — March 4, 1969  
 120 MHz.: WA6LET — G3LTF  
 5,730 Miles — Sept. 25, 1965  
 1215 MHz.: WB6IOM — G3LTF  
 5,192 Miles — April 27, 1969

then in the evening hooked K8REG, Ohio. That was K8REG's 15th state.

WØLER reports similar successes. John worked W8BPG, probably the first Minnesota-to-Michigan 432 contact, plus stations in Ohio and Illinois. John also caught WØIT (ex WØBJV) at Watertown, South Dakota ragchewing with two other South Dakota stations and was successful in adding that state to his list. WØLER also exchanged reports with K8DEO for that Ohio station's 17th state. Both WØLCN and WØLER have eight states worked, best DX is just over 700 miles. WØLER suggests that during long-haul 432 openings, we should incorporate meteor scatter signal report exchanges when signals are marginal.

Bill Lewis, W8HVX, Ann Arbor, Michigan, worked 15 states between July 14 and 16. His best DX was 660 miles to WØDRL.

From Jud, K2CBA we learn that in addition to his record-breaking contact with WØDRL, he also worked W8MNT and K8DEO, Ohio, W8HVX, Michigan and seven Illinois stations.

At De Kalb, Illinois, W9WCD added his 18th state, W4VQA in Kentucky. He is also nearing completion on a 16-foot dish for 1296.

Also in Illinois, old friend Dallas, W9AAG, added one new state, K2UYH, New Jersey. He says K2UYH also worked WØDRL on July 15. W9AAG worked numerous other stations, including K2ACQ and K2CBA. He predicted this opening; now those he told are asking for details on his crystal ball! Nice to hear from you, Dallas.

Earlier in July, good tropo was reported on the 4th. That was K2RIW's first evening on the band — and before it was over, Dick had worked seven states. He had listened on 432 for some 2½ years before putting together a 40-watt rig. Dick said that in those 2½ years he had never before heard comparable signal levels.

Conditions were also good in June. K2ACQ raised half of his December-storm-damaged 128-element collinear in time to catch the WA2WEB East Coast VHF Society expedition to Vermont. W2CLL brought his states worked to 15 by contacting WA1JTK, New Hampshire; W3CGV, Delaware, and WA2WEB/1, Vermont, all during June. W2CLL also worked VE2LI and VE3BQN on a good, north-south tropo opening June 26.

Al, K2UYH, stands at 16 states worked. During the June contest he contacted W1MX/1, Mt. Equinox, Vermont. And on June 21, Al worked WA2WEB/1, also Mt. Equinox. Al helped organize that venture which, under the supervision of K2KJL, gave Vermont contacts to many needing that state. Al says the K2RTH/S trip to West Virginia during the June contest was not as successful as hoped. An amplifier was left in New York, and the group had to settle for a varactor tripler which burned out after working a handful of stations. K2UYH says other expeditions to West Virginia will be organized, perhaps yet this year.

1296-MHz. activity is quiet, but surely WB6IOM

and G3LTF are continuing moonbounce experiments. WB6IOM isn't one to rest. There were at least two interesting 1296 contacts made during July. On the 3rd, K4SUM, near Washington, D. C., worked W2NFA, the Crawford Hill Vhf Club station in New Jersey, over a 200-mile path. K4SUM used a 32-element extended collinear, and a varactor tripler developing about 10 watts at 1296. This was fed through a filter and 80 feet of RG-8U — leaving something in the order of one watt at the antenna!

W2NFA, operated by W2IMU, used a 60-foot commercial-type dish having 45 db. gain. Transmitter power reaching the antenna was estimated at 50 watts. This is the first Virginia-to-New Jersey contact on 1296. W3NG, in Maryland, also worked W2NFA on the same date.

### F.M. News

The South Florida F.M. Association has operated 2-meter repeater WB4HAA for more than one year. There are some 65 mobile and base stations using the system. The repeater uses a GE model 4ET48 transmitter, running 90 watts output, and 4-element stacked J-pole at 90 feet. The GE 4ER25 receiver has an antenna 176 feet high. The u.h.f. receiver is a Motorola T44GA. Other equipment used includes a tape recorder, touch-tone decoder, automatic code wheel and a back-up control unit.

The system is remotely controlled by six member stations through 448.2-MHz. secocode pulse dialing. At least one control station is active whenever the repeater is operative. Any control station can shut down the repeater, in the event of an illegal transmission or equipment malfunction.

Recently an automatic phone patch unit was added, allowing mobiles to dial their own patches without the aid of a base station.

Nominal coverage for the repeater is 200 miles for base stations, 70 miles for mobiles and 15 miles for hand-carried portables. Further information on the South Florida F.M. Association is available from K4ANW or WB4HDZ.

The Southern Nevada F.M. Association boasts some 70 members. The repeater station, W7AKE, atop Angel Peak, elevation 9,000 feet, 30 miles northwest of Las Vegas, has 2-meter-to-2-meter, 2-meter-to-6-meter and 6-meter-to-2-meter capability. Output is 80 watts, with regulated 7-kHz. deviation. Further information is available from Association Chairman, W7OK.

W7LVU says seven Casper, Wyoming area stations are active on 6-meter f.m. Transmitted power varies from 30 to 100 watts. W7LVU asks what 6-meter frequencies are being used in his general area and the antenna polarization.

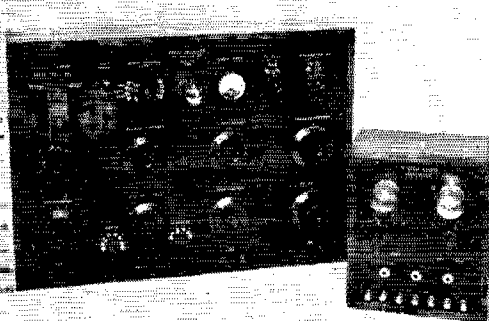
In Alberta, VE6MX says that after two years of work, VE6NT, in Edmonton, has made contact with the Calgary repeater, VE6AUU. The distance is 190 miles over what is considered commercially to be a very difficult path. VE6NT has 500 watts input and stacked 16-element Yagis. Other f.m. stations active in the Calgary area include VE6AWV, VE6AKW and VE6LH. QST

### 220- and 420-MHz. STANDING

220 MHz.			420 MHz.		
W1HDQ... 13	5	450	K1BFA... 10	4	470
K1JIX... 12	4	600	W1QVF... 10	5	400
K1BFA... 8	3	225	K1JIX... 10	4	460
K2CBA... 17	5	1090	K1HTV... 10	4	400
W2DWJ... 15	5	740	W1HDO... 10	3	250
K2DNR... 13	5	600	W1JTK... 9	3	490
W2SET... 12	5	325	K2UYH... 16	6	718
K2RTH... 12	4	600	K2CBA... 15	8	2670
W2CRS... 10	4	440	W2CLL... 15	6	693
W3UJG... 14	5	460	K2ACQ... 14	8	800
W3RUE... 10	5	480	W2BLV... 13	5	500
K3IUV... 10	4	310	W42EAB... 12	6	720
K4LXC... 3	2	1090	W2DWJ... 11	4	330
K4GL... 3	2	—	K2YCO... 9	6	525
W5RCL... 19	6	880	W42EUS... 9	4	260
W5ORH... 12	4	700	K2RIW... 9	3	—
W5AJG... 7	3	1010	K2YCO... 8	6	550
W5UKQ... 6	2	590	W2GNS... 7	5	525
W5AWK... 3	2	222	W2SEU... 6	4	230
W6DQJ... 4	2	360	W3RUE... 14	7	585
K7ICW... 4	2	225	W3UJG... 9	4	400
W7JRG... 2	2	420	K3IUV... 9	4	310
W7JRG... 2	2	420	W4FJ... 20	7	995
K8DEO... 17	6	625	K4QIF... 17	6	1065
W8HVX... 15	8	660	K4EJQ... 12	5	550
K8REG... 15	6	625	K4NTD... 9	2	835
W8MNT... 13	7	600	W4UJG... 9	4	560
W8RQL... 10	6	425	K4GL... 5	2	—
W8VHG... 7	5	415	W4VHL... 5	1	450
W8VWF... 7	4	450	W5RCL... 19	6	880
W9WGD... 18	7	825	W5ORH... 12	4	700
W9HUV... 16	7	780	W5AJG... 7	3	1010
W9AAG... 14	5	800	W5UKQ... 6	2	590
K9AAJ... 12	5	425	W5AWK... 3	2	222
W9NKT... 9	3	400	W6DQJ... 4	2	360
W9JY... 8	4	500	K7ICW... 4	2	225
W0DRL... 18	6	1185	W7JRG... 2	2	420
W0LER... 8	3	709	W8DEO... 17	6	625
W0EYE... 6	2	425	W8HVX... 15	8	660
VE2HW... 3	3	750	K8REG... 15	6	625
VE7ZC... 7	5	510	W8MNT... 13	7	600
VE3AIB... 5	4	450	W8RQL... 10	6	425
			W8VHG... 7	5	415
			W8VWF... 7	4	450

## From the Museum of Amateur Radio

Here is an all-wave receiver of beautiful construction. By using the appropriate honeycomb coils, all wavelengths of interest to amateurs of the day could be covered. The circuit is a little unusual in that only two of the three honeycomb coils are used, regeneration being accomplished by the use of a variometer in the plate circuit of the detector. The series-parallel switch extends the tuning range. The components, mostly Chelsea, and switches are of the highest quality. A large brass shield in back of the front panel affords shielding and freedom from hand-capacity effects. Both the receiver and two-stage amplifier were built and used by L. C. Lunsy, W1AR, in the very early 1920s.—W1ANA





CONDUCTED BY ROD NEWKIRK,\* W9BRD

**Who:**

"Telegraph", you know, means "DX writing" and Sam Morse meant his invention to do just that. The electrical impulses went through his wires just fine as planned, but the gimmicky gadgets devised to transmit, transcribe and translate his Morse code gave everybody fits. Undependable is putting it mildly.

But telegraphy did take off promptly like a rocket without the Rube Goldberg contraptions when it was discovered that human transmitters and translators could do the job by ear and fist as fast as anyone could wiggle a pencil, and with amazing reliability. As we mused last month, somebody had to do this stunt first, and demonstrate that it could be accomplished by anyone young or old caring enough to try. That somebody, we think, deserves more than anonymity. Let's help bring him, her or them out of the shadows of history courtesy the September-October 1968 issue of *Dots and Dashes*, publication of Morse Telegraph Club, Inc.,<sup>1</sup> which discusses writings of one Joseph N. Van Dycke, a Morse family relative. . . .

During Morse's experiments at Cherry Valley (1836-'38) he had employed the assistance of a young townsman, Wallace Leaning, to help him in the tests. It was Leaning who was the first to learn the Morse code, and to perform on the experimental machines. Morse took him along to act as operator on the test line.

One of the very first commercial circuits, constructed largely for experimental purposes, was between Albany and Syracuse, N. Y., known later as Circuit No. 151. This was constructed about 1846, with Cherry Valley as the central office, in charge of Morse's old helper, Amos Swan.

Morse recognized the need for experienced operators, and had Swan open a school at the Telegraph Building (still standing). Morse also had returned Leaning to Cherry Valley to assist as teacher. It was not long after Leaning's return, and sitting outside of the office one evening listening to the click of the sounder (the instrument marked paper tape with dots and dashes) that he discovered he could read

the message by sound! So there's no question but that he was the first operator to read the Morse code by ear.

At that time there were 25 to 30 students at the school, so he instructed them in the new method of "receiving". This was brought to Morse's attention, and as qualified operators became available they were distributed about the lines, and the printers were discarded. . . .

Sounds close enough to call it a tie. Our superpioneers, then, must have been Amos Swan and Wallace Leaning. Soon came those thousands of landwire ops, then an army of wireless telegraphers including the modern ham generation. In the absence of any formal monument to this particular development, the flood of followers in their footsteps should gratify the ghosts of Leaning and Swan. In one respect they were born a half century or so too soon. Bet they would have leaped at the chance to become hams.

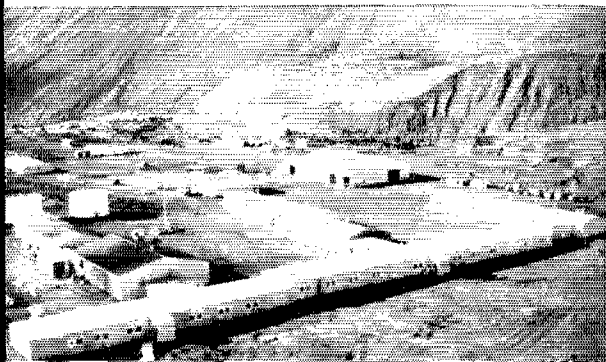
**What:**

Monument? Well, we recently took care of OM Hertz rather belatedly. Now how about Wallace and Amos? The clumsy code speed measurement, w.p.m.—could we let *Swannings* go for words per minute? . . . Another question making the DX rounds right now is just how hot (or cold) 28 MHz. will be this season. We'll very soon find out, so let's review recent DX activity on ten as reported by the "How's" grapevine. . . .

**10 phone** gets the 5B-DXCC rush by Ws 1EGM 2VOZ 3HNK 4UF 4YOK 5OJZ 6YRA 8BQV 8YGR 9LNO, Ks 1HDO 4TWJ 5YUR, WAs 1FHU 2YWR 8EQW 8MCQ 8YXE 9TFM, WBs 2DZZ and 9BUY, aided and abetted by A2s (CAH (28,526 kHz.) #000 GMT, CAQ (565) 18, CEs 2CC (600) 20, 3AAI (510) 22, 3FI 3OE (600) 21, 3NT 3RR 3TS 3UH 5EQ 23, 6CA 7DW 7EJ 8AA, COs 2VN (335) 0, 6FA (750), 6JH 8CP, CPs 1CW (601) 19, 1GD 1HW 16, 5AK 5DB, CRs 4BB 4BC (510) 11, 6BF (649) 12, 6CA (651) 1, 6BX 6CL 6DM 6DU 6EZ 6GA (560) 17-18, 6HM 6II 6KV 6LC (610) 20, 6LF (555) 19, 6LL 6MN 7BD (215) 23, 7BO (600) 19, 7DS 7EL (591) 21, 7FM (675) 13-20, 7IC 7IZ (535) 14-15, 8AI (587) 12-13, 9AK (540) 13, CTs 1BH 1MD (605) 15, 1PK 1TZ 1UA 2AS 2AT 3AS, CXs 1BE 2AAJ (690) 22, 2AAV (523) 17-18, 2CO (590) 17, 2DT 4DT 6AAA 7AP (585) 19, 7BF 7BG 8CJ 8DE (523) 18, 9PP, DU1s FH (600) 0, ZAG (548) 15, EAs 2CX 19, 3RF 15, 6BJ 8CV (600) 17, 8DV 8EM 9AQ, 6Ls 2AK 2BD 8F 8J, EP2s BQ JP, ET3s REL (580) 14-15, USA, FG7s XL XT (550) 13, XX (597) 17, FH8CE, FK8BG (553) 2, FM7s WE WN WW (730), FO8s AA (555) 0, BS (568) 21-22, FR7s ZD 13, ZG, FY7s YQ (596) 19, YR (201) 0, GCs 2FMV 2FZC 14, 3OXJ, GD3JU (575) 18, G15UR 20, GWs 3DZJ 3XCR 5XA, HB6LL 15, HCs 1TH (750) 17, HHM (595) 16-17, 4HM (569) 16, HGs 5CZ 8QF (160) 10, HIs 3JR 8MPW (940), 8XJP (550) 17, 8XMC, HKs 3DBU 3JH 3RQ (544) 20, 3VA 3WO 4AZX

\* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

<sup>1</sup> O.H. Braese, pres./ed., 1656 N. Vagedes Av., Fresno, Calif., 93705.



JX-land, the bleak isle of Jan Mayen at 71°N-8°W, is your QTH of the Month. This is Olonkin city, outpost home of a continuing succession of Norwegian amateurs engaged in scientific work. This year old-timer JXs 1OM 3DH 3XK 4EJ and 5CI conducted a ham course among the transient base populace of 36, turning out new JXs 3NM 4XM 4YM 4ZM 5CM 5HM and others to help assuage DX appetites world wide. (Photo via JX3DH)

**QST for**



JAJ2XQ takes her turn at the 3.5-144-MHz. installation of JA2YAA, club station of Chubu Nippon Broadcasting Co. in Nagoya. Miss Kishigami is one of forty members likely to enjoy this facility during off-duty hours. (Photo via ex-YO2BO)



5NE 20, 0BKX (540) 18, 0BMO, HL9UU 12, Hps 1DQ 21, 1XHU (650) 1, 3DA, HRs 2HHP 3AC (540) 18, 4DHS 20, taboo HSs 1LG 3AL (600) 15-16, 3DR, HV3SJ ISIs GF LIO (600) 16, LMN (600) 16, RUA (500) 15, JAs 1DDZ 1FJO 1IRT 1JNM 1LZR 1NDO 1NEZ 1QPD 1RCD 1RJV 1RWE 1WPX 2AAL 2CG 2UW 3BLG 3CFO 3HUJ 3KIE 3NFA 4OK 5AB 5BYL 6AA 6EEL 6EER 6QT 7EHU 7UUI 8JL 8ZO 9BE, JHIs AGU BAs 2VT DCU FRI FTL KVE all 14-19, JXs 3DH 4XM, KAs 2VT 8CW 9MP (600) 23, KC6s AO (750) 22, BY (600) 23, KGs 4AN 4DH (650), 6AAy (555) 23, 6AQY 6ARV (570) 0, 6SE, KH6s GFI SP, KJ6BZ (500) 20-22, KL7EER (540) 11-12, KP4s AN BCL DAH GDK LV TL (568) 21, KR6s AI (570) 23, IS KI KN JT QW TAB 12-13, TX, KY4s AD (700) 15, FA FO FZ FS, KW6s DT GU 1, KX6s BC BU (515) 22, DC (640) 23, DQ BG (610) 0, KZs EK HC JW 19-20, KN MB NG, LAs SPF RPS 0AD 14, LUs 2LJB 2DKG 2FAO 2KE 3EAN 5AQ 5DBS 5DDM 4LZG 7AFG 7FAG 8DKA 8DX 8FJ 8ST 9BBB 9DD 9DDH 9DM MP4s BEZ BHL (700) 12, BGW 14, BGX 15-16, TAF (55) 13, TCE (572) 12, OAs 4CK 4CZ 4ED 4LV 4OS 4PF 16, 6PU 4/19, 6PY (615) 20, 8AQ 8V 9G (730), OD5s BA BZ FP (526) 17, FA (665) 15, FG FM (635) 14, OEs 2EGL 14, 5OEL 5XBB 6UX, OJs 2AN 2BEN 2DB (600) 13-14, 3LW, OX3FA, OY4OV, PJs 2CC 2CQ (574) 15, 3AH 7JC, PYs 1BKQ 1CAD 1CZH 1TE XIN 1NBF 1AN 2CK 2CQ 2DFR 2DK 2ERS 2PC 2PE 3AAZ 3AHI 3AHA 4KL 4OD 7ABY 7ASQ 7NF 7OS 7TS 7VON 7VX 7ZIs BX CF 18-19, DA DF DN, SL2AK, SP8BJH, SV6s WJJ (600), WN (555) 17, TEs 2WPK (665) 15, 2WLN 3MA, TGs 4SR 8GF 9EP (585) 23, 9CF (533) 14-17, TIs 2LA 5WM (510) 19, TJUA, TL8GL 13-15, TN8BK (593) 16, TR8AD, TR8AF (540) 16, TU2s BC CF UAs 2KAA 6KP2 9AI 9SLU 0LEH 10, UEs AGN DF JZ KI W 15, UC2s BU (585) 18, KZ 2SK, UR6s AGN FIZ KI W 15, UR6s CR (600) 13, DM KMF VAE, UG6s ARO AZO, UH8BO (550) 15, UH8s BQI MBM, UJ8s AAC AAO AAT ABT APR HBR KAA (610) 14, UJ7s AJG AYB 4XT HDH IE OB PL, UO5s BZ (585) 16, LW (628) 17, UP2s NCK OV (610) 15, PG (582) 9, UO2s ARO MLQ (895) 17, UR2s AO (580) 13-14, DD (565) 11-12, QD, UT8ER, UW9CR, UY5AD, VEsAB, VKs 2KM 6CT 6KM 6NM 6OV (581) 11, 7GK (525) 21, 8UG 9BR (600) 11-12, 9UC (730) 1, 9WD (557) 12, 9WP 9X1, VPs 2AA (567) 22, 2AW 2GAI 2GBL (679) 20, 2GBR (575) 0, 2GDL (503) 20, 2GDO (580) 19-20, 2GLE 20, 2MK 2IC 18-19, 2S0 (535) 20, 5AA (600) 16, 7NA (550) 18, 7NF 8HZ 19, 8JT (576) 22, 8KD (545) 21, 8KE (548) 15, 8KF 8KL 18, 8KO 18, 8KR (562) 15, 9WB (750) 23, 9Os 8CG (583) 12-13, 9C (580) 17, 9EP (520) 17, VR1L (543) 10-10, VS6s AA AD AJ BS FZ, VU2s DK 11-12, GGB (700) 11-12, JM JL VZ, XEs 1CCW (550) 1, 1FG 1OD 2WZ 2JZ, XW8s AX (570) 14, BS, YAs LAR (614) 12, YB (586) 11, 1ZC 5RG (614) 19, YBs AB (608) 14, 3R (495) 13, YNs 1PAC 1GLB (600), 1PS (643), 2BS 19, 4SBM (750) 22, YO 2BB (615) 14, 4AKA 5ACB 6ALD 9ABE, YSIWEP, YUs 2HA (598) 13, 3EY (570) 17, YVs 1ABE 1HT 1TP 1WF 3DK 3PQ 5AM 5BPG 5CEY 7BI all 17-21, ZB2BC (563) 17-18, ZC4s IM MO (558) 10, ZDs 3D 5X (600), 8AR (560) 18, 8JW 8HL (605) 15, 8ZR 9BE (544) 15, 9BC 18, ZEs 1CB 1BP 4J5 6JP (426) 13, ZLs LAQ (542) 2, 1DS 1IM 1KG 2SE (553) 0, 2VN (564) 0, 3AB 3ABJ/c 3RM 3FO 3LE 3QK 3RK 4AW, 3AP 5CN (590) 18, 51Y 5GJ 5KA 5ML 5MO (542) 21, 8AZ (990), 9AC, three dozen ZSs including 3AW 3BS 3HF 3S (523) 15, 3K (556) 17, 4M7AV (611) 21, 4U1TU (650) 16, 4S7FB (560) 17, 4X4s AM CY BL GV 15, HF (600) 14, IX, 5As ITA 1TK (840), 1TN (800) 12, 2TX 3TX (628) 15, 4Ys 5TS, 5H3s KJ LV (580) 11, MA (590) 16, 5WV (560) 16, 5N2s AAP ABG (583) 17, 5R8s AP 1524 14, AX (600) 15-16, 5W1As (517) 1, 5Z4s AA (578) 8, DW KO LG (605) 13, 6W8s AL BM DY (615) 19, XX (569) 17, 6Ys AD (600), AK DW LA NY (684) 0, 7PBAs (570) 16, 7Q7s RM (681) 16, WW (645) 15, 7Z3As 8P6BU 21, 8R1G (572) 20, 9E3USA (575) 19-20, 9G1s BF DM 14, 9V (572) 17, 9H1s BN K M 9J2s BC (550) 18, BR CS (595) 12, DT (575) 19-20, RA JC, 9K2s BJ 15, CB (565) 20, CZ 16, DT, 9L1s AT 17, HC (530) 14-15, KG (510) 17, KZ (510) 18, JP (510) 16, 9M2s GA HR (560) 14-15, 9N1AM (603) 9-10, 9O5s AL (600) 18, EB (633) 20, HF HT JL (547) 19, 9U5HI (516) 8, 9X5AA (590) 14-18, 9Y4s 1Q MM and RP, about ten per cent with carriers.

10 c.w. is this productive for us 3HNK 4YOK 7BE 8BQV 8YGR, Ks 1HDO 3CUI 3UXY 5YUR 0GVA, WAs 1FHJ 1JKZ 3ATX 5PPZ, Vbs 2RNL 2UOO 4HPJ 4GTI and 11ER: CEs 3AET 3ZK 8AA (60) 18, CN8HD (63) 18, CO2BE (22) 16, CRs 4BB (104) 19, 6AI (22) 19,

6AL (32) 17, 6EI (19) 16, 6BX (50) 16, 6GO (50) 16, 6JJ 6KB 18, 6KV (32) 18, 7CN (14) 16, 7IZ (70) 17-18, CTs 1EN 18, 1MO 17, 3AS (35) 16, CXs 1BM (33) 17, 1JM 3BH 7AP (40) 16, DMs 2AFO 2BRN (57), 2DEO (33) 3IGY (0) 15, EAs 1AB (30) 19, 2DT 18, 8BK 8FH 9AQ (70) 16, EIs 5F 9J (25), EL2s BJ Y (21) 14, EP2BQ, PEs 5EF 5TC (11), 9MS 9LT 14, FG7XX (43) 12-13, GCs 2FMV 3IEW 16-4LI (13) 16, GD3s AIM 9, FBS 15, GJ3JEX, GM3s EQZ (60), KLA 11-17, NO (25), GW3s PSP 14, KSQ SSK (10), HAs 2RB (57), 8CF 5BB 5KFZ (22) 14, TRB (12) 14, 8UD, HB9s AGH AJI BX MU UB (50), HGs 2KRD (35), 4KYJ (22) 14-17, TPQ 0KHV (50) 16, HH9DL, HH9DLN 15, HKS 3BAE 14, 3RQ 3TM 7YB (62) 17, HL9KQ (48) 11, ISIs AEW (45) 13, BDO, IT1P1T (26) 15-16, JAs 1MIN 1PTX 1SDX 2ALY 6BBE 6TG 8CKC 0ADY all 16-23, JH1KLO, K2M7F (24), KP4UW (27) 15, KR8s BU EA 11, EI, KV4s FZ (24) 18, GA 15, KX6PN, KZ5II (40) 17, LAs 3SG 4JG (35) 14, 7Y (35), 8MK (49) 18, 0AD 14, LUs 1DEW 3DD 3DSI 3EX (25) 14-18, 5FE 5FEH 6DXK 9DL 9FAZ, LX1CF (65) 10, LZIs CW (24) 14, KPG (20), KSZ (29) 16, YW (70), MP4s BBA 13, BFO (26) 15, BGX (105) 10, BHQ 14, 1CP 10, OAs ACF (68) 16, BD DL (22) 15, DX (20) 16, KF (22) 18, PJ (16), ZP (27) 19, OD5s CX (70) 14, LX (32) 16, OE5RI (10), OHs 1VR 2BC 2BCD (12), 2LA 2PM 7RI (25), OKs 1AHX 1AMR 1APP 1APV 1APV 1RKN 1KTE 1RX 1VB 1WC 2BP 2BMF 2QX 2TB 3DG, OX5BJ, OY4R (75) 17, PJ2s CB (18) 17, VD (22) 14-19, PYs 1ADA 1CAD 1MB 1MCC 2OU 5ASN 6FI (20) 16, 7AN, SKs 5AA 6CF 16, SPs 2AGH 2B1K 4BYQ (27), 5AA (9), 6AXF (26), 7HF, ST2SA 36 14-15, SV0s WMI (55), WN (18) 17, TAZe (10), 16, T2DL (9) 22, T31s AJ (26) 17, QQ, UAs 1KCU (25), 2CS (23) 14, 2EC 3AZ (28), 3MV (34), 3PZ (25), 3RF 6KMY 6LA 6PD 6WY (57), 9CF (40), 9MFF 9OE 0BX 0PD, UC2s AC DR (51), KKB, UD6KBO 10-11, UFs AB DM (65) 18, UG6LP 12, UH8s ABC AE (24) 11-12, AWB BV, UI8BI (38) 12, UJ8s KAA (37) 11, SX (20) 14, UL7s BBY OA (38) 18, PL (44) 12, UM8AP (30) 12, UP2JO (55) 13, UQ2HD (57) 10-14, UR2MS (15), UT5s KCD (32), KDN (42) 16, KDP (25), YP (25) 16, UV3s AX (17), DO (13) 13, UW3s BO LL (22) 14, NN (23) 14, QV 9V (21), WN (32), UY5s LK (21), NY (17), VE2DHF/YV1 (10) 20, VKs 2HO 7, 3XB 4HR 5DS 10, 6AI (60) 13, 6NS (60) 12, 8EA (65) 8-12, 8UG (64) 12, VPs 2MQ 8HJ 14, 9BK, VR2DK (20) 23, VQs 8CC (23), 8CP (24) 17, 9B (44) 17, VS6s AA AF 13, AI (48) 14, FX 13, VU2s GGB 13, GH 10, JA (18) 17, OLK (30) 11-12, VZ (20), XW8s BP (26) 11, CS (35) 17-18, YOs 2BV (54), 2BS (24), 2CD 5ALH (22) 14, 8AD 15, 8APK (30) 16, YUs 2NFJ (25), 3BB (58), 3SX (55), 4ALM 16, 5XCS, YVs 5AHN 6FW, ZB2BO (40) 18, ZC3s AK 15, SS (15) 11, ZD5X (47) 10, ZEs 1As (43) 16, 1BT (33) 10, 1DC (18) 10, 2JL (20) 16-17, 2JO 10, 3JJ 3JO (50) 3, 8JJ (30) 16, 8JN, ZF1KV (25) 16, ZLs 1AJU (40) 20-21, 1DJ (30) 21, 2VN (45) 22, ZSs galore including 3AW (40) 18, 4SD7DA 12, 4U1TFU (33) 16, 5As 1TA (30) 11, 3FW (85) 16, 5H3s KJ (40) 17, LV (40) 19, 5Z4s KO (80) 13, SS (31) 16-18, 6W8s CQ XX (5) 16, 6Y5s SR 17, UC (35), 7P8AB (90), 7Q7RM (25) 17, 8P6BU (20) 19, 9GIGE (20) 13-17, 9H1s AY (25) 14, BL (50) 16, 9J2s EJ (80) 13-14, GJ (48) 14-17, MG (51) 17, MIX RA (26) 17, RQ (29) 14, VB XL 20, XZ (26) 14-16, 9I, 1HC (13) 15, 9VIs LK (4) 11, OA (29) 18, OT 17, PB PD (43) 17, 9Y4s NN (37) 18 and RP (47) 14-18. Got 28 MHz. chalked off your 5B-DXCC list? Time's a-wastin'.

Other band amateurs are moving up the ramp thanks to (20 c.w.) Ws 1ARR 1FK 1TAT 3HNK 3KNG 4YOK 6BAB 6EAY 7BE 8IBX/2 8YGR, Ks 1LWI 1UHY 4TJW 6GAK 6TWT 8DHT 8PYD 8TRF 9SRR, WAs 1FHJ 1JKZ 1KEX 2YWR 5PPZ 6JVD 6TWT 9SQY, WBs 4GTI 6VVS 9BUV, VEs 3GLG 7BST, 11ER: (20 phone) Ws 1ARR 1BGD/2 2DY 2VOZ 3HNK 3ICQ 4YOK 6YRA

8YGR 9LNO, Ks 1UHY 4TWPJ 6TWT, WAs 1FHU 1JMR 2BHU 2YWR 5PZ 5RTB 6EQW 8YXE, WB6VVS, VE7BST, ICTL, P. Kilroy; (15 c.w.) Ws 1ARR 3HNK 4YOK 8YGR, WAs 1FHU 3KSQ 9SQY, WB0BUV, WNs 2HPB 4JYB 8DSF 6WOW; (15 phone) Ws 1ARR 2DY 3HNK 4YOK 6YRA 8YGR, KITWJ, WAs 1FHU 6EQW; (40 c.w.) W8YGR, K8DHT, WAs 1FHU 1JKZ 2BHU, WB6VVS; (40 phone) W8YGR; (80 c.w.) WISWX, K8DHT, WAs 1FHU FNJ; (75 phone) WA5IIS; (160 c.w.) W1BB and K8DHT, Autumn DX fun dead ahead!

## Where:

**AFRICA** — VQ8CV, whose new address appears in the listings to follow, offers, "Anyone still needing a QSL for my VP2KR operations can write me for the card. I'll reply direct if self-addressed envelope and International Reply Coupons are supplied, otherwise via bureau." — BT3USA pleads through W1ETU that W/K/VE/VOs QSL only via VE3IG with appropriate postage defrayal. — Geoff Watts's *DX News-Sheet* reminds us that ZS6LW's stint as ZS2MT's QSL aide dates from May 23, 1969. — W0DW hears, "R7ZL, back from his 55-day stay on Tromelin, had a streak of bad luck and has been too busy to answer all QSLs. He assures me that he will take care of the stack as soon as possible." — "ZE1CU has complete logs for his extensive ZS8L activity and welcomes QSL inquiries," advises K9BNF, doing QSL chores for Ken's current Salisbury operation. "Bureau difficulties may have caused earlier ZS8L cards to stray." — You might check with CR6GO via REF, REP or RSCB if you need QSLs from CR6s BX CA DA DB DK DX EA FY HL JY and/or IR. W6EXT learns these stations are no longer affiliated with Angola's LARA bureau. — W3BYV affirms, "I'll be QSL manager for missionary airman EL8C effective July 1, 1969. Roy will mail logs to me once a month." The customary s.a.s.e. (self-addressed stamped envelopes) from Statesiders, s.a.s.e. with IRCs from others, is requested unless you don't mind the slow but sure bureau route. — G4GG advises me that QSLs for his ZD5G work are available through his U.K. address, says K9HWB. "Derek was active in Swaziland from 1966 to '68." — L1DXA's *Bulletin* finds EA9AA determined to liquidate past QSL debts with a fresh batch of blanks from the printer.

**ASIA** — "I still have a few AP2AR QSLs for forwarding," notifies W8QWL. "I'll drop them in the mail with the extra postage provided by the more generous self-addressed envelope providers. This concludes my tenure as QSL manager for Arif who now will spend three years in the States." — FRU of 4U1TU writes 487AB that future Maldives amateurs are expected to sign normal ham prefixes hereafter; 8Q7AA instead of 8QAA, for example. — EP2CB (WA6GZZ), new proprietor of Iran's QSL bureau, states, "QSLs for EPs should be addressed as follows until my return to the U.S. next June: Amateur Radio Society of Iran, c/o HP2CB, P.O. Box 2000, USDAO, United States Embassy, APO, New York, N.Y., 09205. I hold many cards for ex-EPs dating back into the 1950s. Unless they are claimed, their destruction is planned for December 1, 1969. Old or recent holders of EP calls are invited to keep me supplied with s.a.s.e. for prompt forwarding of their due QSLs."

**OCEANIA** — Some reciprocal P.I. licenses courtesy *DX News-Sheet*: DX1s AAV (W4AAV), HMI (W8HMI), LNY (K8LNY); DU1s ZAA (K2IRT), ZAB (W7UXP), ZAC (K3MOV), ZAE (W4JNR), ZAF (9G1TV), ZAG (WB6KRW), ZAH (W4SUS), ZAI (KG6APJ), ZAJ

(W7UO), ZAN (W1GL), ZAW (W4EIV) and DU8ZAD (W4MOV). — "K6ZIF has 9M6IIM logs dating from February of this year," notes WA6AKN. "He requests s.a.s.e. or IRCs for direct response, or replies go out via bureau shipment once a year." About this s.a.s.e. business — for direct reply, unless specifically waived, self-addressed envelopes with International Reply Coupons, or self-addressed stamped envelopes when appropriate, should be included in mailings to QSL managers. This is only fair when seeking postal response from anyone.

**EUROPE** — The F5KAE club gang, signing C31BC and C31BT, and HB9UP as C31CE and C31CI, tried out those new-style Andorra calls in midsummer. — VERNON's *DXpress* warns that PA6s will switch to their PD3 commemorative prefix this month, suffixes presumably unchanged. — Greece's National Amateur Radio Union has organized a Mediterranean QSL Bureau at P.O. Box 1412, Athens, functional area as yet unclear. — "I'm still QSL manager for W. Walker, CT2AR," clarifies WA4WIP. — JX3DH guarantees that QSLs for any JX will reach him via this address: Jan Mayen, c/o Norwegian Embassy, Reykjavik, Iceland. — Concerning the upcoming Scandinavian Activity DX test, Norway's NRRL entreats, "All SAC participants are requested to confirm each QSO with QSL. This voluntary habit is aimed to foster general QSLing between all amateurs."

**HEREABOUTS** — "My home call is WA2OYS and I maintain an envelope on file there," remarks OX5BG. "The fastest way to reach me with a QSL, however, is direct [to the address in the list to follow]. Nos. a.s.e. necessary but make sure your address is correct on your QSL. Incidentally, there are no more KG1 calls assigned in Greenland and no KG1 cards available to send out. OX5s may be reached via XPIAA, MARS Dir., 1983rd Comm. Sqdn., APO, New York, N.Y., 09023. Missent OX3 and OX4 cards must be reforwarded with delay." — "I've made arrangements with WB4KZG to handle my U.S. and Canada QSLing," confirms KZ5II. "Stations elsewhere may use the KZ5 bureau." The usual s.a.s.e. provision, of course. — QSL agent VE2DRY, in lines called to our attention by W1ETU and ARRL Assistant Secretary W1UED, protests receipt of U.S.-stamped s.a.s.e. from W/K QSL-seekers. Can't be mailed in Canada, guys. — "DL7FT is my QSL manager since May 20, 1969," declares KZ5EK (WA7ARU). — "VP5CB is a good friend but I'm not his QSL manager," informs VP5AA (W1WQC). "I suggest Chuck's home K3NAU address." — WB9BUV, formerly WA8PVN, wants to hear from DX buddies c/o WCSI Radio, 501 Washington St., Columbus, Ind., 47201. "Some of us WB9s are Extras," he insists. — WA4WIP reasonably demands s.a.s.e. or s.a.s.e. with IRCs, plus strict adherence to GMT in granting KIA/KC4 pasteboards. Ever try searching an 11,000-QSO log? — West Coast *DX Bulletin* understands that H18XHG is a few hundred QSOs behind in QSLing but his intentions are solid. — Ws 1SWX 3HNK 4NYQ 8IBX/2, Ks 1HDO 4RON, WA9SQY and WN1JYB direct our "QSLers of the Month" salute toward CO2CN, CT3AS, DM3XL, FK8BG, FM7s WN WW, LA1OA, LZs 1YW 2AE, OH6NH, OZ2X, PA6JV, PZ1BC, SM7AGR, SU1IM, UA6YT, UG6ARO, IW9BIV, VPs 2DAE 2GBL SKL, VQ8CP, VU2VZ, ZL1HW, 5As 1TL 3TX, 5H3KJ, 6W8WD, 6W/W4RPD and 9X5AA, plus QSL agents Ws 1YRC 4YHB, WA3s HUP and 1XP for quickie QSL comebacks. Any snappy mailers we missed? — WA1HAA would like to learn more about WA1LHD/VE8 including the feller's QSL address, and WA9SQY ponders an overdue SM7BKX confirmation. — W3IINK and WA9ZAK offer to perform as QSL aides to needful DX ops.

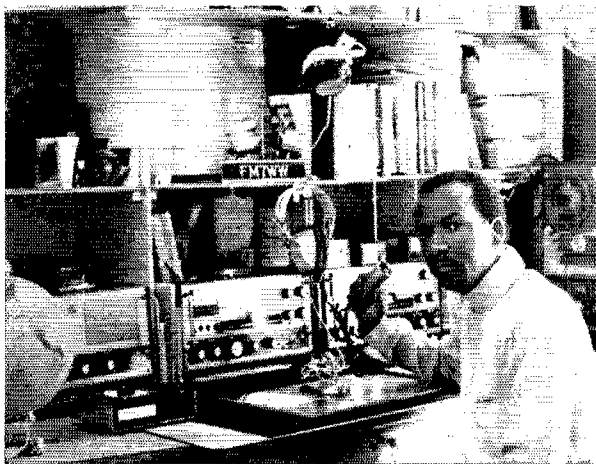
**SOUTH AMERICA** — "Mail from the Galapagos is very erratic, logs often delayed or lost," reports HC8RS QSL tender SM5EAG to *DX News-Sheet*. — The same periodical suggests PY4AP, P.O. Box 481, Belo Horizonte, MG, Brazil, as a route toward elusive pasteboards confirming 1968 PY3BLR contacts. — LZ is another Argentine prefix possibility, according to West Coast *DX Bulletin*, which publication also lists CE3ZN as contemporary CE9AT QSL pusher. Apparently no logs are on hand for CE9AT's numerous February '68 QSOs, though. — Here's the month's QTH accumulation but keep in mind that each specification is necessarily neither "official", complete nor accurate. . . .

**C31BC-C31BT** (to F5KAE)  
 CT2AK, Box 143, Sao Miguel, Azores  
 CX1JDW, c/o 1512-1/2 N. Klein St., Oklahoma City, Okla. 73106  
 DJ5NG, R. Koch, Streitbergstr. 87a, 8 Munich 60, Germany

Afghanistan's ham population continues to thrive. Here we find (front, left to right) YAs 1ZA 1EXZ 1YB 1ZC 5RG, (rear) YAs 2ZC 2AR 1GNT 2HWI 1AR and 1AB attending a lively meeting of the Camel Drivers Radio Club at Kabul. (Photo via YA5RG, CDRC president)



FM7WW, operated by Dr. Fred Alexandrine at Fort-de-France, provides plenty of Martinique phone QSOs in fluent English or French. (Photo via K1HDO)



California DX Club *Bulletin* (WA6GLD), UBA's *On the Air* (ONs 4AD 5VA), Utah DX Association *Bulletin* (K7DEQ), VERON's *DXpress* (PA0s FX LOU TO VDV WWP) and West Coast *DX Bulletin* (WA6AUD). Got a lead or two we missed?

### Whence:

**OCEANIA** — Next month NZART (New Zealand) invites amateurs throughout the world to frolic in its 1969 VK/ZL/Oceania DX Contest as part of New Zealand's Bi-Century Celebration to be held (phone) from 1000 GMT the 4th to 1000 the 5th, and (c.w.) the 11th-12th, same times. Exchange the usual RS- or RST001, RST002, etc., serials. Non-Oceania participants earn a point for each non-VK/ZL Oceania captured, 2 points for each VK/ZL worked, and final score multiply this total by the number of VK/ZL band-call areas accumulated. (Oceania contestants outside VK/ZL work both sides of the fence at 1 point per non-Oceania and 2 points per VK/ZL, same multipliers.) Your log should clearly indicate date, GMT, call of station contacted, band, serials sent and received, and each new VK/ZL call areas as worked per band (separate sheets for each band). Club entrants please note club name on entry to qualify for club aggregate entry. Include a summary sheet showing your call, name, address, equipment description, and designate multi- or monoband entry certification. Whisk the works off to Contest Manager ZL2GX, NZART, Box 489, Wellington, N.Z., postmarked on or before January 23, 1970, to be eligible for possible certifications and other awards. (Gluck! . . . West Coast *DX Bulletin's* Pacific net directory: Pacific Inter-island, 14,320 kHz., 0830 GMT, Mon., Wed., Fri.; Marianas, 3850, 0830, Tues.; Gecko (Marianas), 14,240, 0930, Tue., Fri.; Marine Corps, 21,380, 1900, daily; Confusion, 21,400, 0200, daily; and YL-SSB Oceania, 14,332, 0300, Saturday. Loads of zoodies make these scenes regularly.

**ASIA** — From 0000 GMT October 18th to 2400 the 19th OARC (Okinawa) invites DXers world wide to have a go at its KR6 DX Contest, c.w. and phone. The usual RST001, RST002, etc. (no "P" on voice, of course) serials will be exchanged with KR6s at 25, 20, 5, 10 and 15 points per QSO on 80, 40, 20, 15 and 10 meters respectively, final score equivalent to total QSO points. For possible certificate recognition ship your log accompanied by a signed summary sheet showing each station worked, bands and modes used, QSO points as claimed, total claimed score, whether single- or multiop, multiband or monoband entry is desired, and transmitter description including power input, to Contest Committee, Okinawa Amateur Radio Club, APO, San Francisco, Calif., 96331, postmarked no later than November 1, 1969. . . . OD5FB of RAL (Lebanon) exhorts all phone and/or c.w. DXers to romp in a Lebanese DX Contest from 0001 GMT October 4th to 2359 the 12th, a week-long fest, wherein non-OD5s hunt down OD5s at 2 points per contact on 10, 15 and 20 meters, 4 points per 40-meter contact, and 6 points per 80-meter QSO. No special serial swap is specified. To be eligible for possible merit awards — certifications, cups, etc., — zip your entry log to RAL, P.O. Box 1217, Beirut, Lebanon, postmarked no later than November 1, 1969. . . . There's a Southeast Asia DX net, 487PB presiding, on 14,320 kHz. almost daily at 1200 GMT. The outfit frequently hooks up with a Caribbean DX net steered by YV4UA on 14,170 kHz. at 1145 GMT on Sundays. Juicy about at both ends.

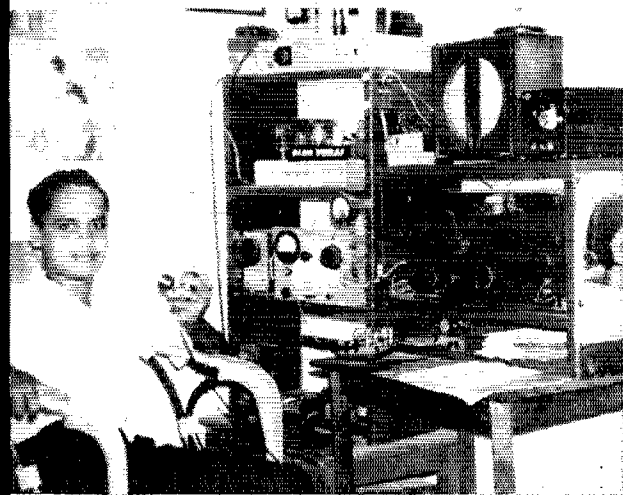
**EUROPE** — East Germany's 1969 WADM Contest, a c.w.-only deal, takes place from 1500 GMT the 18th of

- DUILP, P.O. Box 59, Quezon City, P.I.  
 EA8GR, Box 860, Las Palmas, Canary Islands  
 EL8C (via W3BYY; see text)  
 FK8BN, Box 637, Noumea, New Caledonia  
 FL8MB, M. Blaise, B.P. 49, Djibouti, Fr. Somaliland  
 FM7WW, P.O. Box 10, Fort-de France, Martinique  
 G5ANX, 2130th Comm. Sqdn., APO, New York, N.Y., 09378  
 GC5s AOH AOI (via F9MD)  
 GD3s KDB LNS (to G3s KDB LNS or via WB2YQH)  
 JW5 2QK 9DL (via LA1SL)  
 KC6AT, Box 94, Ponape, E. Carolines, 96941  
 KH6ABH, USCG Lorain Stn., Box 48, FPO, San Francisco, Calif., 96610  
 KM6CE, U.S. NavSta, Box 23, FPO, San Francisco, Calif., 96614  
 KX6s EQ/KC6 FN/KC6 (via W2GHK)  
 KZ5EK (via DL7FT; see text)  
 OE5LX, L. Mis., P.O. Box 38, A-4600 Wels, Austria  
 OH2BHU/OH0, B. Ahlnas, Box 1, Marichamn, Alands, Finland  
 OX5BG, R. Harris, Box 1165, 1983rd Comm. Sqdn., APO, New York, N.Y., 09023  
 PZ1BX, P.O. Box 2003, Paramaribo, Surinam  
 ST2SA, P.O. Box 244, Port Sudan, Sudan  
 TF2WLR, R. Monroe, Box 14, FPO, New York, N.Y., 09571  
 TR8DG, G. Delas, P.O. Box 356, Libreville, Gabon  
 VK3AEJ, G. Brain, 5 Lomond Av., Kilsyth, Vic., 3137, Australia  
 VK9s AM FH (via WB6AUH)  
 VK9BH, Box 723, Lae, T.H.G.  
 VK9BN, Rev. B. Newman, c/o St. Fidelis College, P.O. Alexinhaven, T.N.G.  
 VQ8CV, J. F. Stratfull, Audit Dept., Port Louis, Mauritius  
 VQ9MK, R. Markham, Bajce St. Anne, Praslin, Seychelles  
 VR2FV, R. Darling, Box 252, Airport, Nandi, Fiji Islands  
 VU2AL/W2, C. Anandasegar, 58 Curtis Av., Manasquan, N.J., 08736  
 YA1SG, S. Garwood, Main St., Flanders, N.J. 07836  
 YB0BD, Salembatengah 24, Djakarta, Indonesia  
 YJ8JM, c/o Radio Santo, Santo, New Hebrides  
 YJ8RG, R. Graham, c/o P.O., Vila, New Hebrides  
 ZP5KU, Box 241, Asuncion, Paraguay  
 3B3FL, Box 9434, Stockholm, Sweden  
 5VZDB, P.O. Box 123, Lome, Togo  
 6W8BJ, B.P. 62, Thies, Senegal  
 9G1GE, Box 2, Nsutvassaw, Ghana  
 9Q5TR, H. Wilcke, B.P. 143, Bunia, R.C.  
 9U5CB, Box 1920, Bujumbura, Burundi

- ex-AP2MR (see text)  
 EL2BT (to WA3LRD)  
 ex-F08CG (to F5PE)  
 FW8AH (to FK8AH)  
 ex-FW8RC (to F0GL)  
 GC5UGK (to G3UGK)  
 GC5AGA (to K4IL)  
 HB0XWD (via G3JLJ)  
 HB0XWL (via G3PUO)  
 HC2GG (to DL2GG)  
 HS3LJ (via W9VNE)  
 JX4YM (via NRRL)  
 KZ5II (via WB4KZG)  
 LX1FT (via DL8FD)  
 LX2CO (via DL1YA)  
 MP4BGX (via G3XHE)  
 MP4TDA (via G3HSE)  
 OA7BA (via W6CDD)  
 ON6SB (to ON5TO)  
 P39HH (to W6ZJA)

- SK6CF (via SM6CKU)  
 TAlAU (via DJ48K)  
 ex-TA2BK (to DJ0UJ)  
 FF3IRA (via IRA)  
 TL8GL (via VE2DCY)  
 ex-TU2AP (to 5VZDB)  
 ex-VK4EV (to VK3AEJ)  
 VK9DH (via WA6TVH)  
 VP2GBR (via G3UUR)  
 ex-VP2KR (to VQ8CV)  
 VP5TH (via WA5GFS)  
 VS5MC (via K8UDJ)  
 ex-ZD5G (to G4GG)  
 ZD9BM (via GB2SM)  
 ex-Z8RL (to ZE1CU)  
 3A0II (to ON5TO)  
 4U7ITU (to 4U1ITU)  
 5A2TR (to DL9OH)  
 9U5RH (via ON5TO)

Thanks for the preceding go to Ws 1ARR 1ETU 1CW 1DW 1SWX 2DY 4YOK 6QFU 8YGR, Ks 4TWJ 6GAK 8PYD 9BNF 0HWB, Was 1FHU 3K5Q 4WIP 9SQY, WB9BUV, TF2WLV, Columbus Amateur Radio Association *CarAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4-BB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Long Island DX Association *D X Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N.Y., 12020), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DX'er* (Box 608, Menlo Park, Calif., 94025), Southern



VU2AI's Madras layout is now closed down while the OM takes up work in New York as VU2AI/W2. Anand made a multitude of DX friends with his homespun 40-watter, BC-224 and folded dipole. (Photo via W1YYM)

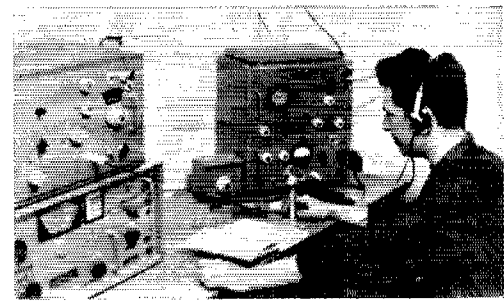
AR, 487DA, 4U1ITU, 4X4HF, 6W8XX, 9J2MX and 9Y4I.A. Home front performers in order of score are (phone) DJ's 2YA 5BV 3JB, DL's 7AA 5GI, DJ's 6LDA 9AH, DL8OH, DJ2WE, DL9PU; (c.w.) DJ8SW, DM2ATD, DJ's 2BW 2YA, DL7AV, DJ5AZ, DJ's 3WU 3JB 7IK and DL1AM. On the multiplier scene at our end the crews of W4ZXI, K8UDJ, W9EXE, K6AHW and WA6GLD came through very big in that scoring sequence. Don't pass up the voice wind-up of this year's WAEDC shebang on the 13th-14th of this month! . . . Clipperton isle, Albania, Laccadives, Bouvet isle, South Sandwich, Iraq, Cocos (TIG), China, San Felix, Maria Theresa, Revilla Gigedo, Sikkim, Tokelau, Niue, Tibet, Cambodia, Mali, 9K3-land, Bhutan, Spratly Is., Juan de Nova, Manihiki, Serrana Bank, Bajo Nuevo, Kermadecs, Campbells, Voltaic Rep., Infi, Minerva reef, Aves isle, Juan Fernandez, Palmyra, Fanning, 824-land, Qatar, Geyser reef, Jordan, E. Pakistan, Rio de Oro, Kure isle, Amsterdam isle, Timor, Burma, the Andamans, Karaman isle, Guinea and Spanish Guinea rank in that order of DX desirability according to *DX News Sheet's* recent subscribers poll. Navassa, Heard and Malpelo isles are still well up there, too.

October to 1500 the 19th on 3.5 through 28 MHz. Non-DMs will work DM stations exchanging the customary RST001, RST002, etc., serials. Each DM may be worked once per band at 3 points per QSO, this total to be multiplied by the number of DM band-districts worked, for final score (the last letter of a DM's call indicates his district, 'A' through 'O', fifteen possible per band, and DM7-8-9 stations worked can be substituted in your results for uncontacted band-districts). Mail log entries within 30 days to Radioclub GDR, DM Contest Mgr. DM2ATL, DDR 1055, Berlin, P.O. Box 30, G.D.R. This one could move you toward DMCA diplomas administered through DM2ACB, Box 185, 27 Schwerin, G.D.R. . . . NNRL (Norway) welcomes world-wide indulgence in the 1969 Scandinavian Activity Contest scheduled for (c.w.) the period 1500 GMT on the 20th of this month to 1800 the 21st, and (phone) on the 27th-28th, same times, on 3.5 through 28 MHz. Non-Scandinavians will round up as many JW JX LA OH OHØ OX OY OZ and SK-SL-SM stations as possible, swapping the usual RS- or RST001, RST002, etc., serials. Scores are calculated at one point per completed QSO, this total multiplied for final score by the number of Scandinavian band-prefixes collected (45 maximum possible). Your log transcript listing date, GMT, station worked, serials sent-received, band, and notation of each new multiplier claimed, should be submitted with a summary sheet to NNRL, P.O. Box 21, Refstad, Oslo 5, Norway, postmarked no later than October 15, 1969, to be eligible for possible award acknowledgment. Good chance to clean up on such certifications as OHA, OZCCA, WALA, WASM, etc. See you on the north Atlantic path, DXdom's Route One! . . . Ham Radio's W1DITY slips us single-op results of DARC's 1968 WAE DX Contest, popular West German export. Call area leaders our way go (phone) K1HVY, WB2RXS, K7ADD/3, W4WSF, K5MDS, Ks 6AHV, 8HZU, W9EXE and VE3-KZ; (c.w.) Ws 1BPW 2MEL, Ks 3HTZ 4DSN, W51OU, WB6HGU, K7WWR, Ws 8GQU 9VNE, WAØKDI, KH6LJ, VEs 1ASJ 2WA 3BRE 4ZX 5DZ 6VO and VO1L. In order of score we find (phone) Ks 1HVY 7ADD/3, WA3KEG, Ks 3HTZ 8HZU, Ws 4WSF 1DTY, WB2RXS, W9EXE and DL7KX; (c.w.) Ws 1BPW 2MEL, K3HTZ, Ws 9VNE 51OU, K7ADD/3, W3PG, K3MNT, WB6HGU and W1DITY. Continental voice winners are CR6PY, GC5AET, DT1FH, OD5BZ, PY3BXW and WØVXO/KV4; c.w. toppers are (R)6G0, EP2BQ, W1RPW, OH2BR, PY7ACQ and VK6RU. Other leaders per country: (phone) CE6EF, CM2DC, CR4BA, CT1MW, CX2CN, EA4KC, EL8J, ET3REL, F2JEL, G3IAR, GW3NRY, HA5CQ, HB9AKJ, HL9KQ, HQ2GK, I1PGL, JA1ND0, KØ1L/KG6, KR6NR, KX6DR, LA1K, LU8DKA, LX1BW, MP4BGU, OE4WBW, OH6VR, OK1ADM, ON8AJ, OZ3SK, PAØ-HBO, PZ1DF, SM7ALA, UAs 4PW 9BW, UB5WF, UD6-BD, UF6FE, UH8AE, U18CD, UL7BF, UP2ER, UR2OV, VK2APK, VS6DR, VU2DKZ, YA5RG, YØ3JU, YU3AR, YV5CIL, ZB2AY, ZD8CC, ZL1AG0, ZS6ACK, 3AØEF, 4U1ITU, 4Z4HF, 5N2AAF, 5R8BP, 7Q7AM, 9Y4KR; (c.w.) AP5HQ, CE2CR, CO2DR, DJ6S1/LX, DL1SU/YB, EA5 2CR 6BH 9B0, EL2Y, E15F, FØ1P, G3FXB, GD3-AM, GM3CFS, HA1SB, H13AV, HK4ALE, HL9KQ, JA1MN, Ks 4PHY/YV5 Ø1L/KG6, LA6AD, LZ2EA, OE4SZW, OK1BYW, ON4XC, OZ1LO, PAØINA, PZ1AH, SM5DWL, SP3AJJ, UAs 3KBO 9WS, UB5GX, UC2SE, UD6AM, UF6CX, UH8B0, U18LK, UJ8AC, UL7GW, UP2KBC, UQ2GW, VK9GN, XEØGJR, YØ9APJ, YU3-

**SOUTH AMERICA** — RCP (Peru) invites amateurs of S "all American republics and the Panama Canal Zone" to work each other in its 1969 Pan American Peru DX Contest from 1700 GMT on the 27th of this month to 0500 the 29th, phone only on 75 through 10 meters, swapping RS001, RS002, etc., serials at one point per contact. For final score multiply QSO points by "each band 2 points and each American republic 2 points." Every effort must include no less than 20 contacts and at least one QSO with an OA station. To be eligible for various awards acknowledging meritorious performance make sure your log entry is in the hands of Radio Club Peruano, P.O. Box 538, Lima, Peru, no later than November 7, 1969. . . . Results of RCV's 1968 Venezuela Independence DX Contest disclose Yank call area toppers W1MDO, WA2YCA, W3BYX, WA4PXP, K5IKL, WB6HGL, WA7ISQ, Ws 8FPM 9JQD, KH6GLU and VE3BMB. In order of score it's WA4PXP, W1MDO, WB6HGL, KH6GLU, WB6LXS, W8FPM, WB6SAZ, W8EVZ, WA1HN, K5IKL and W4YWV. Killers by continent are EA8EF, HK5BDS, JA1CWZ, KP4AST, UP2NV and VK2APK. Winners per country include CP5AK, CR4BI, CT1MZ, DL5LB, DM2ATL, EA7II, G6LK, GM5AHS, GW3RTY, HA5CQ, HI8JAC, HP1RS, HR2GK, I1CBZ, KR6NR, KZ5MA, LA8NK, OA4XE, ØH2VB, OK1AGQ, OZ4CF, PZ3CL, PZ1BD, SM5AP1/3, TG8IA, TL1JAA, UAs 4PW 9FU, UC2BF, UD6CC, UQ2-KEM, UT5KTH, YN2JS, YS1XE, YU2NTJ, ZP3AL, 4A1LS and 9M2PO. Call area pacers in the host country are YVs 1LA 2LR 3NS 4QG 5BTS 6GL 7AV and 9AF, with YVs 1LA 4QG 5BTS 4UA 5BOA 3NS 7AV 7DU 6GL and 9AF in order of score. U.S.S.R. contest hawks still outparticipate the U.S.A. heavily in most of these overseas tiffs — let's give 'em more competition!

The *Radio Club Brasileiro* announces a contest commemorating the independence day of Brasil starting at 0301 GMT September 1, and ending 0300 GMT September 8. All bands can be worked on a.m. or s.s.b.; call "Brasil Independence." Contacts with RCB members count 2 points official station PY2DVA, 5 points, and other stations 1 point. Each of the nine Brazilian regions count as a multiplier. Logs go to RCB, P.O. Box 14630, Sao Paulo, Brasil.

QST



LZ2EA's homebuilt outfit at Pleven features a sleek five-stage multiband 50-watt transmitter, 19-tube receiver and various skywires. Anton was the 100th country worked by K1HDO, contributor of this photo.

# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* WB6B BO

## What Have You Done?

If we, as amateur radio operators, were asked to individually defend our amateur privileges by suddenly being asked, as was Kipling's Tomlinson:

"Give answer, what have you done?" would we, as did Tomlinson, reply by citing the experiences of others, both individual or group, whose public service exploits or successful experiments that advanced the state of the art are legend? In most cases we would, even as we do when protesting some particular proposed change in the rules. We never stop to think of the hundreds of little things performed by ourselves in our everyday operating, or in club activity that have advanced the state of the art, or given a helping hand when it was needed.

We might stand mute wondering what in the world we could say when some grateful mother or wife could answer that thanks to us that they had learned that their serviceman had escaped the fire aboard the carrier *Enterprise* without injury. And there are the thousands of families all over the country who are grateful for the selfless giving of their time by the YLs in MARS for the phone patches that brought the voices of their servicemen into their homes for a brief time.

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

Everywhere people might step up and say: "My family were caught in a spring flood and we couldn't get in contact with them, then this ham called with a message saying they were safe." There are the SECs and ECs who are able to mobilize a communications group for any emergency from hunting a lost child at a picnic, to a major disaster. And others such as W4TVT, Claire, who maintains a daily "traffic watch" net in the Washington D. C. area. Probably no YL who is a member of a weather net, or hurricane watch thinks it is outstanding enough to cite as an example of her activity. The gals on the Eyebank Net are performing a great service night after night to bring sight to someone they have never met. There are the YLs in the National Traffic System who maintain their assigned schedules in this 365-day-a-year activity to keep the messages flowing smoothly throughout the country.

Other women might answer that they were a part of the handicapped net assisting those who are not so fortunate to get on the air through code and theory classes, or even designing equipment to fit the needs of some handicapped amateur. And there are others who set up communications at booths in fairs and other public gatherings, and spend long hours in them explaining the amateur radio service to the public, as well as taking messages from that same public



Irene, W3RXJ, with Mrs. Marion Jayne, the first entrant of the Powder Puff Derby to land at Dulles, sending "arrived safely" message to her family.

(Photograph courtesy WB4FUJ)



W3UTR, Meg; W3RXJ, Irene; and W3GTC, Carolyn, at the Powder Puff Derby station in Dulles Airport in Washington, D.C.

(Photograph courtesy WB4FUJ)

for relay across the country. If not in that activity, there is the time devoted to speech making in an unofficial public relations capacity to tell the story of amateur radio and the service we perform to the many clubs and organizations in our individual communities.

Then there are the clubs and the individuals in YLRL who have adopted DX YLs for membership in YLRL, or contribute to the assistance of amateurs in other countries through the people-to-people program.

None of these gals who are doing any of these things would consider them outstanding enough, or important enough to cite as an example to answer that question. For each of us it is just routine, it is doing something because we love doing it. Yet it is this daily activity, this seeming routine of giving a little of our time and ourselves in what the late Ben White, W4PL, once called Public Interest, Convenience or Necessity that is the answer to that query.

### Plan Ahead

Fall activities calendar for YLs.

September 24, 25, 26	YLRL "Howdy Days"
October 11, 12	Floridora Contest
October 15, 16	YL AP, c.w. contest
November 5, 6	YL AP phone contest

### YLRL "Howdy Days"

**Start:** September 24, 1969, at 1800 GMT.

**End:** September 26, 1969, at 1800 GMT.

**Rules:** Scores will be based on contacts with licensed women operators only. All bands and modes of emission may be used. No cross band operation. Net contacts do not count. Only one contact with each YL station may be counted.

**Scoring:** Score two (2) points for each YLRL member worked. Score one (1) point for each non-YLRL member.

**Awards:** Top scoring YLRL member will receive her choice of a YLRL pin, charm, or stationary. Non-YLRL members will receive a one year membership in YLRL.

Logs must be received by the contest chairman no later than October 14, 1969. Mail to: Ebba Kristjansson, VE5DZ, Box 71, Colonsay, Saskatchewan, Canada.

"Howdy Days" was devised as a get acquainted activity. During these three days of this laziest and easiest of contests, it is possible for YL to meet YL, renew old acquaintances, and actually get a prize for doing it.

The 30th anniversary year of YLRL should give added spice to our contacts with other gals. "Howdy Days" which is a YL QSO party under another name, should be the most successful so far, as we celebrate thirty years of YLRL. Remember you don't have to be a YLRL member to submit a log. All women are welcome, and all logs are welcome whether it is for three contacts or a hundred.

### Floridora Contest

**Start:** October 11, 1969, at 0000 GMT.

**End:** October 12, 1969, at 2300 GMT.

**Rules:** Operation on any band in any mode. Exchange RS, or RST, State, and County.

**Awards:** Special certificate for working the most Floridoras will be issued to DX and Stateside YL or OM, and to the highest scoring worldwide YL.

Logs must be received by the contest chairman

by November 15, 1969. Mail to Dorothea Seaver, W4QBY, 254 Oceanic Avenue, Lauderdale by the Sea, Florida 33308.

### YL c.w. Nets Organized

Carrie Lynch, W4BYD, announces that two c.w. nets for YLs are now operating.

Monday at 1400 GMT on 7100 kHz.

Monday at 1900 GMT on 14070 kHz.

YLs everywhere who like to chat with their fingers are welcome. All any woman operator needs is a key and a desire to talk to other women.

### Meet the Club — The Red Wagon "Widows"

Are you the wife, or mother of a fireman in a paid, or volunteer Fire Department? Have you experienced that horrible moment when just as you are putting dinner on the table the sirens cut loose heralding a major alarm? Has your favorite man come home in the wee hours smelling exactly like a campfire? Have you watched on the sidelines as your hero stands on a high ladder directing a stream of water into a burning building? If you have, and are a YL Amateur Radio Operator, then you are eligible to become a member of the Red Wagon "Widows", a group of women operators whose lives are governed by the "red light and siren," and whose theme song might well be taken from the Broadway musical, *Up in Central Park*:

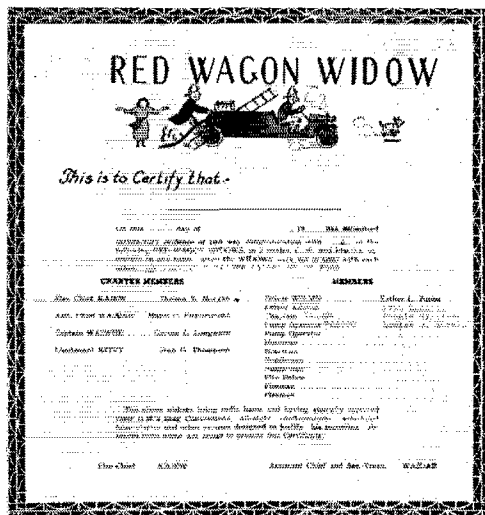
"The fireman's bride, the fireman's bride

She stays home by the fireside."

Membership is open to any YL in the amateur ranks who can qualify. At present it includes, Thelma Morgan, K2OEW, founder of the club; Mabel Fitzsimmons, WA2UAB; Gretna Longware, WA2-WHE; Jean Thompson, K1TVT; Esther Tubbs, W2LMN; Fran Ugolick, K3PGZ; Bonnie Williams, VE3GSW; and Louise Moreau, W3WRE/WB6BBO.

The RWW certificate is available to any amateur who submits proof of contact with any three of the members in two modes, c.w., and phone, on any bands, when the "widows" are not in QSO with each other. Or proof of contact with 5 "widows" on either c.w. or phone.

RWW is looking for more members, so check your qualifications gals.



Red Wagon Widows certificate.





Don Morris, W8JM, SCM, W. Va. presents Kay Anderson, W8DUV, with Worked all Counties West Virginia certificate #49.

### Kay Anderson, W8DUV

She said "I'd love to," and the coming Roanoke ARRL Division Convention, on October 11 and 12, in Huntington, West Virginia, will be the results of her efforts as co-chairman.

Kay, W8DUV, has always been a very busy YL. First licensed in 1953, as W4BLR, she has held YLRL offices from Fourth District Chairman through President of YLRL in 1959. While she, and OM Ed, W4BVB, lived in Virginia, Kay was also

busy as a CD Block Warden, a Den Mother in Cub Scouts, and was, for a time a dispatcher at the County police station.

The move to West Virginia only increased her activities and interest in amateur radio. She became Secretary of the West Virginia State Radio Council, and Assistant ARRL Director of the Roanoke Division. Also Secretary of the Tri-State ARC of Huntington in 1969, where she arranged for a color TV show that publicized Amateur Radio. Kay is the official RTTY broadcast station as well as Procedure Officer for West Virginia Army MARS. Operating RTTY, a.m., s.s.b., and c.w. she is active in both MARS as well as the WVN Nets. She holds CP-30, ORS, OPS, A-1 Operator, and is a member of ARRL, and YLRL.

Kay and OM, Ed, W8DUW, have separate stations, with Kay's in the kitchen where she can keep in touch with the family, and still be able to maintain her many net schedules which include a three times a week sked with KC4USP on 20 c.w.

Her desire is to act as a sort of public relations officer for ARRL and YLRL combined to sell the amateur program as well as the YL side of amateur radio. She and the West Virginia SCM have been doing just that not only in their Section, but throughout the Division.

### Correction

VE2IL reminds us that Canadian amateurs did not always have the VE prefix. While VE3AYL was, in fact, the first YL in Canada to receive a call with the VE prefix, the 1924 *Call Book*, lists 3QT, Miss M. C. Cross, of Bolton, Ontario. If there is no other evidence of earlier YL operators, "YL News and Views" will assume that Miss Bolton was the first YL in Canada.

**QST**

## Strays

### I would like to get in touch with . . .

. . . amateurs who are working with computerized ionospheric propagation predictions and who have access to a punched card set of  $f_oF_2$  and  $M(3000)F_2$  numerical coefficients as issued by ESSA, Boulder, Colorado. — WA2EIN.

. . . anyone interested in discussing and comparing U.S. and Australian university systems. — Gilbert Yonow, K6TOS/VK1YG, 23 Carrington St., Deakin, Canberra, 2600, Australia.

. . . hams in the lower northern part of Michigan who are Morse telegraphers and interested in starting a Morse telegraph club. — W8ZHB.

. . . anyone interested in joining a 15-meter Novice band net to discuss ESP and other psychic phenomena. — WN5WOE.

. . . anyone interested in forming a UFO tracking net on 14,250. — WA0OHK.

. . . graduates of Tigard Union High School (Oregon). — W7JAZ.

. . . anyone interested in membership in the Radio Amateur Invalid & Bedfast Club. — G3IDG.

. . . radio amateurs interested in starting a weather net — WNSCEH.

. . . ex-members of the City College Amateur Radio Club having information about the history of amateur radio at the college prior to World War I. — W2HJ.

### QST congratulates . . .

Herman Lukoff, W3HTF, recipient of the fourth annual W. W. McDowell award presented by the Computer Group of the Institute of Electrical and Electronics Engineers.

Armin Meyer, W9ACE, named U.S. Ambassador to Japan by President Nixon.

Erwin Schuler, W7BFI, on receiving the Ham of the Year award at the 1969 Weather Net Banquet.

William Schultz, Jr., W8LME, who received the Founders Medal awarded by the Cranbrook (Ill.) Foundation.

Ray Meyers, W6MLZ, appointed as a member of the President's Committee on Employment of the Handicapped.

Wayne L. Walter, W9DOG, on receiving the Amateur of the Year award at the Dayton Hamvention

Anthony A. Angelo, W1VP, on receiving a plaque from the Antarctic Development Squadron Six for his public service communications.

Glenn V. Evans, W4OKY, elected Vice-president of the National Association of Police-Community Relations Officers.

Percy H. Shea, W0APZ, featured in the Denver Post Gallery of Fame for his public service in reporting over 3000 weather observations to the U.S. Weather Bureau.

# Operating News

GEORGE HART, WINJM,  
Communications Manager

ELLEN WHITE, WIYYM,  
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE

DXCC: ROBERT L. WHITE, WICW  
Training Aids: GERALD PINARD

Administration: LILLIAN M. SALTER, WIZJE  
Public Service: WILLIAM O. REICHERT, WA9HHH

**The Bootleggers.** Many amateurs are prone to flatter themselves that someone is using their call. When an amateur gets a QSL card confirming a contact he didn't make (not to mention an OO card or an FCC citation), the first thing he thinks of is that someone is "bootlegging" his call. No doubt there are some such cases, but in 99 out of 100 cases it is simply mistaken identity.

There are a number of ways in which this can come about, but by far the most common one is carelessness in speaking or sending. Even painstakingly articulated (an extreme rarity on most voice transmissions, these days), it is impossible to tell an S from an F, a B from a D or a M from a N even when receiving conditions are prime. On c.w. even a correctly-sent call can be loused up by the receiving operator who is inept or

harassed by poor receiving conditions of one kind or another, either atmospheric or mechanical. Anyone can make a mistake in call letters, and we mean *any one!* Yes, even you. On voice, when receiving conditions are marginal, all letters with the "F" sound in them can be mistaken for any of the others — B, C, D, E, G, P, T, V and Z. A, J, H and K can sound alike. F and S are undistinguishable, so are M and N. In fact, when you stop to think about it there are only five letters in the alphabet with distinctive sounds — L, O, R, W and X.

On c.w. the possibility of error is just as great. How many cards has W1AW received that were intended for W1AWE (and vice versa)? W2LX recently told of receiving many DX cards that didn't belong to him and he was convinced that

## OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

September	October	November
1-7 Brazilian Contest Week of Independence Day (p. 94, this issue). 4 Qualifying Run, W6OWP 6-8 Washington State QSO Party (p. 124, Aug. QST). 11 Qualifying Run, W1AW 13 Frequency Measuring Test (p. 100, Aug. QST). 13-14 VHF QSO Party (p. 59, Aug. QST). WAE, phone (p. 97, Aug. QST). 19-28 Idzerda Memorial Contest, PΔθ (p. 81, this issue). 20-21 SAC, c.w. (p. 94, this issue). Maine QSO Party (p. 118, this issue). 20-22 Pennsylvania QSO Party (p. 102, this issue). 22 High-speed code test (p. 100, this issue). 24-26 YL "Howdy Days" (p. 96, this issue). 27-28 VE/W Contest (p. 65, August QST). Pan American Peru 1969 Contest (p. 94, this issue). SAC, phone (p. 94, this issue).	1 Qualifying Run, W6OWP 4-5 VK/ZL, phone (p. 93, this issue). 4-6 RTTY Medallion SS (p. 54, this issue). California QSO Party (p. 126, this issue). 4-12 Lebanese DX Contest 11-12 CD Party, phone* VK/ZL, c.w. (p. 93, this issue). 15-16 YL/AP, c.w. 17 Qualifying Run, W1AW 18-19 CD Party, c.w.* KR6 Contest (p. 93, this issue). WADM (p. 93, this issue). * League Officials and Communications Dept. appointees, only.	1-2 Massachusetts QSO Party 5-6 YL/AP, phone 6 Qualifying Run, W6OWP 8 Frequency Measuring Test (ARRL Official Observers, only). 8-9 SS, phone 9 OK DX Contest 15 Qualifying Run, W1AW 15-16 SS, c.w. Jan. 10-11 VHF SS Feb. 7-8 DX, phone 21-22 DX, c.w. Mar. 7-8 DX, phone 21-22 DX, c.w.
NOTE: Possible W6OWP Qualifying Run "alternate" (same times/frequencies) is W6ZRJ.		



someone was bootlegging that juicy call. We suggested he try W2AIX, W2LXE, W2LXW and other possibilities. He finally found the real owner of the cards — W2LXK!

The moral of this story is twofold: first, be careful how you identify yourself on the air. If your contact doesn't have your call right, be sure to correct him until he does get it. On voice, use phonetics! Second, don't jump to hasty conclusions if you occasionally get a card that doesn't agree with your log. Chances are, no one is bootlegging your call. There is a much better chance that someone's sending isn't so good, or someone's receiving ability is equally poor, or maybe conditions were just plain poor and someone made a wrong assumption. Of course, it could be that the date on the card (or on your log?) was wrong, or the handwriting was illegible. A lot of things could happen, someone bootlegging your call being 'way down the list in probability.

**Banding Together.** Any good farmer will tell you that, given a choice, a hen will lay her eggs in a nest which already contains eggs. Hams exhibit the same tendencies when it comes to band occupancy. (In fact, come to think of it some of the ham bands even *sound* like hen-houses!) They flock (sic!) to the same frequencies or band segments on which signals already appear. This is the reason why, especially in the v.h.f. regions, there are so many wide open spaces seemingly unoccupied while in other portions of the same band the signals are three and four deep.

South Jersey Radio Assn. President W2SDB in the May '69 issue of *Harmonics* notes that in a v.h.f. contest all the signals are bunched between 145.0 and 145.3 Mc., while the rest of the band goes begging. "Please repeat" and "the QRM is so bad I cannot make you out" are often heard. "I have inquired and have gotten

BRASS POUNDERS LEAGUE					
Winners of BPL Certificate for June Traffic:					
Call	Orig.	Recd.	Est.	Del.	Total
K6BPI	7638	1404	1231	173	10446
W3CUL	325	1981	1763	197	4266
K5TEY	1	1650	1635	1	3290
K5BNH	3	1344	1266	37	2650
K9ONK	128	695	670	18	1511
W45PFB	231	416	310	106	1063
K3NSN	90	469	460	9	1028
W1OJAL	5	478	476	2	961
W3VR	109	429	389	15	942
W40THQ	23	446	405	40	919
W50BD	5	360	360	0	725
W4STPT	21	322	294	25	662
W42CAL	41	281	243	21	585
K7RQZ	16	285	269	15	585
WB2RKK	8	287	232	34	561
W448CK	31	264	260	6	561
W49QVU	9	273	247	10	539
W48ETX	64	235	217	19	535
W44DYI	10	260	254	1	525
W46LWB	23	239	155	107	524
W0LCX	7	287	222	8	524
W3MPX	35	248	187	44	514
W61PW	11	243	240	11	505
W3EML	24	276	198	4	502

Late Reports:					
Call	Orig.	Recd.	Est.	Del.	Total
W6EOT (Dec.)	4	377	352	6	739
W2FR (Apr.)	20	254	223	4	501

More-Than-One-Operator Stations					
Call	Orig.	Recd.	Est.	Del.	Total
WA4ECY	433	70	2	68	573

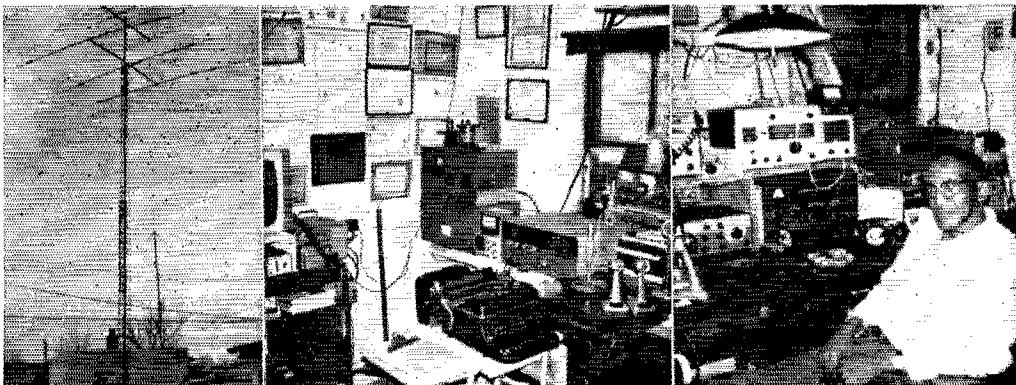
BPL for 100 or more originations-plus deliveries

WB6ZVC	137	W2EAF	117	WA6KXZ	104
WB4NQA	130	W4DIL	114	WA2CWT	103
WA5KIV	126	W2OE	112	WB2DRG	101
W48BZK	124	K2KDJ	110	Late Reports:	
W48YTH	122	W4RDWL	109	WB6ZDJ	(Nov.) 136
WA0HQR/0	122	K0MNX	108	WA0MZW	(May) 122
WA0VAS	120	W0PSJ	105	K2KQC	(May) 111
		W3TN	104		

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WB6ZDJ, WA7BZY, WA8WZF, W9JBQ.

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.

several answers," says Bill, "such as (1) general operating habits, (2) more Techs and Novices can be worked, (3) you lose power if you move to a higher frequency and (4) you have to retune your Xmtf if you move too far. To all this I say 'Baloney.' Operating habits can be changed." He suggests that if some of the high power boys



#### Meet Your SCM

Indiana SCM Bill Johnson, W9BUQ, has almost a half century of interest in amateur radio behind him. Bill first got interested in hamming back in 1923 and has held his present call since 1925. This versatile ham is interested in all phases of the hobby including phone, c.w., amateur TV, 6-meter FM, etc. Bill holds the posts of OPS, OVS, EC and OBS. He is active in the RCA Amateur Radio Club, the Red Cross Amateur Radio Club, the Indiana Amateur TV and UHF Amateur Radio Club, QCWA, MARS and is a member of the A-1 Operator Club. He has participated in communications during several disasters. W9BUQ is Group Leader (Test Maintenance) for RCA. When time permits, he enjoys gardening, football and bowling.

move up the band and call CQ, it will draw others up there too, but cautions that tuning ranges should be also announced so the rockbound boys will not be neglected. At least this would educate all and sundry to the fact that the two-meter band goes all the way up to 1.48 Mc., doesn't stop at 145.5 or thereabouts.

The same thing applies to six meters, and also to some extent to all the other bands. Let's spread out, fellas! You Extra and Advanced Classers, use your privileged frequencies! During contests, the low edges of the bands are comparatively dead. From 7000 to 7025, for example, is almost vacant, but when you pass 7025 it sounds like a dozen alleycats on a moonlight night.

We're not suggesting that the extras snub the advanced and the latter snub the generals, but what's wrong with working each other in

your privileged bands and working across-band to work amateurs of other grades? There is no law requiring you to listen only on the transmitting frequency, y'know — although transceiver operation may have made it seem this way. Let's not lay all our eggs in one nest; we might find that the unused nests will soon be occupied by the unused species of bird. — *WINJM*.

### HIGH-SPEED CODE TEST

(Sept. 22, 1969)

The Connecticut Wireless Assn. announces its 22nd semi-annual high-speed code test, to be conducted simultaneously on seven different frequencies on 80 and 40 meters by five stations throughout the U.S. The date is Sept. 22, the time to start listening 0115 GMT. (This works out to 9:15 p.m. EDT, 8:15 p.m. CDT, 7:15 p.m. MST and 6:15 p.m. PDST on Sept. 21) The stations and approximate frequencies to listen for are as follows: W1EIA on 3637 and 7120 kc.; W5QMJ on 3665 kc.; K6DYX on 3690.



## DX CENTURY CLUB AWARDS



From June 1, 1969 through June 30, 1969, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to the Amateurs listed below.

### New Members

DJ0PN.....285	K8UCL.....115	W4UHL.....105	K3GY8.....101	ZS2DC.....101	W7EFP.....100
W4ZNI.....203	WB2WZB.....108	W5QWY.....105	K9ZXE.....101	G3COI.....100	W8B8R.....100
UN3FV.....174	W8KZO.....108	W7PIM.....105	VP5AA.....101	JX5CI.....100	W8IPA.....100
8P9AL.....156	W3PZ.....107	WA9NYA.....104	WA2AXY.....101	K4DKO.....100	W8JFA.....100
K4FLP.....142	W6QMA.....107	PZ1AV.....103	WA2BCK.....101	K6OD.....100	W8UDS.....100
FM7WO.....131	HK7XI.....106	W2CSP.....103	WA5QKE.....101	W2EGX.....100	W8OQE.....100
W9CHN.....126	K2PKR.....106	K8HKM.....102	W6ZHI.....101	WB4CPE.....100	W8QTA.....100
WA9UVE.....120	CT1SH.....105	K2CQJ.....101	YU2XT.....101	W6EIF.....100	ZB2AX.....100

### Radiotelephone

ZL3QN.....210	K8NNV.....132	WA1GNX.....111	K9DIN.....106	DL7KX/W2.....102	PJ2ARL.....100
DJ0PN.....201	W9CBN.....123	W44QO.....111	W4WVF.....106	W2ZRBG.....102	WA2XKJ.....100
K7EXT.....157	PY18Z.....122	H3AGS.....109	Z61CX.....106	DL4HU.....101	W4DTC.....100
YV5ALD.....147	YV5JO.....121	W1HQO.....109	K8VBS.....104	VP5AA.....101	W6CPN.....100
W4REZ.....133	KH8ABQ.....112	W6CFG.....108	W4NBO.....103	W5ULN.....101	W66YNT.....100
F9BP.....132	WA4WIN/9.....112	W6QMA.....107	W7GSP.....103	W92WQ.....101	W6GY.....100
					W0KRU.....100

### Endorsements

Endorsements issued for confirmations credited from June 1, 1969 through June 30, 1969 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

<b>335</b> K4LNM	<b>315</b> W8CT	<b>300</b> 0H2YV SM5BCE	<b>260</b> DL8NU W1DEP	<b>200</b> W4REZ W4USQ	<b>200</b> K4OCE K6ZIF	<b>200</b> 0K1KTL SM5BZH	<b>200</b> VE3CEA VK9KS	<b>200</b> W3ZUH W4IQO
<b>330</b> K6CH	<b>310</b> PY1HX WB2CKS	<b>280</b> SM7ANB WA2HOK	<b>240</b> W4BHG WA4MUB	<b>200</b> W5ERY WA5JSI	<b>200</b> WB2KTO W2MB	<b>200</b> VF3GWE W8WUU	<b>200</b> W2CHP W8WUU	<b>200</b> W7GXC WA9UMU
<b>325</b> DL3BK PA0LOU W5PM	<b>305</b> W0BK W6CJZ	<b>280</b> W6JKJ W6NWI W60F	<b>240</b> W0BL W0TDW	<b>220</b> F8CW K4CFB	<b>200</b> W3QZA W4GQM	<b>200</b> W4JHN W4JFX	<b>200</b> W9DDL W9LAX	<b>120</b> DL4QP K6DYQ LA2Q
<b>320</b> W4NJF W6KG W9RKP W9TKV	<b>305</b> F3AT JA6AD	<b>280</b> K1YZW SM6AEK W1OHA W6NUTU	<b>240</b> K6CWS K6JR K9GZK	<b>220</b> W2CNQ WB2KTO W6ETJ	<b>200</b> W8PYL WA9NSR W7YBX WA80VC XE2IH	<b>160</b> W96MLG W8KC	<b>160</b> DJ9ON K2GTF K7RLS K0DYM	<b>120</b> DL4QP K6DYQ LA2Q EA9XA W4IJC K9YXA 0Z7DX W40WE WA4KQO W60BZ W3CRE W0VTZ

### Radiotelephone

<b>315</b> OZ7FG VK2JZ W2WMMG	<b>280</b> JA1BK VE2NV	<b>240</b> K5QHS WA4MUB WA80JI W9QGI SM6AEK SM0ATN	<b>200</b> W50LG W6KJ W0BK W0SFU YV5BPU	<b>200</b> VP7DL W1BAB W2CNQ W80JU W6ZC XE2IH	<b>160</b> W8NXX W9CCK W0BL	<b>160</b> I1SMN JA6BZI K1NIE K7RLS K7UXS K1G9K W2BKTO W2BMTW W4DQD WA8PYL WA8YBB	<b>120</b> W9DDL 5Z4KN	<b>120</b> IS1EP K4OCE K7RDH W1JUC W2GSC W3CDL W43JHB W8LAX W8NCV W9HQF WA9JCP
<b>305</b> PA0EFM SM5BCO W4IC W5JWM	<b>280</b> K9PPX PY3AHJ V61AFY W2JXS W6KNH	<b>240</b> I1YRK DL3BK KH6BB W5ERY	<b>220</b> AP2MR I1ZV K6CWS K6JR PA0LOU	<b>200</b> W2YYL W2YUZU W3KJ WA4GQM	<b>180</b> W1AW W1A1EN WB2BEE W4BHG W5DJ W6HPS W7YBX	<b>160</b> W9DYL W8HPS W48YB	<b>120</b> CT1UA I1DAB K1GXU 0Z7DX W1DHL W2GA W3GHN WB4HNV	
<b>300</b> DL7AA	<b>260</b> JA6AD							

kc.; W6EOT on 3640 and 7115 kc.; W9FA on 3653 kc. All stations transmit identical text in as close synchronization as possible.

This time the order of speed goes from high to low; that is, we start at 60 w.p.m., then go to 55, 50, 45 and 40 w.p.m., in that order, with five minutes of plain text at each speed. Transmission starts at 0115 GMT with a call-up to enable listeners to find the best signal at their locations, and to plead for a clear channel. At 0130 very important instructions for copying and submitting copy are transmitted, at approximately 25 w.p.m. At 0150 the 60 w.p.m. text will be transmitted. Then follows a five-minute relaxation period, and at 0200 we transmit 55 w.p.m. Following the same pattern, the 50 w.p.m. transmission is at 0210, 45 w.p.m. at 0220 and 40 w.p.m. at 0230. Some of the stations will stand by for QSOs or comments after the tape is finished.

Starting August 11, W1EIA will transmit an announcement of this test at 0130 GMT, just prior to the regular code practice transmission.

Remember, it's a Sunday, not a Monday, evening, if you are still struggling along on obsolete, outmoded, confusing, variable local time.

on 3590 and 7129 kHz. 0400 GMT September 4. (In converting, 1400 GMT September 4 becomes 2100 PDST September 3.)

### 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 w.p.m. 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, 7½, 10, 13, 20, 25	9:30 P.M. EDST \ SnTTh 6:30 P.M. PDST / Sat	0130 MWFSn
"	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 TThSat
"	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 fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0130 GMT practice on the following dates:

- |          |   |
|----------|---|
| Date     | Subject of practice text from July QST      |
| Sep. 15: | <i>It Seems to Us</i> , p. 9                |
| Sep. 18: | <i>Toucheolder II</i> , p. 11               |
| Sep. 24: | <i>The Alpha Special</i> , p. 26            |
| Sep. 30: | <i>Amateur Radio Public Service</i> , p. 62 |

- |         |  |
|---------|--|
| Date    | Subject of practice text from <i>Understanding Amateur Radio</i> , First Edition |
| Oct. 3: | <i>Matched Antenna Systems</i> , p. 110  |
| Oct. 8: | <i>"Open-Wire" Feeders</i> , p. 111  |

## 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 w.p.m.) you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., 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 transmit a qualifying run on all listed c.w. frequencies (see footnote one in schedule) at 0130 GMT September 11. (In converting, 0130 GMT September 11 becomes 2130 EDST September 10.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run

## W1AW SCHEDULE, SEPTEMBER-OCTOBER 1969

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.-2:30 a.m. EDST and Sunday 3 p.m.-10:30 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 Sept. 1 in observance of Labor Day.

The W1AW Fall-Winter schedule, which becomes effective October 25, will appear in October QST.

GMT*	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 w.p.m. TTh Sat), (5-25 w.p.m. MWFSn) →						
0230-0300 <sup>4</sup>			3.555		1.805		3.555
0300	← 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> →						
0335-0400 <sup>4</sup>			7.220	3.820	7.220	3.820	7.220
0400	← 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 w.p.m. MWF), (35-15 w.p.m. 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>	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> C.W. OBS (bulletins, 18 w.p.m.) 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) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

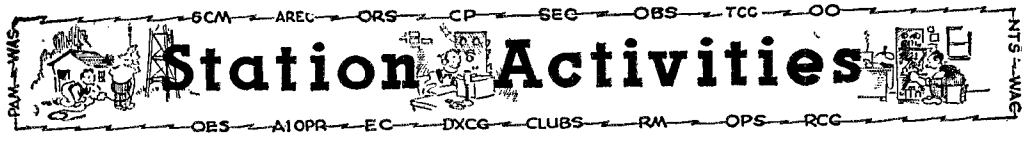
<sup>4</sup> Starting time approximate. Operating period follows conclusion of bulletin or code practice.

<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; W1s Q1S WPR, K6OSO. \*Times-days in GMT. Operating frequencies are approximate.



• 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. Summer vacations found W3ACDV, W3DKX, K3NYG, K3JLY, W3DEO and many others wandering all over the U.S.A. With the summer activity reports are at a minimum, so I will make it easy on the editors of QST and make this column short. Please make an effort to check into one of our sectional nets this fall.

Net	Freq.	Time	Day
DEPN	3905 kc.	1800 local	Sat.
KCEPN	3905 kc.	1300 local	Sun.
DSMN	50.4 Mc.	2100 local	Tue.
DTMN	145.260 Mc.	1930 local	Mon.

Traffic: W3DKX 39, W3EEB 23, WA3DUM 18, WA3GSM 14, WA3HWC 7, W3TRC 5, K3NYG 3.

**TWELFTH ANNUAL PENNSYLVANIA QSO PARTY**  
September 20-22, 1969

The twelfth annual Pennsylvania QSO Party starts at 2300 GMT Saturday, September 20 and runs until 0200 GMT Monday, September 22, 1969. Rules: Scoring: Pa. stations count three points per out-of-state QSO, one point per Pa. QSO, multiplied by the number of ARRL sections and other countries. Out-of-state stations count one point per QSO, multiplied by the number of Pa. counties worked. The same station may be worked on different bands and modes. Log Data: Show date/time in GMT, QSO number, station worked, RS(T), county worked (for non-Pa. stations) and ARRL section for Pa. stations, band and mode used. Exchange: Pa. stations send QSO number, RS(T), county—non-Pa. stations send QSO number, RS(T), ARRL section or country. The general call is CQ Pa. Penna. stations sign de Pa. Frequencies: Activity will be found around 75 kHz. up from the edge of each c.w. band and 3880-7280-14280-21325 kHz. on phone. Check phone bands on the even GMT hours. Awards: Certificates go to each first-place station in each ARRL section and country. Second and third-place certificates issued where justification warrant. Awards to the highest Pennsylvania scorer and non-Pa. scorer. Single operator station awards only. Multiop. stations are a separate category. Nittany Amateur Radio Club members are ineligible for awards/certificates. Mailing deadline Oct. 20: Send to NARC, Bos 60, State College, Pa. 16801.

**EASTERN PENNSYLVANIA**—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC, RMs: W3EML, K3-MVO, K3SLG, W3MPX, W3AGLI, K3MYS, V.H.F. PAM: W3FGQ. OBS reports were received from WA3-HGX, WA3AFI, W3CBH, WA3IHV, WA3EEC, WA3-HDI, WA3IOB and W3ID; OVS reports from WA3-EEC, W3ZRR, WA3IOB, WA3K1P, K3WEU, WA3HIT, W3CL and WA3HDI; OO reports from K3RDT, K3-HNP, K3WEU, WA3IUU, W3FGQ and W3KEK. FD messages were received from K3IEC, WA3IHV, WA3-MOI, K3CSG/3, WA3JKB, WA3EM/3, WA3GXE, W3-UU/3, W3NNL/3, K3BK/3, W3NZ/3, W3EQ/3, W3-AA/3, W3OK, WA3ERJ/3, K3SSC/3, W3KGN/3 and W3DUU/3.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610 Daily	6:45 P.M.	245	269	W3MPX
PTTN	3960 Daily	6:00 P.M.	220	148	W3MPX
PFN	3960 Mon.-Fri.	5:30 P.M.	461	565	K3SLG
EPAEF&TN	3917 Daily	6:00 P.M.	421	225	WA3GLI
ENTN	5740 Daily	7:15 P.M.	108	67	WA3IUU
VHF (6)	50.94 Mon.-Fri.	7:00 P.M.	97	37	W3FGQ
VHF (2)	145.35 Mon.-Fri.	8:00 P.M.	65	34	W3FGQ
Novice 40	7170 Daily	4:30 P.M.	47	46	WA3JWF

BPL certificates were issued W3CUL, K3NSN, W3VR, W3MPX and W3EML. K3RDT is in Europe for a few weeks. New officers of the Mt. Airy V.H.F. ARC are K3KKN, pres.; K3JZJ, corr. secy.; W3SAO, rec. secy.; K3ZPN, W3CXU, K3MXM, dir. K3VBA is on the night shift so it's week ends only. The recent storm took most of our V.H.F. PAM's antennas down. The v.h.f. nets are going to operate daily with m.c.w. operation on Sat. and Sun. for Novice training in traffic and code at the same time. W3VR is doing some art work—painting the house. W3MPX says get those net reports in by the 3rd of the month! W3EML reports TCC traffic down. K3MVO says if he could add his golf score to traffic it would be back to normal. WA3-AFI is visiting in Wisconsin on vacation. WA3IHV went back to school for graduate work. The Penn Jersey YL RC's first FD was a big success, says WA3ATQ. W3JSX says the R.F. Hill ARC FD was a real bang. WA3HIT has volunteered to pick up EC for Philadelphia County from W3PST. K3MDG is mostly mobile these days. The v.h.i. nets still need more liaison stations from h.f. nets. Here's a switch—WA3IOB reports his mother is now WA3MKK! W3ID reports the IRC ARC now has a new location. W3CL sounds fully recovered on nets. A speedy recovery to S.N.J. SCM W2ZI. Traffic: (June) W3CUL 4266, K3NSN 1028, W3VR 942, W3MPX 514, W3EML 502, WA3IUU 161, WA3EXV 155, K3MVO 148, K3BHU 138, WA3INC 119, K3SLG 116, WA3GUK 112, W3HK 97, WA3AFI 92, W3FGQ 88, WA3GLI 84, WA3IHV 79, WA3ATQ 75, WA3EEC 70, WA3JWF 60, K3OJO 59, W3HNK 56, WA3JGN 54, W3FPC 48, WA3LAK 45, WA3IZ 40, WA3-JWL 38, W3VAP 35, K3HKW 31, WA3JXN 25, W3JSX 22, K3PIE 21, K3WEU/1 19, WA3HIT 18, W3RFB 16, WA3JKB 16, WA3IAC 15, K3MDG 15, W3CBH 14, WA3HDI 12, K3HNP 12, W3VA 11, WA3HGX 10, WA3IYU 10, W3KQE 8, W3OY 7, WA3GAT 5, WA3IOB 4, WA3IAZ 3, WA3BJQ 2, W3CL 2, WA3ENB 2, WA3GYE 2, W3ID 2, WA3KEM 2, K3KTH 2, WA3DE 1, W3BUR 1, W3EU 1, W3KEK 1, WA3KTP 1, W3YFP 1. (May) K3BHU 271, K3SLG 260.

**MARYLAND DISTRICT OF COLUMBIA—SCM,** John Munnholland, K3LFD—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	Mgr.
MDD	3643	2300Z	Daily	28	218	4.0 W3UO/3—RM
MDDS	3643	0030Z	Daily	15	15	4.0 W3CBI/RM
MDCTN	3920	2200Z	STTS	17	85	15.4 W3ATQ/PAM
MEPN	3920	2200Z	MWF			K3IAG
		1700Z	SS			
MSTN	50.400	0000Z	M	3	0	5.3 WA3EOP
MTMTN	145.206	0100Z	T-S	22	78	10.1 W3JFW
CVTN	145.620	0200Z	M-Th-Sa			WA3JPI

New appointments: WA3EQM as OVS. With K3LFN catering, the MEPN had a fine picnic at the Westmoreland Hills Recreation Center June 22. The following were awarded Section Net certificates for notable net activity: W3ADQ, W3DKX, W3LDF, W3BERL, WA3GDC, WA3GXN, K3GZK, WA3ISU, W3HWZ, K3-IAG, WA3JLR, K3LFN, K3RPT, K3TGB and K3UZE. Your SCM was honored with Field Day messages from the following amateur radio clubs and groups: Howard County, National Institute of Health, Springbrook High School, Rock, Aero, Harford County C.D., Friendship, IBM, COMSAT, Bowie, Hopkins and K3NS/3. W3EOP has been QRL with Intruder Watch operations. W3CQV visited W2LPPYI (ex-W3TSC) at Sag Harbor for the Ole Whalers Festival and did some hamming along the way. WA3HEN put her OM, K3TBD, in the shade and won the 2-Meter Ternite Contest. WA3CBO was second. W3EOP reports WA3LQM upgraded his license to Tech. and WA3EEB has gone overseas to Korea. WA3KQQ and WN3MJA are operating from KP4-Land. WA3EQM is homebrewing microwave equip-

ment around a 2J27 magnetron. W3FA reports his major activity is inactivity "cause the hot WX has him taking it easy on his antenna-farm project. WA3GAU is counting on his new antenna to boost his signal and his on-the-air time, too. W3MSN put together a switch gear for rapid 6- and 2-meter switching from his Swan 250 to his Swan Transverter. K3OAE, K3QDC and the Wisconsin gang teamed up for Field Day. K3LFN is mobile with a "sweet little rig" called a Swan Cygnet 260. W4TFX/3 operated Field Day at W1ECV/1 in Connecticut. W3TN spent a gem of a vacation near Sapphire, N.C. K3RGB reports W3WCQ won the Baltimore City AREC transmitter hunt. WN3MJJF is building an SB-101 while he preps for General Class. WA3IYS operated Field Day from WA3DJQ/3. WA3GGO used special delivery mail service to make sure his MSTN report made the press deadline. Traffic: W3ATQ 199, W3TN 193, WA3IYS 127, W3DYA 119, W0UCE/3 90, WA3HEN 88, W3LQY 88, WA3GUI 86, K3GZK 59, W3IAQ 58, WA3KAA 58, K3OAE 42, W3EOV 28, WA3JR 28, K3LFD 28, WA3ERL 18, K3LFN 16, K3TBD 16, W3ZNW 15, W3ECP 13, WA3GXN 12, W3FA 11, W3CRE 7, WA3EQM 7, WA3IRQ 6, K3QDC 5, W4TFX/3 1.

**SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2Z1—Asst. SCM, Charles E. Travers, W2YPZ. SEC: W2LVW, RMs: WA2KIP, WA2BLV. PAMs: WA2UVB, W2ZL. It is a pleasure to report that our SCM, Ed Raser, is now home from the hospital and on his way to recovery. Field Day was well represented by the southern area of the state. July QST shows a very good record by the southern counties in the Jan. SET. Interest mounts in teletype interest. An excellent station in this mode is WA2ANL, Ernie has a complete and working teletype station. Our very best wishes go forward to W2HX on his recent retirement from Princeton University. "BB" is very well known in amateur radio and is connected with many radio organizations, being secretary of the Quarter Century Wireless Assn. and executive committee member of the DVEA in Trenton. A recent member of the QCW is W2ISZ, of Ft. Sumner, well known in amateur radio. WA2KIP is busy these days taking courses at Rider College. Reports on unusual Field Day activities are solicited for future publication. Please include in your activity report. The NEPTN will hold its Annual Dinner Meeting at the Barrett Restaurant on the River Road between Trenton City and West Trenton at 7:30 P.M., Sat., Oct. 25, 1969. Traffic: WB2DRG 283, WB2VEJ 83, W2YPZ 29, W2DNF 20, WA2ANL 12, K2SHE 12, W2IU 4, W2CDZ 3.**

**WESTERN NEW YORK—SCM, Richard M. Pitzerze, K2KTK—Asst. SCM: Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. RMs: K2KIR, W2FR, W2MTA, W2RUF. PAM: WB2VSL. The list of section nets appears in the June column. A new appointee is WB2YEE as OPS. Renewals are W2MTA as RM and W2PVI as OPS/and Asst. SCM. Sorry to report the passing of W2ELI, K2GBY, W2RUI and W2UOH. Octogenarian W2QCE works his garden in sunshine and 20 meters in the rain. NYSPOB was activated for the tornado that struck southwestern N.Y. K2KQC and WA2CAL were NCSS with 13 busy check-ins. K2DPT, WA2HCT, K2ISN and W2RN are to be commended for their fine performances in that same emergency. K2VCZ QSYed to Henrietta. New officers of STARS are WB2YNR, pres.; WA2VVF, vice-pres.; K2EQB, treas.; K2KQC, secy. Likewise for RAWNY we have W2DRY, pres.; W2PLG, vice-pres.; W2TAX, treas.; WN2GPO, secy. Rounding out elections, the Walton Radio Association elected W2TFL, pres.; WB2FWG, vice-pres.; W2OSL, secy.; W2THO, treas.; WB2VNB, act. mgr.; W2FNU, trustee. New Generals are WA2HYQ, WA2EKW, WA2GOK and WB2JPF. WA2IRU gets a new Advanced. W2AFB is recovering from a cataract operation. W2CFP enjoyed a KH6 type vacation. WB2WGF has the r.f. section of the 813 amplifier nearly completed. Field Day messages were received from W2EUP/2, K2UAN and K2IC/2. The message that W2WS/2 sent with me watching hasn't arrived yet. Your SCM and SEC had a good time at the June meeting of the Genesee Radio Amateurs. RAGS plans its annual booth at the New York State Fair, the call to be W2AE/2. W2MPPM is the v.h.f. editor of the *K1RA Rag* for the second year in a row. BPL certifies for June go to W2OE and WA2CAL, while K2KQC gets one for May. NYS reports handling 453 messages with 656 check-ins for May. Traffic: (June) WA2CAL 586, W2OE 325, W2MTA 215, W2FR 202, W2RUF 194, K2KQC 138, W2FEB 85, K2RYH 71, WB2SMD 68, WB2VND 53, WA2BEX 51, W2PRY 45, W2RQF 25, K2UIR 21, WB2HLI 18, K2VCF 18, WB2WGF 16, W2CFP 12, K2IMI 12, K2OFV 12, WB2ZDK 12, WA2ICU 10, WB2RWR 10, WB2YEE 10, WA2DHS 9, K2KTK 7, WB2OYE 7, W2PVI 7, WA2-**

## Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1BUB, Joseph H. Areng, Belmont, Mass.  
 WA1CTN, Henry P. Davis, Framingham, Mass.  
 K1DJM, Frank H. Simmons, Jr., Dorchester, Mass.  
 WA1DOC, Glenn M. Kirkpatrick, Watertown, Mass.  
 W1DQF, Alice S. Perry, Winthrop, Mass.  
 ex-W1GS, F. Cheney Beckley, West Hartford, Conn.  
 WN1IJG, Clyde H. Carley, North Adams, Mass.  
 WA2AJD, John Wendell, Forest Hills, N. Y.  
 W2ELI, Joseph D. Cammelli, Buffalo, N. Y.  
 W2GPL, Lester Moore, Waterford, N. Y.  
 W2LLO, Dr. Wm. L. Wheeler, Jr., New York, N. Y.  
 W2RUI, F. Floyd Ziehl, Lockport, N. Y.  
 K3JYR, Alva E. Smith, Takoma Park, Md.  
 W4AY, Marvin C. Smith, Nashville, Tenn.  
 W4AZK, David S. Tracer, Naples, Fla.  
 W4BTB, Olin Lawson, Athens, Tenn.  
 W4EMG, John D. Sheppard, Rockingham, N. C.  
 W4FF, Joseph E. Aiken, Arlington, Va.  
 W4FR, Dealva C. Summerford, Tallahassee, Fla.  
 W4GDU, Raymond Boles, Montgomery, Ala.  
 K4GKD, Claude J. Key, Parrish, Ala.  
 WB4IGL, Wilbar A. Craig, Sarasota, Fla.  
 W4JNO, Warren A. Wetzel, Memphis, Tenn.  
 K4JU/K2JU, Clifford J. Goette, Sr., Hernando, Fla.  
 ex-KN4SFP, Lt. John Lakin, USMC, Ft. Walton Beach, Fla.  
 W5ROC, Samuel T. Donnell, Lampasas, Texas.  
 K5GYB, Robert C. Lee, Carlbad, N. M.  
 WA5KVB, Elbert Daugherty, Calumet, Okla.  
 W6BBP, Douglas H. McCarley, San Martin, Calif.  
 W6BJO, Del O. Johnson, Loleta, Calif.  
 W6DSJ, A. F. Lupus, Burbank, Calif.  
 W6DYJ, Robert E. Fisher, Los Alamitos, Calif.  
 W6EMR, Paul N. Harrison, Lafayette, Calif.  
 W6GYH, Cesare P. Cavadini, Burbank, Calif.  
 K6JN, Will E.-Gene-Gray, Oceanside, Calif.  
 W6SZU, Dr. Samuel Sosnov, Los Angeles, Calif.  
 W6ZH/K6ZH, Herbert Hoover,\* Jr., Pasadena, Calif.  
 W7BI, J. H. Gilbert, Columbia Falls, Mo.  
 W7DPS, Harold Lines, Lebanon, Ore.  
 WN7JWA, J. N. Gibson, Olympia, Wash.  
 K7JXL, Arthur P. Higgins, Great Falls, Mont.  
 W7JYL, Archie W. Bradford, Murray, Utah.  
 K7URY, C. A. Hedrick, Kingman, Ariz.  
 W8DTE, Harry Avery, Caro, Mich.  
 W8DVM, Russell Barnes, Mansfield, Ohio  
 W8EG, Albert G. Heck, Farmington, W. Va.  
 WA8KTO, Edwin L. Guenther, East Lansing, Mich.  
 W8LEU, Joseph Kaller, Detroit, Mich.  
 W8NZY, Stephen W. Balkwill, Cleveland Heights, Ohio.  
 K8RXZ, D. Kenton Bollinger, Ravenswood, W. Va.  
 W9GVY, Edward O. Schuman, Downers Grove, Ill.  
 W9NNE, George D. Voris, Elmhurst, Ill.  
 W9OEC, Glenn A. Crispe, Goshen, Ind.  
 WA9BRI, Carl Brockman, Weir, Kans.  
 W0CKV, William H. Balderston, Dodge City, Kans.  
 W0NLY, Edwin J. Moles, Jr., White Bear Lake, Minn.  
 WA9OQH, Melvin W. Rogers, Minneapolis, Minn.  
 W9QLR, Harold M. Lewis, St. Charles Hills, Mo.  
 KH6BLX, Clyde Stickle, Honolulu, Hawaii.  
 KL7DRW, Rev. John A. Carter, Spenard, Alaska.  
 VE1VX, Rannie J. Moulton, Oromocto, N. B.  
 VE5PX, Norm L. Edmonds, Foam Lake, Sask.  
 VE7WP, A. W. Mushins, Prince George, B. C.  
 KP4PT, Manuel Pérez-Torres, Rio Piedras, Puerto Rico.  
 ex-OK2MA, Antonin Machan, Poruba, Czechoslovakia.  
 ZL1GI, Athol D. Smerdon, Auckland, New Zealand.  
 \* Charter Life Member, ARRL

UFI 2. (May) K2KQC 221, WB2HLI 62, K2VZC 56, W2AFB 18, W2CFP 5. (Apr.) W2FR 501, K2KQC 307.

**WESTERN PENNSYLVANIA**—SCM, John F. Wojtkiewicz, W3GJY—SEC, W3KJP, PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFL, W3NEM. Traffic nets: WPA, 0000 GMT, 3585 kc. daily; KSSN, 2330 GMT, Mon. through Fri., 3585 kc. The Keystone Slow Speed Traffic Net (KSSN) will begin operations Sept. 29 under the able guidance of Net Mgr., WA3AKH. Trafficators are invited to check into both nets. Sept. 20 at 2300 GMT is earmarked as the starting date and time for the 12th Annual Pennsylvania QSO Party. K3OLG, of Indiana, Pa., now operates K3OLG/W0 at Santa Maria, Calif. W3EXD has been upgraded to Extra Class. W3BRM is building a transverter for 2 meters. W3BPE climbed the ladder to the Advanced Class license. WA3JBN purchased a new Galaxy V transceiver. WN3MST is a new licensee in the Greensburg area. WN3LLX suffered a lightning hit to his antenna. Fortunately, it was "grounded" during a storm, causing practically no damage. Get the idea? K3ASI tunes for ATV signals using a home-brew 432-Mc. skelton slot. K3ZOB frequents 2 meters. Six-meter activities are augmented by K3NPY, WA3DKY, WA3JDT. The Skyview Radio Society will host a swap and shop hamfest on its club grounds Sept. 7. Plan to be there. K3LTH is employed by Cameradio at Pittsburgh. WA3JFK was installed as District Delegate and W3TOC as Patriotic Instructor for their local VFW post. The W3PIE "Gabfest" is slated for Sept. 13 at Uniontown. Club bulletins are welcome at this office and enables members' activities to get in print in this column. Clubs and club members also are invited to participate in the Amateur Radio Emergency Corps program. Preparedness warrants ideal amateur communications when called upon during an emergency. Complacency helps to further disaster when least expected. Send a request to SEC W3KJP for full AREC information. Endorsement: K3EXE as ORS. The WPA Traffic Net had 30 sessions and handled 142 messages during the month of June. Traffic: (June) WA3IPU 301, W3KUN 214, K3ZNP 152, W3NEM 99, WA3AKH 97, W3LOS 59, W3GJY 44, K3ASI 26, K3EXE 17, K3HCT 14, WA3JEM 6, W3YA 6, W3IDO 5. (May) W3NEM 118, K3HKK 74, WA3AKH 62. (Apr.) W3NEM 198. (Mar.) W3NEM 150. (Feb.) W3NEM 134.

### CENTRAL DIVISION

**ILLINOIS**—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMS: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	Tfc.
IEN	3940 kc.	1400Z	Sun.	32
ILN	3760 kc.	0100Z	Daily	140
NCPN	3915 kc.	1300Z	Mon.-Sat.	179
NCPN	3915 kc.	1800Z	Mon.-Sat.	
IL PON	3915 kc.	2245Z	Mon.-Fri.	480
IL PON	3915 kc.	1430Z	Mon.-Fri.	
IL PON	145.5 Mc.	0200Z	M.W.F.	41
TNT Net	145.35 Mc.	0300Z	Sun.-Fri.	no report

K9GCE was given the QST cover award at the Central Division Convention in Indianapolis for his March QST article. Many FB reports have been received on the Annual Field Day activities and from indications the results should pass all previous years' scores. W9LNQ scored high in the recent YL-OM C.W. Contest. K9DRS was busy making marriage plans. The big day was July 25. WA9QXT has moved to 430 Decatur Ave., N. Minneapolis, Minn. WA9LDC received her WAS certificate (No. 20,005). WA9QBP was appointed an Official Relay Station. WB9ALS is working on an operating console and antenna farm. WN9BUR has been having trouble with his antenna but replaced it and is now bringing in fine DX. K9LUX has been mobiling through the Western states. WA9UQO received his Advanced Class license. The Hamfesters of Chicago held its Annual Hamfest Sun. Aug. 8 and a fine time was enjoyed by all present. WN9BKZ, WN9BMK, WN9BNB, WN9BUK, WN9BQC, WN9BVM, WN9BWW, WN9BXB and WN9BSH received their Novice calls as a result of the radio classes held in Carmi, Norris and Wayne City. The Six-Meter Club of Chicago held its 12th Hamfest Aug. 3 at Frankfort. WA9WJB received his General Class ticket. WA9QVU is the only BPL recipient for June traffic. Traffic: WA9QVU 539, WA9AKR 124, W9HOT 100, WA9SFB 95, WA9WNH 94, WA9BRQ 77, W9JXV 74, W9DOQ 51, WA9LDC 34, W9PRN 30, W9NXG 27, WA9QXT 20, WA9NZF 17, K9HSK 11, W9LNQ 9, WA9UXF 5.

**INDIANA**—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Net	Freq.	Time	June Tfc.	Mgr.
IFN	3910	1330Z Daily	2300 M-F	135 K9IVG
ISN	3910	0000Z Daily	2130Z M-S	500 K9CRS
		2300Z S-S		
QIN	3656	0100Z Daily		136 WA9FDQ
Ind. Pon	3910	1245Z Sun.		35 K9EYF
Ind. PON V.H.F.	50.7	0200Z Mon.-Thurs.		79 WA9NLE

W9FQN got married. W9JBQ is home from the hospital. New officers of the Mobile ARC of South Bend are WA9BVL, pres.; WA9ONY, vice-pres.; WA9DOR, secy.-treas.; WA9EJR, trustee. W9HRY, RM/9RN, needs a station to check in to get better coverage. W9YB's summer net frequency is 7290 kc., at 0030Z Wed. W9YB wants to thank all who assisted with the Purdue Centennial Air Show. WA9FDQ, RM/QIN, sends a list of nets that operate near the QIN frequency. 9RN, 0045Z, 3640; Mich. PON, 0000Z, 3645; QIN, 0000Z, 3656; WIN, 0015, 3662; QMN, 2300Z, 3663. I received more Field Day messages this year than last. WA9CJR is giving up printing the *Bison* because of poor health. Your SCM went to the ARRL Convention at Des Moines, Iowa, June 20, 21 and 22. It was the best ARRL National that I have ever attended. Indiana was well represented. MARS had a very fine program. Among those present at the Convention were W0DX, W1LVQ, W1NJM, W3P5, W0CQ, W1CW, W1YIM, W1CIP, W1HDQ, W9HPG, and W9PRN. W9PMT, Mgr. of the Hoosier V.H.F. Nets, reports June traffic as 80. QIN Honor Roll: K9VHY 27, K9HYV 16, WA9KAG 16, W9QLW 15. *Amateur radio exists because of the service it renders.* BPL certificates went to K9FZX/9, W9JYO, W9FWH, W9EQO and WA9QOQ. Traffic: (June) W9HRQ 334, W9EQO 222, K9IVG 196, WA9BWW 193, WA9JQO 112, W9UEM 109, K9HYV 96, W9BUQ 77, W9UCU 60, K9CBY 48, W9JBQ 48, K9CRS 47, WA9JZZ 42, K9VHY 37, K9YBM 27, WA9OHX 24, K9RWQ 23, WA9AFX 22, WA9BVL 20, WA9CHY 20, W9PMT 17, WA9RNT 17, WA9WME 17, WA9QEQ 16, K9KTB 14, W9HWR 12, K9JQY 12, K9EYF 10, WA9LGH 9, K9ILK 8, WA9OAD 6, W9ALM 5, WA9VGB 5, WA9VRV 4, WA9VZD 1. (May) WA9BVL 3. (Apr.) WA9BVL 3.

**WISCONSIN**—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9NGT. PAMS: K9DBR, WA9IZK, W9NRP, WA9QNI and W9AYK. RMs: K9KSA and W9DND.

Nets	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1145Z	Mon.-Sat.	318	204	W9AYK
BEN	3985 kc.	1700Z	Daily	543	193	W9NRP
WBSN	3985 kc.	2200Z	Daily	1113	278	WA9QNI
WIN	3662 kc.	0015Z	Daily	190	88	W9DND
WSSN	3780 kc.	2330Z	Daily	139	45	K9KSA
WRN	3620 kc.	0030Z	Sun.	15	0	K9GSC
SWRN	145.35 Mc.	0130Z	Daily	225	29	WA9IZK
D2R2N	50.4 Mc.	0200Z	Mon.-Sat.			K9DBR

Net certificates were sent to W9IHW for BWN and WA9UNN for BEN. W9KCR assisted with tornado communications in Jackson County June 26. WA9YCY has received his General Class license. He also won for the Wisconsin section in the NR Contest. BPL for June traffic went to W9ESJ. W9CXY received an Armed Forces Day award. K9GDF led the 00s with 41 notices, and says there were many had FD signals. K9GZK and WA9AIB are on 146.94 Mc. from Ripon. Traffic: W9CXY 344, K9CPM 302, W9RTP 233, W9ESJ 211, WA9QKP 207, WA9RAK 107, W9DND 93, K9KSA 84, W9KRO 74, W9DXU 66, K9FEI 52, WA9UNN 46, WA9TXN 45, W9AYK 36, K9GSC 33, W9PKM 31, K9BTB 30, K9JPS 26, W9BCH 23, K9LGU 20, WA9THF 20, WA9HFB 12, W9UCR 5, K9GDF 4, WA9SAB 3, WA9AIB 1.

### DAKOTA DIVISION

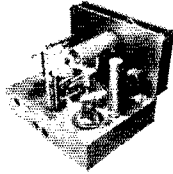
**MINNESOTA**—SCM, Larry J. Shima, W0PAN—SEC: WA0MZW. PAMS: WA0MMV, WA0EJ, WA0HRM, K0GYO, WA0DWM. RMs: WA0RRA, WA0IAW. W0QSL Bureau: W0DMA. For Section Net listing, see last month's QST. WA0QNP is a new Advanced Class. It was refreshing to see all the Handi-Hams at the Convention in Des Moines. Thanks to all who made the trip possible. W0BE won the C.W. Speed Contest at the convention (45 W.P.M.). Congratulations to WA0MZW on receiving the Forest Bryant Trophy and a citation from the Army Corps of Engineers for his tremendous efforts in organizing the Minnesota AREC organization during the spring floods. The following appointments were acted upon in June: New—W0IYE, WA0TGM as ORS; WA0IXG (Wright), K0ZSE (Redwood), K0FLP (East Folk).

(Continued on page 107)

Hafstrom Technical Products' heavy duty BTI LK-2000 linear amplifiers complements extra class design with compact modern circuitry built around an Eimac 3-1000Z high- $\mu$  power triode. The amplifier achieves full 2 kW PEP SSB input and 1 kW input on CW, AM and RTTY.

Hafstrom chose the rugged 3-1000Z zero-bias triode because it offers a conservative 1000 watt anode dissipation rating and provides up to 20 times power gain at moderate plate potential. This tube, widely used in commercial FM and HF

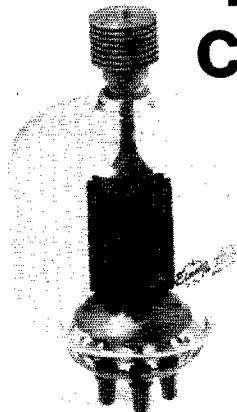
broadcasting, is ideal for heavy duty around-the-clock operation in cathode-driven grounded-grid service, eliminating any need for bulky and expensive screen and bias supplies.



For more information on the 3-1000Z and other Eimac tubes for advanced transmitters, write Manager, Amateur Services, Eimac Division of Varian, 301 Industrial Way, San Carlos, Calif. 94070, or contact your nearest Varian/Eimac distributor.



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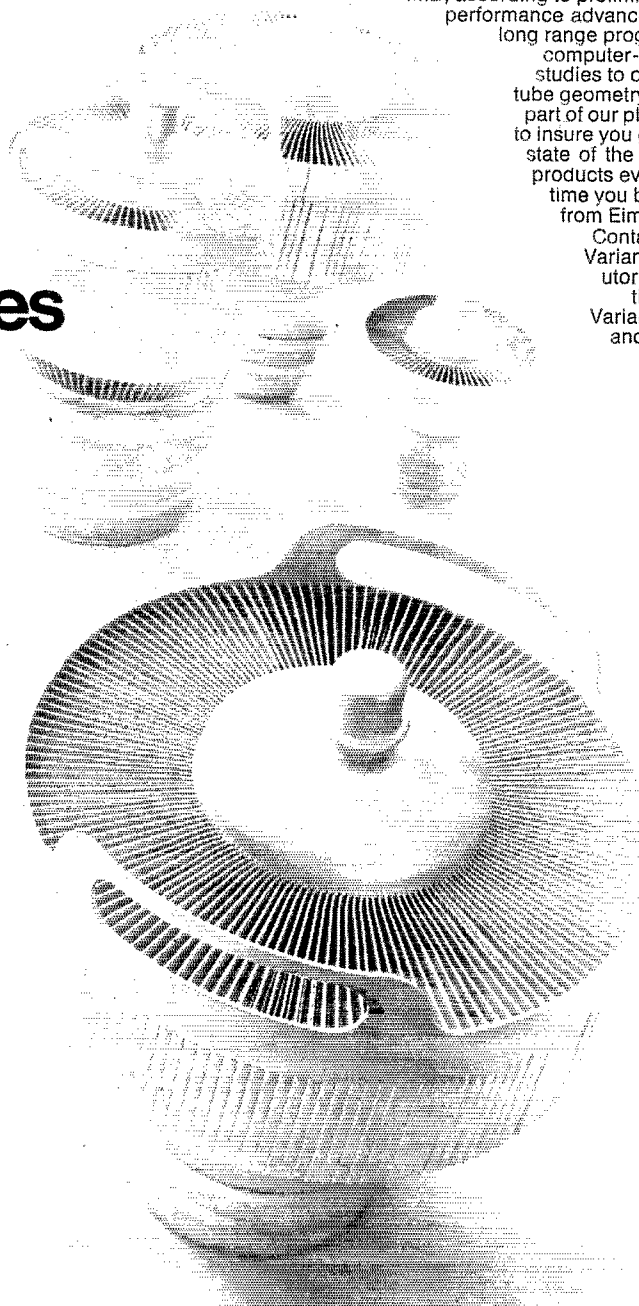
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and Device Group





(Continued from page 104)

WOWFA (Pipestone), KODID (Roseau and Lake of the Woods), KQJYJ (Jackson), WOFYT (Traverse), WQGB (Clay), WAQNS (West Hennepin), WAQIO (Isanti), KQGX (Benton), WAQVA (Anoka) as ECs. Endorsed—WQBUO as OPS, WAQHRM as PAM Evening MSPN. Our thanks to KQZZR and WQHEN for their participation as ECs. The SCM received 17 Field Day messages. Traffic: (June) WQTHI 300, WAQTQT 278, WAQVAS 235, KQMYF 116, WQPAN 101, WQZHN 78, WAQRRR 68, WAQIAW 66, WAQOEJ 65, WAQ-MAV 53, WAQHRM 52, WAQTGM 44, WAQEPX 35, WAQVEB 34, WAQVFP 34, KQZBI 27, WAQ LIS 25, WQBUO 23, KQFLT 22, WAQPYZ 21, WQFHH 19, WQKNR 19, WAQODR 18, KQJTA 17, WQKLG 14, WQIYP 12, WAQJR 12, WAQVHG 12, WQSKJ 11, WAQURW 10, KQORK 9, WAQVHX 9, WQHEN 8, WAQNRH 8, WAQDFT 7, WQUMM 7, WAQRAQ 6, KQXQ 6, WQOTFC 6, WAQOJU 5, WAQPMI 5, KQWX 5, WQDKK 4, KQICG 3, WQYAH 3, WQ-TCK 2, WAQJKT 1, WAQOEF 1. (May) WAQMWZ 195, WAQDPT 13, KQILL 8, WQCK 7.

**NORTH DAKOTA**—SCM, Harold L. Sheets, WQDM - SEC: WAQAYL, ORS: KQSPH. PAM: WQCAQ. RM: WAQBSR. OO: WQBF. WAQWBU, of Grafton, and WAQSB, of Bottineau, are new licensees. WQFVX and WQDOO went into the hospital about the same time for surgery and are feeling better now that the job is done. K3CLA/Q, of the GFAPB, did right well in the V.I.F. Contest with 4 watts s.s.b. WAQOVW took the General, Advanced and Extra First exams and returned the next week and took the 1st-class commercial radiotelephone operator's exam. He passed them all and is doing some parttime work at KRAD. WAQRAQ visited him over FD. WQECX reports that more than 100 registered for the Kindred Picnic. WQDM helped get his Scout Troop to camp and missed the picnic. The family returned and spent July 4th with WQTXQ at Detroit Lakes. Reports were received from three Clubs on Field Day. The Fox Club, WAQJXT/Q, was at Lake Ashtabula. WQZKT/Q, the Bismarck Club east of Bismarck, while the Dickinson fellows, WAQVGT/Q, were at the Teddy Roosevelt Park. The Fox fellows put up a quad which worked out well for them. The North Dakota Civil Defense presented a RACES Directory to all members. This was dedicated to WQNMV, who was responsible for the setting up and gathering of all the information. It also contains the membership as to counties and Navy MARS directory as well as all the telephone prefixes for the towns of the state. This is much appreciated by the ham fraternity of the state. Thanks to the c.d. for this service.

N.D. RACES	Net 20 sessions	Ck-ins 395	Tfc. 69	KQSPH
N.D. PON	Net 14	" 193	" 7	WAHUD
N.D. CW	Net 13	" 23	" 0	WAQBSR

Traffic: WAHUD 76, WQNMV 72, KQSPH 39, WQDM 9, WAQJPT 9.

**SOUTH DAKOTA**—SCM, Seward P. Holt, KQTXW - SEC: WQCPX. PAM: WAQCWW. RM: WQIPE. The Sioux Falls AREC is running three classes a week, Novice, General, Advanced-Extra Classes. WQSMV has returned to work at FAA after his recovery from surgery. New licensees in the Sioux Falls AREC are WQNYRH, WQNYRI and WQNYLM. Four members of the Hot Springs AREC participated in Field Day, contacting 360 stations, some being in Hawaii, Australia and Marshall Islands. SCM WAQCPX reports membership in AREC as of June 30 was 87 members, 21 having NTS liaison. The Morning Net had 33 QNI, 58 QTC and 14 informals, a good record. Traffic: WAQFUZ 80, WQIG 31, WQROJ 27, KQAI 26, WQDJO 24, WQFJZ 4.

**DELTA DIVISION**

**ARKANSAS**—Acting SCM, Robert D. Schaefer, WA5IIS—SEC: W5PBZ. RM: W5NND. PAM: WA5-PPD. Congratulations to W5OBD on making the BPL 100 times. WA5VWH and WA5QM/Q have new quads. W5PBZ and I enjoyed operating W5ANR/5 with the Fort Smith Club during Field Day. W5AAI passed the Extra Class exam. W5NVSU received his WAS certificate. K2UMO/5 is the new pres. of the Bayou Meto ARC, which set up portable at the Little Rock Air Force Base Armed Forces Day celebration. W5N5VZ passed the General Class exam. W5N5VRG is on with a new HW-16. WA5VVQ has a new SB-401. Net reports for June:

Net	Time	Freq.	Tfc.	QNI	Mins.	Mgr.
RN	2330Z	3.995	57	532	486	WA5QM/Q
OZK	0000Z	3.790	17	126	426	W5NND

APN	1100Z	3.937	17	400	1313	W5VFW
Teenage	2230Z	3.995	25	280	426	WA5QM/Q
PON	2130Z	3.925		475	628	W5ELF
VHF PON	0100Z	(Wed.-Sat.)				51 Mc.
DX Info	2345Z	Mon.				3.860 Mc.

Traffic: W5OBD 725, W5NND 73, WA5PKO 48, WA5-QAQ 46, WA5KEF 31, WA5TJB 26.

**LOUISIANA**—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5OB. RM: K5ANS/5. V.H.F. PAMs: WA5DXA, W5UQR. FD activity was at an all-time high over the state. Yours truly visited six field locations. WA5NYY has been appointed OO. Congrats to W5GZR and K5-MNP on passing the Extra! WA5OVX reports that she and WA4BVD are trying to start a YL International C.W. Net on 7100 Mon. at 1400 GMT and 14.070 at 1900, same days. Anyone interested, please contact her. W5-CEZ is busy attending MARS zone meetings but finds time for excellent attendance on LAN. WA5NLI says the BRARC was spared the wrath of Murphy on FD. W5N5ZCF is a newcomer up Monroe way. WA5WBZ and WA5LGO set up portable gear for camp members in the Shreveport area. RM K5ANS/5 has set up a point system for LAN members with the "W5PM". Annual Trophy to be awarded the winner at the end of the year. Frank also has installed, a completely un-attended Autostart RTTY on 3575.000 kc., 350 shift. W5GHP has rebuilt his shack. An Executive Council has been formed in the GNOARC to promote and plan better activities for the club. The New Orleans Club has started theory and code class. W5CZ has been made pres. of the Telephone Pioneers. W5HO is burning up the airways with his new quad. The CLARC repeater should now be in operation. WA5NJK has opened up a ham shack handling only ham gear in New Orleans. W5SKW was awarded a Certificate of Merit recently. W5OB has now 316 confirmed in his DX escapades. W5BV confines his activities to 75 s.s.b. If you would like to see the state nets at the head of this column send me the details. Traffic: W5GHP 197, W5CEZ 133, W5MXQ 120, W5MI 115, K5ANS 95, WA5-NLJ 56, W5MBC 30, WA5WBZ 17, WA5QVN 12, W5EA 8.

**MISSISSIPPI**—SCM, Clifton C. Comfort, WA5KEY - SEC: WA5JWD. The MSBN Summer Picnic at Sardis Lake was a success, with 26 amateur families attending. Thanks to WA5SSZ and K5UBL for the leg work. WA5JWD received the W5EPT Memorial Citizenship Award for this year. WA5YJA and WA5VFP now have Advanced Class licenses. WA5OLS is on the air with a home-brew s.s.b. rig. W5GGZ is recovering from a heart attack. WA5UDQ operated portable with generator power during a family reunion. WA5UIH is portable in Texas for the summer. K5ZFM is portable from the Gulf Coast for most of the summer. WA8MLB spent several days in the State because of his mother's illness. WA5FCS made a leisure trip from Houston, Tex., to Huntsville, Ala., visiting friends along the way. The MSBN sponsored FD operation using the call WA5 Sadistic Insistent Mosquito. WA5SIAI, WA5VAJ and WA5TOD each traveled over 100 miles to be there. WA5XC hosted so well that all are planning to be back next year. WA5GOH and WA5CAM, of Natchez, are the net mgr. and secy. of the Central Gulf Coast Hurricane Net.

GCSBN	3925 kc.	2330Z	Daily	W5JHS Mgr.
MSBN	3990 kc.	0015Z	Daily	WA5SIM Mgr.
CeugCHN	3935 kc.	1000Z	Daily	WA5GOH Mgr.
RACES	3987.5 kc.	1345Z	Sun.	W5I2S RO

Traffic: WA5FIH 56, WA5KEY 20, WA5SIM 12, WA5SKI 10, WA5SEG 2.

**TENNESSEE**—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. PAMs: W4PFP, WA4YBT, WA4EWW, WB4HMA. RM: WB4GSS.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980	Mon.-Sat.	2330Z	25	985	98	WA4YBT
TPN	3980	Mon.-Sat.	1145	30	1005	77	W4PFP
		Sun.	1300				
ETPN	3980	M-F	1040	21	453	91	WA4EWW
TCN	3980	Thurs.	0100	4	20		W4TYV
TPON	3980	Sun.	2330	5	147	23	K4RTA
TTN	3980	Daily	2100	30	298	89	WB4HMA
TN	3635	Daily	0000	30	105	49	WB4GSS
TSN	3635	M-W-F	2300	13		21	WB4GSS

The following stations reported their Field Day activities: WA4A/4, WA4S/4, WB4DJF/4, WA4OLB/4, W4-PQP/4, W4RUL/4, W4TRC/4, W4WVJ. ORS WA4UAZ has had rig trouble. Congratulations to W4JVM on his 16 years as NCS of the Chattanooga 6 Meter Net, 50.4 Mc. The Delta ARC sponsored a hamfest in conjunction

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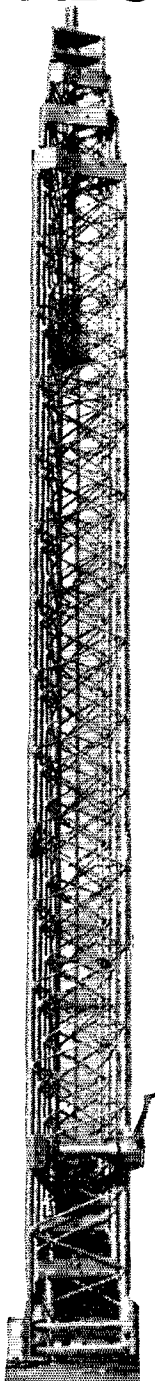
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with Field Day. W4OGG, W4WBK, W4SQE, W4NBO and K4FA attended the National ARRL Convention in Des Moines, Iowa. W4LHE reports that the Memphis Sesquicentennial Award is available to anyone working 5 Memphis stations in 1969. All clubs are reminded to take advantage of the films available from ARRL as well as other training aids. Traffic: WB4JFT 129, W4-OGG 98, W4UAZ 87, W4GLS 77, WB4DJP 75, W4-  
WVW 57, WB4HMA 53, WB4ANX 39, WB4HLH 33, WB4EHD 31, WB4HYI 30, K4COT 29, WB4GSS 20, W4ODX 18, W4PPF 18, WB4DYJ 17, WA4TWL 16, W44EWW 10, W44YYM/4 9, WB4FUR 8, WB4EHK 7, K4PUZ 6, K4AIC 4, K4UMW 3, W4TYV 2.

### GREAT LAKES DIVISION

**KENTUCKY**—SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Appointed: W44VUE as EC. Endorsed: W4NBZ and WB4HUS as ORSs. BPL: W44DYL.

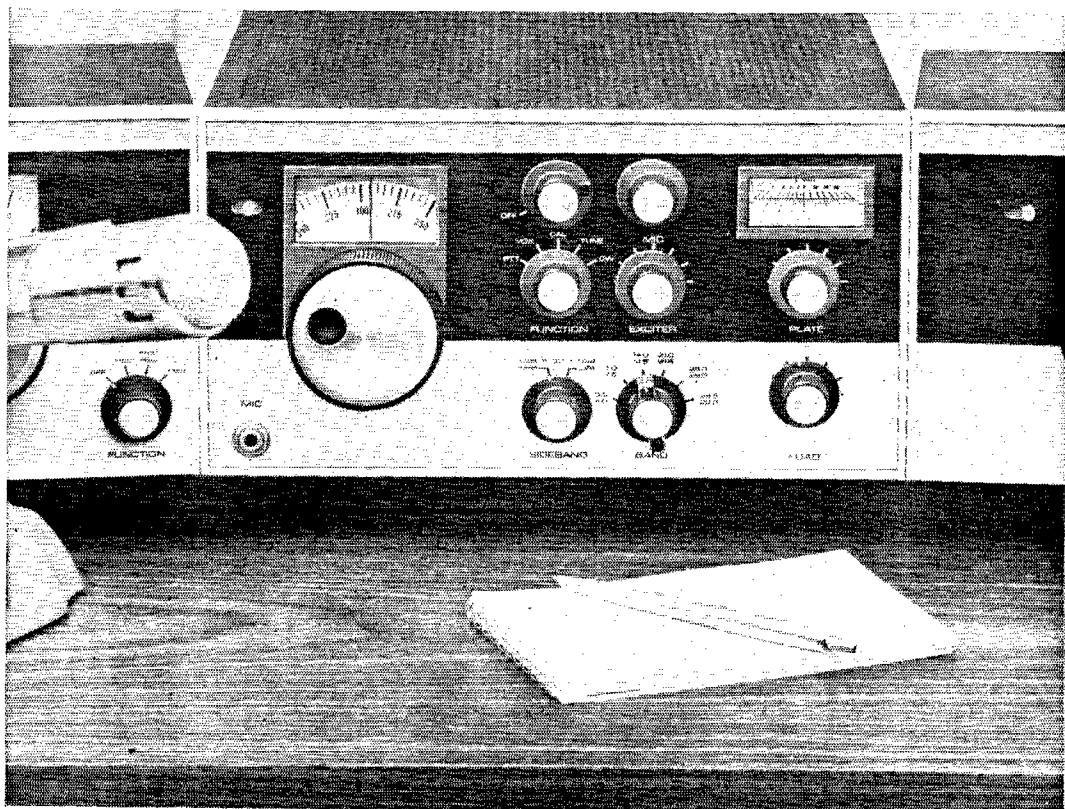
Net	QNI	QTC	Net	QNI	QTC
KRN	384	35	KYN	388	570
MKPN	526	84	FCATN	143	78
KTN	818	260			

Owensboro/Henderson did themselves proud for their work in the Hydroplane Race at Owensboro. The Coast Guard folks said it was the best they'd ever seen. There were 25 operators involved. K4DMU was Acting PAM of FCATN while W4OTP was away. WB4HUS keeps the minibox manufacturers in business with his HB gadgets. WB4FLA/4 handled traffic at a local fair and did a fine job. Kentucky looked good in the SET results, but it's not too soon to be looking to next year. Traffic continued up but reporting was down very slightly compared to last June. That's the first dip in reporting in a year and it wasn't much down at that. Traffic: (June) W44DYL 525, W44VUE 483, WB4KPE 237, WB4FLA 187, WB4HUS 159, W44AGH 132, W4BAZ 103, K4MAN 102, WB4HQW 97, W4OYI 74, K4HY 72, W4OTP 67, W44MXD 65, WB4FDK 46, W4CID 44, W4TOY 44, K4TRT 44, W4UK 42, WB4EOR 39, K4VDO 32, W4KJP 30, W4NBZ 24, K4FPW 23, W4VZZ 23, W44GHQ 21, WB4EQY 17, WB4GCV 16, K4UMN 15, WB4HTN 14, WB4IOU 14, W4NMY 12, W44WWT 11, W4BTA 10, W4ISF 4, WB4LKP 2. (May) K4FPW 16, W4NBZ 15, WB4ILF 10, W4BTA 9, W44WSW 6. (Total traffic 2385, last year 2127; total reports 42, last year 45).

**OHIO**—SCM, Richard A. Ebert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU, RM: W8IMI. PAM: K8UBK. V.H.F. PAM: W8ADU. June net reports:

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
O8SBN	1794	1203	60	3972.5	1430 & 2245Z	K8UBK
BN	495	431	60	3580	2300 & 0200Z	W8IMI
06MtrN	367	76	53	50.01	2300Z	W8ADU
				59.16	0100Z	
OSN	168	69	28	3580	2225Z	W8VNU
Apricot	280	560	30	31.0	0100Z	K8ONA

BPL for June goes to W8UPL, W8ETX, WB8RZX and W8YTH; BN certifies to W8AJZ, W8CHT, W8CHW, W8CXY, K8DDG, K8DHJ, W8ADUL, W8-ELL, W8GOE, W8GVX, W8IMI, W8IO, W8IUS, W8JH, W8LAM, K8LGA, W8OCG, W8QXQ, W8RYP, W8-SZU, W8SULF, K8UMX, W8UTX, W8VNU, W8-WAK, W8WEG and W8ZTV. June appointments: W8ZTV as ORS. Congratulations to new Extra Class K8KRN and to new Advanced Class WB8AYN. RM/BN Manager W8IMI advises that the alternate net frequency for the Buckeye Net is 7050 kc.; this frequency to be used for special sessions and when conditions warrant. W8ERD reports that 99 logs were received from participants of the Ohio QSO Party. First, second and third place winners (Ohio) are W8ETX/8, K8RRQ and W8GRR/8, respectively. Out-of-state awards went to W9JCK, K8GGD and W8ZDT for first, second and third place. W8ERD had the second highest score, but disqualified himself for awards. K8KOM received the ninth Worked All U.S. Counties award. W8RZN and W8RZM, editors of Toledo's *Ham Shack Gossip* won first place for local coverage in the Amateur Radio News Service's publication contest. W8HWL, editor of *Buckeye (Belles) Burr*, won three awards in the same contest. The Columbus ARA had W8JK as feature speaker. New officers of the Dayton ARA are W8PHV, pres.; K8DOT, vice-pres.; W8DPW, secy.; W8-UUX, treas. New officers of Chix on Six are W8EBS, pres.; W8WRJ vice-pres.; W8EFB, secy.; K8VMY, treas. Congratulations to newlywed W8HQX, editor of Springfield ARC's *Q-Line*. SEC W8OUU received semi-annual reports from 25 of the section's EC's, 100%. W8OUU has created a Section Emergency Plan. It will be made available to all, and will serve to get the



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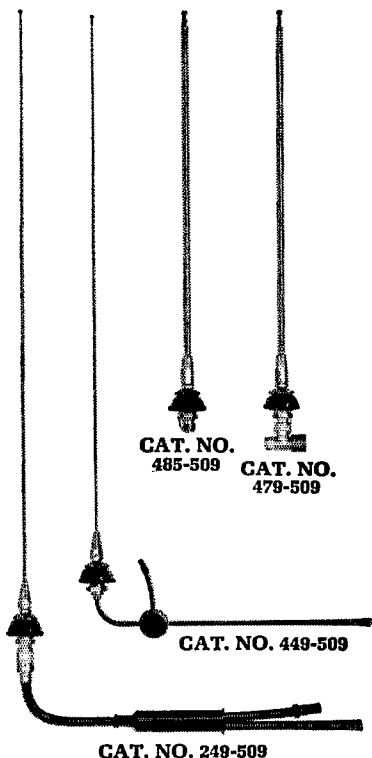


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**485-509**—144 to 174 MHz chromed brass "simulated collapsed whip".  $\frac{1}{4}$   $\lambda$ , Unity gain. 50 ohms, 10-MHz bandwidth, 1.5:1 VSWR, 100 watts, UHF coaxial connector. \$22.20

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**PHELPS DODGE COMMUNICATIONS COMPANY**

ARPSC wheels in motion when the need for emergency communications arises. The storm disaster of July 4 is the biggest we've ever had in Ohio. AREC groups in the affected areas were activated, and the OSSBN remained in session for several days. I listened to several hours of OSSBN's operation, and it's hard to imagine a more businesslike, professional approach to disaster communications. The net controls did a superb job in maintaining order and handling things in accordance with precedence. Most of the traffic was handled in proper format, particularly when NCS was one of the "old pros." Several letters have been received from hams in the affected area requesting information on joining the AREC. We hope that those who put in the time and effort in preparedness are convinced that the effort was worthwhile, and that those who have not been a part of ARPSC are encouraged to "join up" against such time as Mother Nature does it again. Sincere congratulations to all who justified the existence of amateur radio. Traffic: (June) WA8UPL 66Z, WA8ETX 535, W8IMI 378, W8GNL 304, WA8DWL 295, W8BBZX 206, WA8ZTV 197, WA8YTH 181, WA8ETW 176, W8SUS 171, W8SCHW 163, W8BAKW 155, W8QCU 129, WA8ZNC 120, K8ONA 115, W8UDG 111, WA8ULF 98, W8LRE 97, WA8VNU 89, WA8QFK 85, W8ID 75, W8FGD 73, WA8YB 73, WA8ARW 67, WA8OCQ 67, WA8NOQ 58, W8UX 58, WA8DUL 56, WA8ADU 51, W8CHT 50, W8ERD 50, WA8SED 49, W8BBLH 47, W8QZK 45, W8OE 43, W8PAJ 42, W8ETU 41, WA8YU 37, K8BYR 35, W8BDSV 33, K8PBE 33, W8DAE 30, W8TV 28, W8GRT 26, WA8MEO 26, K8EHE 25, W8MOK 24, W8GOE 18, WA8SX 16, W8AAJZ 15, WA8SH 14, W8WJR 14, WA8FSX 13, W8NAL 13, WA8YIN 13, WA8JEH 12, K8DDG 11, WA8KPN 11, WA8BZR 10, W8OUU 10, WA8LAM 8, K8CKY 7, WA8CXV 7, W8LZE 6, WA8RQQ 6, W8WEG 5, WA8ZJF 5, W8BDC 4, WA8JSW 4, WA8MCR 4, WA8RUO 4, K8DHJ 3, W8BEH 3, WA8RUO 2, W8DYF 1, W8GDQ 1. (May) W8BZX 14Z, W8ERD 64, WA8MCR 16, WA8VVN 13.

## HUDSON DIVISION

**EASTERN NEW YORK**—SCM, Graham G. Berry, K2SUN—Asst. SCM/RM: Ruth E. Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB, V.H.F. PAM: WB2YQU. Section nets: NYS on 3675 nightly at 2300Z; ESS nightly on 3590; NYSPT&EN on 3925 nightly. *Appointments and renewals:* W2HZZ as EC Dutchess County; W2HO as EC for the Town of Alonroe; W2HZZ as OBS; WA2QEG as OPS. We still are looking for applicants as EC in Columbia, Putman and Greene Counties. If interested, get in touch with the SCM or SEC. *On the club circuit:* ED messages were received from WB2ELL, W2DXL, W2RP and K2AE and non-club messages from WA2BLM, WA2CRW and WB2HUP. Our PAM visited both the Schenectady and Albany Club sites during ED. The Albany Club had W2ONE and W2ITQ demonstrate land-line telephone equipment and operation using antique American Morse instruments. The New Rochelle Club entered the V.H.F. QSO Party using member VK1ZAR/W2's call on 2 meters. The Albany HS Club is semi-active for the summer and looking for QSOs via W2YFN/2. Repeater licenses in the Albany area are K2CT for the AARA on 6 meters from Loudonville; WA2UWL for County AREC in Berne, N.Y., and for W2YPN. The Overlook RS reports 5 new Novice tickets on the way as a result of classes just ended, while down at other end of section, the Communications Club of New Rochelle has 2 new Advanced Class tickets in the works before the end of the course, plus two Techs. *Individual station reports:* WB2RBG needs 4 more states in the W7 area for 48 states on 8. Sporadic E helped build her total during June. W2HZZ is sending Bulletins on Mon., Thurs. and Fri. on 145.8 Mc. at 2045 local time beamed S.E., N and S.W.—and via the f.m. repeater through W2CVT at 2055 local the same evenings. WA2CRW has new s.s.b. equipment. W2KGC will be back on 75 soon with a new antenna and final. WA2VEG added another notch to his DXCC count; likewise WB2NVJ. WA2TEQ is supervising the final check-out of RTTY equipment at K2YCJ for the New Rochelle Club with an assist from K2AVP and W2KLD from the NYCLI section. Asst. SCM WA2VYS took a quick trip to VE-Laud, mobilizing all the way. Traffic: (June) W2EAF 214, WA2VYS 73, WA2VYT 50, K2SN 25, W2ANV 9, WA2FDD 9, WA2HGB 7, WA2CRW 6, WA2JWL 5, W2TPV/2 5. (May) WA2JWL 13. (Apr.) WA2JWL 11.

**NORTHERN NEW JERSEY**—SCM, Louis J. Amorosio, W2ZZZ—RM: WB2RKK. PAMS: W2PEV, K2KQD, WA2KZF, WA2TBS.

Net	Freq.	Time	Days	Sess.	QNT	Tfc.	Mar.
NJN	3695 kc.	7:00 P.M.	Dy	30	387	172	WA2BLV
NJN	3695 kc.	10:00 P.M.	Dy	30	142	86	WA2BLV

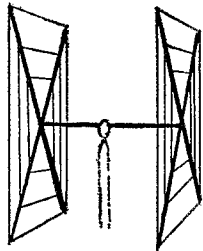
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these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators)—absolutely no bamboo. Complete with 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!



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Elements: A full wavelength driven element and reflector for each band.

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SWR: 1.05:1 at resonance.

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Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

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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

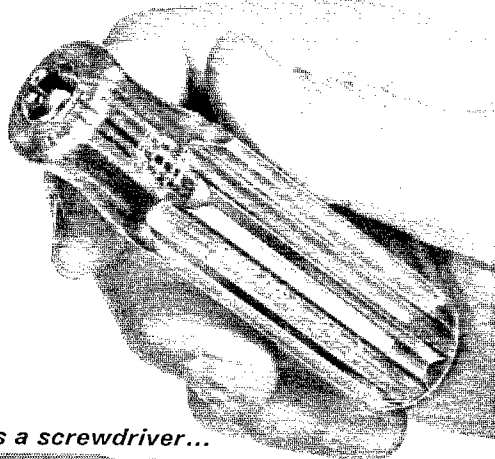
"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

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40, 20, 15, 10, 6 meters . . . . .	\$18.95



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NJSN	3740 kc.	8:00 P.M.	Dy	16	130	46	WB2RKK
NJEPTN	3950 kc.	6:00 P.M.	M-Sat.	28	425	302	W2PEVS
NJPON	3930 kc.	6:00 P.M.	Sun.	4	73	36	WA2TB
NJAN	50,425 kc.	8:00 P.M.	M-F	21	190	23	WA2KZF
PVETN	145,710 kc.	7:30 P.M.	Dy	30	161	210	K2KDQ
ECTN	146,700 kc.	9:00 P.M.	Dy	28	130	46	WA2TBS

WA2TBS is the new net mgr. for the NJPON, and WB2FJE is the new asst. mgr. New club officers for the St. Peters College ARS are WB2MIC, pres.; WB2NCZ, vice-pres.; WN2GPP, secy. The group is hopefully planning a 20-ft dish for 432. New club officers for WB2MFD are WA2NHH, pres.; WA2NZF, vice-pres.; WN2IPM, 2nd vice-pres.; WB2ZMU, secy. WN2IWH passed the General Class exam. WN2KJD is a new ham in Bergenfield. WN2JAE is new in Edison and reports using the DX-60A and Comanche receiver. WA2NHH is working on a slow-scan monitor. K2AIFG applied for DXCC with 102. W2PEV operated portable in N.H. during his vacation. WB2RJJ has a new Swan Cymot. WB2NHF and WB2CWP have a new SB-101. WA2IIV, WA2HSJ, WB2DYB, WB2EYC and WB2FEL enjoyed the visit to W1AW. W2CVW has a new Waters wattmeter. WB2TUL is the new pres. of the N.Y. Univ. RC. WN2KLB is a new ham in Wyckoff. W2KLB reports he is using a Drake 2B w/BQ and Viking 11. WB2BRW is applying for a club license for the BSA station. The SCM received FD messages from the following stations: W2SE/2, W2AOH/2, W2RJ/2, K2CCP/2, WA2AQK/2, K2GQ/2, K2LSA/2, W2ZZ/2, W2GLQ/2, WA2SCG/2, WB2CZN/2, W2ELN/2, WA2WHM/2. This year's FD was reported as the best ever. We had a great time and are looking forward to next year without Murphy. WA2ASM has given up the post of SEC for N.N.J. because of the heavy work load at the salt mine. Many thanks, OM, for a great job and hope things slack off. We need him. Traffic: (June) WB2RKK 561, K2KDQ 313, K2DEL 282, WB2FEH 212, WB2BCS 158, WB2DDQ 143, WB2NSV 130, WA2TBS 122, WA2CVU 117, WA2ACP 69, WB2RXX 65, W2PEV 60, WB2YXJ 59, WA2BHI 49, WB2WID 43, W2ZZ 41, WA2GLI 38, WA2CCF 37, WB2TUL 27, K2ZFI 18, WA2EUX 15, WA2NJB 15, WB2PUW 13, WB2WNZ 11, WA2GE 10, W2CVW 8, WA2TA 8, WA2KZF 7, WB2ZSH 7, W2OV 6, W2TFM 6, W2EWZ 3, WB2CWP 2, (May) WA2ACP 34, WB2AMV 12, WB2BXX 12, K2MFX 6, WB2AMV 5, WB2TUL 4.

**MIDWEST DIVISION**

**IOWA**—SCM, Wayne L. Johnson, KOMHX—SEC, KOLVB, PAM, WOPZO, RAM, WOLGG, OBSS, WOLCX, WOJAO, WAOMIT. New appointees: WOMML as OPS, KOGFY as EC, KOFMI as EC, WOYXK trustee, advises the Iowa Central Community College. ARC has four chapters with club stations WAQVTV, WAQVUB, WAQVUK and WAQVUL. KOLKH is active on 6 after two years in the service. WOKB has been busy with phone patch work to the Pacific Islands. WOLCX found time to pass the Extra Class exam at the National Convention. Red did an excellent job with the code tests at the convention. WAQFFN reports WOBLL now has Extra Class and WODEZ Advanced Class licenses. New Novices are WNOYGA and WNOYGV. KONL, our vice-director, announces a division net at 7 P.M. local time Sun. on 3912. All appointees and interested parties are welcome.

Net	Freq.	Day	MT	QNI	QTC	Mgr.
Iowa 75	3970	M-Sat.	1730	1248	294	WOPZO
Iowa 160	1815	Daily	0000	605	3	KOTDO
Iowa SSB	3970	M-Sat.	2300			WBYLS
TLCN	3560	Daily	2330	110	126	KBAZJ
PON	3915	Tue.-Thurs.	2330			WAQDY

Traffic: (June) WOLCX 524, WOUPT 302, WAOKZL 141, KOJGI 104, WOKB 104, WAQOTQ 84, WAQFFN 70, KOTFT 60, WAQVGC 28, KQAZJ 24, WAQVDP 24, WAQYVR 18, WAQPOE 16, KOTDO 15, WAQZL 12, KOEXN 11, WODMX 8, WOBW 7, WORJZ 6, WMOIQ 5, WAQGMZ 4, WAORUP 4, WAQDAG 2, WAQEF 2, KOLKH 1, (May) WAOKZL 105, WMOIQ 69, WAQFFN 30, KOEXN 10, WAQPPW 13.

**KANSAS**—SCM, Robert M. Summers, KOBXF—SEC, KOEMB, PAM; KOJMF, RAM; KOMRI, V.H.F. PAM; WAQCCW, WAQJSH, KPN, QNI 125, QTC 12, 12 sessions; KSBN, QNI 594, QTC 166, 28 sessions. QKS, QNI 285, QTC 201, one emergency session June 22, 3 1/2 hours handling Salina Tornado emergency traffic out of the state. Stations known to have participated in Kansas Nets during the emergency caused by the tornado in Salina are WAQTHQ, WAQUTT, KQDVN, WAQHZL, WAQPGI, WQSOE, KOMRI, WOHY and WOLXA. On June 6, 7 and 8, the Hiawatha ARC provided communications for the Boy Scouts at Brown County State Lake for their Annual Conserama. WQCHJ traveled northward after the National

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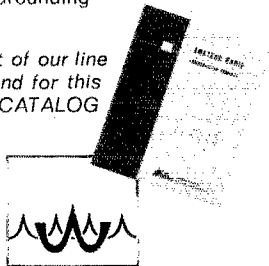
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Convention to Grand Rapids, Mich. where he visited his son who is the national representative for Red Cross there. Zone 2 AREC report from WA0OZP: 75 meters, QNI 27, 4 sessions; 2 meters, QNI 71, 5 sessions. The following stations send Field Day messages to SCM K0BXF: WA0OUL Hiawatha ARC; W0-VZG/O Pilot Knob ARC; Leavenworth, WOHT Flint Hills ARC, Eldorado; W0PTB Emporia ARC; W0-BZN Newton; W0LB Jayhawk ARC, Wvandoette County, K0VKN Ft. Hays QSOers, W0SOE Wichita ARC, W0ERI Johnson Co. ARC, WA0NDV McPherson, W0ONF Howard, W0PEP Haven. Our deepest sympathy to the family of W0CKV, who passed away July 5, 1969. Traffic: WA0THQ 919, W0HI 346, K0JMF 122, K0BXF 103, K0MRI 99, WA0LLC 73, W0INE 68, WA0UTT 64, W0BGX 62, K0PSD 23, K0GH 27, K0EVM 22, W0GUR 19, WA0OZP 16, WA0OWH 15, K0UVH 15, W0GCJ 13, K0FIG 11, K0GZP 11, W0CGZ 9, W0CHJ 4, W0PB 2, W0LYC 1.

**MISSOURI**—SCM, Robert J. Peavler, W0BV—SEC: W0BUL. Appointments renewed: W0BUL as SEC. With deep regret, I report the passing of W0DE, husband of W0UD. A pre-WW I licensee, Al was one of the first amateurs in the Joplin area, and will be greatly missed by many of us. Net reports:

Net	Freq.	Time	Days	Sess.	QNS	Tfc.	Mgr.
MEN	3885	2230Z	M-W-F	12	180	55	W0BUL
MoSSB	3968	2300Z	M-Sat.				W0RTO
MON	3585	0000Z	Daily	22	74	56	K0AEM
MNN	7063	1800Z	M-Sat.				W0UD
SMN	3585	2100Z	Sun.				W0UD
MaPON	3930	2000Z	M-F				W0TAA
PHD (May)	50.45	0030Z	Tue. (GMT)	4	76	8	W0AKUH
PHD (June)	50.45	0030Z	Tue. (GMT)	5	79	8	W0AKUH

We have all come to expect rain on Field Day, but this one was ridiculous! W0BUL reports Field Day messages from W0GWN, O, K0RWL, WA0RAD, O, WA0-JBX, O, W0BRN, O and W0UXH, O. W0BY received a message from WA0UGU, O. The Ruskin ARC reports three cars and one truck stuck, providing great experience in towing and pushing! Congratulations to WA0-VBG, who was recently married; to WA0JQS, who passed the Extra Class exam; to WA0BGU, WA0-CHH and WA0SHD, who passed Advanced Class; to WA0YEV and WA0ZCQ, who passed General Class; to WA0YIT on Technician Class license; new Novices W0NYGW (age 9), W0NOYPI, W0NOYL, W0NOYPM, W0NOYP, W0NOYPP, W0NOYQV, W0NOYQX, W0NO-YOY, W0NOYZ, W0NOYRA, W0NOYRB and W0NO-YRC; and to W0NUNR, who graduated from Northeast State College and is now in graduate school. WA0-ITU has built a new solid state electronic lever. W0NOUNQ has a new house. WA0HQR, O is operating portable from H. Roe Battle Scout Camp, where he is a camp counselor. WA0FKF is pres. of the Tri-State ARC. Traffic: (June) K0ONK 1511, K0AEM 219, WA0HQR, O 153, WA0VRI 90, WA0HTN 70, W0RY 58, W0BUL 45, WA0FMD 18, W0JKF 17, W0AKUH 15, K0EOD 5. (May) WA0KUH 16, W0JKF 9.

**NEBRASKA**—SCM, V.A. Cashion, K0OAL—SEC: K0ODF. The Nebraska Amateur Radio Hall of Fame Selections Committee met in Kearney June 15. Clubs were represented from Hastings, Crete, Lincoln, Omaha (Ak-Sar-Ben) and North Platte. The meeting was for the purpose of honoring an Amateur Radio Operator in Nebraska for his or her merits and services to Amateur Radio. This program was originated in 1965 at North Platte. The 1969 selection will be announced in late summer.

Net	Freq.	GMT	Days	QNI	QTC	Mgr.
NEB I	3590	0000	Daily	39	7	WA0FGV
NSN I	3982	0030	Daily	815	67	WA0LOY
NEB II	3590	0300	Daily	36	9	WA0HWR
NMN	3982	1230	Daily	1002	38	WA0JUF
WNN	3950	1300	M-Sat.	547	27	W0NIK
AREC	3982	1330	Sun.	220	2	W0IRZ
CHN	3982	1730	Daily	1170	120	WA0GHZ
NSN II	3982	2330	Daily	855	48	WA0LOY

Traffic: W0LOD 211, WA0HWR 52, K0DGW 51, WA0GHZ 51, WA0QEX 40, K0JFN 25, WA0IBB 22, WA0JTU 22, K0UWK 18, WA0FGV, O 12, W0FLO 12, WA0PC 12, W0NIK 11, WA0XD 10, WA0OQX 10, WA0PI 10, WA0RPB 10, WA0DXY 9, WA0JH 9, W0FQB 8, WA0OMY 8, W0TMG 8, WA0VJ 8, K0-ODE 7, K0HNT 6, WA0QLE 5, WA0EEI 4, W0HTA 4, WA0BL 4, K0UDW 4, W0ATU 3, WA0JUF 2, K0OAL 2, W0RJA 2, WA0SCS 2, K0SFA 2, W0WKK 2, W0WZR 2, W0VEA 1.



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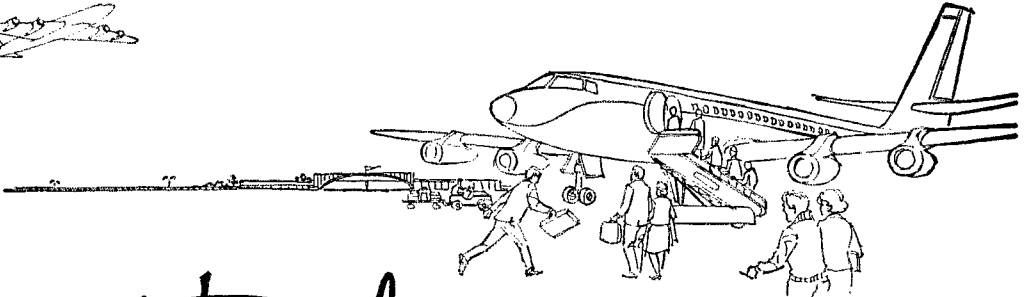
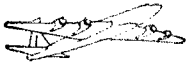
**NEW ENGLAND DIVISION**

**CONNECTICUT**—SCM, John J. McNassor, W1GVT  
—RM: WA1HSN, PAM: W1YBH, V.H.F. PAM: K1-  
SXF, June activity report:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	30	225	268
CPN	3880	M-S 1800 Sun.	1000	29	474	151
VHF 2	145.98	M-S	2200	21	66	5
VHF 6	50.6	M-S	2100	21	157	28

High QNI: CN—W1EJI, K1EIR and WA1HOL. CPN—K1YGS 28, W1GVT 27, K1BSS 26, K1EIC and K1SXF 23, W1YBH 21, WA1HOL and W1LUH 20 and K1LFW 18. Another Field Day is over and it seemed that everyone was active in it. Thanks to all who sent messages—hope you also took advantage of the Publicity and Message-Handling Bonus to get those extra 600 points! Prepare now for next year when that Extra Class station and license will be needed even more to keep away from the QRM. The May ARRL Director's Meeting covered a lot of ground—seems they included something of interest to everyone. Please keep your hard-working Director, W1QV, up to date on your views and interests—he wants to represent you and will if you contact him. Club newsletters are a part of every good active club and the Candlewood ARA in Danbury is a leader. Among its many worthwhile club projects is its work to develop a method or find a way to require the inclusion of high-pass filters and better shielding in TV receivers. Perhaps other clubs could assist them with this. Because of the frequency allocation change due Nov. 22, the Connecticut Phone Net will shift to 3965 kc. CPN must continue as a training net available to General Class operators. CPN will change to 3965 on Sept. 1. Traffic: WA1GF 347, WA1HSN 171, K1EIR 159, W1EFW 157, WA1HEW 140, W1EJI 98, WA1HOL 93, K1EIC 81, W1AW 62, W1GVT 57, K1SXF 45, WA1MO 33, WA1EG 20, WA1HLP 18, WA1QC 17, W1LUH 17, WA1JGA 14, WA1JV 13, K1YGS 13, W1YBH 9, WA1-KMR 8, W1BNB 6, W1CUB 6, W1QV 6, W1CTI 2, W8-CWE/1 2, W1BDI 1.

**EASTERN MASSACHUSETTS**—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from W1RPF, K1s DZG, ZUP and WA1DXI. Silent Keys: W1DQF, the wife of W1BB, K1DJM and W1-NVV. I received many Field Day messages. New YLs: WN1s LGY Low-ll, LH1H Dedham, W1FER, Woburn, is ex-W3MVD. G3DKK/1 is in Medfield. WA1KOW has a Ranger 1. W1PSS now is in Beverly. W1BGW joined the OOTC. DL2AA is in Norwood for a year. W4CEH, ex-W1BNU, and his XVT, are visiting in N.E. W7CAR/K1-QAG also is back and seeing son K1VCL in N.H., and K1FPA/7. WA1CRA has a cubical quad on the low bands. K1YUB has a new 4 BTU antenna. WA1APX graduated from the Maritime Academy and now is in the Navy. The N.E. Teen Age Net, on 3905 at 2300Z was reactivated by WA1s HUM, GUD and JMR. WA1-FHU had YV5CIZ and YV1ACI visit him. New officers of the Chelmsford ARA are W1MWM, pres.; WA1GSP, vice-pres.; K1MGF, secy-treas. New officers of the Quannapowitt RA are W1DFS, pres.; K1NFW, vice-pres.; K1ZUP, secy.; W9GTC/1, treas.; W1AOG, WA1s FHU, HUD, HPS, K1s NKA and PMM, directors. WA1FTY is active on 2 and 6 and is Radio Officer for ECCM of the 6-Meter Moblilers. W1WNK is now Advanced Class. W1TJP is on from Salem, N.H. W1-SX is collecting certificates. WA1-WN1M is on c.w. a lot. WA1DPX worked W1GIU on a f.s.k./RTTY on 2. K1WPS is on 6-meter RTTY. W1MX operated from Mt. Equinox, Vt., and worked W2CJC in N.J. and WA4TTG in Va. on 432 Mc. W1CE is going to England for a trip. WA1DFL worked into Arizona on 6; he has a Drake TR-6. K1NPS, the son of K1AFF, on his way home from Thailand, was awarded the Navy Commendation Medal for meritorious achievement while serving as the initial aviation storekeeper advisor to the Royal Thai Navy Air Squadron. K1UW is getting married. WA1CEO got married and moved to Plainville. He has an SX-7L. New appointments: WA1RY as EC for Sharon. K1CZH as OO. WA1CEO as ORS. W1BUF as OO. Appointments endorsed: W1s ZQQ, VAH as OOs; W1EHT, W1DWY, K1PNR as ECs; K1QDR as OVS; W1MX as OPS/ORS. New Novices: W1s LIP, LIV, L1B, L1GV, L1L, L1H, L1C, L1W, L1L, L1A, L1GZ, L1GW, L1GE, L1GC, L1GB, L1GD, L1GF, L1DF, L1FE, L1FO, L1FC. Other new calls: WA1s L1B, L1EE, L1HV, L1HF, L1GK, L1FV, L1FS, L1EZ, W1HNK, W1DEL and W1ALP are back on 2. W1ZFD is quite active in our 2-Meter Net. W1N1X is on 40-80. The EM2AN had 21 sessions, 166 QNIs, 113 traffic. EMN had 37 sessions, 254 QNIs, 141 traffic. EMNN had 4 sessions, 14 QNIs, 2 traffic. W1OJM made the BPL. WA1JMR is a new OBS/OPS. W1HKJ is a new ORS. W1AOG, our



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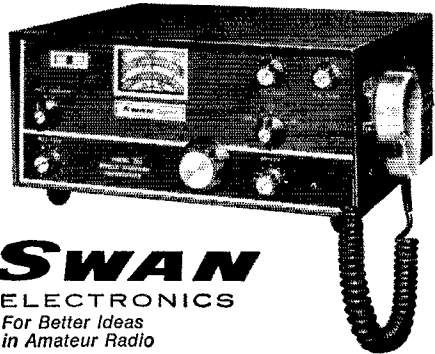
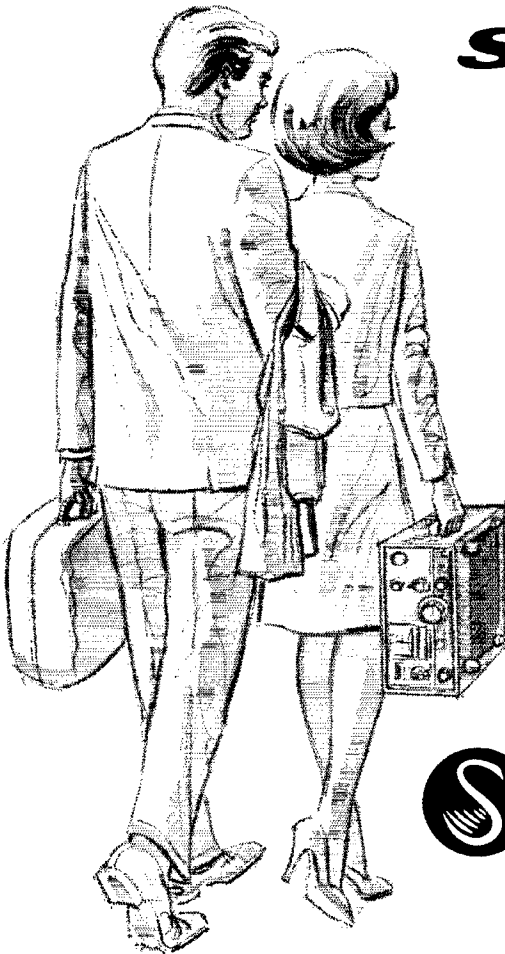
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SEC, says we have many towns that need an EC. Now that Technicians are eligible, let's hear from you. We also would like to have Radio Officers who are ARRL members, also be ECs. If you live in any of these counties, you are in the Eastern Mass. section: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk. All others are in the Western Mass. section. Traffic: (June) W10FM 981, W1PEX 494, WA1EYY 244, K1ESG 236, WA1BL 218, WA1FAD 140, K1PRB 69, W1BTF 41, W1HKJ 41, W1DOM 36, WA1RY 33, W1CTR 23, WA1DPX 26, WA1JVL 26, WA1PE 21, WA1JL 21, WA1JMR 21, WA1OG 14, WA1EST 12, W1ZFD 12, K1CLM 11, K1LCQ 5, K1YUB 4, WA1CEO 3, WA1EC 2, WA1DF 2, K7JRE/1 2, (May) W1EMG 89, WA1FHU 40, K1YUB 23, WA1JMR 3.

**MAINE**—SCM, Peter E. Sterling, K1TEV—SEC: K1OLF, RM: W1BJG, PAM: WA1FLG, W1GKJ had an FB visit from VE1AT of Prince Edward Island. WA2EPG is operating portable from Peaks Island. Would appreciate getting some news from hams in the state. It is very hard to write a column without some kind of news to put in it. WA1JPK is in Saco, W1GIU and W1WHI are using RTTY on 2 meters; GIU and WHI are in Kittery. New hams in the state are WN1-LFZ, WN1LFK, WA1LHD and WN1LHJ. There was a good crowd at the Augusta Hamfest. Hope everyone had an FB time. We need NCSs for the Seagull Net. Any volunteers? WA1KLO is on with a new HW-100. Traffic: (June) WA1PCM 49. (May) W1BJG 229. (Apr.) W1BJG 453.

### MAINE QSO PARTY September 20-21, 1969

The Portland Amateur Wireless Assn. announces sponsorship of the Maine QSO Party and invites all interested radio amateurs to participate.

**Rules:** 1) The contest period will be from 1700 GMT Saturday Sept. 20 to 0200 GMT Sunday Sept. 22. All bands and modes may be used. Maine stations may work as many stations as possible, stations outside of Maine work Maine stations only. Stations may be worked once on each band and mode. 2) The general call will be "CQ the Maine QSO Party" on phone and "CQ Maine" on c.w. 3) Maine stations send QSO number, RS(T) and county. Others send number, RS(T) and state, province or country. 4) **Scoring:** Maine stations multiply the number of QSOs times the number of states, provinces and countries. (1 point per QSO). Non-Maine stations multiply by the number of Maine counties. 5) Awards: A certificate will be awarded to the two highest scoring stations in each Maine county, and to the highest scoring station in each state, province and country. 6) Neat and accurate logs including the participant's name, address, call and county, state, province, country, should be marked no later than Oct. 3 and mailed to K1RQE, 1454 Washington Ave., Portland, Maine 04103. 7) Suggested frequencies: c.w. 3535 7035 14035 21035 28035 7175 3716; phone 3940 7240 14290 21350 28550. Novice Activity is anticipated.

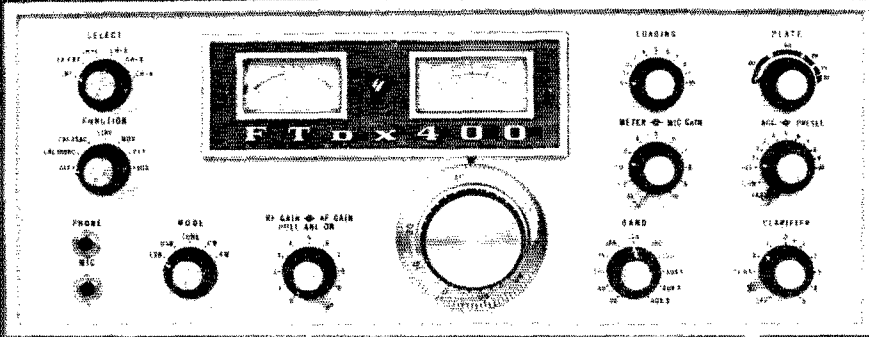
**NEW HAMPSHIRE**—SCM, Donald Morgan, K1QES—SEC: K1RSC, RM: K1BCS, PAM: K1APQ. The following new licensees are welcomed within the state: WA1GI, Cody Radio Club of Ossipee, N.H.; WN1-LGS, of Concord; WN1LGT, of Concord; WN1LGN, of Dublin; WN1LGP, of Hudson, WIWAK reports working W6OA on c.w. using only 300 milliwatts. Good work, boys, this indicates that high power is not always necessary. Summer activity is filling the spectrum with many calls, some portables and many mobiles. New Hampshire QOs report some stations are overlooking the ten-minute ID. Let's identify but not to excess. The NHAREC reports 141 check-ins and 24 traffic. The GSPN reports 802 check-ins and 102 traffic. By the time this report reaches you vacations will be over and some will be in college, others back in school. For all we hope that it was a fine summer and you are safe and rested. Late report of NHAREC for the month of May shows 92 check-ins and 18 traffic. Traffic: K1-BCS 68, K1PQV 27, K1QES 10, W1B35 2, W1SWX 2.

**RHODE ISLAND**—SCM, John E. Johnson, K1AAV—SEC: K1LH, RM: W1BTV, PAM: W1TXL, V1LAF, PAM: K1TPK, R1SPN reports 30 sessions, 461 QNT, 99 traffic. The SCM received Field Day messages from the

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# THE FT<sub>DX</sub> 400 TRANSCIVER

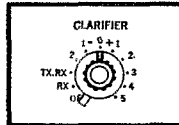
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

**FEATURES:** Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

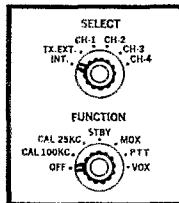
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

**SPECIFICATIONS:** Maximum input: 500 W PEP SSB, 440 W CW, 125 W AM. **Sensitivity:** 0.5 uv, S/N 20 db. **Selectivity:** 2.3 KHz (6 db down), 3.7 KHz (55 db down). **Carrier suppression:** more than 40 db down. **Sideband suppression:** more than 50 db down at 1 KHz. **Frequency range:** 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). **Frequency stability:** Less than 100 Hz drift in any 30 minute period after warm up.

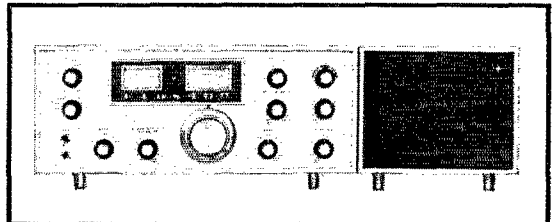


**CLARIFIER CONTROL** — Does the work of an external VFO — allows operator to vary receive frequency 10KHz from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



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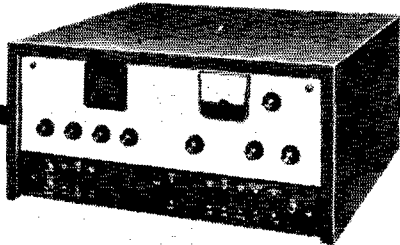
**FUNCTION CONTROL** — Selects crystal calibration marker frequency and desired transmit mode of operation.



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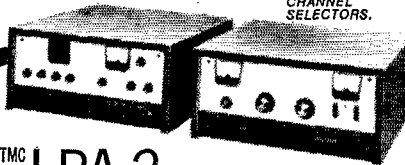
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following clubs: W1AQ/1, W1SYE/1, W1OP/1 and K1JL/1. Rhode Island had good weather for Field Day and activity on the bands was excellent. W1AQ F chairman KIAMG reports that the club had a very active group operating three transmitters and working fifty states from its site at the North Central Airport in Lincoln. The Aquidneck Novice Net has moved to 7.185 Mc. every Sun. from 10:30 EDST to 11:30 EDST. Present recently were WN1KO, net control and WN1KRP, WN1JNY, WA1BLC, W1KXG, W1FJ and WA1AUL. During the summer months ham activity seems to cease but the SCM would like to hear about your contacts and activity during these months so don't forget to drop him a line. Traffic: W1TXL 18, W1YKQ 144, WB2HPW/1 51, K1VYC 42, WA1CXF 2, W1BTV 24, K1QFD 19, K1TPK 14, WA1BLC 10.

VERMONT—SCM, E. Reginald Murray, K1MPN-

Net	Freq.	Days	Time	QNI	QTC	N. Mgr.
Gr. Mt.	3955	M-S	2130Z	311	14	W1VMG
Vt. Fone	3955	Sun.	1300Z	72	—	WA1EDI
Vt. CD	3990½	Sun.	1400Z	31	6	W1AD
Vt. PO	3909	Sun.	2200Z	72	17	K1BQB
Vt. SB	3909	M-S	2130Z	478	78	KL7DVP
		Sun.	1230Z			

Note the new frequency for the Gr. Mt. and Vt. For Nets—3955. W1TLL and W1RPR were in Fanny Allen Hospital at the same time. W1FRT is out of the hospital and doing fine. Welcome to new Novices WN1LE (Essex Jct.), WN1LFT (White River Jct.) and WN1LI (Moretown). W1WOO is working in Montpelier for the summer. W1IHN is 1969 Vt. QSO Party winner with 65,382 points—an all-time high score. K5AAV, from Lubbock, Tex. (3645 points) was outside winner. Traffic: K1BQB 293, W1IHZ/1 11, K1MPN 11.

WESTERN MASSACHUSETTS—SCM, Norman J. Forest, W1STR—RM W1DWW reports W1MNF attendance was down noticeably from May (June 122 vs. 180 in May). Several factors contributed: K1WZY had a session in the hospital but we are glad to see her back in full swing covering Mon. night schedules. According to RM records, we should have 100% representation for IRN for June. Stations in order of activity out of possible 30 sessions are W1BVR-25, W1ZPB-24, W1DWW 24, K1WZY-12, W1IHI-12, W1STR-7, W1ZEL-6, W1KK-5, WA1ABW-4, with K1IUV, W1LLN and W1IIX reporting once. K1IUV is at the cape for the summer. WA1ABW is at Oak Ridge. W1STR is at R.P.I. W1ZPB erected a short horizontal "Y" beam to help with traffic to the Caribbean families of his students. Field Day message was received from W1J.S. Field Day chairman for the HCRAI group at Middlefield. The VARC group had a good Field Day also. The CMAR group in the Worcester area still is working on the fan repeater and project. K1OUT is heading for Vietnam. As of this issue I will no longer have the privilege of writing this monthly report. We are lucky to have W1BVR resume as SCM. To all who have helped in with this chore, please accept thanks for I have appreciated it. Traffic: W1ZPR 78, W1DWW 66, W1IHI 5, W1BVR 31, W1IC 17, W1STR 9, K1WZY 8, WA1ABW

### NORTHWESTERN DIVISION

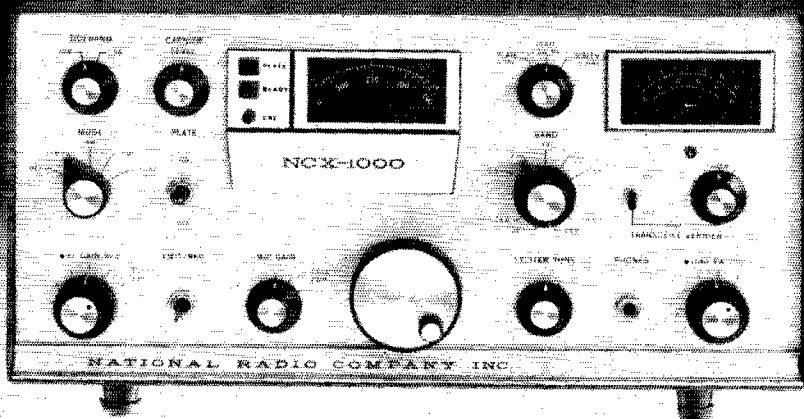
IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC K7THX. The FARM NET convenes at 0200 GMT, 3935 kc. The Idaho RACES Net convenes at 1415 GM on 3991 kc. WA7EWV has temporarily moved to Alaska. The Bonner County Club has a new club house provided by the City of Sandpoint. The Gem State Club sponsored a code and theory class and as a result WN7MLT, WN7MLX and WN7MLW are new amateurs. Boise, WA7GOO is net control for the World Scout Net, which meets each Sat. at 1800 GMT on 21.36 Mc. Governor Samuelson has proclaimed the week of Ju 28 as Amateur Radio Week. FARM Net report: sessions, 342 check-ins, 184 traffic handled. Traffic: W7GHT 71, WA7BDD 39, W7ZNN 12, W7PIS 1.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN SEC: W7RZY, PAM: W7ROE. Section Nets:

Montana Traffic Net	3910 kc. M-F	0100 GMT	QTC	QNI
Montana Post Office Net	3950 kc. M-Sat.	0345 GMT	148	41
Montana Post Office Net	3950 Sun.	1545 GMT		
Montana Section Net	3950 1700 GMT	(Closed for the summer)		

The Hellgate Radio Club at Missoula has a certificate. Write WA7LQ, Box 999, for details. K7EGJ has been on vacation. We are again saddened to report two Silent Keys: W7VNE, of Anaconda, and K7JXL, of Great Falls. Both gentlemen will be greatly missed. WA7BKW is on with Drake gear. W7JFR has moved to San Jose with the IRS. WA0ATY and WN7JN have moved to Cedar Rapids. Orvil was the EC for Bozeman, W7NPV will fill in. WA7HYW was the val-

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- 1000 Watts PEP on SSB, 1000 Watts CW, 500 Watts FSK, 500 Watts AM.
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dictorian of his high school class. WA7MKY is a new ham in the Anaconda area.

**OREGON**—SCM, Dale T. Justice, K7WWR/WA7KTV—SEC: W7HLF. RM: W7ZFH. PAM: K7RQZ. Section nets:

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mpr.
OSN	3585	Tue.-Sat.	0130Z	22	80	32	K7GGQ
BSN	3875	Daily	0030-1900Z	60			
Ore.							
AREC	3875	Daily	0200Z	30	777	38	K7YQM
Pdx.							
AREC	145.35	Tue.-Sat.	0330Z	20	307	14	WA7DCC
Salem							
AREC	145.35	Daily	0300	30	293	15	E7YIA
ON	3980	Daily	0200-0100Z	59			W7VIF

New appointment: W7HLF as SEC. We are pleased to have Dwight join us and are sure he will do a fine job. New Novices in Grants Pass: WN7MQT and WN7MTO. WA7KJV has put up an 80-meter dipole. WA7BYP has been on phone lately. WA7JMD went to school in California and used a small rig to operate from the motel room. WA7FTN ran 233 phone patches to S.E. Asia during the month. Congratulations to the Rogue Valley ARC on its affiliation with ARRL. W7MLJ keeps us informed of what all seven Lakeview hams are doing. Field Day messages were received from W7RXO/7, K7CCH/7, K7CBP/7, W7PXL/7 and W7OTV/7. Traffic: K7RQZ 585, WA7IFS 252, WA7BYP 133, K7IFG 62, WA7JAU 49, WA7KIU 49, K7OUP 33, W7CPK 33, K7YQM 23, K7WWR 25, W7BNS 16, W7HLF 15, WA7DOX 14, K7USZ 13, W7MLJ 12, WA7KJV 10, K7ADR 7, WA7JMD 6.

**WASHINGTON**—SCM, Harry W. Lewis, W7JWJ—The QCWA held its annual convention in Vancouver, B.C. during the week end of June 7. Elections were held and VE7LL was elected chairman. Vice-chairman is W7QA; secretary is W7PN. An enjoyable boat excursion was held Sun. with a journey up Indian Arm. The Northwest Chapter 75-Meter Net will hold its next meeting the Sun. following Labor Day. Also in June the Wenatchee gang held a sunny warm hamfest at Rocky Reach Dam. This is the location of the QCWA museum which soon will be open for viewing. The Code Practice Net, with W7LEC, held an outdoor picnic at Olympia. We regret the passing to Silent Keys of W7VUD, Mary Youker of Auburn, Wash. K7UTT now is on the air with a.s.b. and the Swan Cynet. WA7KWY now has moved to a new QTH and will be on the air soon. W7AXT has been near zero beat with his recent frequency measurements. NSN, QNI 238, QTC 67, sessions 30, AREC NET, QNI 42, QTC 9, 5 sessions, WSN, QNI 259, QTC 248, sessions 29, Noct. Time Net, June check-ins 769, traffic 237, sessions 30, WA7DZL secy. WARTS Net, June check-ins 156, traffic 147, sessions 27, K7YFJ secy. Traffic: W7PI 317, W7AXT 259, WA7GVB 255, WA7DZL 128, W7BQ 69, W7MOW 59, W7GCV 53, K7JXO 48, W7ACQ 44, K7CTP 44, W7APS 41, W7KPA 35, W7GYF 34, W7BTB 21, W7KOB 28, WA7UT 25, W7USO 22, W7LET 21, W7JWJ 18, W7UWT 13, W7AIB 11, W7ZBU 10, W7OEB 9, W7UU 8, K7YFJ 8, WA7KWY 4, K7EEB 2.

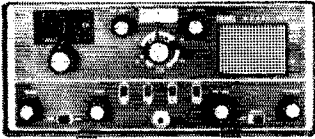
## PACIFIC DIVISION

**EAST BAY**—Acting SCM, Paul J. Parker, WB6DHH—1969 officers of the East Bay Radio Club are W6JKY, pres.; W6HMY, vice-pres.; WN6PZC, secy.; WN6YBU, treas. W6OA reports that the XYL is very active on 2 a.m. and 40 c.w. Look for Una, WB6TZG. W6OA has been making some QRP tests with W1WVK using 300 mw. on 21,005 kc. W1 copied him but at 8 zero. Ron Martin will again transmit the Pacific Division Bulletins on 3570, 7070 and 14,070 kc. K6BYQ is pres. of the Silverado Amateur Radio Society, Inc., W6CO. W6NOP is very active on RTTY from St. Helena. W6LQK, WB6PJJ, WA6SMK and K6RZR are all very active on Navy MARS. WA6SCO lost his 2-meter rig to Murphy recently. WA6YST has been too busy for ham radio. Look for K6BLN on 2 meters from "Two-Rock Fire Lookout." WB6BNR has a new SB-100 transceiver. WA6DKP is putting the final touches on his tri-band quad. K6TFT finally sent in a report; It's good to hear from Will again. W6IPW reported rather light traffic this month but still managed a total of 505. WA6DIL made the BPL again. WB6VEV reports that he is having a good time handling traffic on NCN. W6ZF is pulling out the old faithful valves in his radio and putting in some of those things called transistors. W6UZX is running a new Drake line and having a ball up where the air is rare. Traffic: (June) W6IPW 505, WA6DIL 282, WB6VEV 34, WA6DKP 22, K6TFT 18, W6ZF 4. (May) K6PMG 12. (Apr.) W6UZX 5.

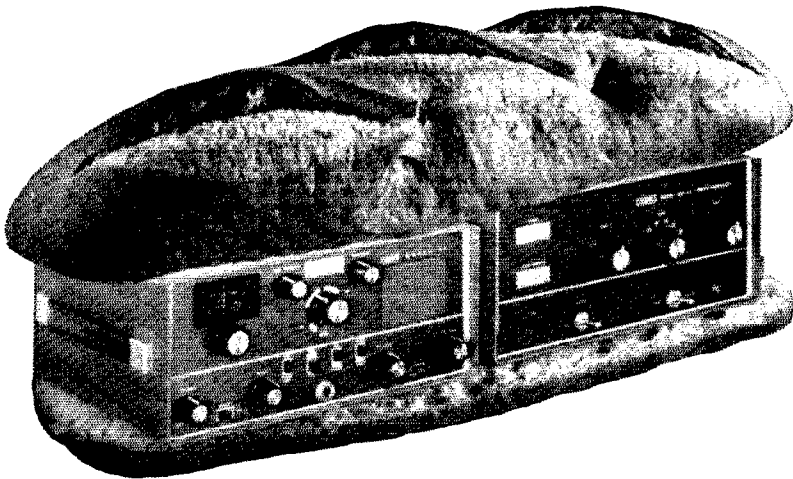
**HAWAII**—SCM, Lee R. Wical, KH6BZF—SEC: KH6GRZ. PAM: W4UAF/KH6. RM: KH6AD, V.E.F.



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Friendly Net	7.290	2030Z	M-F
Pacific Interisland Net	14.320	0830Z	M-W-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4th Tue.
Gecko Net (Marianas Is.)	14.240	0930Z	Tue. Thurs.
Pacific DX Net	14.270	0700Z	Tue. Thurs.
Marine Corps Net	21.380	1900Z	All
Confusion Net (Phone Patches)	21.400	0200Z	All

It is with deep regret that we report the death of a well-known amateur, personal friend and holder of many certificates and awards, KH6BLX. Hope that if you are on the West Coast you'll plan to attend the Southwestern Division Convention Oct. 17-19 at the Hilton Inn in San Diego, Calif. For more information write: 1989 ARRIL S.W. Div. Convention, P.O. Box 1469, San Diego, CA 92112. May I take this moment to wish W3PWK/KH6GJT and his family Aloha as they leave for their next assignment at Pope AFB, N.C. Ted was past director of USAF MARS-Hawaii while doing a tour with CINCPACAF at Hickam AFB. Field Day was a great day in the "islands." Heard on Field Day were KH6s GMP, WO, RS, LG, ETG, VG and GLU. Our QSL Mgr. KH6DQ, returned from a convention and tour in JA-Land. W5NKJ/KH6 now is KH6ESC. KH6AYQ was active on 6 meters recently. KH6GLU reports that he was selected as Area Coordinator of Navy MARS. W4UAF/KH6 worked another new one. CN8BB. K0QZP/KH6 will be with us for the next few years. KH6GPO has been clicking 'em off during recent CD Parties. KH6ATO passed the Extra Class test. KH6GPP has returned from BV-Land, where he vacationed with his family. Keep your reports coming in. Form 18 reporting cards are available from your SCM, address page 6 each issue. Traffic: (June) KH6BZF 16, KH6GQF 1. (May) KH6GQW 6.

NEVADA—SGM, Leonard M. Norman, W7PBV—SEC: W47BEU, Nellis ARC, Nevada Amateur Radio Assn. and Sierra Nevada Amateur Radio Society were all out on Field Day. K7UGT, f.m. repeater, has a new antenna installation on Slide Mountain. W7LHQ is off the sick list. K7YVN, K7ZAU and son are vacationing in Mexico. W47ARZ and K7ZOK have been in the east on business. W7YDX has 2 and 6 meters, plus 75, in his mobile. The W7AKE repeater on Angels Peak is operational from Goldfield, Nev., and Bishop, Calif. W7FJM and K7TDQ represented Nevada f.m. at the f.m. Council relay meeting in Los Angeles and will host the f.m. meeting at SAROC. W47DSP worked 18 sections and Mexico on 6 meters. K7RSQ, the Banjo player, entertained at the Pacific Division Convention. W7ZT and XYL are visiting in Oregon. W7CV and XYL are vacationing in Mexico. W7PRM is busy reviewing old mining claims. W7YKN is building an SB-301 and an SB-401. W6PWE, ex-W7PWE, has taken a new bride. W47BGA is active on 40 meters.

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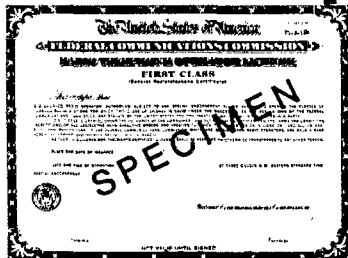
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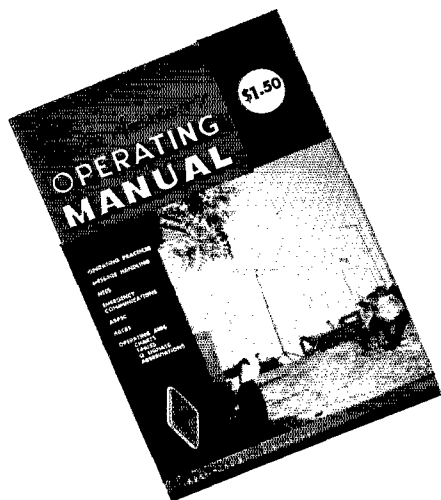
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California stations multiply total QSOs by total ARRL sections and DX countries worked. (Do not count California sections.) Non-California stations multiply total QSOs by total California counties. Additional county credits may be claimed for each six different stations worked per county. Example: 7 different stations in Los Angeles County will count as two counties. Call CQ CA on c.w., and CQ California QSO Party on phone.

Suggested frequencies: 3550 3725 3900 7075 7175 7250 14,075 14,270 21,075 21,175 21,370 28,075 and 28,700.

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First place certificate to the winner in each of the 74 ARRL sections and DX country. Additional awards may be issued (such as 2nd and 3rd) if enough logs are received.

All entries must be postmarked no later than November 7, 1969, and mailed to John F. Minke III, WA6JDT, 6230 Rio Bonito Drive, Carmichael, California 95608. If results are desired, please include a large s.a.s.e. DX stations need not submit s.a.s.e.

Please note scoring change, due to large Los Angeles participation in 1968. All suggestions and comments are welcome.

**SACRAMENTO VALLEY**—SCM, John F. Minke, III, W6KYA/WA6JDT—FCs: K6REW, W6SMU, WA6-TQJ. RMs: W6LNZ, W8VDA/6.

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The above listed nets may be of interest to all of you potential net joiners. The 4th Annual California QSO Party will be held Oct. 4-6. Get in the fun and be a "DX" station for once. The Pacific Division Convention is over after a mild turnout of about 350 at the banquet. Those of you who didn't attend missed meeting such noted amateurs as W1CER, W1LYQ, K4LIF and VS6DR. The next convention will be held in Fresno May, 1970. WB6VNC has slowed a bit with his ham activities because of a YL, K6GG married off his daughter and will have more time for amateur radio. W6WD has been working DX with a 800-mw. QRP rig. Now is the time to prepare for the Nov. Sweepstakes. Traffic: (June) W6LNZ 33, K6RPN 21, WB6ZJV 19, WB6WJO/WA6GHS 17, WA6RBD 15, WB6MAE/6 13, W6KYA/WA6JDT 5, W6VUZ 3. (May) WB6VSC 8. (Apr.) K6RPN 2.

**SAN FRANCISCO—SCM.** Hugh Cassidy, WA6AUD —SEC: W6WLV. A new appointee is H83DR, publisher of the STAR at Udorn in Thailand. He is an APO attached to the San Francisco section but his home call is in 7-Land. Other new appointees are K6SRM, OBS in the Sonoma Valley, and WB6KMI, EC in the Sonoma area. WB6UJO had his picture in the DX portion of the RSGB Journal in June. New amateurs in the Sonoma area are W6HNO and W6HNN, an YL/OM team. WA6BYZ made the RPL in June, the sixth month in a row. The San Francisco Section Courier won a first and second award in the 1969 Amateur Radio News Service Competition. WA6JUV was the section winner for the Spring V.H.F. Contest. WN6ETM, in San Francisco, is an 11-year old Novice getting an early start towards QCWA. The Marin Club handled the Dipsea Race communications again this year on the annual footrace over Mt. Tamalpais to the ocean. W6KUF continues to acquire new antennas. WB6CIE, the XXL stalwart in the Marin Club, had a new tower up and a beam rotating. WN6ZUC still is getting plaudits for her big overall showing in the Novice Competition—fifth highest score. WA6AUD was elected pres. of the Northern California DX Club. W6GPB has been inactive during the last year and is thinking of unloading his gear. W6KVQ continues to work on the antennas at the new Navarro QTH. W6EAJ attended the Convention at Sacramento. Hiram Johnson, III, is a distinguished California name showing up among the Marin County amateurs. The Valley of the Moon Radio Club held a rummage sale in mid-July. Traffic: WA6BYZ 322, W6BWV 33, WA6AUD 15, K6-TWJ 14, W6CYO 2.

**SAN JOAQUIN VALLEY—SCM.** Ralph Saroyan, W6JPU—The Tulare County Radio Club held its FD near Pierpoint Spring with 15 operators. The Turlock Radio Club held its FD near Sonora with 20 operators. W6ASV was in charge of the Tulare County FD operations. WB6LYR is active on 40 and 80 s.s.b. W6DDP is working DX and locals on 6- and 2-meter s.s.b.

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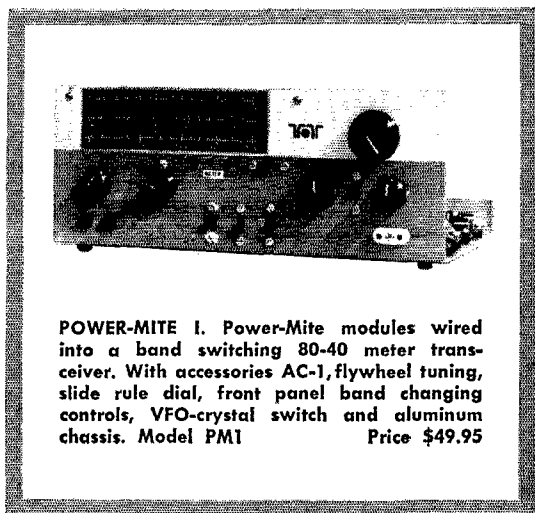
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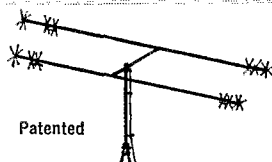
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# VHF COMMUNICATIONS

TOPSFIELD, MASSACHUSETTS 01983

W6JUK has a kw. on 2 meters. WA6HCJ is heard on 75 s.s.b. W6IWC is on 75 s.s.b. W6UBK is putting up a tower for a beam on 10-15-20 meters. W6FUA is on s.s.b. with a Swan 350. WB6MCG is on 2 meters. WB6DPP is a new ham in Fresno. WN6CVU is a new Novice in Fresno. WN6CVW is a new ham in Fresno. WB6YNH has a 2-meter beam and is working out very well. W6YEP has a self supporting tower, tilt-up type. W6YEP is the new president of the Fresno Amateur Radio Club. K6KDM is on 2-meter RTTY. W6IRV has a quad on 20 meters. If you want code practice, W6ZRJ runs c.w. on Tue., Wed. and Thurs. at 7:30 p.m. on 3590 and 7129 kc. W6IPC and K6OER are active in Navy MARS. Traffic: K6KOL 92, WA6-SCE 62, W6IPC 51.

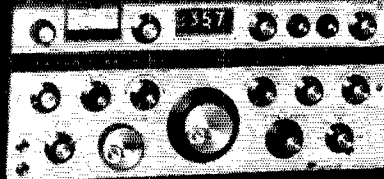
**SANTA CLARA VALLEY**—SCM, Albert F. Gactano, W6VZT—SEC: W6VZE, RM: WA6FLA, WB6ZSE completed her SB-101 and it passed the smoke test. W6BPT, along with CN, has been busy getting started on the MARS nets. K6DYX is continuing his high level of technical competence in ham radio by building a transistorized slow-scan TV monitor using magnetic deflection on a long persistence eleven-inch picture tube. W6YBV has had to mail some traffic to the Los Vegas area because of no net check in from that area. Come on, you seven, let's get on the nets. W6RFF has just renewed his ORS appointment for the thirtieth year. W6TFT has received his QSL card from the USS *Princeton*, which he worked while at the Apollo 8 splash-down. There were several good traffic get-togethers at the Pacific Division Convention at Sacramento in June. It appears that all who attended had a good time. W6OH has been limited to 40 and 80 meters until he gets his quad for 20, 15 and 10 up. In general, the traffic count gets pretty low in the summer months. This probably is caused by a lack of greeting type holidays and because a lot of people are on vacation. This does present some drudgery on NTS, but stick with it, fellows, because things will pick up again. One thing that may help is that if the club members would tell their friends and neighbors that hams will send messages, we might be able to pick up the traffic count during these dull periods. This trick also will give some much-needed amateur radio "good publicity." Traffic: W6RSY 372, W6YBV 325, WA6LFA 154, W6DEF 109, K6DYX 23, W6AUC 28, W6VZT 26, W6OH 12, W6RFF 8, W6BPT 2.

## ROANOKE DIVISION

**NORTH CAROLINA**—SCM, Calvin M. Dempsey, WA4UQC—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE, RM: W4IRE. PAM: W4AJT, V.H.F. PAM: W4HJZ, K4CIA got his DXCC 220 endorsement. K4EO finished his 1500 county list. The Camp Lejeune Club had 4 transmitters on the air Field Day. Two operators, WB4ICF and WB4WKY, are AREC members. The Greensboro Radio Club operated W4GG/4 Field Day at Boone, N.C. The Yadkin Valley Radio Club operated Field Day from Albemarle, N.C.

**signal/one**

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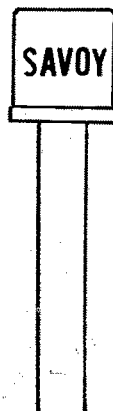
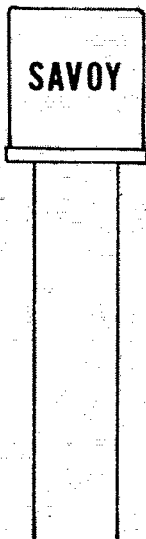


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NCN (L)	3573	0300Z	Daily	44	WA4CFN
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NCN (L)	3573	0300Z	Daily	56	WA4CFN

Traffic: K4VBG 130, WA4GMC 58, WA4VNV 43, K4EO 40, WB4HGT 39, WA9JX/4 38, W4FDV 28, WB4GHK 26, WA4UQC 18, K5TGA/4 17, WA4AKX 12, W4VTR 8, WB4HHI 5, K4YCL 5.

**SOUTH CAROLINA**—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ. PAM: W4VFO. RM: K4BSS/4.  
SCPn 3930 kc. 0830 and 1530 EDST Sun., 12 Noon Daily  
SCN 3795 kc. 2245Z and 0200Z Daily June Tfc. 38  
SCSSBN 3915 kc. 2300Z Daily June Tfc. 78  
W4NTO reports WN4MCI is busy building a mountain cabin instead of cramming for the General Class exam. WB4LAM is on vacation in Arkansas. WN4NJH is a new Novice in Anderson. He's operating 80 and 40 with a homebrew rig. WB4AMR, WA4YAV and W4FVV put on a demonstration of the use of c.w. for a group of local Boy Scouts. The Anderson Club plans to start an amateur radio course in the near future. W4ISS, in Augusta, reports WA4MWC, in Pelzer, is booming into the Augusta area with an SB-500 on 2 meters. Hope some of you Sandlappers are planning to help me represent S.C. at the Roanoke Division Convention in Huntington, W.Va., in Oct. The Georgia State ARRL Convention will be held in Augusta, Ga., on Sept. 13 and 14. Hope to see some of you there. WN4N2K is a new Novice in North Augusta. Traffic: K4BSS 222, W4NTO 36, K4OCU 13, W4FVV 9, W4JA 1.

**VIRGINIA**—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: K4MLC, WA4EUL, W4YZC and WB4AMT received Advanced Class licenses, WN4JZV passed the General. WB4JTT received a CP-15 certificate. WB4FJK is a new ORN. Often the least noticed volunteer in any section is the OO. He does a usually thankless job but one that is most important to the fraternity. Hats off to these unsung heroes in all sections and especially to our own most active and expert WB4GTS and W4HU. Members are reminded of the substantial additional operator class band reservations which will be effective this November. While there is talk about a possible extension of the effective date, at this writing the band restrictions are officially effective in November. Any definite change will be announced. Traffic: (June) WB4DOY 167, WB4FJK 161, W4SQQ 145, K4KNP 136, W4ZM 130, WB4FDT 125, WB4CVY 123, WA4EUL 77, WB4DRB 75, W4RHA 59, WA4JF 48, W4THV 43, W4OKN 37, W4TE 36, W4ZYT 27, W4KFC 22, K4TSJ 22, WA4MJE 20, K4LMB 19, K4JM 18, WA4PBG 18, W4SHJ 18, WA4NJG 17, K4GR 12, WA4WQG 11, K4KDJ 9, W4GEQ 5, W4JUJ 5, K4LEF 5, W4MK 5, W4KX 4, K6ZQB/4 3, WB4GTS 2. (May) WB4FLT 6, WA4WQG 6.

**WEST VIRGINIA**—SCM, Donald B. Morris, W8JM—SEC: W8EV. RAs: K8TPF, K8MYU. PAMs: K8CHW, W8IYD. Net Mgrs. C.W., WB8BBG, phone, WB8AQE.

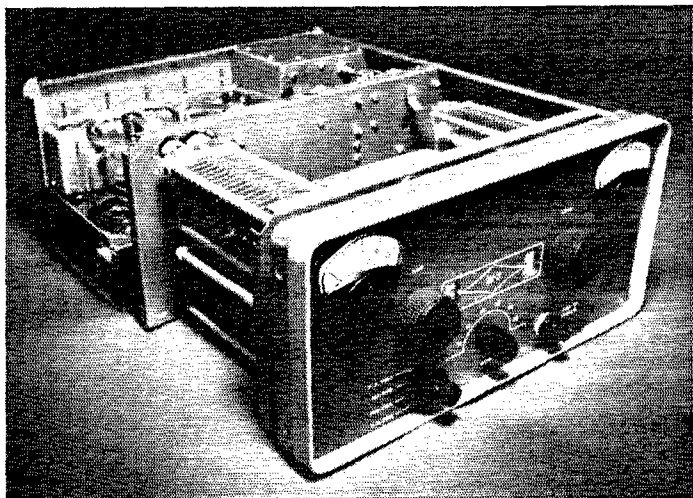
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WA8CRW was chosen as West Virginia's outstanding Amateur for 1969. The Kanawha Radio Club received the Field Day trophy for finishing first in the '68 FD. Division Director W4KFC, Vice-Director W4ACY and WIICP, representing Hq., were featured speakers at the State Convention. I regret to report the passing of K8RXZ and W8EG. W8YCC received his Advanced Class license in time for the '69 FD. WN8CBJ is a new Novice. The MARR has a new club site with trailer and beam antennas, and operated FD using W8SP. The Buckannon ARC, operating W8WVA at the State Convention, were swamped with calls. Remember the Roanoke Division Convention, Huntington, Oct. 11 and 12. W8SHSZ and W8DUV are co-chairmen. It's good to hear W8FMU and W8KWL active again. W8APOS, W8AFB and W8JM report receiving Amateur Extra Class licenses. The WVN C.W. Net reports 47 sessions, 228 stations, 132 messages, the WVN Phone Net 30 sessions, 511 station, 61 messages. Traffic: K8MYV 135, W8SQO 132, WB8BBG 54, WA8RQB 51, WA8NDY 37, W8CKX 24, WA8YHH 21, W8JMN 19, WA8WCK 12, W8DUV 10, WA8TQD 7, WA8NHI 3, WA8AGD 2, W8QEC 2, W8YOF 2, K8ZPQ 2, K8CFT 1, W8FNU 1, WA8FLIV 1, WA8LFZ 1, K8MSP 1, K8MYU 1, K8QEW 1, WA8TOL 1, WA8WIX 1, WA8YSB 1.

### ROCKY MOUNTAIN DIVISION

**COLORADO**—SCM, Charles M. Cotterell, W0SIN—Asst. SCM: Neal Morris, K0TIV, SEC: WA0HLO. RM: W0LRN. PAM: W0CXW. V.H.F. PAM: WA0LIK. K0MNNQ is vacationing with a new mobile. The 2-meter repeater and controls at Squaw Mtn. are now working OK, 146.34 in, 146.94 out, tone controlled by the 450-Mc. link 444.45 and 449.45; 52/525 is also back on the air. The Boulder Amateur Radio Club will hold its annual auction at the National Guard Armory, 4750 N. Broadway, Boulder, Colo. Sept. 21, noon to 6:00 P.M. Further information from John Shafer, K0GZG, 303-443-5073. W0LRW, now a Class I OO, has a new 2-meter rig. OO K0HWB reports 24 cooperative mailings in June. WA0HLQ's report shows 313 AREC members. Districts 4,5,6,7,9,17 and 19 do not have an EC. We need volunteers. Field Day messages were received from W0LRN, Arapahoe RC, 11 AREC ops; WA0SKHP 1 AREC; W0OUI, Denver RC, 6 AREC ops.; W0RTI, Empire RC, 3 ops.; WA0VTV, PPRAA, Colo., Spgs., 20 AREC ops.; WA0PHZ, Hamsters, 11 AREC ops.; WA0NDZ, at Wetmore, Co. O AREC ops. W0FA received the PICON Award for '68. W0GCH, our EC for El Paso and Teller Counties (Dist. 14) may be leaving us for Arizona. We'll miss him. Total traffic reported: 694. The Hi-Noon Net had a QNI of 834 and QTC of 95; Columbine had a QNT of 1077 and QTC of 120. Traffic: (June) K0MNNQ 263, K0JSP 232, W0WYX 104, W0SIN 24, W0YCD 24, W0LEK 14, W0LRW 6, W4MXU 6, WPMYB 6, WA0PGM 6, W0KQK 4, WA0QFY 4, W0LCE 1. (May) W0KAU 50.

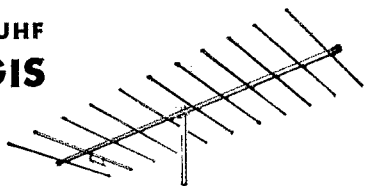
**NEW MEXICO**—SCM, James R. Prine, W5NUI—Mobile station W5NTG has been providing essential communications during the summer from the 4-H Camp, located in Scott Able Canyon of the Lincoln National Forest. This remote camp has no regular telephone or mail service. EC W5PNY has moved to a new QTH in Los Alamos, and is now back on the v.h.f. and h.f. bands. It is requested that all current RACES members send a postal card to New Mexico State Radio Officer Jack Wilson, W5LNG, P.O. Box 1102, Espanola, N.M. 87532, in order to update state files. K5GYB of Carlsbad, N.M., passed away July 3, 1969 after a long illness. Traffic: W5NUI 50, W5DMG 47, W5NON 47, W5A5UJY 40, W5AJNC 18, W5ABLI 12, W5AMLY 4.

**UTAH**—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. Field Day seems to be the topic of conversation with several groups in the state scoring very well. Early reports indicate the following number of contacts: W7UP (operated by W7ICG) about 900 contacts, W7EU (Utah Amateur Radio Club) 1160 contacts and W7HS (Utah DX Association) 1650 contacts (a national record for the one-transmitter class, maybe?). At this time no report of score has been received from the Cedar City group. Z85PG has earned the first Utah DX Association certificate for working ten stations in Utah. W7WKF is the proud owner of a new Drake R-4 and T4X and BTI linear amplifier. Please send your monthly reports to the SCM. Report forms are available on request. Traffic: K7HLR 110, W7EM 66, W7OCX 52.

**WYOMING**—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ, W7FHA. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily

# Cush Craft

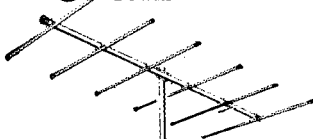
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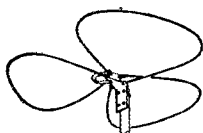
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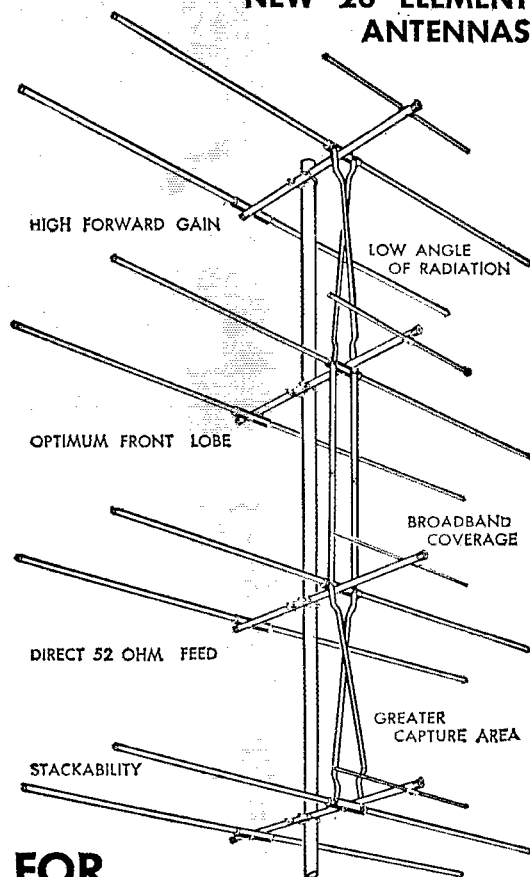
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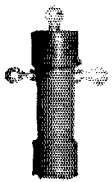
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at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Vx Net, Mon. through Sat. at 0630 on 3920; PO Net, 1900 Mon. through Fri. on 3950. WA7-CGK has joined the ranks of the happily married. K7BMS has completed a code and theory class in Jackson and the following new calls are on the air: WN7-MFG, WN7MGE, WN7MCL, WN7MCM, WN7MIU, K6NI and WA7EHB are spending the summer in Jackson and doing a lot of operating. Those who didn't attend the hamfest missed a very nice time. The Salt Lake City Convention was a great success and there K7NQQ was made the recipient of the 1968 PICON Award. It was quite a surprise to Glen but he is very deserving of it. Traffic: W7SDA 79, W7TZK 55, K7-VWA 33, K7TAQ 24, K7QJW 20, WA7BDI 19, K7AHO 12, K7WRS 9, W7NKR 8.

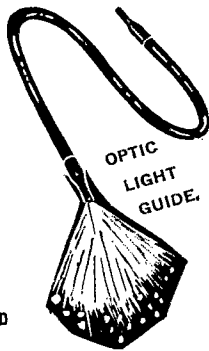
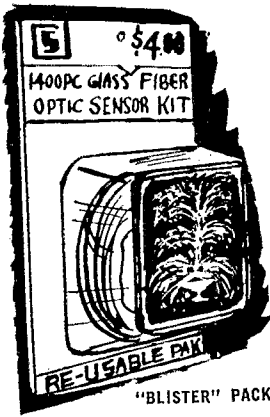
### SOUTHEASTERN DIVISION

**ALABAMA**—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. RM: W4HFU. PAM: W4EEC. The traffic from the AEN system seems to be holding up well in spite of the vacation period, although a smaller number of people are getting a little more than their share. A big thanks to all who participated in the ED exercise this year. Let's all wait for official results. Winner predictions are difficult so results may be surprising. W4HFU is a new RM and NM for AENB. Thanks to K4BSK for a fine job the past few years. WN4NJV is a new Novice in Marion, WB4LAL has his General now. New NCSS for AENM are WA4GNK, K4UFR, W4VBZ, W4DGH and W4HDO. We came in third in the SET this year and didn't have a picture in QST. Let's do something about that next year. Traffic: K4BSK 103, K4AOZ 84, W4EXB 68, W4FVY 58, WB4EKJ 55, W4HFJ 51, WN4MIN 35, WB4JMH 31, WN4KDI 25, W4WLJ 21, WN4KSL 15, W4DGH 9, WB4LAL 9, K4KJD 7, K4AEB 6, K4UMD 6, WA4-JSM 5, WB4LAO 5, WB4KSM 2.

**CANAL ZONE**—SCM, Russell E. Oberholtzer, KZ5-OB—A recent visitor to KZ5-Land was K3WVF/MXL. He was just in time to attend a farewell dinner for KZ5JL. JL was act. mgr. for the CARC and did a fine job, especially with the code and theory classes. JZ, Jerry, JC & PE drove up the Inter-American Highway to the states. Congratulations and best wishes go to KZ5BR and his new XYL. KZ5LM is off for a short trip to the states because of his XYL's illness. KZ5AD and family took their stateside leave, also. KZ5WR, the CARC pres., is off to KL7-Land after doing a good job as prexy. KZ5OA went to Miami for the annual convention of the IMRA. Looks like the e.d. rig in Balboa Hts. might be getting on the air soon; at least the antenna is on the building now.

**EASTERN FLORIDA**—Acting SCM, Ronald J. Locke, W4YPX—SEC: W4YVT. Asst. SEC: W4SMK. RAIs: K4EHY (C.W.), W4RWM. RTTY PAM 75: W4OGX. PAM 40: W4SDR. PAM VHF: W4BMC. Official Bulletin reports were received from WA4EYU and K4LPS. As always there was a great Field Day turnout from the Eastern Florida clubs and groups. Almost all of these are trying for national honors. It's refreshing to see some of the older clubs who have scored high in the past get back on the bandwagon and give the younger groups a real race. W8BZY/4 sent in the only OO sheet. Get with it, you other OOs, lots of stations would like to know their signals aren't up to snuff. K4LEX is enjoying the luxury of a quad up 50 feet and says it sure beats dipoles! Ex-SCM W4DVO offers to help the Acting SCM. Help! State amateur magazine *Florida Skip* walked off with almost all the honors in the publication contest. Don't see how Editor W4YVT (also E. Fla. SEC) keeps it up. FMTN moved to 7255 kc as of July 1; the Gator Net to 7115 kc. Ex-SCM W4MVB will soon move to Norfolk. New Hillsborough EC W4BNE suggests on-air meetings of ECs. It's been a long time since LO meetings. There have been lots of Advanced and Extra Class licensees in the past couple of months as well as new calls. SE Director K4KQ says the new call has more DX appeal than W4YV. Bet you can work 300 on that one, too, Chuck. The Brandon ARS Camporee was a great success. This might be good idea for sagging clubs. All evening traffic nets are experiencing the same QRM—attendance waning because of the fact some low-power NCSS can't beat the static. Traffic: (June) WA4SCK 561, WB4ATW 181, WB4HJW 149, K4EHY 128, WB4IER 103, K4DAX 99, W4SDR 95, W4EHW 90, W4FPC 88, K4LEC 87, WA4JH 78, WB4GHP 74, WA4KB 72, WA4FGH 72, WB4EPD 67, W8BZY/4 66, W4YPX 62, W4ZAK 58, WA4HED 50, K4JEX 47, W4LK 40, W4SMK 40, WA4CIQ 37, K4LPS 36, W4OGX 33, WA4NBE 29, WA4HDH 27, W4DVO 23, WB4HNL 23, W4NGR 20, W4YVT 19, WA4EYU 10, W4TJM 10.

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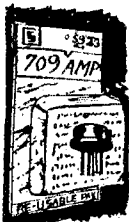
No.	Description	3 for \$15
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200	<input type="checkbox"/> .91	<input type="checkbox"/> 1.10	<input type="checkbox"/> 1.25
400	<input type="checkbox"/> 1.50	<input type="checkbox"/> 1.75	<input type="checkbox"/> 1.95
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100	<input type="checkbox"/> .07	<input type="checkbox"/> .07	<input type="checkbox"/> .19
200	<input type="checkbox"/> .09	<input type="checkbox"/> .09	<input type="checkbox"/> .22
400	<input type="checkbox"/> .12	<input type="checkbox"/> .12	<input type="checkbox"/> .31
600	<input type="checkbox"/> .16	<input type="checkbox"/> .16	<input type="checkbox"/> .43
800	<input type="checkbox"/> .21	<input type="checkbox"/> .21	<input type="checkbox"/> .49
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<input type="checkbox"/> 2N3568	5 for \$1
<input type="checkbox"/> 2N3638	5 for \$1
<input type="checkbox"/> 2N3641-3	5 for \$1
<input type="checkbox"/> 2N3645	5 for \$1
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**GEORGIA**—SCM, Howard L. Schonher, W4RZL—SEC: WA4VQU, RM: W4FDN, PAMS: K4HQI, W4YDN, K4HQI is suffering growing pains. As the station grows so do the failures. General Doyle Hurley (Confederate Signal Corps) reports 14 operators with 7 stations total operating Field Day from Tyrone, Ga. How about some information on the CSC 2-Meter Net? W4ISS reports hearing W8NUB and worked W4CKB (Central Fla.) on 2. He has a 5722 noise generator W4VHH (S.C.) is active on 144 and 432 Mc. K4SZB (Albany) skeds W4HYO (Doraville). The Georgia Single sideband Net held 30 sessions, with 749 check-ins and 168 formal messages. In addition many informals and patches were routed. The Georgia State Net, with 60 sessions, accounted for 193 messages with 301 check-ins. W4LYG is on vacation in the northwest. W4LRR worked W4MWF (Montgomery, Ala.) and heard W4-ESG (Columbia, Ala.) starting the V.H.F. Contest. WB6UTC/4 is now WB4NQA. K4TXK reports reliable 2-meter copy over a 300-mile range with traffic on the upswing. WA4UQQ has a new Advanced Class ticket. WA4VWV is getting a chance to meet some of the gang while traveling for the boss. I enjoyed my visit to the deluxe Field Day site of the Augusta Radio Club. Traffic: (June) WB4NQA 254, W4TYE 151, WA4RAV 100, W4FDN 70, WA4UQQ 48, WA4VWV 31, WA4GXZ 22, WB4HLX 22, W4UVP 21, W4DDY 5, W4RZL 4, (May) K4TXK 105.

**WESTERN FLORIDA**—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB, PAM—V.H.F.: K4NMZ, RM: K4UBR, RM-RTTY: W4WEB, Nets:

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957 ke.	2200Z	Daily	30	540	75
QFN	3651 ke.	2230/0200Z	Daily	60	323	265

Newly-licensed hams include WB4NEU, WB4NJW and WN4NRM, of Fort Walton Beach, and WB4NBM, WN4NBO and WB4NEQ, of Panama City. Clubs at Pensacola, NAS Corry Field, Eglin AFB and Panama City were out for Field Day, using the calls W4UC, WA4ECY, W4NN and W4JJ. The P.C. club had top claimed score with 1900 QSOs! Pensacola: VE3FRE/W4 was transferred by the Navy. Fort Walton: The Eglin ARS, formerly W4SRX, was assigned the memorial call W4NN, originally held by Ray Atkinson, a former member. W4CFQ, W4SGG and K4KHV all suffered lightning damage. The NW Fla. F.M. Assn., as a club project, built a portable fm. repeater and demonstrated it at the Mobile, Ala., Hamfest. It included a scale model of the area built by W4ZGS, Panama City: K4VFX renewed his ORS and QPS appointments; Chipley: WA4SRR was appointed County Civil Defense Director, with W4IKB Deputy Director and W4LXK RACES RO. Traffic: (June) WA4ECY 573, K4VFX 245, WB4DVM 29, W4RKH 18, K4DOT 3, (May) WB4DVM 69, WB4EQU 7.

### SOUTHWESTERN DIVISION

**ARIZONA**—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ, RM: K7NHL, PAM: W7UXZ. Many enjoyed operating Field Day this year. Some of the calls, locations, approximate numbers of contacts and numbers of transmitters operating were: WA7APE/7, Star Valley, 650, 2; W7CFJ/7, Near Tucson, 1364, 1; W7GV/7, Tucson, 1600, 3; W7I0/7, Mings Mtn., 1500, 4; W7KB/7, Woods Canyon Lake, 1300, 3. The Coronado Trail Club helped put out a forest fire near Grey's Peak on Field Day weekend. The Worked All Arizona Award is available from your SCM upon submission of log information for a contact in each of the fourteen counties. Required data are call letters, date and time of contact, frequency and location of each station worked. Contacts with mobile stations are not acceptable. Also, any amateur interested in ARRL appointments should contact his SCM. W7EPB handled some urgent traffic through WCARS for a family in Phoenix and Pasadena. K7VAG and WA7AOH are now Extra

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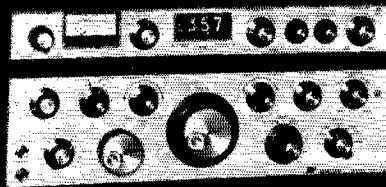
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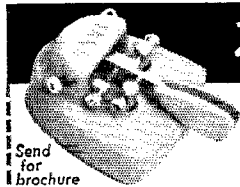
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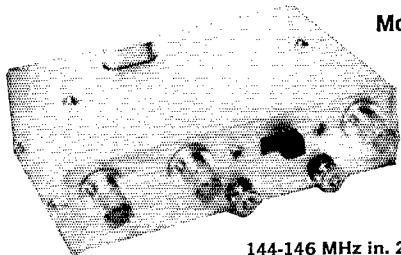
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Class ticket holders. WA7GKL is vacationing in Europe. W5HVV/7 has completed his tour in Thailand and is returning home by way of Europe. The Copperstate Net handled 126 QTCs in June. Traffic: (June) W7GEP 207, K7NHJ, 137, W7LLO 37, W7FEG 31, W7SBZ 22, W7UXZ 22, WA7GAE 18, W7OUE 18, W7AMM 6, W7JMQ 6, W7WGW 6, W7CAF 6. (May) WA7ISP 35.

**LOS ANGELES**—SCM, Harvey D.D. Hetland, WA6KZI—Asst. SCM: Don Etheridge, K6UMV, RM: W6MN. New section appointees include WB6ZVC (ORS), W6JET (OBS) and WB6PKA (ORS). New LACARO secy. is W6TCH; new ATM. Inter-Rocketdyne secy. is K6SQP; and new W6IN Society officers are WA6AYM (pres.), WB6LLI (vice-pres.) and WB6NST (secy.-treas.). W6AM worked the Navassa DXpedition on five bands c.w. and s.s.b. K6AWO's jr. operator is on the air as WN6FFU. WN6BJP is reworking his 6V6 rig for use on 3.5 Mc. Council of Radio Club delegates, please note the Nov. meeting will be on the 13th rather than the third Thurs. as normal. WB6TAY is planning on future mobile operating and WB6QWC mobilized while on vacation. Fellow Crescenta RC members claim W6INH is generating many new pigeon roosts with a new antenna. WB6MPM is specializing those new NNN/PPP, transistors much to the pleasure of fellow club members. W6JET is building a monitor scope following an old fashion antenna raising party for the new 7-Mc. antenna. WB6PKA is the new SCN2-mgr. WB6WDS reports the station is back in full swing. The following amateurs helped in the San Fernando Fiesta Day Parade and/or the San Fernando Police Reserve Communications for the July 4th fireworks display: K6ALL, WA6AYM, WB6IDZ, W6IH, WA6LLI, W6JEX, WA6KZI, W6MN, WB6NST, WB6OQB, WB6ROY, WB6RSP, K6SQJ, W6TCH, W6TXJ, WA6ULA, W6UKS, K6UMV, WB6UZS, WA6VAI, WA6VEP, W6VI, WB6ZLP, WA6ZNP and K6ZTX. Communications were coordinated by the W6IN Society and participating amateurs represented L.A. City RACES, L.A. County RACES, the Metro Net, Santa Clarita ARC, So. Cal. V.H.F. Club as well as members of the W6IN Society. The W6IN Society welcomes the opportunity to work with or to assist other groups with such public service communications. In fact they would like to establish a calendar of such events in our area. Contact K6UMV or WA6KZI. KC W6TXJ would like to hear from amateurs in the L.A. area interested in starting a two-meter f.m. net for the AR EC. The Monterey Park ARC Picnic will be held Sept. 21. Contact W6IDF. The Long Beach Club will ask for the 1971 Division Convention rather than 1970 because of delays in the conversion of the *Queen Mary*. This year's convention will be held in San Diego Oct. 17-19. The San Gabriel Valley RC auction will be held Oct. 7. June traffic net reports:

Net	Freq.	Time	Traffic	Check-ins
Metro-Net	50.4 Mc.	8:00 p.m.	405	310

Traffic: WA6LWE 524, WB6ZVC 294, WB6OUD 198, WB6BRO 122, WB6PKA 98, K6CDW 29, W6BHG 23, W6DQX 24, W6FD 21, WB6KKG 10, W6HUJ 9, W6INH 9, W6IVC 8, K6CI 7, WA6KZI 7, WA6EGV 4, WB6GGL 4, W6DGH 3, W6TN 3, W6AM 2, WB6WDS 2.

**ORANGE**—SCM, Roy R. Maxson, W6DEY—OBS W6WRJ got the 5-band SR-150 mobile installed for check-in to the Calif. WX Net and to monitor WCARS. WB6ZEC has a new JT-30 microphone for a.m. and plans to rebuild the station. OPS W6BUE has joined the OOTC, also attended the Mission Trail Roundup in Santa Maria and saw many old friends. ORS K6OT is trying to find the source of high line noise. ORS WA6ROF advises that the OCARC FD went quite well, as the site was tremendous although the number of participants was low. ORS W6ELW/6 says he had a good time FD but never did work Michigan. The Corona gang operated FD from Norco, Calif., with 15 operators per WOYJ and relayed by W6JB/6. I am resigning as SCM because we are moving out of the Orange section. The new shack will be located in Vista, Calif., which is in the San Diego section. The assistance and reports from all have been appreciated and it is hoped you will continue the same wonderful help to your new-elected SCM. After retirement I hope to work you all on the air as more operating time is expected in the near future. Traffic: (June) WA6ROF 231, W6ELW/6 71, W6WRJ 28, K6OT 8, WB6ZEC 3. (May) WB6ZEC 29.

**SAN DIEGO**—SCM, Richard E. Luffer, WA6COE—SEC: WA6KHN. Club news includes two summer picnics, one by the ARC of El Cajon and the other held

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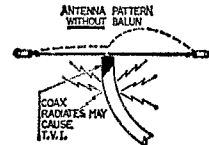
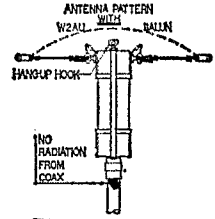
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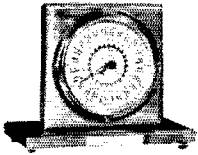
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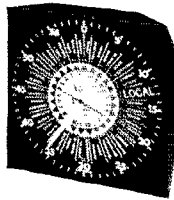
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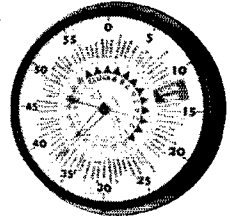


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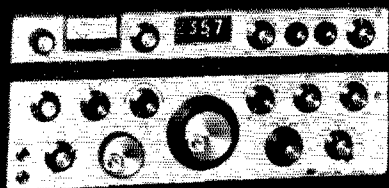
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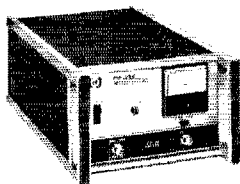
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by the Palomar ARC. WA6BDW was appointed treas. of the SDCARC. The SPARCS and the Baja, Calif., ARC are the newest members of the SDCARC. Are there other clubs wishing to affiliate with the County Council? Contact W6N8R to get started. Those interested in v.h.f. work should contact WA6ZXJ of the S.D. V.H.F. Club. W6INI is working on a membership drive for the North Shores ARC, while W6GQC would like to start a club in the Pt. Loma area. Have you purchased your S.D. County Ham Directory that the Palomar Club printed? Section news: Needed now are operators for the SCN-C.W. Traffic Net, which meets at 0200 on 3600. Contact W6LRU. We are sorry to note the passing of K6JN, an active member of the Palomar ARC. WB6IMN was appointed OPS and OO (III). K6SD originated 166 at the American Legion Convention. Congratulations to K6ROR, being awarded the S.D. City Ham-of-the-Year Award. The 2-Meter ARPSC Net supplied communications for the U.S. Masters Marathon (26 mi.) in July. Thanks to WA6TJK, WA6SPL, WA6JCG, K6VHK, W8CJD/6, WA6MIHU/6, WB6QFD and WB6VWW. W6LRU is back from summer in the Sierras and W6BGF returns from the Western Pacific area. W6LRU passed the Extra Class exam. Support The Southwestern Division ARRL Convention in Oct. Traffic: (June) K6BPI 10446, W6VYNQ 391, W6BGF 341, WA6COE 297, W6LRU 65, WB6UNB 40, K6HAV 23. (May) W6EOT 309, W6LRU 146. (Dec.) W6EOT 739. (Nov.) WB6ZDJ 167.

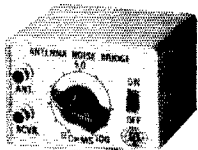
**SANTA BARBARA**—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV, RM: W6UJ, WA6WVC has just finished one of the better antenna installations in Thousand Oaks and is now building a 4-1000A line to feed the antenna. Otherwise the WA6WVC station is all Heathkit. WA6JBE is on vacation in Boston, Mass. W6JTA was responsible for the fine Field Day activities of the Estero ARC. WA6MLL of the Camarillo Mike and Key ARC, received his Extra Class license. W6IDU is the new pres. of the Camarillo ARC and those in the area who are interested should contact him. W6YK continues to be the moonbounce expert in the section. New officers of the Estero ARC are WB6FOG, pres.; WB6NBH, vice-pres.; WB6VKN, sec.-treas. WA6DEI has had to reduce his net check-ins because of a tight schedule. The Oxnard area has three new Heath HW-100s on the air using the calls W6HW, K6YTD and K6EHK. The Channel Cities (Oxnard/Ventura) Two-Meter Net operates Mon. through Fri. at 1830 on 145.8 Mc, with check-ins from L.A. to Santa Barbara. The Ventura ARC can be reached by writing to P.O. Box 2092, Oxnard, Ca. The Simi Valley ARC can be contacted by writing to Box 266, Simi, Ca. 93065. WB6DWM is the pres. of the Simi ARC. Traffic: WA6DEI 90, WA6OKN 4, W6UJ 2.

## WEST GULF DIVISION

**NORTHERN TEXAS**—SCM, L. E. Harrison, W5LR —Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM, PAM: W5BOO. Our top traffic-handler, K5BNI, was almost off the air but thanks to WA5UDL she made her plus-2000 total. Bobby loaned Bea his TX4B and R4B. FD in No. Tex. worked satisfactory. Some 10 stations qualified for the extra 200 points. We could hear most everyone in No. Tex. FD brings ham radio before the public and publicity derived therefrom in no way hurts amateur radio. Your SEC wishes to congratulate K5IOF, Lamb County EC, and WA5PED for the nice work planned and accomplished during a recent hail storm emergency in West Texas. Good work, Joyce and Bob, this is what presents amateur radio in the proper light. Our thanks to WA5JUC, WA5WIX, W5NFO, WA5FRJ, WA5VHC, W5NXA, W5NJY, W5CWL, K5KNY, K5MBS, K5IQN and WA5LWT. Our SEC and other League officials may attend the upcoming RACES meeting in Austin Aug. 2. W5IZU is very interested in PC work but finds the clock has only 24 hours. SEC reports an increase in AREC membership from 44 to 72. This represents excellent increase in percentage. Good work, Bill, WA5KHE reports amateur activity is at a low ebb. However, we note with pleasure that NETEX traffic, QNI, etc., increased to 1062 check-ins for a 3-month period. WA5PPF has a new Swan 260. WA5KIV made the BPL 3 months in a row. K5BNI ran plus-2600 this month. The question comes up nowadays, should a repeater be on a.m. or f.m. What you guys think anyway? W5MNX is interested in nets. WA5OJW, our No. 1 v.h.f. reporting station, is having problems with gear, new addition, etc. W5PBN, ex-Navy OO, is back from vacation looking for intruders and qualified for Class II. W5QXN turned in a nice report. Did you ever hear of WESTCARS and EASTCARS? Sounds interesting. Traffic: K5BNI 2650, WA5PPF 1063, WA5KIV 155, W5JSM 106, W5RHF 95, W5QZG 78, W5LR 47, WA5QWA 10, W5PBN 2.

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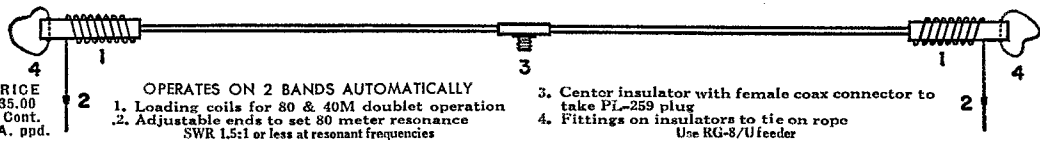


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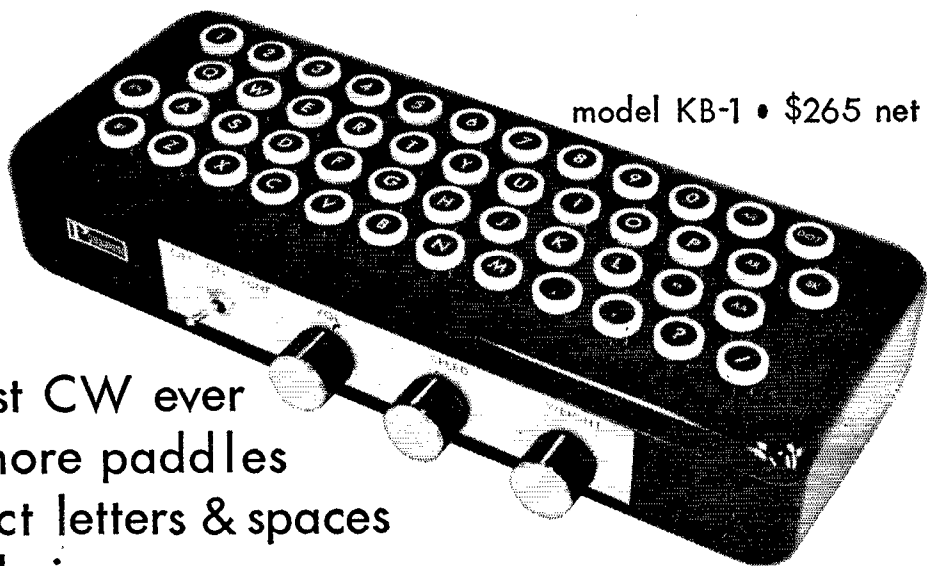
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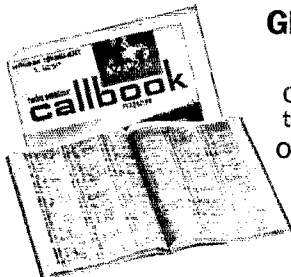
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**OKLAHOMA**—SCM, Cecil C. Cash, W5PML—Asst. SCM: W. L. (Smoky) Stover, K5OOV. SEC: WA5FSN. RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU and K5ZCJ. It seems we are in a slump in net and traffic but I guess this is normal for the summer, with vacations and summertime for out-door sports such as water skiing, fishing, camping out, etc. W5FW just got back from the great Smokies in time for Field Day. W5FWX missed Field Day while on the West Coast. Yours truly's vacation will be late this year and I will just be getting back from the East Coast about the time this issue is delivered. We did, however, have a great turnout for Field Day throughout the section! The Director of the West Gulf Division, your SCM and SEC are planning a trip together in the near future to several clubs in the north and northeast part of the section. It will not be new scenery for WA5FSN, our SEC, as he visited Field Day sites in most of that same area. W5OXX is making a big noise around the area now with a Galaxy Duo-Bander mobile. Net reports:

OPEN	3915 kc.	1300Z Sun.	5 sessions	159 QNI	3 QTC
OPON	3920 kc.	2300Z M-F	21 sessions	323 QNI	436 QTC
STN	3855 kc.	2230Z M-Sat.	25 sessions	658 QNI	167 QTC
OLZ	3682.5 kc.	0001Z Tue.-Sun.	15 sessions	17 QNI	31 QTC
BSZ	3682.5 kc.	0245Z Tue.-Sun.	18 sessions	20 QNI	44 QTC

Traffic: (June) K5TEY 3290, WA5IMO 153, WA5RRH 119, WA5KFT 88, W5QMJ 67, W5PML 46, W5MFX 31, WA5LWD 30, WA5LKS 27, K5SWL 23, W5FKL 22, K5OOV 19, WA5DZP 16, WA5QNF/5 12, WA5FSN 10, K5CBA 3, W5JJ 1. (May) W5QMJ 216.

**SOUTHERN TEXAS**—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Sorry I missed the last report fellows, but I had to be in Oklahoma and Kansas because of illnesses there. Congrats to the El Paso gang! Members of all clubs cooperated in the new El Paso Emergency Committee sponsored by the El Paso Lions of Radio Comms. K5-TML is listed as coordinator. The W5ES Bulletin lists new officers of the El Paso ARC as WA5MTI, pres.; K5UYH, vice-pres.; W5LWP, treas.; W5OVH, secy. Milly did a nice job on the latest W5ES Bulletin which says KINCH is going back East; WA5FCU is leaving for Camden, N.J.; W5BT is being transferred to North Carolina. EC W5KR also has an excellent bulletin, says W5RPZ, ex-W5EIMM. K2EUI/5 is back in San Antonio for a short time before going with TWA. From a bulletin by W5QJA: The South Texas Emergency Nets held a first-class convention in Austin, RM W5EZY has a new HW-100 and is now retired and taking it easy. EC W5TFW says W5IWA has a new beam and mast. June and the first week in July were hectic weeks here and was on the road with no mobile during Field Day. Had nice reports from San Antonio W5SC/5, Houston W5DPA/5, Point Comfort W5BQN/5, Houston YLs Gaylarks K5SKF/5, W5ND/5 Orange ARC, W5KA/5 Austin ARC and W5HYI/5 Caribide ARC. New STEN officers for 1969-1970 are W5WPC, NCS: K5UMH, ANCS: K5CRJ, pro.; W5KLV, secy.-treas. Traffic: (June) WA5FJN 305, K5EZR 197, W5TFW 138, W5QJA 107, W5BGE 102, W7WAH/5 57, W5EZY 51, WA5AUZ 46, K2EUI/5 26, WA5WFR 16, W5ABQ 10, WA5WFP 9, K5WYN 2. (May) WA5FJN 343, W5QJA 291, WA5MXY 173, WA5THM 150, W5BGE 89, W5TFW 72, W5CWE 68, WA5WFR 50, WA5TXI 47, W7WAH/5 47, K2EUI/5 38, W5ABQ 35, WA5AUZ 21, WA5KQE 22, K5WYN 10, W5KLV 1.

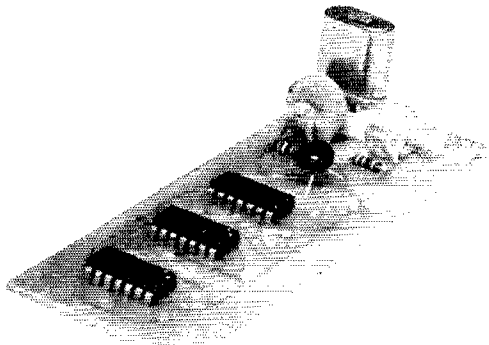
### CANADIAN DIVISION

**ALBERTA**—SCM/SEC, Don Sutherland, VE6FK—PAM: VE6ADS, ECs: VE6SS, VE6AFQ, VE6XC, VE6AWM, VE6IV/VE2/W2 recently visited League Hq. and found it very impressive. Hap reports that with all the work done the \$6.50 membership is a bargain. Congratulations to former SCMs, VE6MJ and VE6TG on their appointment as OO and OPS, respectively. Field Day was an event. The one week adjustment did not fool the wx, with heavy rain and cold as usual for PD in Alta. Believe the CARA and the Border Area Club caught the brunt of the storm. PD also proved we need an educational program in message preparation. It's all in QST and the booklet, *Operating an Amateur Radio Station*, VE6ADX, on Sulphur Mt., worked VE6AVV, of Nanton, through the Calgary 2-meter repeater, a distance of about 140 miles. VE6IF also worked Calgary through the Calgary repeater, a distance of 120 miles, and VE6NT, of Edmonton, culminated 2 years of work and triggered the Calgary repeater from a distance of 200 miles to work some of the Calgary gang. Looks like v.h.f. soon will be able to cover most of the province. The Central gang held a nice annual "do" at Westward Ho. Traffic: VE6FK 25,

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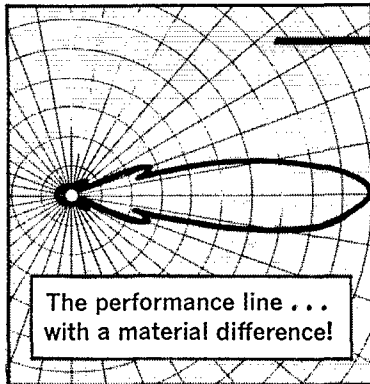


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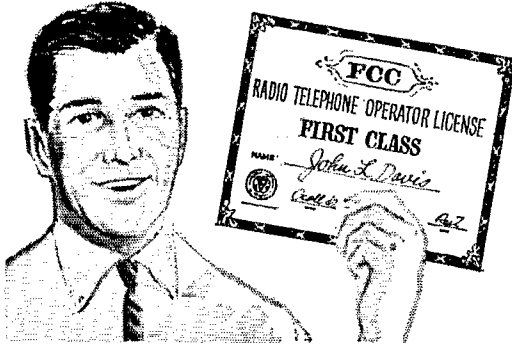
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VE6XC 5, VE6SS 4, VE6AER 3, VE6FS 3, VE6HF 2, VE6VF 1.

**BRITISH COLUMBIA**—SCM, H. E. Savage, VE7-FB—The Quarter Century Wireless Assn. held its Annual Meeting in Vancouver. Sat. night at the Conch House saw a large gathering of young and old from south of the border and north for the dance and smorgasborg. Sun, the business meeting was held aboard ship whilst the ladies were entertained above decks. We wish to give all thanks to VE7LL for producing such a fine week end. Thanks also must be extended to his committee of hard-working people. VE7-BRD has graduated from UBC as electrical engineer. FD reports are coming in. Despite a very wet week end with poor radio conditions the B.C. section turned out in full strength. VE7KY's latest hospital report shows he is holding his own. Nanaimo ARC officers are VE7-MG, pres.; VE7ABR secy. *Beaver Valley Clicks*, by the Beaver Valley ARC is a worthwhile paper. Each issue has real handy kinks and do-it-yourself ideas, plus news. The Richmond ARC held a successful display of operating amateur station at Richmond Trade Fair. Nice to hear that a homebrew transceiver was on display and working. Traffic: VE7II 6.

**MANITOBA**—SCM, John Thomas Stacey, VE4JT—Field Day activity was the order of the day at many sites. VE4EI, with an assist from VE4HI, was on from Dugald. The Winnipeg ARC, VE4BB, with an assist from VE4HJ, operated from St. Andrews. Flin Flon ARC, with VE4EO at the helm, put Big Island Lake on the map. Brandon ARC, VE4QD, with the help of VE4RW, operated from Alexander. VE4JK operated from Carman. The Winnipeg DX Club, under VE4SK, operated from Falcon Lake. All told, 62 operators took part. The Winnipeg F.M. Net is operating on 147.33 Mc. Wed. at 1930 and Sun. at 1100 local time. VE4IH is new from Winnipeg and is the father of VE4HI. The current issue of the *Manitoba Amateur* is a credit to ARLM. The boys are actively drumming up membership. If interested, drop a line to the secretary, VE4OL, at P.O. Box 475, Winnipeg. Traffic net reports: MTN, sessions 29, QNI 86, QTC 37. Phone Net sessions 30, QNI 476, QTC 25. Traffic: VE4QJ 40, VE4-FQ 35, VE4RO 33, VE4XN 13, VE4CR 8, VE4NE 4, VE4Q 14, VE4FO 3, VE4RB 2, VE4KT 1, VE4WT 1.

**MARITIME**—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. We were saddened to learn of the untimely passing of VE1AZ. Mac had a wide circle of friends in amateur radio. He was active on all bands through 2 meters and as a committee chairman contributed much to the success of the Atlantic Convention in 1967. Mac's XYL is VE1AMS and his father is VE3CBK. To the family our sincere sympathy. New SONRA executives are VO1FZ, pres.; VO1FX, vice-pres.; VO1JH, secy.; VO1CX, treas.; VO1s AF, HV and FW, executives. The new slate for the NBARA includes VE1QV, pres.; VE1NR, vice-pres.; VE1JG, secy.; VE1CW, treas. VE1ES expects to put some modulation on his carrier soon. APN reports QNI 219, QTC 47, sessions 58. Traffic: VE1AMR 60, VE1ACO 42, VE1RO 37, VE1AAX 3.

**ONTARIO**—SCM, Roy A. White, VE3BUX—SEC: VE3EWD. PAMs: VE3AKQ, VE3BLZ. RMs: VE3CI, VE3DPO. We have had several requests to resume listing all traffic totals. Glad to hear VE3GGU back after three weeks in the hospital. Your SCM is available for club meetings, but please give me as much notice as possible. The Ottawa Convention in June went off very well and congrats to those responsible. VE3AVI is sporting a new FTDX-400. VE3BHW is moving to an apartment so will be out of ham radio for a while. Some of our boys are using the term "maritime mobile" incorrectly. Better read up the regs, fellows! Your SCM put in 14 hours on c.w. and phone in the Field Day and had a ball. Many Ontario amateurs worked GB2HRH following the investiture of the Prince of Wales. If any of you are interested in ARRL field appointments, let me know. To those who already hold these posts, don't forget to send in your certificates for annual endorsement. Congrats to VE3-ERU who topped all Ontario in the April CD Party. A big hand to VE3s DGX, BUY, DHU and FRZ, of the Scarborough ARC, for their untiring efforts in giving instruction to budding hams. I hope it isn't true, but somebody told me VE3YC is selling all his Collins gear.

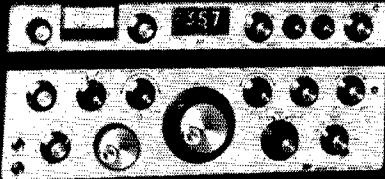
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(Continued on page 150)

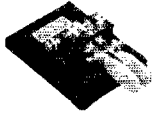


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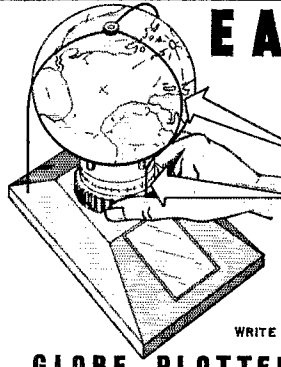


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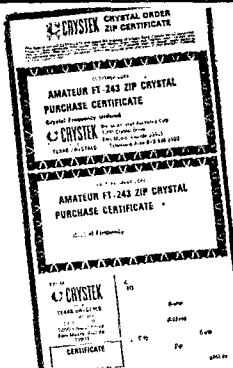


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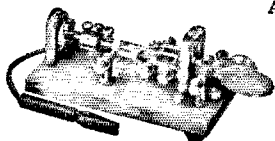
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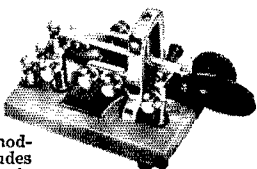
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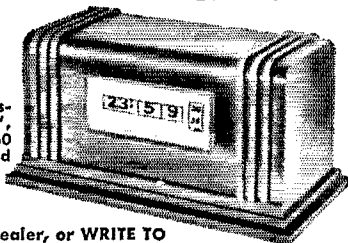
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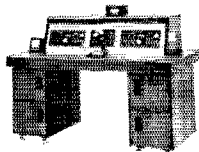
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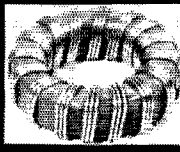
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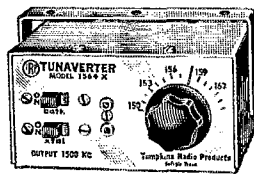
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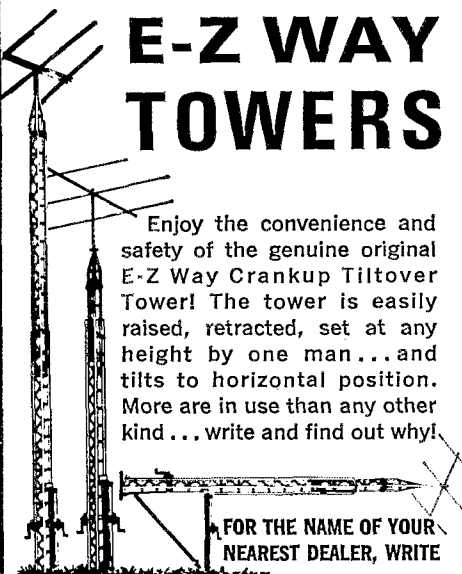
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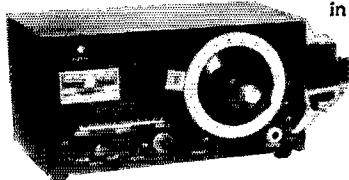
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**QUEBEC**—SCM, J. W. They, VE2OJ—VE2LJ is back after a spell in the hospital and will be active on s.s.b. with a brand-new rig. VE2JZ is on the air with a new s.s.b. rig. The new executives for VE2UN are YN1AMC, pres.; VE2BZK, vice-pres.; VE2DJI, treas.; VE2DKP, secy. VE2MW was VE2BOW. Points for originating Field Day messages to the SCM will go to VE2HG, VE2MD, VE2ARC and VE2CVR. The gang at Three Rivers keeps VE2CTR very busy. VE2BRD reports that the RTQ Net will be inactive for the summer months because of lack of traffic and a shortage of net control stations. A very well-attended convention in Ottawa brought out a lot of new information and suggestions for more use of our frequencies and especially increased use of repeaters. The DOC was well and ably represented by the Director and others. VE2BTZ was very active on Field Day. VE2DFO has a fine record on two nets. From VE2ASU comes the following: Le Congrès de RAQI tenu à Granby, a remporté un grand succès. Plusieurs centaines d'amateurs du Québec se sont rendus dans cette sympathique ville des Cantons de l'Est pour participer à diverses manifestations sur la radio amateur. Félicitations à tous les organisateurs, membres du club VE2CRG, VE2DID et VE2DIN son maintenant en téléphonie sur le 75 mètres. VE2AHU est de retour sur l'air; parmi les nouveaux amateurs, signalez: VE2DLD, VE2AMY, VE2AVJ, VE2BAT, VE2BAL, VE2AJU et plusieurs autres. A tous ces nouveaux, bienvenue dans la grande famille des amateurs. Traffic: VE2OJ et VE2DR 53, VE2ADE 21, VE3EC 14, VE2ALE 7, VE2CP 5.

**SASKATCHEWAN**—SCM, Gordon C. Pearce, VE5-EP—As expected, the Saskatchewan Hamfest held at Moose Jaw July 5 and 6 was an unqualified success. Mr. Weatherman did not altogether cooperate and all events had to be held in the Moose Jaw Technical Institute Buildings. The pre-registration award was won by VE6YE, the proficiency award by VE5FH, c.w. award by VE5TM, the technical award, donated by VE5UU, homebrew equipment award by VE5CX, hidden transmitter by VE5IL, best mobile installation by VE5JG. The Field Day award could not be made until word was received from ARRL, since both the Saskatoon and Regina clubs ran almost a dead heat. The SARRL election resulted as follows: VE5HP, pres.; VE5YY, vice-pres.; VE5s, EE, NX, BO, RE, KZ, YR, FX, SC and EO, directors. VE5FH continues as secy. During Field Day the Regina and Moose Jaw clubs fought a valiant battle against mud and rain to say nothing of their bitter adversary, the Saskatoon club. Traffic: VE5RE 14, VE5BO 11, VE5KZ 8, VE5SN 8, VE5UB 7, VE5EQ 2, VE5FX 2. **QST**

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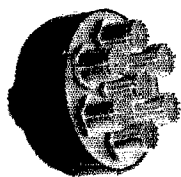
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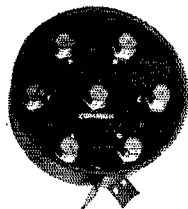
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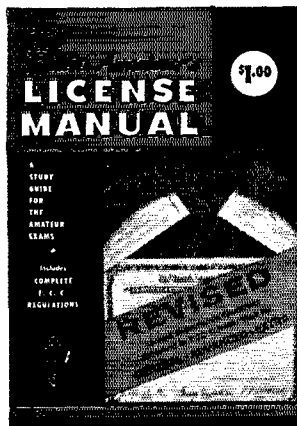
*Q.* When does a state of emergency affecting amateur communications become effective and when is it terminated?

*Q.* On what amateur bands is portable operation permitted without prior notification to the inspector of the district in which such operation is contemplated?

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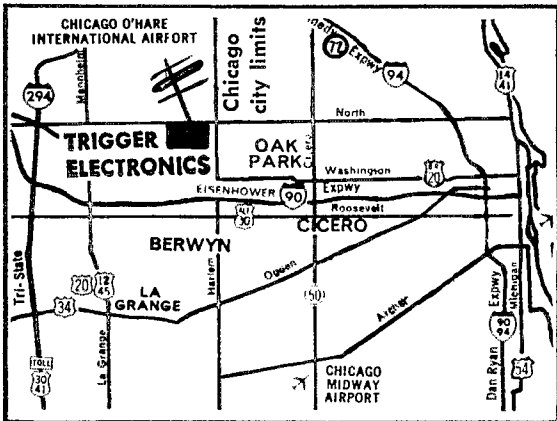
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# HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zip code, which is essential to our firm. An attempt to deal in apparatus in these columns, not even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertisements in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

*Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are not liable for their integrity or for the grade or character of the products or services advertised.*

**CINCY Stag Hamfest:** The 32nd Annual Stag Hamfest will be held Sept. 28, 1969, at Stricker's Grove, Compton Road, Mt. Healthy, Cincinnati, Ohio. Lots of food, flea market, model aircraft flying, and contests. Identify Mr. Hamfest and win prize. \$5.00 cost covers everything. For further info, contact John Bruning, W8DSR, 6347 Fairhurst Ave., Cincinnati, Ohio 45213.

**PEORIA Hamfest:** September 21, Peoria, Illinois. Same place as last year. For full details, see September issue of OST, Hamfest Calendar, Advance Registration: \$1.50. Write Ferrel Lytle, W9HDE, 419 Stonegate Road, Peoria, Illinois 61614.

**ROCHESTER, N.Y.** is again Hamfest, VHF meet and flea market headquarters for largest event in northeast, May 16, 1970 Write WNY Hamfest, Box 1388, Rochester, N.Y. 14603.

**DALLAS Area Ham-Swapfest:** Texas Instruments Activity Center, Sunday September 14, 1969, 9 to 5. Register now! \$2.00 per person. John Zagrodnick, 3823 Antiqua Dr., Dallas, Texas 75234.

**R. L. DRAKE CO.** Notice: come say hello to the fellows from the R. L. Drake Company at the following conventions: Amarillo, Texas, West Gulf Div. ARRL, August 16-17; San Diego, California, Southwestern Div. ARRL, October 17-19; Las Vegas, Nevada, SAROC convention, Jan. 7-11, 1970. The R. L. Drake Company now open after vacation shutdown fellas!

**14th Annual Hamfest by Four York County Clubs** again sponsored at Adams County Fair Grounds, 4 miles north of Abbottstown, Penna; August 31, 1969, rain or shine. Registration begins at 0900 hrs. Talk-ins 50.62 and 145.62 Mc for the mobiles. York County "Hams" were pleased with FM interest last year. This year greater emphasis is being put on the FM swap and sell section. Talk-ins on 52.525 MHz and 146.34-146.876-146.45 MHz. Plenty of eats, drinks, transmitter hunt, auction. For XYL's free Bingo. For info, write K3POR, Leroy Frey, 170 S. Albemarle Street, York Penna. 17403—Keystone VHF Club.

**A.W.A. National Amateur Radio Historical Conference,** Oct. 3, 4, and 5th, East Greenwich, Rhode Island. A weekend of nostalgic memories! Spark transmitters, Crystal sets, Hartley oscillators, and Regenerative Receivers. Everyone welcome! Write W2QY.

**OCTOBER 12th** is the date of the year's big event: The Miami County ARC Hamboree Fleamarket at Fairgrounds in Troy, Ohio. Open sales from 10 til ???, Auction from 3 till 5 p.m. Table space, \$1.00. Donation \$1.00. Held indoors rain or shine. For more info, write W8FW, Box 214, Troy, Ohio 45373

**SEE your picture and a thumbnail sketch of your life** in wireless along with many of your old buddies in Spark Gap Times magazine published by the Old Old Timers Club. Char-regular membership to any operator licensed 40 years or more. Regular membership is offered to all pre-World War 1 operators. ago. Be a recognized pioneer, join the Old Old Timers by ago. Be a recognized pioneer, join the Old Old Timers by writing the Secretary W5ZC, Bert E. Gamble, 402 Beck Building, Shreveport, Louisiana 71101.

**WELCOME To Maritime Mobile service net,** 14313 KHz, daily 2130Z, Amateur Radio's service to the Fleet, Vic Barry RDC USS Cory, DD817 FPO, N.Y. N.Y. 0950.

**QSLs??? SWLS??? America's Finest!!! Personalized made-to-order!** Samples 25¢. DeLuxe, 35¢. Religious, 25¢. (Refundable), Sakkers, W8WED, Ham Print Shop, Box 218, Holland, Michigan 49423.

**C. FRITZ** Vacation and fix-up time; see ya October! Box 1684, Scottsdale, Ariz. 85252.

**QSL "Brownie" W3CJI,** 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

**QSL.** With all this competition, you've gotta have something different. Try us, Samples 10¢. Alkanprint, Box 5494, Minneapolis, Minn. 55408.

**QSL stamp and call brings samples.** Eddie Scott, W3CSX, Fairplay, Md. 21733.

**QSL Free samples, attractive designs.** Fast return. W7IIZ Press, Box 2387, Eugene, Oregon 97402.

**QSL—SWLS, Samples 25¢.** Malgo Press, Box 375, M. O. Toledo, Ohio 43601.

**QSL SWLS Hundred \$2.00, samples dime.** Garra, 414 Mahoning St., Lehigh, Penna. 18235.

**DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton N.J. 08638, Samples 10¢.**

**10¢ Brings free samples.** Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

**RUBBER Stamps \$1.25 includes tax and postage.** Clint's Radio, W2UDQ, 32 Cumberland Ave., Verona, N.J. 07044.

**3-LINE engraved badge, any color, \$1.25.** Special rates to clubs, Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

**QSLs, Free samples, rubber stamps, address labels, stationery, Quality with service.** R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

**QSLs, samples 10¢.** Fred Leyden, W1NZJ, 454 Proctor Ave., Revere Massachusetts 02151.

**QSLs by KIFF, \$2.00 for 100.** Others at reasonable prices. Samples 25¢ (deductible). KIFF QSLs, Box 33, Melrose, Mass. 02177.

**OSL, SWL, cards that are different.** Quality Card stock, Samples, 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

**QSLs, Radio Press, 15008 Orchid Ave., Poway, Calif. 92064.**

**CREATIVE QSL Cards.** Personal attention. Imaginative new designs. Send 25¢. Receive catalog samples, and 50¢ refund coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.

**QSLs, SWLS, XYL-OMS.** Sample assortment, 25¢. All the fabulous designs of the late Warren Rogers, K0AAB, Patterson Printing Co., 961 Arcade St., St. Paul, Minnesota 55106.

**QSL 300 for \$4.35, samples 10¢.** W9SKR, George Vesely, Rte. #1, #100 Wilson Road, Ingleside, Ill. 60041.

**QSL cards Finest quality.** Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

**QSL-100 3-color glossy \$3.50; silver globe on front; report form on back.** Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

**QSLs, Gorgeous rainbows, cartoons, etc.** Top quality! Low prices! Samples 10¢ refundable. Joe Harms, WAFJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

**QSLs SWLS, WPE, Samples 15¢ in adv.** Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

**RUBBER Stamps, 3-line address \$1.50.** J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

**QSLs, finest YLRL's.** OM's samples 10¢ W2DJH Press, Warrensburg, N.Y. 12885.

**RUBBER Stamps.** Return mail delivery, postpaid. Basic price, \$1.00 first line. 60¢ each additional line. Request type style chart. Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

**QSLs.** Neat, quick, 10¢. Filmercraters, Box 304, Martin's Ferry, Ohio 43935.

**QSLs Kromkote glossy 2 & 3 colors, attractive, distinctive.** Choice of colors, one hundred—\$3.00 up. Sample 15¢. Agent for Call-D-Calls, K2VOB Press, 457 Chancellor Ave., Newark, N.J. 07112.

**3-D OSLs—The modern concept that makes all others old-fashioned.** Samples 25¢ (refundable), 3-D OSL, Co., Monson 2, Mass. 01057.

**EMBOSSED QSL's.** Free Samples, with cut catalog 25 cents. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44102.

**ORIGINAL EZ-IN double holders display, 20 cards each in plastic.** 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free samples to Dealers or Clubs, Teabco, John K4NMT, Box 198T, Gallatin, Tenn. 37066.

**LOW Priced QSLs!** Free samples! K.L.L. Press, Box 258, Martinsville, N.J. 08836.

**QSLs 3-color glossy 100, \$4.50.** Rutgers Vari-Typing Service. Free samples, Thomas S., Riesel Ridge, Milford, N.J. 08848.

**RUBBER Stamps, badges, nameplates.** Fast accurate delivery. Request price info and style charts from Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

**PICTURE QSL cards of your shack, etc.** from your photograph, 500, \$12.00, 1000 \$15.25. Also unusual non-picture designs. Generous sample pack, 20¢. Half pound of samples 50¢. Raum's, 4154 Fifth St., Philadelphia, 19140.

**RUBBER Stamps, 2 for \$1.00.** E. Mac, Box 8151, Rochester, N.Y. 14603.

**QSLs: Kromkote, 100/\$2.50 up.** Buy best for less. Samples, 10¢. Mills Printing, P.O. Box 1004, Lima, Ohio 45802.

**QSLs, 100 \$1.40 and up, postpaid.** Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

**QSLs—Second to none.** Same day service. Samples airmailed 25 cents. Ray, K7HLR, 25 South Terrace Drive, Clearfield, Utah 84015.

**NEW!** Truly custom QSL's! Let our professionals design and print your card. Every card original samples free. Printing and follow-through arranged and personally handled by WFLX QSL Design, 20 Britton Street, Pittsfield, Mass. 01201.

**CANADIANS!** The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. It will pay you to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel: 416-789-1239).

**CHRISTIAN Ham Fellowship** now organized for Christian hams who wish fellowship with other Christian hams. Request free information on how to witness to other hams. Christian Ham Callbook, \$1 donation. For free details write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

**INVITATION:** New York Radio Club invites New York Area hams and SWLS to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 PM W2ATT, New York Radio Club.

**QCWA—Quarter Century Wireless Association** is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information A. J. Gironda, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10453.

**DRAKE ZA with 2AS** \$125; Globe DSB-100, \$25.00; Sony FC-200 Stereocorder, \$100. Alan Rumsey, W9KVD, 5615 S. Woodlawn Ave., Chicago, Ill. 60637.

**MICHIGAN Hams!** Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. Normandy 8-8262.

**PROP Pitch rotor, W2W** 2, small, excellent, \$45.00. Link, 1081 Aton St., Cocoa, Fla. 32922.

**WANTED:** Military and commercial laboratory test equipment. Electronics, Box 13, Binghamton, N.Y. 13902.

**FILTER-Condensers:** Aerovox oil-filled 100 mfd, @ 3000vdc condensers, \$30.00 each. Basil J. Weaver, 1821-C Ave. M Lubbock, Texas 79401.

**NOVICE Crystals:** 40-15M \$1.33, 80M \$1.83. Free list. Nat Stinnette, Umatilla, Fla. 32784.

**NORTHERN California hams:** best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1305 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

**WANT Early issues Radio News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electrics, Popular Radio, Radio Broadcast, Wireless Age, 1923-1925 Callbooks.** For historical library. Wayne Nelson, W4AA, Concord, N.C. 28025.

**SELL swap and buy ancient radio set and parts magazines.** Laverty, 118 N. Wycomb, Landsdowne, Penna.

**DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95.** Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

**POLICE Fire Radio Dispatcher directories!** Exclusive official directories: Call signs, frequencies of local, county, state agencies. National. For all VHF fans, CD, AREC, RACES, MARS, VED, Catacombs for stamp. Communications, Box 56-1, Commack, N.Y. 11752.

**WANTED:** Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-0567, Annandale, Va. Phone: 703-560-5480 collect.

**WANTED:** 2 to 12 304TL tubes. Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606. (Note new address, fellast)

**MANUALS for surplus electronics.** List 156, S. Conslavau, 4905 Roanoke Drive, Washington, D.C. 20021.

**HAM'S Spanish-English manual** \$3.00 Ppd., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

**WANTED:** For personal collections: How to Become a Radio Amateur, Edition 9; The Radio Amateurs License Manual, Edition 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

**TUBES, test equipment, transmitters or receivers.** Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 08032.

**QST's Wanted:** December 1915 to December 1916, 1913, IRE Proceedings. Any unreasonable price! Ted Dames, W2K0W, 308 Hickory Street, Arlington, New Jersey.

**FOR Sale:** SB-10 and SB-200. Wanted, kits to wire. Heath preferred, 1/2% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

**WE buy all types of tubes for cash, especially Eimac, subject to our test.** Maritime International Co., Box 516 Hempstead, N.Y. 11551.

**CASH Paid for your unused Tubes and good Ham and Commercial equipment.** Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

**TOROIDS, 88 mh uncased, 5/82.50.** Postpaid, Humphrey, W46FN, Box 34, Dixon, Calif.

**WANTED:** Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S, R358, R390, GRC, Army 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

**INTERESTING Sample copy free.** Write: "The Ham Trader," Sycamore, Illinois 60178.

**RTTY gear for sale.** List issued monthly, 88 or 44 Mhz toroids, five for \$2.50 postpaid. Elliott Buchanan & Assoc. Inc. Bud, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

**1000 PIV @ 1.5 amp. epoxy diodes** includes disc bypass, caps and bridging resistors, 10 for \$3.75. Postpaid USA. With diode purchase, 125 Mf. at 350 volt electrolytic capacitors, 50¢ each. Postpaid, no limit. East Coast Electronics, 123 S Boniface Rd., Cheektowaga, N.Y. 14225.

**WE'RE Trying to complete our collection for Callbooks at Headquarters.** Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934 ARRL, 225 Main St., Newington, Conn. 06111.

**TELETYPE Wanted:** Models 28.32, 33.35. Receivers R-390A, R-388. Cash, or trade for amateur equipment. Altronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: a.c. 617-742-0048.

**DAH-DITTER Keyer.** Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in SC pwr. supply, feed relay output, with sidetone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30238.

**TELETYPE Wanted—M28 typing units, any condx, keyboard perforators—reperforators, cast aluminum TD bases, all unused parts.** Sell, too, Typetronics, Box 8873, Ft. Lauderdale, Fla. 3310.

**SPIDERS For boomless quads.** Helicar welded aluminum, A1's Antenna Accessories, 1339 South Washington St., Kennewick, Washington 99336.

**TEST Equipment wanted:** Any equipment made by Hewlett-Packard, Tektronix, General Radio, Stoddard, Measurements, Houston. Also Military types with WRM-O, USM-O, TS-O, SG-O and similar nomenclatures. Waveguide and coax components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040, R389, R390, R390A 51J4, 75A4, 75S3A, NC101X, HR050T1, HR060T1, SP600, KWM-1, KWM-2, 62S1, 31ZB5, HA-2, and others. List for SASE, W2ADD.

**SELL trade or buy Call Books, handbooks, magazines, and old radio sets and parts.** Erv Rasmussen, 164 Lowell, Redwood City, California 94062.

**SAVE.** On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

**WANTED:** An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also \$25.00.00 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

**10 Meter amateur band linear R.F. amplifiers** for base or mobile use. Base units: "Hornet"-200 watts PEP output-\$104.95; "raider" 400 watts PEP output-\$149.95; "Maverick" 800 watts PEP input, \$244.95. Mobile: "Scorpion" 200 watts PEP output-\$99.95; "Bandit"-up to 500 watts PEP output-\$169.95. Electronic relay switching. All units designed for transceiver operation. State drive power when ordering. Dealer inquiries invited. D & A Manufacturing Co., 1217 Avenue C., Scottsbluff, Nebraska 69361.

**PL-172 tube or equivalent in good used condition** wanted at reasonable price. Write F. G. Ruhli, K2BLI, 57 Drum Hill Drive, Summit, N.J. 06901.

**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, R. I. 02880.

**WANTED:** Valiant II and SSB adapter, 6N2 transmitter, N2 converter, VFO, Ranger II. Lesson course on electronics, 2 1/4 x 3/4, 4 x 5 speed rack. John Waskowitz, 541 Marcy Avenue, Brooklyn, N.Y. 11206.

**WANTED:** QST copies in good condition 1920, 1921, 1922 and August of 1928 to complete personal 50-year collection. Rex Bassett, W4OS, Box 4163, Fort Lauderdale, Florida.

**KWM-2 Waters O-Multiplier** \$16F-2 supply built-in speaker. W4ZUH, Roslyn, L.I., N.Y. Tel: Days (516) IV1-9844, Evenings (516) MA1-2629.

**PREPARE for FCC exams!** You need Post-Check, now with addenda to cover latest FCC questions. Multiple choice questions, diagrams, explained answers, IBM sheets for self-testing. Same form as FCC exams. New price—General Class \$3.50, Advanced Class \$3.75, Extra Class \$4.00. Each complete for a specific exam. Basic questions duplicated if they apply. Third class answers prepaid. Add 32 cents per copy for first class mail, 64 cents for air mail. Send check, or money order, to Post-Check P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322. Addenda available separately for each class to previous purchasers covering new questions. Send 50 cents per copy in coins or stamps.

**I.C.'s factory-fresh Fairchild U1914.70,** 3 for \$2.00. Motorola MC790P dual flip-flop \$1.75, 3 for \$5.00. Add 15¢ for postage. Logic Components, Box 224, New Canaan, Conn. 06840.

**TOROIDS, Uncased 88 or 44 mhz, 5 for \$1.50 pnd.** M. Wenschenker, K3DPR, Box 353, Irwin, Penna. 15642.

**REPAIR and calibration service.** Write before shipping. Pan Tronics, Inc., 6608 Edson Road, Alexandria, Virginia 22312.

**SALE:** Collins 175S-3 S/N-13726, like new \$390 or your best offer. Dan Jettecht, W4ACR, 3930 Blackstone Ave., Bronx, N.Y. 10471. Tel: K19-4409.

**SELL:** SX-011A, in exclnt condx, both mechanically and electrically. I must sell this receiver. Please, no trades! A real bargain! Mike Prust, 514 North Washington, St. Peter, Minn. 56082.

**TOROID Coils 88 mh uncased postpaid, 5/82.00.** La Von Zachry, P.O. Box 845, Apple Valley, Calif. 92307.

**COUNTER, integrated circuit, 15MHz.** Article in December Ham Radio. In exclnt condx. \$200. Bert Kelley, 2307 So. Clark Ave., Tampa, Fla. 33609.

**JOHNSON Viking 500 wanted.** Advise condx and price. Will consider pick-up within 150 mile radius. Carmody K2BZC, RD 3, Canandaigua, N.Y. 14424.

**HALLICRAFTERS SR-150.** Mobile Mount. Antenna, \$375.00; SX-17AW spkr \$225.00; Heath SB-200 Linear, \$195.00; HW-29, \$35.00; 8' WVA, \$35.00. All in excellent condition. W2ERV, 14 Bernice Dr., Freehold, New Jersey 07728.



BECKMAN Electronic Frequency counters 6146; transistorized, operates to 25 MHz, \$750.00. Other units available Parts, Sundtek, 131 Allen Ave., Springfield, Oregon 97477.

QSTS 1930 to 1968 average 25¢. SASE for inventory, plus years of QO, Johnson 250W Matchbox, \$30; Navigator, \$40. Rowe, W1AQW/WA3PK, Hillside Road, RD #1 Mechanicsburg, Penns. 17055.

RESISTORS, Resistors, Resistors, Resistors. Only 8¢ each: 10/60¢ Ppd, May be assembled. Garrett Industries. 4504 Nunnswood, Lakeland, Fla. 33803.

DRAKE T4XB, R4B, L4B. Perfect condition. Approx 5 hrs total. All power supplies, manuals, and original cartons. First check of \$250 takes all including shipping. K7HNR, Box 483, Grand Prairie, Texas. 75050.

DX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available. \$3.95 postage paid (\$4.95 foreign). The McMahon Co., (W6IZE), 1055 So. Oak Knoll, Pasadena, Calif. 91106.

WANTED: 4-1000A tubes new or used if condition and full emission guaranteed. 4-1000A glass chimneys. Can use up to five of each. Advise price desired or will trade 304TLs or other types. W4YHD, 6800 Hampshire Road, McLean, Virginia 22101.

WRITE, phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallicrafters, Hammarlund, Hy-Gain, Mosley, SBE, Waters, Henry Linear, B11 linear, towers, rotators, other equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

SWAN 350, all modifications w/117XC, \$295.00; Hallicrafters HT-44, \$235.00; Tri-Ex 500, 500W SSB AW, CW, special, \$175.00; Collins KWM-1 w/AC-DC mobile mount, complete, \$385.00. 75A4, \$425.00. Want Drake equipment. List available. John Kakstys, W2FNT, 18 Hillcrest Terrace, Linden, N.J. 07036.

HAVE Too much stuff! Swan 500-C with matching power supply. In like-new condx. \$450.00, W0GML, 5520 Porter, Wichita, Kansas 67204.

SELL: Swan 350 and 117XC power supply. In gud condx. You make offer. W1OER, 135 Barbara Road, Waltham, Mass. 02154.

DRAKE 2B, 2BQ, not used much in gud condx. WA7BIK, Rte #5, P. O. Box 745-N, Bremerton, Washington 98310.

WANTED: Home-Study course E.C.C. multiple choice O & A papers for commercial license. N.Y.C. area. Call a.c. (212)-536-5487. WA2JOF.

NATIONAL HRO-60 receiver for sale, with all plug-in coils and homebrew spkr. WAILAT, 14 Percy Road, Lexington, Mass. 02173.

SELL: Johnson Thunderbolt amplifier. In gud condition, \$200. WA4YYW, Steve Orr, 1100 Pollock St., Kingston, N.C. 28501.

NOVICE: T-60, 60-watt xmtr, \$25.00; SX-140 rcvr, \$45.00. Both excellent with manuals. WA2JFK, 80 White Spring Road, Geneva, N.Y. 14456.

SELL: Ranger, VFO needs work, \$55.00. WAIIZS, 179 Knollwood St., Springfield, Mass. 01104.

SELL: Collins, Central Electronics, Monitor Radio, Heathkit, Henry Model 2K, and many more. Stamped envelope for list. Don't miss this fine gear surplus to my needs. Ted Valpey, W1ATP, P.O. Box 87, Mellen Street, Holliston, Mass. 01746.

QSTS: August 1922 to date, in excellent condition, complete with single exception of March, 1953. Highest offer by January 1, 1974. Write: Mr. Scott Cooper, 1714 Alder Court, Bozeman, Montana 59715.

FOR Sale: HO-110C receiver, \$95.00; Eico 720 transmitter with VFO both in like-new condx. W6YG, 6811 Monero Drive, Palos Verdes Peninsula, California 90274.

WRL'S Used gear has trial-forms-guarantee! KWM-1, \$249.95; HW-32, \$89.95; Swan 250, \$249.95; TR3, \$369.95; NCX3, \$169.95; SB-34, \$299.95; Galaxy V, \$229.95; Galaxy VMK2, \$279.95; Ranger, \$99.95; HT-32A, \$259.95; 100V, \$259.95; Galaxy 2000 Linear, \$329.95. Many more. Free "Blue Book" list. WRL, P.O. Box 919, Council Bluffs, Iowa 51501.

SELL: HW-32, in exlnt condx, \$90.00. Pick-up deal only. W2HRX, 201 Congress St., Brooklyn, N.Y. 11201.

SELL: National NC-300 rcvr, with xtal calibrator, in mint condx. No frills, reasonable offer, refused. Steve Miller, W2ZDC, 1277 Bay Park Pl., Far Rockaway, L.I. N.Y. 11698.

ATTENTION, Collectors! Grebe Radio receiver, Type 8, Grebe Audio Amplifier (with jacks); Western Electric No. 14A loud-speaker and telephone assembly (fine Mahor case); box coils, resistors, etc. from Murdoch Co.; box head phone, telegraph sending-key, etc. Van Storm, 6627 W. 81st St., Los Angeles, Calif. 90045. Tel: a.c. (213)-766-6272.

NOVICE Crystals, 75¢. Free list. Gregory Ginn, 1240 21st St., Hermosa Beach, Calif. 90254.

GREAT Buy! HQ-170AC V.H.F. and speaker. In mint condx. original cartons and manual; 2 years old. Contact Dick Heaton, WA9PSI, 104 S. Euclid, Princeton, Ill. 61356.

SELL: Lafayette HA-350 Receiver, speaker, GSB-100 transmitter; Central 600L, other goodies! Reasonable. Will ship, except the 600L. Thurber, W7DZW, 8556 Elm, Fairchild AFB, Washington 99011.

MECHANICAL, Electronic Devices Catalog, 10¢. Teletype re-transmitter, Model 14 with rewind, new, unused, \$2.95. Silicon rectifier 4000 PRV-1 amp, \$3.95 ea. Fertik's, \$249A, "D", Philadelphia, Penna. 19120.

HAMMARLUND SP-600s. Same as shown on page 4 of May QST: \$225.00. R. F. Custom, 253 Bellman Avenue, Warwick, R.I. 02889.

VFO with power supply wanted for Drake 2NT, Need 40 meter output. WN2JYA, 654 Freeman, Orange, New Jersey 07050.

1500 volt 450 mil power supply, with 866As, Thordarson xfmrms, 6 ft. rack panel cabinet de-TV'd with copper screening. QST's 1937 thru 1958, complete; 28 random copies 1932 thru 1936. All items heavy. Prefer pickup deal. Want SB-200. Make offer. Al Palmer, WIKIO, 111 Wilfred St., West Hartford, Conn. 06110.

4CX250B tubes (Eimac). Have small quantity for sale. (Never used), \$18.00 each, two for \$32.00. John C. Carlton, WAQEB, 1602 Birch St., Shelbyville, Tenn. 37160 Phone 615-684-2521.

FOR Sale: SBE-34 incl. mobile mic, \$260.00; Matchbox 275 w. dir. coupler, \$60.00. Both in exlnt condx. No trades. Bob Thwaites, 128 Chestnut Hill Lane, Reisterstown Md. 21136.

EICO 720 xmtr, 722 VFO, Antenna-tuner, Ant. relay, extras. K. Aronson, WB2WOU, 1440 E. 52nd St., Brooklyn, N.Y. 11234. Tel: a.c. (212)-CH-8877.

GROUNDED Grid filament chokes 30 amps, \$4.00. Plate chokes 800 MA, \$2.00. HPUSA 43, William Deane, 8831 Sovereign Road, San Diego, California 92123.

HEATH SB-301, SB-600 speaker. In A-1 condition: \$250.00. W6MVS, 136 Vantassel, San Anselmo, California 94960.

KNIGHT T-60 xmtr, xtls, \$35.00. R-55A rcvr with calibrator, \$50.00. Both for \$80. D. Ronco, WA3JGS, Slate Belt Blvd., Roseto, Penna. 18013.

SELLING Out: KWM-2, 516F2, 312B4 less than 6 months old: \$1100.00. GSB-201 MK II, new, \$219.00; Millen Sr. Transmatch, \$95.00, new, Johnson phone-patch, \$20.00; HT-40, \$30.00; SB-600 rcvr, \$125.00; Heath SWR bridge, \$12.00; E-V-664 mic and stand, \$25.00; Tri-Ex W-51 tower, less base, \$230.00, new, Ham-M rotor, new, \$80.00; Mosley 2nd quad, \$40.00; 200 ft. RG-8/U and connector, \$15.00. Contact WA2YNS, J. L. Perry, 177 Paris Road, New Hartford, New York 13411. Tel: 1-315-RA-45374.

SELL: Brand new Yaesu FT-DC400 transceiver and FL-DX-2000 linear, W8A0, 2912 Riverview Boulevard, Silver Lake, Ohio 44224.

COLLINS S/-S-IF, \$985.00; 75A4, \$350.00; 75A3, \$175.00; Johnson KW, mint, all new tubes, \$495.00; B&W L1000A, \$160.00, Tom Nash, M.D., W5NWA, 1100 Canterbury, Dallas, Texas 75208.

WANTED: Manuals for B&W 5100 and 51SB. Will copy and return. David Kirk, WA2WTN, 440 Church St., North Syracuse, N.Y. 13212.

FOR Sale: Drake 2-B receiver, now on the air after being stored for three years. Like new inside and out: \$150.00. No. Galaxy GT-550 transceiver A.C. 400 PPS, matching SC-550 spkr., \$330.00. K1PNL, Tel: a.c. (203)-583-5433.

VIKING Challenger, 80-6 AM/CW, like new, \$75 or trade for good Ham-M, K1LEC, Box 73, North Springfield, Vermont 05150.

SWAN 12-volt DC module for mobile operation, hardly used, \$50 or your best offer, WA80VC, Jim Hoffer, 109 Vaughn Road, Delaware, Ohio 43015. Tel: a.c. (614)-363-1819.

NOVICES: GR-64 xcvr, like new condx, with manual. Your best offer. Charles Costa, Jr, 1219 Holly, Lodi, Calif. 95240.

WANTED: Amateur transceiver, not working, unfinished kits, etc. Will buy or swap 4-400 SSB linear, Snd details, all replies answered. K2RDM, P.O. Box 445, Pleasantville, N.Y. 10570.

FOR Sale: Digital readout receiver AN/WR-2- 2-32 MC freq. synthesized. Upper-lower Sideband. Price: \$1000. Pick-up deal only. SASE for full info. Herb Reiss, W2ONZ, 176 N. Virginia Ave., N. Massapequa, L.I. N.Y. 11758.

FOR Sale: HW-12A w/HP-13 dc. pick up, in mint condx. Used less than 10 hours. You make offer. K4KJC, Jim Hayes, Rte 7, Franklin, Tennessee 37064.

FOR Sale: Tektronix 514D scope in excellent condx: \$250.00; BC-221 with solid state supply, \$50.00; Heath VTVM Model V-7A, \$15.00. Bug type J-36, \$6.00. R. Bartel, W2AWS, RD #2, Box 31, Kingston, N.Y. 12401.

KWM-2 312B5, ac/dc supplies; #B-200, mobile mount, three heliwhips. Price firm: \$1050.00. No deals. WA2FBL, Phone a.c. (607)-648-4952.

SELL Back numbers QST-CO-73-IRE. W6MLZ, Box R, San Gabriel, Calif. 91778.

MANUALS: TS-323/UR, TS-173/UR, TTS-186D/UP, BC-638A, \$5.00 each. Many others. SASE brings reply. S. Consalvo, W3IHD, 4905 Roanne Drive, Washington, D.C. 20021.

DAVCO DR-30, in excellent condition, fine receiver for trip or vacation. Only \$200. W9KYT, 3419 N. Dousman Street, Milwaukee, Wisconsin 53212.

HW-12 with HP-0 power supply, and mike: \$80. W3DKL, 36 Harvey Ave., Erie, Penna. 16511.

SELL: Drake 2-B, 2-BQ speaker and O-multiplier, 2 AC calibrator; Ameco TX-62 VFO 621, original cartons and manuals, mint condition. Ameco CN50 Converter. Best reasonable offer. Ship collect. L. R. Dolton, WA90GN, 2629 Vinewood Dr., Speedway, Ind. 46224.

FOR Sale: In excellent condition: Drake T-4X, R-4A, MS-4, AC-4; \$750.00, plus shipping. Dennis J. Burke, WA1KZI, Meadowcrest Dr. RFD 5, Bedford, N.H. 03102.

SELL: HT-37, electrically perfect and with manual, but front panel scratched: \$190.00. TH-4, CDR rotator, 60 ft. crank-up tower. Come and take them for \$160. Gordon Roret, 300 La Vida Drive, Lodi, Calif. 95240.

HAMMARLUND SP-600 all-band receiver with product detector further improving the excellent performance of this model. Sensitivity 2.3 microvolts, selectivity variable 13 kc-200 cycles. Rack mode with 600 ohm spkr included. \$195 cash, will ship. Les Collins, 759 Tenneco Building, Houston, Texas 77002. Tel: (713)-225-5501 day; (713) 781-0380 night.

SELL: Central Electronics 100V, \$300; Clegg Interceptor B with all-band tuner, \$350.00; Amero, CN-50, 28 MH, A.F. \$25.00; RV-144 preamp, \$7.50; Ameco power supply, \$7.50; Hallcrafters R-48 speaker, \$10.00; Heath SB-500 28 MH, I.F. \$170.00. All units like-new condx. WA8ASV, Charles Secrest, WA8ASV, 1211 Milbourne, Flint, Michigan. Tel: 1-313-290025.

CLEANING Out: Teletype Model 19 ASR set \$125.00; Model 28 KSR tabletop cabinet with keyboard and IESU, \$200; FRXD typing reperf and TD w/cover and connectors, \$40.00; Tektronix Model 511AD oscilloscope, \$200.00; Heathkit Sine-Square audio generator, \$25.00; Jackson R.F. generator, \$15.00; Eico 425K oscilloscope, \$25.00; ART-13 surplus transmitter, w/813, \$20. And lots of parts to get rid of. Pick up only. Gerry Block, WA2YJD, 35 Amherst Road, Great Neck, L.I., N.Y. 11021. Tel: a.c.(516)-487-2435.

FOR Sale: Hallcrafters SX-110, \$105.00 and HT-40, \$45.00, both in excellent condition, will ship in original cartons you pay shipping, Charles E. Reed, Jr., 836 Hundley St., Martinsville, Va. 24112.

SELL: 52 ft. windmill tower, \$185.00; Gordon rotor, \$95.00; SR-150 with AC, DC and mount; \$445.00. Sell or trade \$114 for SR-400. H. Pavlok, 1688 Elmwood Drive, Highland Park, IL 60035.

MUST Sell complete station: NC-303 receiver, HT-37 transmitter, SB-200 Linear, plus mikes, keys and miscellaneous stuff. No room for antenna at new QTH. \$550 takes all. No separate sales. WPHEN, 1200 Glendeling, Wilmette, Illinois 60091.

COLLINS 75S-1 rcvr with 500 HZ mech. filter and c.w. BFO xtal; FM tuner; c.w. keyer; SASE for list. W0AEP, 704 27th St., N.E. Cedar Rapids, Iowa 52402.

CLOSING Estate: Make offer on NCX-3, NCX-A, National 100 Kc. calibrator, HO-10 scope, HM-11 SWR, Turner S-95 mike with p/t stand; 2 RCA VOM W77A, Heathkit IG-102 RF sig. generator, Eico Model 232 VTVM, Monarch VOM MT-220; Greenlee rd punches 5/8" through 13/8"; Micro Match SWR Model 262; Astatic 518H mike; HN-31 dummy load, 75 ft. Rohm #6 tower, 2-meter jeton beam, 6 meter 4 element beam, 75A-2 with mech. filter and CE Model B SSB slicer, to W5LCI, Box 592, Wynne, Ark. Tel: BE8-2791.

HANDICAP Radio Club needs equipment and accessories for new station. Donations anyone? Please write Radio Club, c/o New Britain Memorial Hospital, 2150 Corbin Ave., New Britain, Conn. 06650.

SALE: Transmatch, Sr., Milon 92200, 2 KW, DCL, \$119.00; Swan 400, 200, 117K, 117K, 117K, \$375.00. John H. Bardon, W4RHC, 2238 Morgan Lane, Dunn Loring, Va. 22027.

HEATH Apache, excellent condition, \$75. W2UGF, W. Otter, 54 Arlyn Drive East, Massapequa, L.I., N.Y. 11758, 516-HR-2163.

WRITE phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallcrafters, Hammarlund, Hykain, Mosley, Waters, Henry linear, BTI linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

TELETYPE: Model 19 and model 14 typing reperforator. Perfect condition. \$185.00. You must pick up. Write W2CMD.

DRAKE 2-B, 2-BQ, 2-AC \$159. DX-60, Johnson VFO, coax relay \$59. WA5FTF, T. L. Bratton, 5353 Dora, Apt. 14, Houston, TX 77005.

MUST Sell Eico 720 transmitter; Eico 730 modulator; Heathkit VFO; perfect condition; all inquiries answered; best offer; WA9JMY, 1420 West Bolivar Avenue, Milwaukee, Wisconsin 53221.

FOR Sale: Collins 310-B exciter, Collins 32V2, Waters phone patch, Eico speaker, 24 hour clock, Sockets and chimneys for 4/40 tubes. K6NA, 682-2915.

WANT: Swan 350, 500, Galaxy V, or TR-4. In mint condition. Reasonable. Jim Schulz, 76 Poinciana, Memphis, Tenn. 38117.

SELL: Valiant II. Exclnt., Manual, \$150.00. Will deliver N.Y.C. area. Howard Buck, WA2FQY, 212-424-1847.

TOUCHTONE telephone dials (round), direct replacement for standard rotary dial (4); new, beige, green, white, black at \$22.50. Gonset 6 meter 200 watt linear (2826's), excellent \$65. Tonax CLOWDG power supply \$38. Gonset No. 3011 (40-50 M.C.) tuner \$27. Richard M. Jacobs, WA8ATY, 4941 Tracy Avenue, Kansas City, Mo. 64110. Tel: 816-444-1968.

HAMMARLUND 170 A VHF sell or trade for 6 meter sideband, also Ameco 6 and 2 with matching VFO \$125. All mint condition. WB2JDS, Tel. Bronx, N.Y. 212-733-5755.

MR-150 Mobile mounting rack, PS-150-12 mobile power supply, Master mobile antenna system for 80-15 meters, for SR-150 transceiver—going for best offer. WA3LRJ, 1160 King George Court, Pittsburg, Pa. 15237.

HEATH HW-16 kvcr. Prof. aligned, mint cond. All accessories, original carton. First \$92.00 M.C. takes 1 pay shpg. in Cont. U.S. Lloyd Wright, 106 Woodruff Road, Greer, S.C. 29651.

WANTED: HT-32B, Johnson KW matchbox, cash deal. Stan Talago, Rt 3, Bridgeport, W. Va. 26330.

SELL/Trade—NCX—5 MK II, A.C. supply and calibrator—late serial number—\$490.00, OST's Sept. 1955 through Dec. 1968—\$25.00. Stamp for list. Want—75A2, 51J, SR-160, J. Shank, 21 Terrace Lane, Elizabethtown, Pa. 17022.

SELL: Drake SW-4, excellent condition, \$230. Chiu, 91 Baxter Street, N.Y.C. 10013.

L.A. RADIO Sales (formerly L.A. Amateur Radio Supply) 24214 Crenshaw Blvd. Torrance, Calif. 90505. Have big discounts! Antenna tower packages savings to 20 percent. FOAM-RGR/U .08"/ft W/purchase. Ham-Ms \$99, TR44 \$59, AR33 \$39 save! New Displays: Swan-350C \$459, 500C updated \$389, Galaxy-G1550 \$399, TR4 \$489, T4XB \$189, R4B \$369, L4B \$630, BTI \$695. Gonset-GSB201-MKIII \$339, Swan-MKII \$589. Prices F.O.B. Send S.A.S.E. for listing of used equipment & quotes.

DRAKE Station, T4X/AC supply \$350.00. R4B \$255.00. Speaker W/built in 970 keyer \$40.00. All excellent condition. FOB Louisville, WA4ZIR, 7902 Tip Top Ln, Louisville, Ky. 40219.

FOR Sale: SSB Heath 110A 6 mtr., like new, factory aligned and tested, including 6 element highgain antenna. \$310.00 firm. Home pickup. Henry Lehmann, 49 Leonard Avenue, Tenafly, N.J. 07670. Phone after 6, 201-569-8323.

COUNTER—HP524B excellent condition. No plug-ins, basic unit counts DC to 10 megahertz, displays eight significant figures to 100 million counts. Best offer over \$500. K6DM, Walt Larson, 12582 Ninth Street, Garden Grove, Calif. 92640. (714) 857-8447.

INTEGRATED Circuits: New Fairchild Micrologic: epoxy TO-5 package, 900 buffer, 914 gates, 60 cents each, 923 J-K flip-flop, 90 cents each. Guaranteed. Add 15 cents postage. HAL Devices, Box 365Q, Urbana, Illinois 68101.

FOR Sale old copies OST magazines September October nineteen, years twenty through thirty one fair thirty two to March forty one good. Also Handbooks twenty six twenty nine thirty one and four good. Mrs. Blakely Cross, 40 Clyde Street, Gloversville, New York 12078.

REAL Antenna-tower security! Highly corrosion resistant, stainless, brass, bronzes, nylon, threaded, washer, hardware. Many antenna accessories. Room mount,Guying hardware, ceramic insulators. More lists one dime! Write us for your hardware needs! Walt, W8RLR, Ham Hardware Headquarters, 29716 Briarbank, Southfield, Michigan 48075.

SELL—349 copies "OST", 157 "CQ", 56 "Radio". Some back to 31. Best offer. W3CBN, Bangor, Penna. 18013.

HT-40 xmtr Xent condition \$55.00 each. A. Wilson, Box 392, East Brewster, Mass. 02640.

HQ-180 with speaker, in like-new condition. Used only for 4 months. Will sell for \$200. David Goldryn, 1544 E. 16, Brooklyn, N.Y. 11230.

SELL: Hallcrafters S1X-01-A in mint condition. \$190. WB2FSC, 134 Utterby Road, Malverne, N.Y. 11565. Tel. 516-593-7804.

COLLEGE: Sell: Heathkit DX-100B and SB-10 for cw/am/ssb. All conversions, grid block keying, 200 watts d.c. input. Both excellent. Also mint Lafayette HA-350 receiver. Will accept reasonable offers. WA3JYM, 92 Grandview Blvd., Reading, Pennsylvania, 19609.

BARGAIN: PAH LA 400C, linear—800 watts, PEP—mint—\$75.00. Colwelt, W2AWM, 2021-27 St., L.I.C., N.Y. 11105.

OST's (1930-1967) in permanent, library-quality binding. Excellent condition. S.a.s.e. for full description, picture. \$295 f.o.b. Williamsburg, Va. 23185. W4JTT, 3 Foxcroft Road.

FOR Sale, at sacrifice price: Reducing size of station. Everything perfect. Collins Radio ham station console, "I" shape; 89 x 36 x 30 inches high on long leg; 42 x 18 x 30 inches high and glass topped on short leg. Has 4 drawers and cabinet, 6 recesses for Collins equipment on opening panel along long leg. White vinyl operating position. Rest walnut finish. \$500. Sorry, cannot ship! Console must be picked up. Station waxon will carry it easily. John F. Rider W2RID, 350 West 57 Street, New York, N.Y. 10019, (212) 586-0038.

SELL: Swan 500C, VOX, AC supply, cables. One year old, new condition. Original owner. \$510. Dr. John Morgan, K4-VXS, 23 Waynel, Fort Walton Beach, Florida 32548, 904-243-6719.

FIXED and mobile stations, Galaxy 300 with AC/PS, Heath HW-12 with DC/PS, antenna, mike, both VG condition, sell as stations to highest offer. K9RLO, Box 437, Hiawatha, Iowa 52233.

CHICAGO area—Knight T-150A mint condition \$45.00. Astatic D-104. Microphone w/desk base, never used \$10.00. W9FKV-L (312)-323-9101.

NOVICE Special—DX20, Knight VFO w/ps xtals, First \$35 takes all. L. Kaminsky, 2501 Uppincott, Flint, Michigan 48007.

SELL: Heath "Twoer"—\$30.00, 13 element beam and halo—\$15.00. New 866A, 866 Jr., 816 tubes \$2.00 each. G. Davis K1PFF, Woodstock Valley, Connecticut 06282.

FOR Sale, 2000+ linear amplifier with A.C. power supply for Galaxy V Mk2. Brand new, best offer. WA1DDW, 50 Sterling St., Lynn, Ma. 01905.

IAVQ—80 thru 10 meter trap vertical antenna. Perfect condx. No shipping. \$20.00. K2GXP-Lewisboro, New York 06840 (Westchester), 914-LE3-2102.

FOR Sale: Viking Valiant mint \$150, SX101S vv-rud \$190, HW-30 (twoer) \$40.00, A-100 modulation speed, \$19. No shipping. Pick up deal. L. Lohrman, WA3ENE, 2053 Ferry Street, Easton, Pa. 18042.

WILL sell one HT-41 Linear in excellent condx, and appearance; \$165.00. Will ship collect in original carton. WA4-AVX, 603 So. Tenn. Ave., LaFollette, Tennessee 37766.

OST's: 1927-1968, John N. Weaver, W3CDJ, 215 Pleasant St., Athens, Penna. 18810.

FOR Sale: Polycorm-2 with all cables, accs and man. In exc. condx. Will ship. \$150.00. Laf. SWR bridge, \$5.00. WA2BQV.

WANTED: All types of tubes. Top prices paid for varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, N.Y. 10007.

WANTED: Drake 2-B ("B-Q"). Must be absolutely mint. Money order for best deal under \$175.00. Describe. Sell: TS-175 frequency meter—85/1000 MHz, no PS, \$50.00. WA5-OUI, Box 236, Ft. Supply, Okla. 73841. Tel: a.c. (405)-766-3261.

WANTED: Drake 2-B. Will trade following or sell individually: DC to 4 MHz Eico 435 scope with Tektronix probe, \$90; Hallcrafters S-85, \$50; Triplett 630 PL multimeter, \$25. All are in exlnt condx. John Gibson, 1305 Tevlin St., Berkeley, Calif. 94706.

HALLCRAFTERS SR-400 xcvr and P-500 power/speaker, \$695; SX-117 rcvr, \$229.00; International Crystal ICV-2 2-meter converter and power, \$15.00; Heath Cheyenne xmr and power, \$39.00; Heath Pawnee 2-meter xcr (9/68 WRL Blue Book, \$189) rcvr not working, \$75. USA postpaid. Bill Bode, 13241 Eton Pl., Santa Ana, Calif. 92705.

NATIONAL NCX-5 with Mark II conversion; NCX-A, AC power supply; XCU-27, xtal calibrator; VX-501, external BFO; Century heavy-duty mobile supply and Hustler mobile antenna with 10 thru 40 meter resonators. All equipment in excellent condition, all must be sold together. Will deliver within 50 miles radius. Will accept first cash offer. KZ2AT/8, 620 Orville St., Apt. 17, Fairborn, Ohio 45324. Tel: a.c. (513)-878-1684.

EXTRA Clean used KWM-2 with a.c. supply with speaker installed, \$675.00; Mobile packages for KWM-2 including rack and 516F-1 D.C. supply in exlnt condx, \$150.00; 75S3B, \$440.00; 32S3, \$485.00; 516F-2 A.C. supply, \$103.00; Galaxy R-530 new with filters installed, \$525.00; Galaxy V in mint condx with A.C. supply, \$340.00; SBE-34 with mike, \$300.00. New and used Swan equipment. All items checked before shipment and are fully guaranteed. Douglas Electronics, 118 South Staples, Corpus Christi, Texas 78404, Bob Douglas, W5GEL.

"HOSS Trader" Ed Moory says if you don't buy your ham gear from him, you might pay too much. Shop around for your best price and then call the "hoss" before you buy! New equipment: Factory warranty; Swan 350-C, \$339.00; early model Swan 500C, \$389.00; FTDX-400, \$489.00; National VX-501 VFO, \$109.00; new display model BTL LK-2000 Linear, \$639.00. No first reasonable written offer will be refused on New Galaxy GT-550 and power supply; new mel New Rohn 50 foldover tower, prepaid, \$188.00; new Mosley Classic and demo Ham-M rotor, \$209.00; Used Equipment: HQ-170A, \$179.00; Drake A-2, \$139.00; "mint" A-4, \$389.00; TR-4, \$439.00; T-4-XB, \$359.00; R-4B, \$349.00; Ham-M Rotor, \$89.00; Galaxy T-550, \$369.00; Swan Cygnat, \$369.00. Ed Moory Wholesale Radio Co., P. Box 506, DeWitt, Arkansas 72042. Tel: a.c. (501)-946-2820.

JOHNSON Valiant, \$125.00. Can be run as 250-watt SBW Linear; Central Electronics 20A SSB exciter, \$90.00; both, \$200. Hammarlund HQ-110C, \$100. FH-3 beam, \$35.00; AR-22 rotor, \$15.00. David Pollock, 44 Wicks Lane, Malverne, N.Y. 11565.

SELL OR Trade: B.T.I. LK-2000, \$475.00; 30L-1, \$325.00; TAXB, AC warranty cards, \$410.00; KWM-2, PM-2, \$710.00; HW-100 HP-23, \$280. Deduct 5% if no trade, Don Payne, RAID, P.O. Box 525, Springfield, Tennessee 37172. Tel. times a.c. (615)-384-5643.

ATWATER-Kent: Retired former employee will purchase early A-K parts and battery operated sers. "Breadboard" types or Models 19, 21 and 24. Frank Atlee, K4PI, 92-31st Ave., St. Pete Beach, Fla. 33706.

RANGER II must go. No first reasonable offer refused. You pay shipping. Condition very good. Contact W8OE, 3624 Risher Road, Youngstown, Ohio 44511.

WANTED: Mechanical filters for 75A4, K4HNA/8, West Liberty College, West Virginia 26074.

COLLINS 2-9 MHz transceiver 95 w. AM/CW ARC-2, \$80.00, Jerry Malone, W0MII/1, 27 Maple, Cambridge, Mass. 02139.

FOR Sale: HW-17, converted to HW-17A, \$95.00. HW-12 in vint condx, \$80.00. HP-23 supply, \$30.00. Ronald Ottman, 1670 Ottman Ave., Red Bluff, California 96080.

SELL: Pair PL-5122's and pair 4-400's, like new, \$10.00 per tube, K6PTC.

QSTS. Sell 1947 thru November 1961. Best offer! F.o.b. Vaughn Layman, W9ACV, 1228 Oakridge, South Bend, Indiana 46617.

SELL: NCX-3 transceiver, NCXA A.C. supply, XCU calibrator, \$175.00. Heathkit DX-20, \$25.00. Byron Looney, K6FI, 7823 Nardian Way, Los Angeles, California 90045.

HEATHKITS: For sale—SB-10 Sideband Adapter, \$55.00; DX-60, \$45.00; HR-10, \$45.00; HG-10, \$25.00. Please send your tel. with adr. to discuss shipping and condition. Richard Van Hooft, WB2MBI, 57 Fuller Road, Albany, New York 12203.

GENERAL Radio 1216A amplifier, \$90.00. Stephen Heider, 326 University Ave., Buffalo, New York 14223.

CRYSTALS Airmailed: Fast service from Mid-America Novice .03% all bands any frequency \$1.50. MARS Marine, SSB, Nets, CD —, Custom finished cgh stabilized FT-243 .01%, any kilocycle or fraction, \$500—8600 kilocycles \$1.90. (five or more this range \$1.75). (nets, ten same frequency \$1.45). 1700-3499 and 8601—30,000 \$2.95, overtones above 10,000, 10,001 to 13,500 fundamentals \$2.95. Add 50¢ each for .005%. Add 75¢ for HC-6/u hermetic miniatures above 2000, 450-460 kilocycles, FT-243 \$2.95. Singles, groups for QST, all other construction articles. Be specific. Free order-bulletin. Crystals since 1933. (mailing 10¢/crystal, surface 6¢. C-W Crystals, Marshfield, Missouri, 65706.

HEATH HX-10 transmitter. Immaculate, newly realigned, litro used, 65 pounds of versatility, 180W SSB, CW, FSK, 75W AM, Stable VFO, all xtals including band edge markers, manual, \$165.00. Heath SB-400 1/2 transmitter, spotless, realigned with new tubes. Modified to 401 with front panel LMO selection switch for transceiving with 300/301 (Main difference between 400 and 401) crystal pack, manual, \$250.00. W2UPC, Tel: 201-334-4163.

SELLING: Swan 250, 117 XC-AC supply, VOX, 100 KC calibrator, \$325.00; Gonset 6M Sidewinder 910B, w/AC supply, \$250.00; Gonset 6M Communicator III, \$130.00; Gonset 6M Communicator IV, \$155.00; Gonset VHF VFO  $\pm$ 3357, \$50.00; Heathkit HR-10 Ham Band receiver, \$60.00; Heathkit phone patch, \$20.00; Knight 6M Linear T-175 (new), \$75.00; Globe King 500A (500W AM/CW transmitter), \$150.00; Hallcrafters SX-71 General Coverage receiver, \$90.00; Knight T-60 (AM/CW transmitter) 6-80M, \$30.00. All equipment is in excellent electrical and physical condition with manuals. F.o.b. Thomas Dittrich, WB2LZD, 249 Meadow Lane, Vestal, New York 13850.

CLEGG Zeus 6 & 2 mtr. transmitter, \$250.00; Clegg Interceptor B receiver with all-band adapter, \$250.00; Clegg 22'er, \$135.00; Heath Apache IX-1 with SSB adapter, \$100.00; Gonset GPP-11 phone patch, \$15.00; Dumont 30W scope, \$75.00; Gonset 3963 200 watt 2-meter linear amp., \$75.00; D-104 mike, \$10.00; Tecraft 2-meter converter, \$15.00; 300-watt constant voltage 110 VAC power supply, \$25.00; 60 ft. self supporting tower with Hy-Gain Long John 6 & 2 meter beams, TR-44 rotor, cable, etc. \$150.00; 3000 volt 800 Ma. power supply, \$45.00; 20 amp. Variac, \$25.00; 833A triode with socket, new, \$10.00; Radio Specialties FM 156 Mescoy, 1 watt walkie-talkie \$35.00, WB2RIP, 29 Tyler St., Sparta, N.J. 07871.

SELLING: Gonset 6M converter, \$25.00; Globe DS3-100, \$35.00; Hallcrafters R-44/ARR-5 receiver 28-146 mcagcycle w/AC supply, \$75.00; 12V 250 W inverter, \$35.00; Tecraft 6M converter w/p.s., 11 mcagcycle I.F. \$35.00; Globe VFO V-10 6-160 M. \$35.00. F.o.b. Ameco PT preamp and Ameco 6M converter, CN-50W w/p.s., 28-32 mcagcycle I.F. Both in factory-sealed cartons, \$53.00 each. Marilyn Carlson, 605 Broad St., Endicott, New York 13760.

LAFAYETTE HA-350, mint condition, \$110.00; Knight T-150, built-in VFO, low-pass filter, \$65.00. DK-60-XR relay, \$10.00. Tom Wood, 24 Roxbury Road, Port Washington, N.Y. 11050. Tel: (516)-767-4461.

SALE: Ranger II with PTT, \$150.00; HO-170C, \$145.00. Both in new condx w/exclnt calibration. K1VMT, Herb Galloway, 46 Oak Hill Dr., Arlington, Mass. 02174. Tel: (617)-648-5474.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info, contact Al Marcy, W4ID, Secretary, 461 Third Ave., Eau Gallie, Fla. 32937.

SELL: Swan 350, 117-C power supply, in exlnt condx, W8IBX/2, 27 Riverside Dr., Deenville, N.J. 07834.

FOR Sale: Hallcrafters SR-400 transceiver with matching A.C. absolutely mint, used only two months. Freight paid in U.S.A. to first check for \$585.00, Jack Yeoman, W8VHY, R #4, Washington, C.H., Ohio 43160.

COMPACT 6-meter mobile, 65-watts, everything included from mike to ant., trade for HW-12A or 995.00, W2OC (W2MXJ), Armonk, N.Y. 10504. Tel: 914-273-3058.

USED Vidicon—RCA, G-E, 7038, 7735A, 6326, etc. Good picture. Only \$11.00 each, WB4HNM, Edward Dauer, 1109 Hardee Road, Coral Gables, Florida 33146.

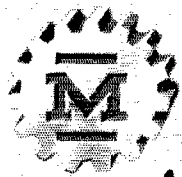
DRAKE T4X R4 MS4 AC4 extra crystals for WWV 160 10 CW perfect, \$625.00. Also Ranger I, like new, \$80.00. New HW-16 transceiver, \$100, W9AO, Ed Heubach, 216 Edgewood, Morton, Ill. 61550.

K2GX1 changing QTH. First reasonable offer takes these 4 year old Telrex beams, presently mounted on 112 ft. Big Bertha mast: 10M636, 15M532, 20M536, 40M346. Bertha and rotor also for sale, make offer. Dow D-K-71 coaxial antenna switch, brand new, never used, \$55.00; Central Electronics 100V plus matching scope, like new, \$395, \$50.00. Two 75A-48, serial No. 473, \$295.00; Serial No. 4773 (3 filters), \$395.00. This DX Hideaway on 2 acre hilltop, 30 minutes from Buffalo for sale under \$14,000. Includes custom 5 room log cabin, and antenna installation. Sommerfelt, K2-GXI, 120 Yorktown Road, Buffalo, N.Y. 14226. Tel: a.c. (716)-839-3335.

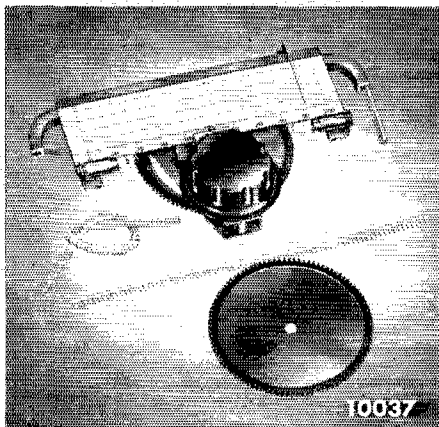
FOR Sale: Drake R-4A for \$300; Heathkit SB-200 in mint condition for \$200. James Trennepohl, 8836 Hunting Lane, Apt. 101, Laurel, Md. 20810.



# Designed for



# Application



## NO-STRING DIAL

No strings; no pulleys; no back lash; no flimsy assembly. The No. 10037 is a sturdy mechanically engineered "Designed for Application" dial assembly which completely eliminates the annoyances of string-driven pointers, eliminates all indicator stutter or wobble and provides positive pointer travel and resetability. The pointer is driven positively by a flexible but non-elastic molded gear driven rack which cannot slip, break or fall off a pulley. The geared flexible rack rides in a multi-slot extruded aluminum channel. This girder-like extruded piece provides mechanical rigidity to the assembly. Furnished complete with panel trim bezel and flexible coupling for output shaft.

## JAMES MILLEN MFG. CO., INC.

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MASSACHUSETTS

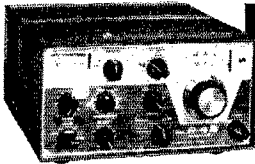


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## DRAKE FINEST 4 LINE



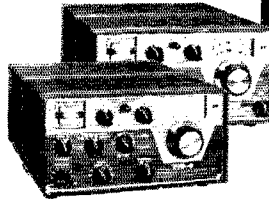
Amateur Net \$430.00

### R-4B Receiver

- Permeability-tuned VFO reads to 1 kHz
- Crystals cover all of 80, 40, 20, 15 mtrs. and part of 10
- Ten 500 kHz accessory ranges (1.5-30 MHz)
- Four bandwidths
- Passband tuning
- Noise Blanker on CW-SSB-AM, Notch Filter, Xtal Cal

## DRAKE SIDEBAND TRANSCEIVERS

### TR-4 & TR-6



TR-4 OR TR-6 \$599.95

**BOTH** have Linear VFO, 1 kHz acc, 300W PEP-SSB, Semi Break-in CW with Sidetone, VOX or PTT, Adjustable Pi-Net, Plate and AGC Mtrs.

TR-4 covers 10-80 meters: USB/LSB, CW, AM; TR-6 tunes 6M plus MARS with 9 xtals (2 furn), USB-CW-AM.

**RECEIVERS:** Sensitivity for 10 dB S/N: TR-4 .5  $\mu$ V, TR-6 .1  $\mu$ V (FET front end) **Selectivity:** Both 2.1 kHz @ 6 dB, TR-4 3.6 kHz @ 60 dB. **BOTH** have diode & prod detectors, S-meter.

### T-4XB Transmitter

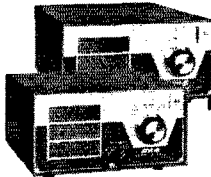
Frequency coverage and VFO similar to R-4B • USB/LSB • Semi Break-in CW • Controlled Carrier AM • VOX or PTT • Adjustable Pi-Net • Xmit AGC, no flat topping • 200 watts • 8 pole SB Filters



\$449.00

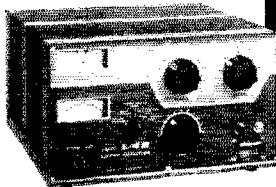
Transceive with R-4B or T-4XB VFO or use separately.

### RV-4 & RV-6 REMOTE VFO's



Permit rcvg, xmtg or xcvg on separate freq in same range as transceiver.

RV-4 OR RV-6 \$99.95



Amateur Net \$750.00

### L-4B Linear Amplifier

- 2000W PEP-SSB, 1000W AM, CW, RTTY • Class B Gnd Grid • Broad Band Tuned Input • RF Neg Feedback
- Xmit AGC • Directional Wattmeter • Iaut-band Meters • Plate Current Meter meets FCC reg • Quiet hi-volume blower.

Incl. sep. sol-st. Power Supply

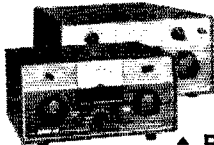
### TRANSCEIVER ACCESSORIES

- MMK-3 Mobile Mounting Kit... \$ 6.96
- Power Supplies: AC-4..... \$ 99.95
- DC-4..... \$125.00
- DC-24..... \$210.00
- MS-4 Matching Speaker..... \$ 19.95
- FF-1 Fixed Freq. Adapter..... \$ 24.50
- MC-4 Mobile Spkr/Wattmeter..... \$ 69.00
- 34-NB Noise Blanker Kit for TR-4..... \$129.00



MC-4

## DRAKE 4 LINE ACCESSORIES



### Matching Networks

Integral Wattmeter: fwd pwr in watts and VSWR direct • Can read refl pwr • Matches xmt to ant VSWR 5:1  
 MN-4 ..... 200 watts ..... \$ 90.00  
 MN-2000 2000 watts PEP ..... \$175.00

### RF Wattmeters

Fwd and refl pwr directly in watts • Two scales each direction • Calib Acc:  $\pm$  (5% of reading + 1% of full scale)

Model	Range	Full Scale	Price
W-4	1.8-54 MHz	200/2000W	\$49.50
WV-4	20-200 MHz	100/1000W	\$73.50

### Matching Speaker MS-4

5"x7" speaker, space for power supply \$19.95

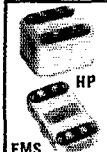
### Cardioid Mike

60-8000 Hz, ceramic, Hi-Z, highly directional, plug...  
 Model 729-SRD ..... \$17.00  
 Standard Crystals, ea \$ 5.00  
 Power Supply AC-4... \$99.95



### DRAKE TVI FILTERS

- TV-300-HP High Pass Filter..... \$ 4.50
- TV-100-LP Low Pass Filter..... 16.95
- HP TV-100-LP Low Pass Filter..... 5.95
- TV-CB-LP Citizens Band..... 6.95
- TV-300-FMS FM Band Stop..... 4.50
- TV-300-FMI FM Tuneable..... 4.50
- LN-4 Power Line Filter..... 7.30



**T-4B Transmitter** • Like T-4XB except use with R-4B in Xcv mode or from 10 accessory crystals • Built-in speaker for R-4B • \$395.00  
**TR-4AB Communications Station** • Consists of R-4B and T-4B in same cabinet • Less power supply and crystals ..... \$850.00

## HAMS SAY... "Best Receiver buy since the 2-B"



### 2-C Receiver

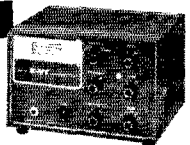
- Xtal control 1st converter • 500 kHz Ranges: 80, 40, 20, 15, 10 meters
- Accessory Ranges 3-30 MHz • SSB-AM-CW • Accessories: Spkr, Q-Mult, Calib, Noise Blanker, Xtals.

Amateur Net \$229.00

### CW Transmitter 2-NT

- 100 (or 75) watts • Break-in CW with 2-C • 80, 40, 20, 15, 10 mtrs xtal controlled • Ant. Relay • Sidetone • LP Filter • Pwr. Sup. incl.

Amateur Net \$149.00



## DRAKE 2 and 6 Meter CONVERTERS



### For Receivers

FET, Lo Noise, Uniform Gain, Low Spurious Response  
 6 meters—SC-6.....\$64.50  
 2 meters—SC-2.....\$68.00  
 Power Supply CPS-1 \$17.95  
 VHF Xtal Cal SCC-1 \$24.50  
 Console..... CC-1 \$24.50

### Transmitting Converters

- TC-2 • Entire 2-meter band • 180 watt input
- TC-6 • All of 6-meter band • 300 watt input

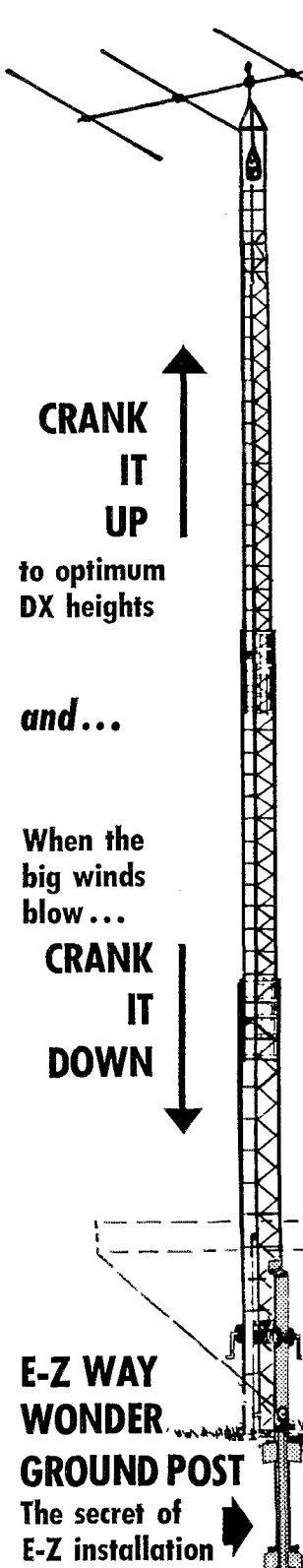
**BOTH:** • Xmit AGC—no flat top • Antenna Relay • Need no separate pwr supply with Drake xmters. TC-2 \$300.00; TC-6 \$250.00



**SPR-4 PROGRAMABLE RECEIVER** • All solid state • 1 kHz acc. dial • 3 bandwidths • SSB-AM-CW • 24 500 kHz ranges 150 kHz 30 MHz (10 ranges furn., others \$5 ea.) • 12 VDC/120 VAC • Access avail: Calib, Noise Blanker, Notch. ....\$350.00

... at your distributor or write:

Dept. 199 • R. L. DRAKE COMPANY • 540 Richard St., Miamisburg, Ohio 45342



## WANT MORE FOR YOUR MONEY?

Unless you're trying for inter-planetary communication, you'll get more and better DX if your beam can be elevated to its optimum height for each band.

Any beam, as it is raised to different heights above electrical ground, goes thru changes in impedance of as much as  $\pm 30\%$ . Its angle of radiation likewise shifts significantly. At optimum (not necessarily highest) elevation you get best impedance match with lowest angle of radiation. This puts more of your precious RF power into the long DX path!

With an E-Z WAY Crank-up tower you can easily set your beam at the best height for maximum signals.

And with E-Z WAY, it's E-Z all the way! Exclusive "Wonder Ground Post" makes installation E-Z (no concrete nor guy wires needed)! Pre-assembled construction makes erection real quick and E-Z! Tilt-Over feature, with geared winch, makes on-the-ground installation and maintenance of beam and rotator E-Z and safe!

And Harrison makes it E-Z for you to own! Just tell me which E-Z WAY tower, and what beam, rotator, etc. you want to get. I'll send you technical literature and low, low prices.

73 *Bil Harrison* W2AVA

**CRANK  
IT  
UP**  
to optimum  
DX heights

and...

When the  
big winds  
blow...

**CRANK  
IT  
DOWN**

**HARRISON IS  
NATIONAL HQ FOR**

## E-Z WAY TOWERS

Complete with Wonder Ground Post mount, two geared winches, safety stop locks, rotor head top with thrust/lateral bearings, mast and coupling (to take CDR rotators). Hot dip galvanized for long life.

**FREIGHT PAID to any of 48 USA.**

TYPE	ANTENNA HEIGHTS	*WIND LOAD	HAM NET
HD†	26 to 60 Ft.	14.0	\$838.50
STD†	26 to 60 Ft.	11.0	596.50
HD	32 to 52 Ft.	28.8	571.50
STD	30 to 51 Ft.	12.0	438.00
HD	27 to 42 Ft.	33.5	503.50
STD	25 to 41 Ft.	12.0	320.00

For safe,  
on-the-ground  
access to beam  
and rotator.

\*Antenna sq. ft. for 50 MPH winds, full up;  
100 MPH when down.  
† Three section; others two.

### WANT TO CHARGE IT?

Just mention your:  
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Account Numbers

**E-Z WAY  
WONDER  
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The secret of  
E-Z installation  
**NO CONCRETE!**

**Harrison**

"HAM HEADQUARTERS, USA"®

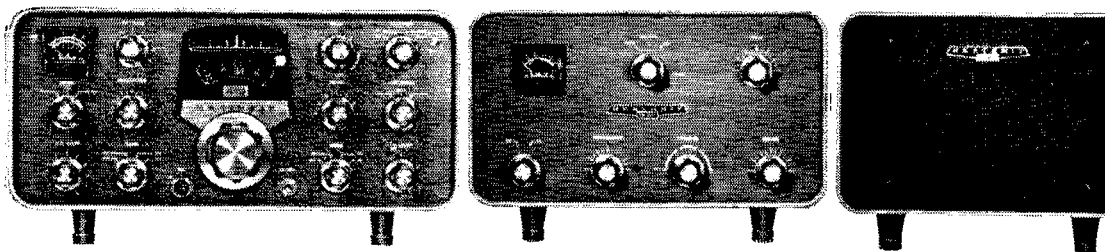
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# The Complete VHF Ham Uses



## Heathkit® SB-110A & SB-500

VHF Is Where The Action Is These Days ... Moonbounce, long-haul DX, more efficient antenna designs ... and a whole lot less QRM. And whether you're a serious VHF'er or an 80 through 10 man just starting to discover 6 and 2, Heath has the gear you need to go first class ... the SB-110A — the 6 meter SSB /CW Trans-

ceiver that puts thousands of hams on 6 ... and the SB-500 — the new 2 meter Transverter that gives more sideband and CW capability on 2. Check the features and specs below ... and be convinced that when you go to the high bands, go with the SB gear from the Hams at Heath.

• SB-110A covers 50 to 52 MHz with crystals supplied ... total coverage 49.5 to 54 MHz • Same Heath Linear Master Oscillator as used in SB-101 for exact frequency control • Switch selection of Upper Sideband/Lower Sideband/CW • 180 watts PEP SSB input — 150 watts CW input • Features same high quality crystal lattice filter as used in Heath SB-101 • Operates PTT or VOX • Separate offset CW carrier crystal for pure, clean CW note • Automatic Level Control helps prevent overdriving and distortion • Automatic Noise Limiter • Built-in 100 kHz calibrator • Built-in Antenna Switching • One kHz dial calibrations — bandwidth equal to ten feet per megahertz • Three oscillator modes aid CW, cross-mode or split frequency — LMO-controlled transmit and receive, crystal-controlled transmit and receive and crystal-controlled transmit with variable-tuning receive • Fast, easy assembly  
Kit SB-110A, 6 M Transceiver, 23 lbs. .... \$299.00\*  
HP-23A, AC Power Supply, 19 lbs. .... \$51.95\*

• SB-500 covers complete 2 meter amateur band when used with SB-110A having a full complement of crystals • Tunes 144 to 146 MHz when used with SB-101, SB-301, SB-401 combination and HW-100 • 140 watts PEP input • 50 watts output for a really big signal on "two" • Highly sensitive receiver — 0.2 uV for 10 dB S+N/N for solid copy QSO's • Fast, easy, exact tuning • Uses a pair of inexpensive 6146's in AB1 configuration in the final • Driving unit supplies final plate voltage ... all other operating voltages come from built-in, very stable supply — no extra outboard supply to buy • Supplies ALC voltage to driver to prevent flat-topping • Reliable, relay-controlled T/R switching • No cable changing necessary to go from lower band gear to 2-meters — internal relays do it all by just turning the SB-500 on • Built-in meter monitors plate current or relative power • Built-in 1 MHz crystal calibrator • SB-Series styling  
Kit SB-500, 2 M Transverter, 19 lbs. .... \$179.95\*  
Kit SB-600, Station Speaker, 6 lbs. .... \$19.95\*

**PARTIAL SB-110A SPECIFICATIONS — RECEIVER SECTION:** Sensitivity: 0.1 uV for 10 dB signal-plus-noise to noise ratio. Selectivity: 2.1 kHz @ 6 dB down, 5 kHz max. @ 60 dB down. Image rejection: 50 dB or better. IF rejection: 50 dB or better. Audio output power: 1 watt. AGC characteristics: Audio output level varies less than 12 dB for 50 dB change of input signal level (0.5 uV to 150 uV). **TRANSMITTER SECTION:** DC power input: SSB, 180 watts PEP; CW, 150 watts. RF power output: SSB, 100 watts PEP; CW, 90 watts (50 ohm non-reactive load). Output impedance: 50 ohm nominal with not more than 2:1 SWR. Carrier suppression: 55 dB down from rated output. Unwanted sideband suppression: 55 dB down from rated output @ 1000 Hz & higher. Distortion products: 30 dB down from rated PEP output. Hum & noise: 40 dB or better below rated carrier. **Keying characteristics:** VOX operated from keyed tone using grid-block keying. **GENERAL:** Frequency coverage: 49.5 to 54.0 MHz in 500 kHz segments (50.0 to 52.0 MHz with crystals supplied). Frequency selection: Built-in LMO or crystal control. Frequency stability: Less than 100 Hz drift per hour after 20 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% supply voltage variations. Dial Accuracy: Electrical, within 400 Hz on all band segments, after calibration at nearest 100 kHz point. Visual, within 200 Hz. Dial backlash: No more than 50 Hz. Calibration: Every 100 kHz. Power requirements: High voltage, +700 v. DC @ 250 ma. with 1% max. ripple. Low voltage, +250 v. DC @ 100 ma with .05% max. ripple. Bias voltage, -115v. DC @ 10 ma with .5% max. ripple. Filament voltage, 12.6 v. AC/DC @ 4.355 amps. Dimensions: 14 1/2" W x 6 1/2" H x 13 3/4" D.

**SB-500 SPECIFICATIONS — RECEIVER —** Sensitivity: 0.2 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. Spurious Response: All are below 0.1 microvolt equivalent signal input, except a 145.390 MHz (50 MHz IF only). Antenna Input Impedance: 50 ohm unbalanced. **TRANSMITTER — DC Power Input:** 140 watts PEP. Power Output: 50 watts (50% duty cycle). Output Impedance: 50 ohm with less than 2:1 SWR. **GENERAL — Frequency Range:** Any 2 MHz Segment between 144 and 146 MHz into 50 MHz or 28 MHz tuned IF. **Mode of Operation:** SSB or CW only. **Power Requirements:** (1) 120/240 VAC, 50/60 Hz at 82 watts (internal). (2) 700 to 800 VDC at 200 mA (from driving unit) **Fuse:** 3/4 ampere slow-blow for 120 VAC (formerly 3AG); 1/2 ampere slow-blow for 240 VAC. **Front Panel Controls:** Meter-calibrate switch, final tuning, off-on (function) switch, preselector, final loading, driver tuning. **Chassis Controls:** Relative power adjust & bias adjust. **Rear Apron Connectors:** RF output, ALC, linear relay, relay, drive, power plug, low f receiver, low f antenna, fuseholder. **Tube Complement:** 6CB6 transmitter mixer, 6CB6 crystal calibrator; 6DS4 receiver RF amplifier, 6DS4 receiver mixer, 12GN7 transmitter RF amplifier, (2) 6146 final amplifiers, (types 6146A or 6146B may be directly substituted), 7059 heterodyne oscillator amplifier, 8156 RF driver, OA2 voltage regulator. **Diode Complement:** 5 silicon diodes, 750 mA, 500 PIV; 3 in power supply, 2 in ALC. 1 Germanium diode, 1N191; REL PWR. **Cabinet Dimensions:** 12 1/4" wide x 6 1/2" high x 13" deep. **Overall Dimensions:** 12 1/2" wide x 7-15/16" high x 14" deep including knobs and feet. **Net weight:** 14 1/2 pounds.



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Benton Harbor, Michigan 49022



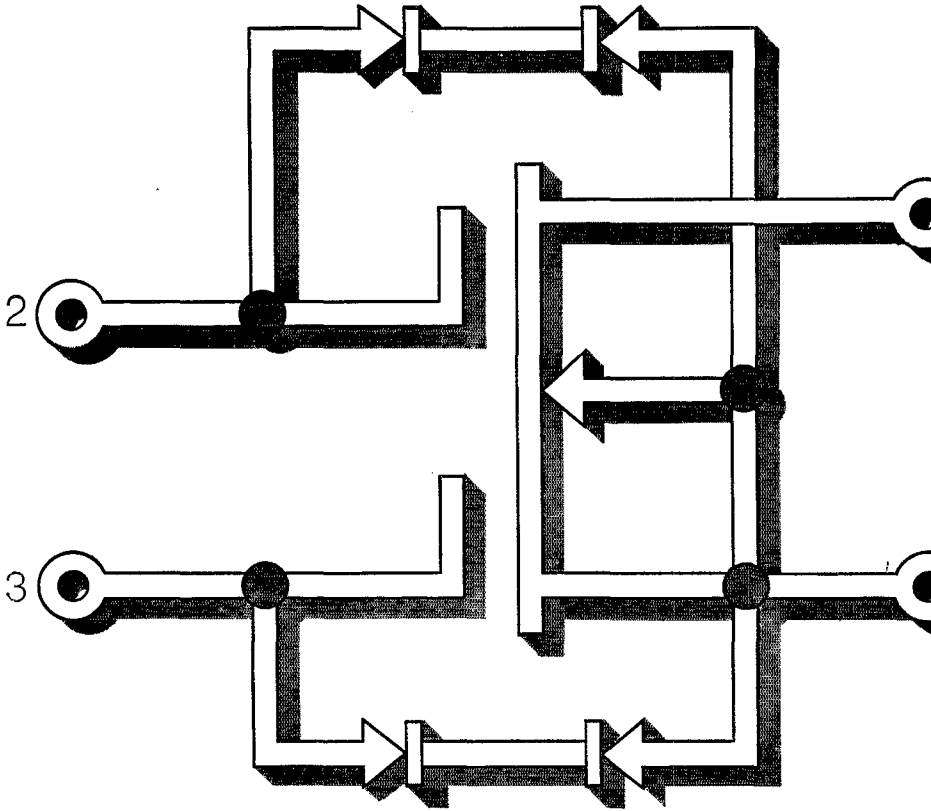
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