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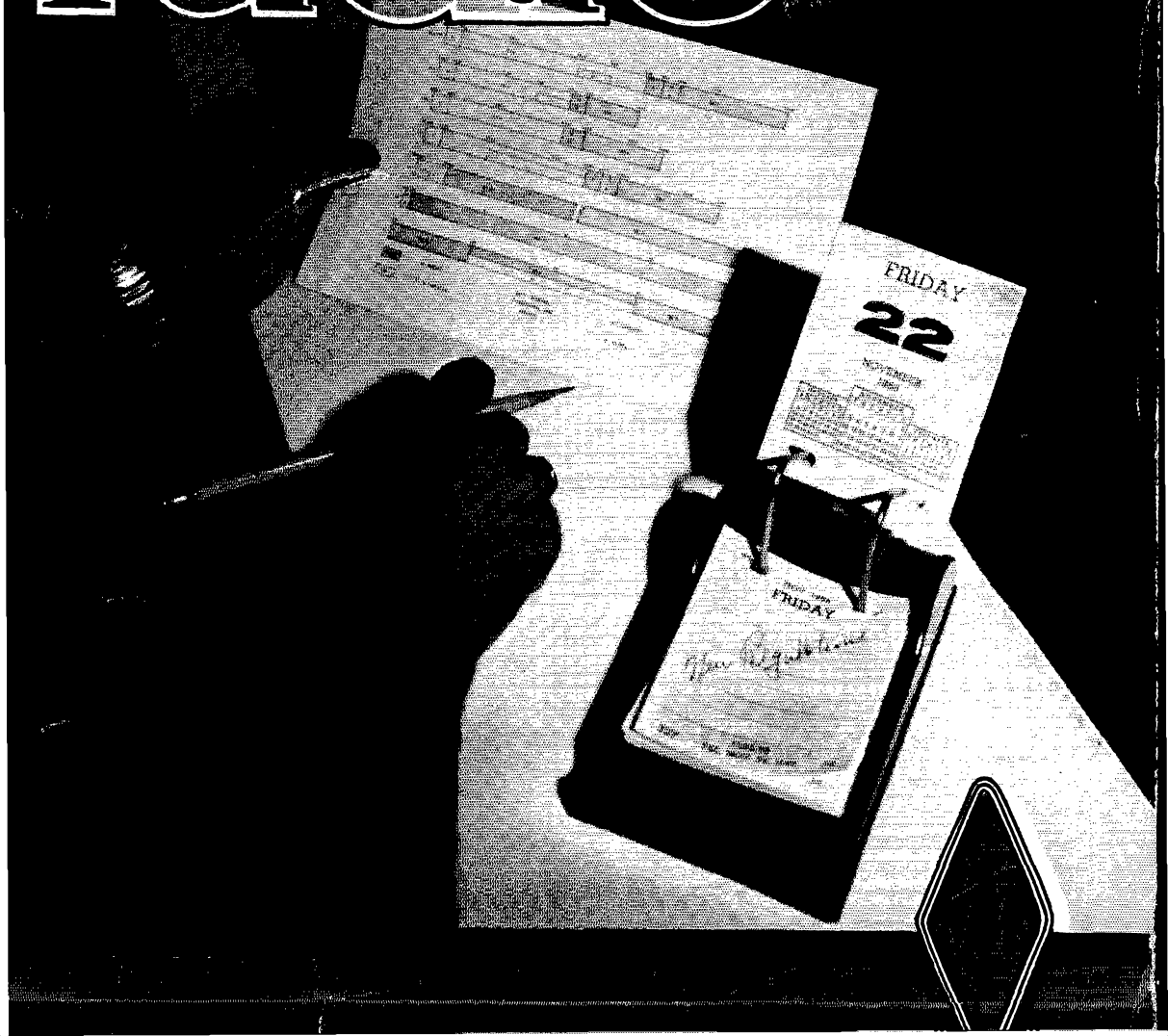
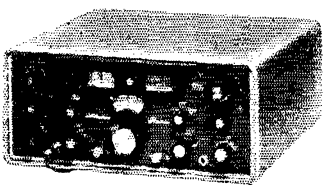


When Hallicrafters says "dual receive" we mean SIMULTANEOUSLY! SIMULTANEOUSLY!

That's right—*simultaneous dual receive!* Unlike any other transceiver/VFO combination, the SR-400 Cyclone and HA-20 VFO lets you "Double-Team" the competition in any DX contest. You can "Band-Scan" for a second contact while you are working another. You can set VFO's on two separate DX stations, receive both simultaneously, and be instantly ready to "Tail-End" on either station. And of course, Hallicrafters' winning performance features don't stop here. Get in front of this rig and you'll know. Hallicrafters has built another "great one" in the fine tradition of the HT-32 and HT-37.



PS: Want simultaneous dual receive with 2 KW on SSB? Put an SR-2000 in your shack.

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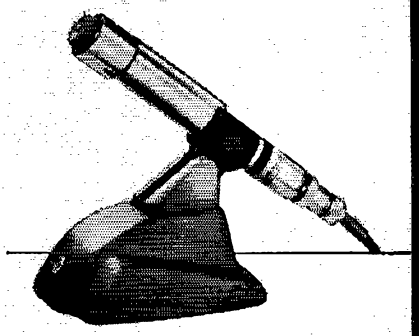

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The backbone of the Electro-Voice Model 676 is no mere decoration. It's visible proof of the most exciting idea in directional microphones—Continuously Variable-D (CV-D)™.

Here's how it works. We attach a very special tapered tube to the back of the microphone element. This tube automatically varies in effective length with frequency. It's a long tube for lows—a short tube for highs. All this with no moving parts! The tube is always optimum length to most effectively cancel sound arriving from the back of the microphone, regardless of frequency.

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Long life and peak-free response are guaranteed by the exclusive E-V Acoustalloy® diaphragm. And the 676 has unusually high output for a microphone so small. Of course you get both 150-ohm and Hi-Z outputs, plus high efficiency dust, pop, and magnetic filters—indeed, all of the hallmarks of Electro-Voice design that have made E-V a leader for years.

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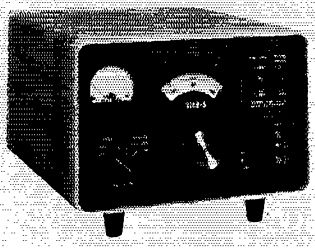
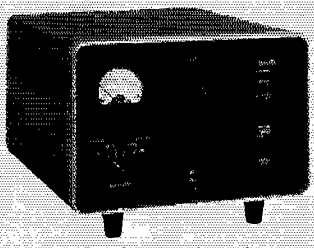
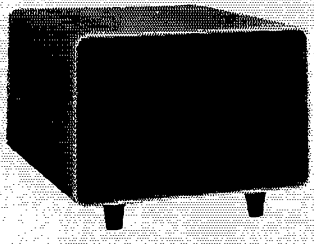


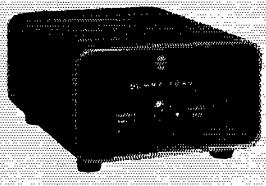
312B-5 VFO Console



312B-4 Speaker Console



516F-2 AC Power Supply



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COLLINS

QST

NOVEMBER 1968

VOLUME LII NUMBER 11

PUBLISHED MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE INC., NEWINGTON, CONN., U. S. A. OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

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OUR COVER

Tear out the chart on p. 64A for easy reference on the new regs effective November 22.

—CONTENTS—

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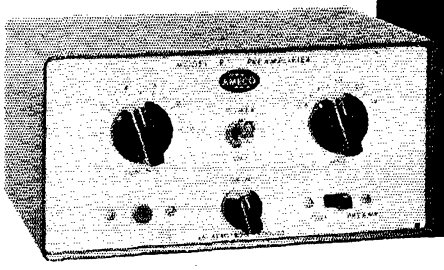

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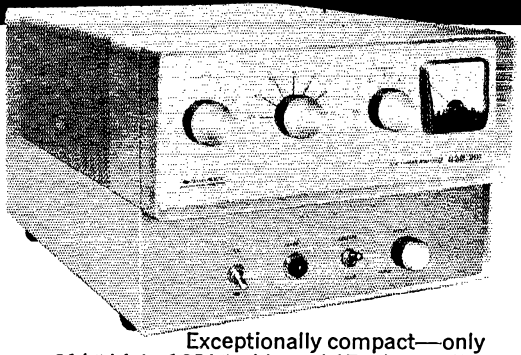

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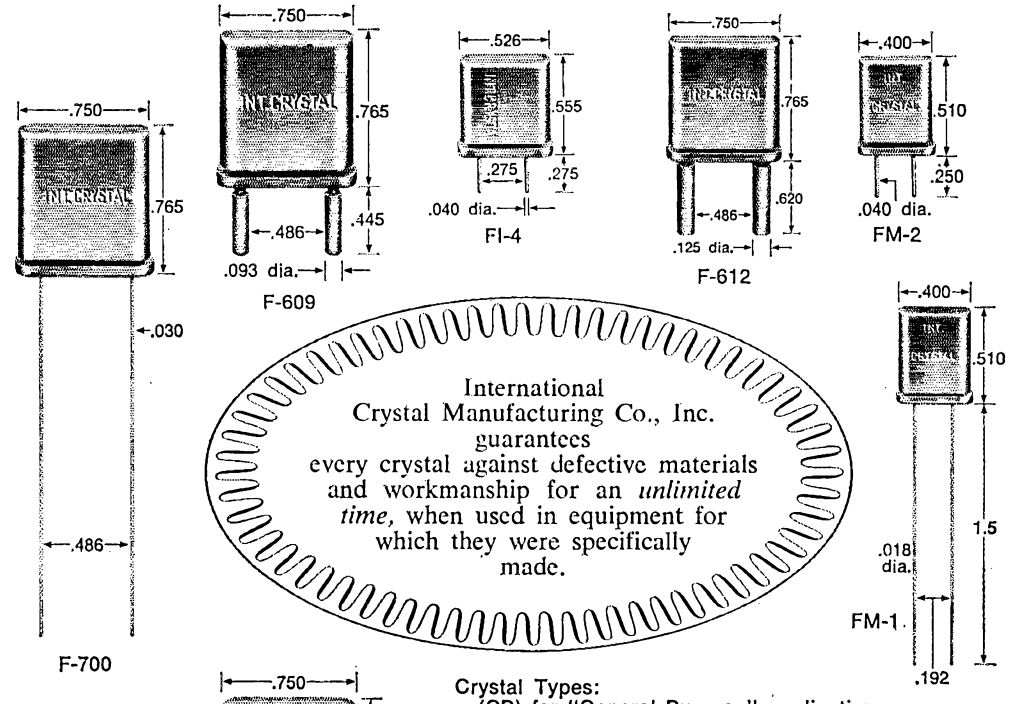

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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On this date in 1906, the International Radio Conference meeting in Berlin adopted "SOS" as the international distress signal.

On this date in 1930 radio fans in England heard their first football game by means of a transatlantic broadcast.

On this date in 1935 the China Clipper left on the first official transpacific airmail flight.

And on this date in 1968 amateur radio returns to a system of incentive licensing which was abandoned some fifteen years ago.

We're sure that none of the November 22 historical events occurred without a lot of work and perhaps a few false starts. There certainly has been a lot of work expended in getting incentive licensing back into the amateur radio picture, but let's hope that there are as few false starts as possible when November 22 rolls around.

We must emphasize again that incentive licensing is not new to amateur radio, but because it was in limbo so long it is new to many present-day amateurs. Thus, in effect, we are entering a new era. We are entering an era where there will be divided bands. Small segments are being set aside, in the first step, for exclusive use by holders of the higher classes of license. The basic philosophy behind this system of incentive licensing is to provide a challenge, and added satisfaction for the individual amateur.

With greater skills, the amateur service as a whole will better demonstrate its worth as one of the thirty-eight services competing for spectrum space, and will thus have a better chance of continuing government support for retention of present amateur frequency allocations at any future frequency conference.

Incentive licensing will work best if, in the months ahead, the segments reserved for the Extra and Advanced Class operators show greater and greater occupancy. You can bet that the amateur fraternity as a whole and the FCC staff will be keeping a watchful eye on those segments to see what activity takes place, and to note the growth trends.

You can also bet that the FCC's monitoring stations will be keeping an ear on these new band segments to check unauthorized operation. As originally proposed, the various classes of license were to have distinctive call signs, and it would have been easy to spot a non-Extra working in an Extra segment. But the Commission abandoned the concept of distinctive call signs, and such transgressions, whether deliberate or accidental, will be slightly more difficult to spot. However, each FCC monitoring station has access to central FCC records giving the operator class of each licensee. In addition there is the wide availability of the *Radio Amateur Call Book Magazine*, which shows the license class of each listed amateur. We can thus accomplish a considerable amount of "policing" on our own—remembering, of course, that there can be errors in the *Callbook*.

What happens on November 22 will not, alone and of itself, be the basis for judging the wisdom of returning to the tried-and-true course; it will take some months of experience and evaluation to conclude with any assurance that the program is or is not working. But it is the kickoff date—as notable as the happy November 15, 1945, postwar return of the first ham bands.

We have returned to incentive licensing as one of a number of ways to strengthen amateur radio and give a renewed sense of accomplishment. November 22, 1968, is an important date—we believe it will become in retrospect a good day for us all. QST

League Lines . . .

The magic number this month is twenty (20) -- not meters, but kc./kHz from the low end of each band or subband for new W1AW code-practice and bulletin frequencies. Same times, same station, but effective October 27 with the return of standard time the spots to listen for voice bulletins are 1820, 3820, 7220, 14220, 21270, 28520, 50120 and 144120; for c.w. bulletins and code practice, 1820, 3520, 7020, 14020, 21020, 28020, 50020 and 144120. No change for RTTY, or for general ragchewing freqs.

By the time you read this, lapel pins for 25 and 50 years of continuous membership will have been mailed to more than 500 on our roster. Likewise, lapel pins are being mailed to all Life Members -- about the same number. Sorry for the delay, gang, but production of anything seems to take much longer these days than anticipated.

Hope you like the handy-dandy tearout chart, page 64A, to place on the shack wall or under the desk glass as an easy reference on the new regs. We'll probably have another one next year with the 1969-effective rules similarly charted.

One thing to note -- c.w. in the new restricted voice segments is limited to the proper license class; this differs from the years-ago system of incentive licensing where c.w. by any ham was legitimate in the old "Class A" bands.

By now all Full Members in the Central, Hudson, New England, Northwestern, Rocky Mountain, Southwestern and West Gulf Divisions should have received ballots in the current director elections. If yours has not arrived, write the Secretary. Be sure to get 'em marked with the candidate of your choice and back to Hq. by November 20 at the latest for the tellers' count.

Two advisory (to the Board and staff) committees are in process of formation -- one on VHF Repeaters, a second on Contests -- to provide new channels for close and effective member-management relationships in League affairs, and to tap additional sources of expertise among the membership. See page 70 for details, and tell us of candidates ideally suited for either group. This is a test project, and its success will encourage the formation of similar committees in other specialty areas.

A number of amateurs regularly provide gift ARRL memberships at Christmastime -- in some cases to young relatives or friends who are budding hams; in others, to handicapped or overseas amateurs. If the idea strikes you favorably but you don't know personally of a suitable recipient, Hq. keeps a list and can allocate your gift to a worthy case.

A recent Army MARS bulletin cites the need for continuing justification by amateurs of present bands, and the objectives of ARRL and IARU in fostering and promoting public service. It ends, "Those who value amateur radio, desire to insure its future and want a strong and capable spokesman will not only join and promote League membership but strive to assist in accomplishing its objectives."

We get "Where's my QST?" complaints from all over, but never from San Rafael, Ca. Maybe it's because WA6AUD is Postmaster!

A Transceiving Converter For "160"

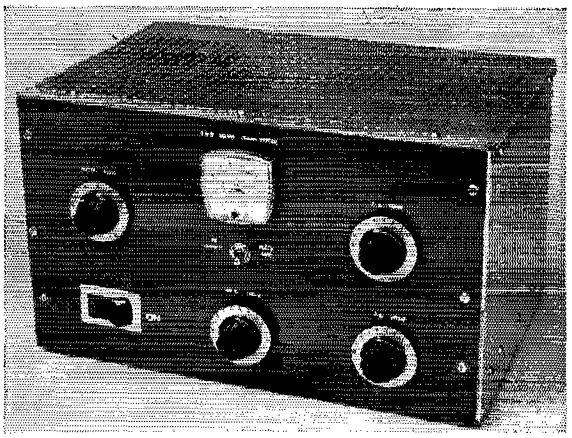
BY DOUG DEMAW,* W1CER

THERE is a good chance that the reader has been wanting to try his hand at "top-band" operation now that the privileges on 1.8 MHz. have been expanded. Also, since s.s.b. operation has become legal on the 160-meter band, existing equipment can be placed in operation to enable the user to visit this interesting band.

For quite some time it has been practical to generate s.s.b. signals in the v.h.f. and u.h.f. regions of the spectrum by using transmitting converters in combination with an existing 14- or 28-MHz. s.s.b. transmitter. The low-band transmitter signal is taken at low power (usually under 5 watts) and mixed with a crystal-controlled oscillator signal to produce the desired *sum* frequency, e.g., a 14-MHz. s.s.b. signal is beat with a crystal-controlled 130-MHz. signal to produce 144-MHz. s.s.b. energy. Getting from the 75-meter band to 1.8 MHz. can be done in a like manner by using the *difference* frequency of a 5800-kHz. crystal-controlled oscillator and that of a 3.8-MHz. s.s.b. transceiver. This combination results in a frequency of 2000 kHz. Moving the transceiver's frequency to 4.0 MHz. results in a difference frequency of 1.8 MHz., the low end of the 160-meter band. This method is used with the simple 3-tube circuit described here. Receiving is handled in the same manner, beating the incoming 1.8-MHz. signal with the 5800-kHz. energy to produce an i.f. of 4 MHz., thus utilizing the 75-meter transceiver's receiver section for listening to the 160-meter signals.

Circuit Data

Looking at the circuit of Fig. 1, V_{1A} operates as a crystal-controlled oscillator to produce a 5800-kHz. local-oscillator signal for transmitting and receiving. This stage operates continuously. Output from V_{1A} is fed to the transmitting mixer, V_{1B}, and to the receiving mixer, V_3. V_{1B} is turned off by means of K_{1C}, the changeover relay, during receive. During transmit, 3.5-MHz. s.s.b. or c.w. energy is supplied to the cathode of V_{1B}, across a 470-ohm resistor. This is mixed with the 5800-kHz. local-oscillator output at V_{1B} and results in a 160-meter signal at the output of V_{1B}. A high-Q tuned circuit couples the mixer output to the grid of the power amplifier, V_2. The 6146B p.a. stage amplifies the 1.8-MHz. signal input power is approximately 35 watts p.e.p.



The transceiving converter is housed in a homemade aluminum cabinet which measures 8 × 8 × 12 inches. Perforated aluminum is used for the top and back sides of the cabinet to assure good ventilation.

During receive the local-oscillator energy is fed to the receiving mixer grid (V_3) and beats with the incoming 160-meter signal to produce a receiving i.f. of 3.5 to 4 MHz., depending upon the dial setting of the 75-meter transceiver. Output from the mixer is routed to the transceiver through K_{1A} and J_1. During transmit, V_3 is turned off by K_{1C}. A double-tuned high-Q input circuit is used at V_3 to reduce images, and to lessen the chances of front-end overload from strong local b.c. stations. A band-pass tuned circuit is used at the output of V_3 to assure that only the desired i.f. signal reaches the input of the 75-meter transceiver.

Straightforward design is used in the power supply. The 6.3- and 5-volt windings of T_1 are series-connected to provide approximately 12 volts for the relay, K_1. They must be phased properly to prevent cancellation of the voltages. If no output is obtained, merely reverse one of the windings. The 12 volts a.c. is rectified by CR_5 to provide d.c. voltage for K_1.

Bias voltage is obtained for V_2 by connecting a small 6.3-volt filament transformer back-to-back fashion with the 6.3-volt winding of T_1. The 125-volt a.c. output from T_2 is rectified and filtered, then routed to R_1, the bias-adjust control. It is set to establish a resting plate current of 25 ma. for V_2.

* Assistant Technical Editor, *QST*.

Getting set up for operation on the 160-meter band is not difficult to do if one already has a s.s.b./c.w. transceiver for the 75-meter band. This article describes an easy-to-build transceiving converter that will work with most commercial transceivers. It has a peak power output of approximately 25 watts and can be used on c.w. and s.s.b. to cover the range from 1.8 to 2.0 MHz.

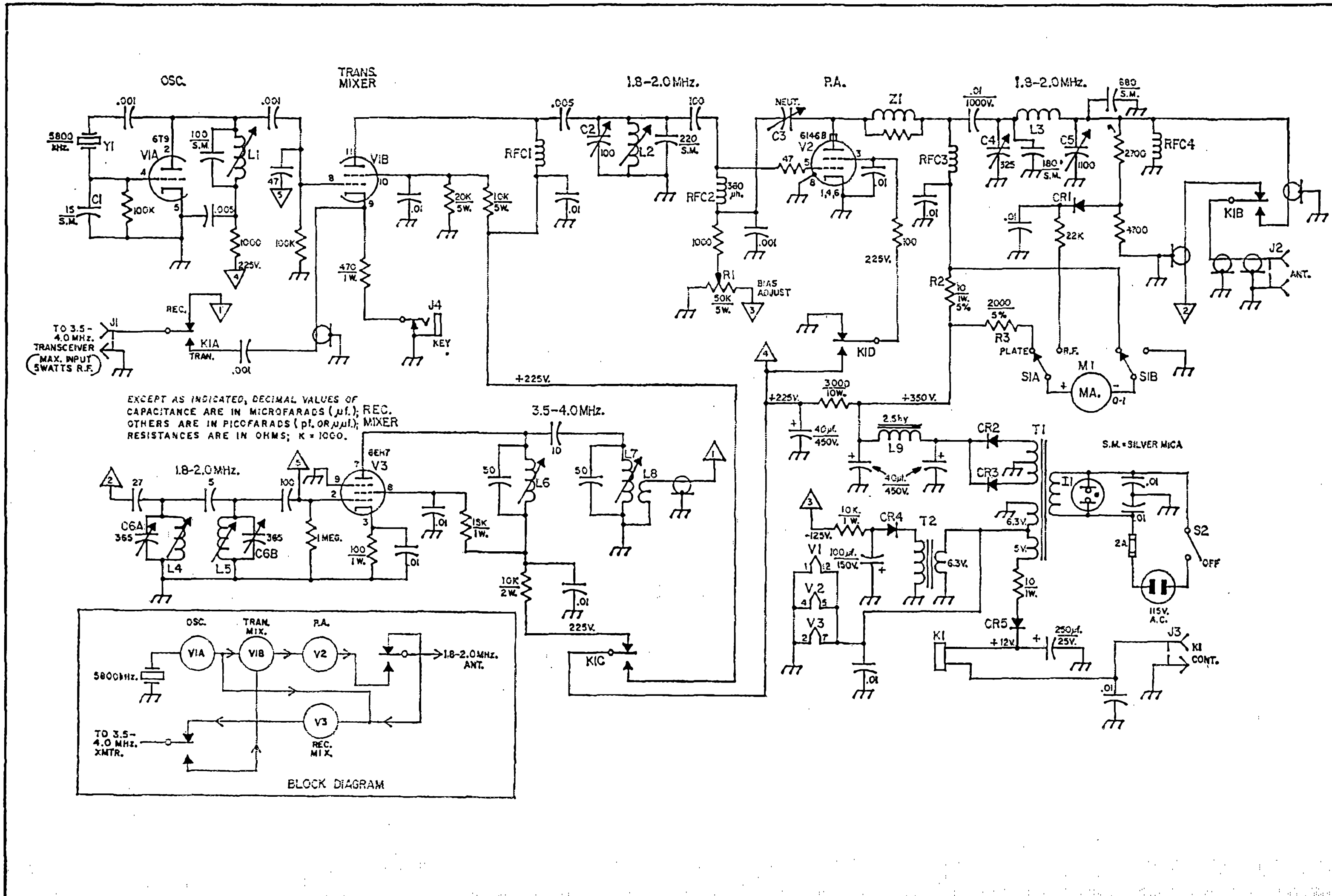

OSC.
TRANS. MIXER
1.8-2.0 MHz.
P.A.
1.8-2.0 MHz.
5800 kHz.
Y1
6T9
V1A
V1B
C1
15 S.M.
100K
1000
225V.
100 S.M.
L1
47
.001
.005
100K
470 1W.
20K 5W.
10K 5W.
RFC1
C2
100
L2
220 S.M.
RFC2
380 µh.
1000
R1
50K 5W.
BIAS ADJUST
NEUT.
C3
6146B
V2
Z1
RFC3
225V.
100
.01 1000V.
C4
325
L3
180 S.M.
C5
1100
680 S.M.
2700
RFC4
CR1
22K
4700
K1B
J2
ANT.
R2
10 1W. 5%
2000 5%
R3
PLATE
R.F.
S1A
M1
MA.
0-1
S1B
REC.
TO 3.5-4.0 MHz. TRANSCEIVER
MAX. INPUT 5 WATTS R.F.
J1
K1A
TRAN.
J4
KEY
K1D
+225V.
+225V.
3000 10W.
+350V.
40µf. 450V.
2.5hy
L9
40µf. 450V.
CR2
CR3
T1
S.M. = SILVER MICA
I1
S2
OFF
2A.
115V. A.C.
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µf.); OTHERS ARE IN PICOFARADS (pf. OR µµf.); RESISTANCES ARE IN OHMS; K = 1000.
REC. MIXER
3.5-4.0 MHz.
1.8-2.0 MHz.
27
5
100
6EH7
V3
C6A
365
L4
L5
C6B
365
1 MEG.
100 1W.
15K 1W.
L6
L7
L8
10K 2W.
225V.
K1C
10K 1W.
CR4
T2
-125V.
100µf. 150V.
6.3V.
6.3V.
5V.
10 1W.
CR5
+12V.
250µf. 25V.
K1
J3
K1 CONT.
BLOCK DIAGRAM
OSC.
TRAN. MIX.
P.A.
V1A
V1B
V2
1.8-2.0 MHz. ANT.
5800 kHz.
V3
REC. MIX.
TO 3.5-4.0 MHz. XMTR.

Fig. 1—Schematic diagram of the 160-meter equipment. Fixed decimal-value capacitors are disk ceramic unless otherwise noted. Polarized capacitors are electrolytic. Fixed-value resistors are ½-watt composition unless indicated otherwise. A block diagram is included to show the direction of signal flow.

C_1—Feedback capacitor. (May require slightly more or less capacitance, experimentally, for best oscillator starting.)
C_2—100-pf. variable (Hammarlund HFA-100A).
C_3—See text.
C_4—325-pf. variable (Hammarlund MC-325M).
C_5—3-section broadcast-type variable, all sections in parallel (J. W. Miller 2113).
C_6—Two section broadcast-type variable (J. W. Miller 2112).
CR_1—1N34A germanium diode.
CR_2, CR_3—1000 p.r.v., 1-ampere silicon diode.
CR_4—600 p.r.v., 750 ma. silicon diode.
CR_5—50 p.r.v., 2-ampere silicon diode.
I_1—115-v.a.-c. neon indicator (part of S_2).
J_1, J_3—RCA phono connector.
J_2—SO-239 style coax connector.
J_4—Closed-circuit phone jack.
K_1—4-pole double-throw 12-volt d.c. relay (Potter & Brumfield KHP17D11).
L_1—5- to 8-μh. adjustable inductor (J. W. Miller 21A686RBI).
L_2—12.9- to 27.5-μh. adjustable inductor (J. W. Miller 42A225CBI).
L_3—20-μh. inductor; 35 turns No. 18 wire, spaced one wire diameter between turns, 1½ inch diameter. Use 35 turns of Polycoils No. 1759 inductor.
L_4, L_5—12.9- to 27.5-μh. variable inductor (J. W. Miller 42A225CBI).
L_6, L_7—23.8- to 39.6-μh. adjustable inductor (J. W. Miller 21A335RBI). J. W. Miller Co., 5917 S. Main St., Los Angeles, Calif. 90003.
L_8—6 turns small-diameter insulated wire wound over ground end of L_7.
L_9—2.5-hy. 100-ma. filter choke.
M_1—0 to 1-ma. d.c. panel meter.
R_1—50,000-ohm, linear-taper, 5-watt control.
R_2, R_3—See text.
RFC_1—1-mh., 75-ma. r.f. choke (National R-50 or equiv.).
RFC_2—360-μh. r.f. choke (Millen J300-360 suitable).
RFC_3, RFC_4—2.5-mh., 250-ma. r.f. choke (Millen 34102).
S_1—D.p.d.t. toggle.
S_2—S.p.s.t. rocker switch with built-in pilot lamp (Carling Electric Co. Type LTILA50). Carling Electric Co., 505 New Park Ave., West Hartford, Conn. 06110 (catalog available).
T_1—Power transformer. 540 volts c.t. at 120 ma., 5 volts at 3 amps., 6.3 volts at 3.5 amps. (Allied-Knight 54C1466 or equivalent).
T_2—6.3-volt, 1-amp. filament transformer, reverse connected.
Y_1—5800-kHz. fundamental-type crystal (International Crystal Co.).
Z_1—Parasitic suppressor; 5 turns No. 18 wire over body of 47-ohm, 1-watt resistor.

The metering circuit reads plate current — 200 ma. full scale — by measuring the voltage drop across a 10-ohm 5-percent resistor, R_2. The 2000-ohm 5-percent metering resistor, R_3, provides a full-scale meter reading of 2 volts, corresponding to 200 ma. of current flow through R_1. M_1 is a 0 to 1-ma. instrument. It reads relative r.f. output voltage when S_1 is switched to R.F. A resistive divider is connected to the output line of the p.a. stage and CR_1 rectifies the r.f. which appears at the junction of the two resistors. A 22,000-ohm "linearizing" resistor helps to make the meter respond more uniformly to the changes in r.f. voltage. If greater accuracy is desired for the plate-metering circuit, 1-percent resistors can be used at R_2 and R_3, though the 5-percent resistors should be suitable for this application.

A probe-type neutralizing circuit is used at V_2. C_3 is actually a stiff piece of bus wire, three inches in length, which is fed through the chassis by means of an insulating bushing. The wire is placed adjacent to the tube's anode, and is in the same plane as the anode. It is moved to and from the tube envelope to vary the capacitance between it and the tube plate. Adjustment of C_3 is discussed later.

Construction

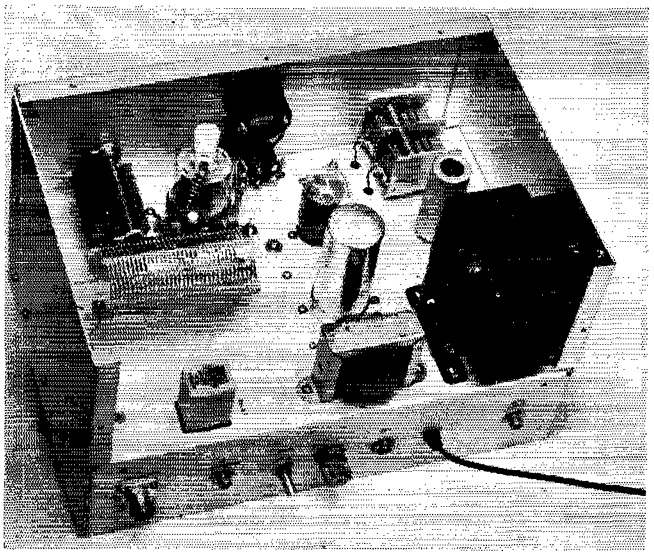
An aluminum chassis which measures 12 × 8 × 2½ inches is used as the base for this equipment. A home-made panel and cabinet is used to enclose the unit. The panel is 8 inches high and is 12 inches wide. The top cover is fashioned from perforated aluminum material which was obtained from the hardware store (Reynolds aluminum).

The layout should be apparent from the accompanying photographs. All long runs of r.f. wiring should be made with subminiature coax cable (RG-174/U), grounding the shield braid at each end of the cable.

Checkout and Tune Up

Some provision should be made to reduce the power output of the 75-meter transceiver to be used with this equipment. No more than 5 watts of drive should be necessary; too much drive can damage V_{1B}. Approximately 30 r.f. volts will appear between the transmitting mixer cathode and ground when normal 3.8-MHz. drive is applied. Some transceivers are capable of supplying sufficient output on 3.8 MHz. by removing the screen voltage from the p.a. stage. Or, it may be practical to disable the p.a. and borrow some output from the driver stage by means of link coupling. The stout-of-heart may wish to merely turn down the speech gain of the transceiver until the desired power level is reached. This method was used in the ARRL lab while working with a KWM-2, but could lead to disaster if the audio level was inadvertently turned up beyond the desired point.

Before testing the 160-meter unit, make sure that the changeover relay, K_1, is connected to the remote keying terminals of the 75-meter equipment by means of J_3. Then, connect a 160-meter

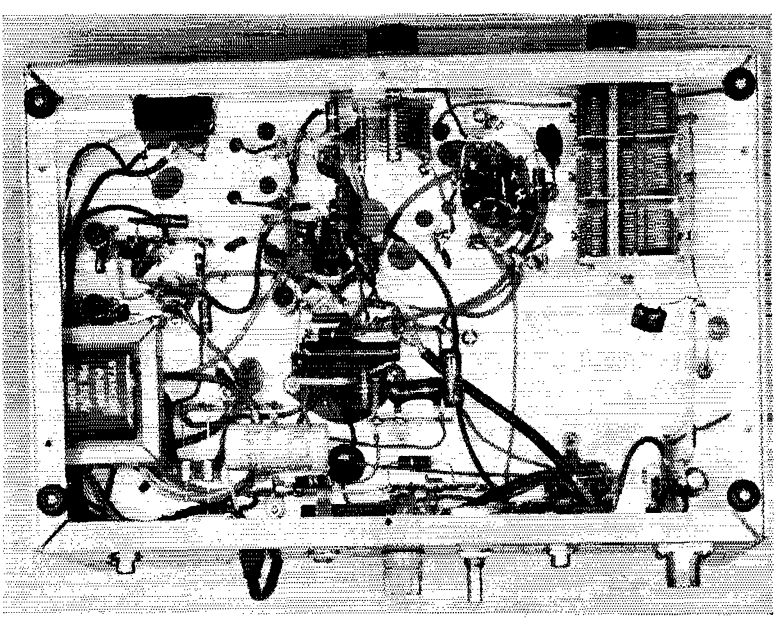


Looking into the top of the transceiving converter, the power supply is at the lower right. Directly ahead of the power transformer is the receiving mixer, V_3, and its tuning capacitor, C_6. V_1 is to the left of V_3, just ahead of the filter capacitor. The p.a. section of the unit is at the upper left. C_5 is below the chassis, directly under C_4. C_3, the neutralizing wire, is encased in spaghetti tubing and is visible adjacent to the 6146B tube. Relay K_1 is at the lower left.

antenna to J_2 and listen for 160-meter signals, atmospheric noise, or Loran pulses. Peak the incoming signal by means of C_6. For reception on the low end of the 160-meter band, C_6 should be almost fully meshed. The slugs of L_4 and L_5 should then be adjusted for best signal response. When receiving near the high end of the band, C_6 should be near midrange. Coils L_6 and L_7 form a bandpass circuit and should be stagger-tuned to give uniform response across any desired segment of the 160-meter band, e.g., 1800 to 1900 kHz., or 1900 to 2000 kHz. If the receiving section is performing properly, one should be able to copy a 0.3-μv. c.w. signal without difficulty in areas where minimum atmospheric and man-made noise levels prevail. Ordinarily, however, noise levels prevent such weak-signal reception. If no signals can be heard, check V_{1A} to make certain it is working properly. The 5800-kHz. signal can be monitored on a general-coverage receiver to determine if the oscillator is operating.

Attach a 50-ohm dummy load to J_2 before testing the transmitter section of the equipment. Set R_1 for a resting plate current of 25 ma. for V_2. This adjustment should be made without drive applied at J_1, but with K_1 energized. Next, apply approximately 2 watts of 3.8-MHz. (carrier)

(*Continued on page 154*)



Looking into the bottom of the chassis, C_5 is at the upper right. The 6146B socket is to its left. C_2 is visible at the upper center of the chassis. V_3 is at the far left of the chassis.

Direct Conversion A Neglected Technique

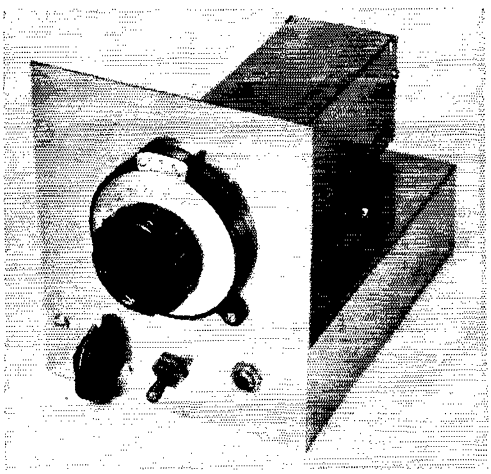
BY WES HAYWARD,* W7ZOI, AND DICK BINGHAM,** W7WKR

An amateur activity of increasing popularity is the construction of small, compact equipment for portable operation. Certainly a review of recent amateur literature will reveal significant interest in rigs of the pocket or rucksack variety. Although the construction of a simple solid-state transmitter with an input of a few watts presents no obstacles to the experimenter with minimal experience, the fabrication of a suitable companion receiver does impose some problems. The portable receivers typically in use are of the regenerative type, the regenerative superhet, or a tunable converter operated ahead of a broadcast band superhet. While all of these techniques have the distinct advantage of simplicity, the results obtained are frequently less than optimum, especially when strong signals are encountered.

Another approach to the portable receiver design problem is the direct conversion technique. Basically the direct conversion method involves the applying of the desired r.f. signal and a local oscillator signal to a product detector. The beating of the two signals produces an audio-frequency signal which needs only further amplification in order to be heard.

Examination of the detection process reveals that the true product detector is a linear device.[1] Its output amplitude is nearly proportional to the input signal for all signals of small amplitude as compared to the b.f.o. signal. In any linear system selectivity may be obtained at either a.f. or r.f. In this case the receiver's selectivity was obtained at audio frequencies by a low-pass filter which is used to eliminate all frequency components above a specified cutoff (about 2 kHz.). A simple, high-gain audio amplifier following the audio filter completes the receiver.

A direct conversion receiver of this kind was described by White in 1961.[2] However, this receiver used several tubes, including an r.f. amplifier, and was just about as complicated as a small superhet. By utilizing the high quality, inexpensive semiconductors currently available to the amateur, the basic performance of White's receiver is achieved with a much simpler circuit.



Complete receiver, as shown, is rather compact. The antenna trimmer capacitor, C_1, is the control to the lower left. The vernier dial is mounted directly on the front panel.

The unit built by the authors is shown schematically in Fig. 1. It operates in the 3.5-MHz. band. This receiver was designed for simplicity and ease of duplication rather than for ultimate performance. Nonetheless, this unit in many ways outperforms many of the less-expensive commercial receivers on the market today.

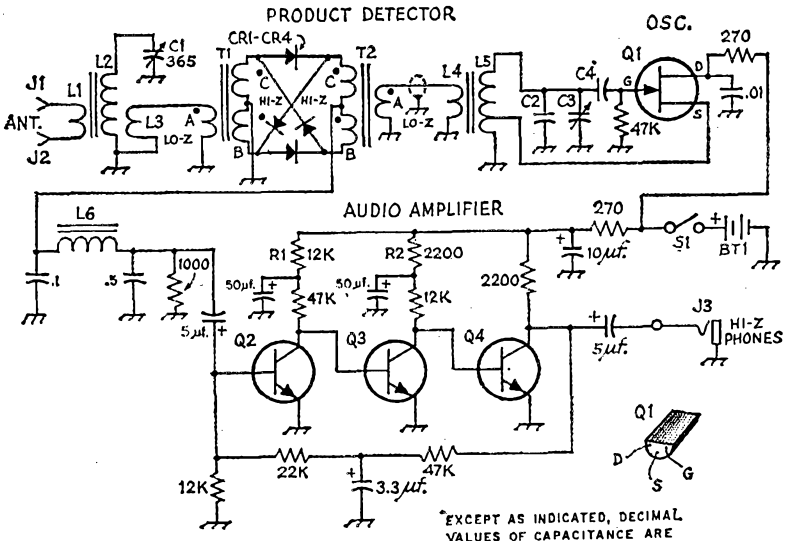
The antenna is coupled directly to the product detector through a single tuned circuit. With the component values shown, either the 3.5-MHz. or 7-MHz. band may be tuned. Following the input tuned circuit is the heart of the receiver, a product detector. It consists of four diodes operating in a ring configuration as a double balanced mixer. While typical junction diodes can be used in this circuit, the hot-carrier diodes[3] used by the authors are strongly

*Display Device Development, Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.
**9021 W. Shorewood Drive, Mercer Island, Washington 98040.

[1] Villard, "Selectivity in S.S.S.C. Reception," *QST*, April, 1948.

[2] White, "Balanced Detector in a T.R.F. Receiver," *QST*, May, 1961.

[3] Most semiconductor diodes in use today are p-n junction devices. Recent technological advances allow the economical fabrication of hot-carrier, or Schottky barrier diodes which are basically metal-semiconductor junctions. Practical advantages of hot-carrier diodes include low noise, fast switching speed and excellent uniformity. The Hewlett-Packard 5082-2800 recommended by the authors sells for $0.99 in unit quantities. They may be purchased from any H. P. sales office. To find the sales office nearest you, consult the white pages of your telephone directory, or send an s.a.s.e. to Mr. B. A. Coler, Regional Sales Manager, H. P. Associates, 620 Page Mill Road, Palo Alto, California, 94304, who will inform the builder of the closest H. P. sales office.



*EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μf.); OTHERS ARE IN PICOFARADS (pf. OR μμf.); RESISTANCES ARE IN OHMS; K = 1000

Fig. 1—Schematic diagram of direct conversion receiver. The 0.01-μf. capacitor is disk ceramic. The 0.1- and 0.5-μf. capacitors are paper or mylar. Polarized capacitors are 15-volt electrolytic. Fixed resistors are ½-watt carbon.

BT_1—9-volt transistor radio battery.
C_1—365-pf. variable (t.r.f. variety).
C_2—470-pf. silver mica for 3.5 MHz., 120-pf. silver mica for 7 MHz.
C_3—140-pf. variable for 3.5 MHz., 40-pf. variable for 7 MHz.
C_4—680-pf. silver mica.
CR_1-CR_4—See text footnote.
J_1, J_2—Insulated banana jacks.
J_3—Phone jack.
L_1, L_3—3-turn link, No. 28 enameled wire, wound on L_2.
L_2—40-turns, No. 28 enameled wire, wound on 0.680-inch diameter toroid.
L_4—5-turn link, No. 22 enameled wire, wound on L_5.
L_5—22-turns, No. 22 enameled wire, wound on 0.680-inch diameter toroid; tapped 5 turns from ground end.
L_6—88-mh. toroid.
Q_1—Motorola MPF-102.
Q_2, Q_3, Q_4—N-p-n, RCA 40233.
R_1, R_2—See text.
S_1—S.p.s.t. toggle.
T_1, T_2—See text.

recommended. The local oscillator consists of a simple Hartley circuit with link coupled output. For simplicity, no voltage regulation is used. The product detector provides a constant load to the oscillator, making a buffer stage unnecessary.

The output of the mixer is applied to a single-section low-pass filter using one of the common 88-mh. toroidal inductors. This filter is definitely needed in that it prevents mixer output signals beyond the audible audio frequency range from overloading the audio amplifier. It also defines the bandwidth of the receiver. The audio amplifier, although quite simple, provides over 100 db. gain. Indeed, it provides the gain for the entire receiver. It is quite important that high-beta, low-noise transistors be used. The devices specified are intended for hi-fi preamplifier applications, are quite inexpensive, and yield satisfactory performance. One will note that no audio gain control is included in the receiver. A strong c.w. signal will easily saturate the audio amplifier. However, the clipping is symmetrical and minimal distortion is introduced. With stronger s.s.b. signals, the gain may be reduced by slightly detuning the antenna trimmer capacitor.

Construction

The method of construction of the receiver is not critical with the exception that the local oscillator should be isolated from the rest of the circuitry and the high gain of the audio amplifier should be respected.

The receiver is built on a 5 × 7 × 2-inch aluminum chassis. A 6 × 5-inch piece of aluminum is used for the front panel. The authors used a 2⅞-inch diameter imported vernier dial although any suitable dial may be employed. The component layout used in the version shown in the photographs is conservative and should be generally followed. Considerable miniaturization is possible if the builder so desires.

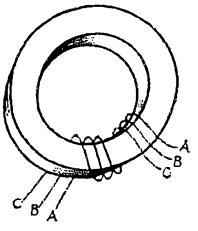
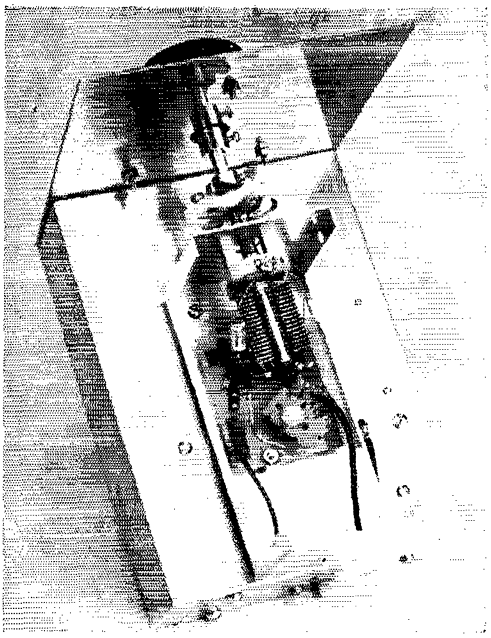


Fig. 2—Proper method of winding toroidal transformers, T_1 and T_2.



The oscillator components are mounted on a single circuit board. The FET is hidden below the tuning capacitor, C_3. Note that the output from L_4 is taken through a shielded cable. The insulated shaft coupling shown is a Johnson type 250.

The local oscillator should be isolated from the rest of the circuitry and for this reason it is housed in a 5 × 2¼ × 2¼-inch aluminum box mounted on top of the chassis.

The audio amplifier may be constructed on a perforated phenolic board or on a printed circuit board. The input and output should be physically separated to prevent undesired oscillation. High-impedance headphones (2000 ohms or more) should be used with the amplifier.

It would be wise to test the audio amplifier before mounting it in the chassis. A 9-volt battery and earphones should be connected to the finished circuit board. You should then hear a quiet hissing sound because of the noise generated in Q_2. If an audible oscillation occurs, it may be eliminated by increasing the value of the decoupling resistors, R_1 and R_2. If no noise output is heard, the amplifier may be oscillating at a frequency beyond the audio range (e.g., 100 kHz.). This oscillation is usually eliminated by placing a 0.01-μf. disk capacitor across the amplifier output or by again increasing R_1 and R_2. When mounting the amplifier in the chassis, the low-pass filter elements should be located away from the amplifier's output.

The underside view of the receiver reveals a rather uncluttered appearance. The product detector and associated transformers, T_1 and T_2, are mounted on a small piece of prepunched terminal board which is located in the right, center of the chassis. L_4 is mounted in the right rear of the chassis. The audio amplifier is mounted on a printed circuit board to the left. The battery is fastened to the rear wall of the chassis using two machine screws and a plastic plate.

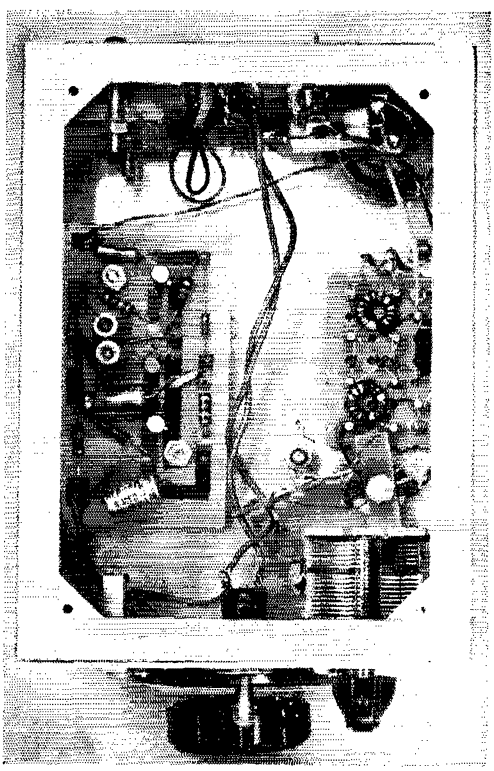
The transformers T_1 and T_2 are easily fabricated on small toroidal coil forms[4] with reference to the sketch in Fig. 2. Three pieces of No. 28 enameled wire are held together and wound trifilarly on each toroid. Fifteen turns are adequate. After winding, the leads are trimmed to about an inch in length and the enamel is removed. Then, using an ohmmeter, the beginning and end of each of the three windings is identified (A, B, C). Winding A is used as the low impedance winding. The beginning of winding B is connected to the end of winding C, providing the center tap for the bifilar high-impedance winding.

Performance

The performance of this receiver is surprisingly good. Sensitivity is adequate and c.w. signals of less than a microvolt may be copied. Stability is superb. The bandwidth is a little broad, but entirely adequate for casual work on the 3.5-MHz. band. Several 3.5-MHz. Asian

(*Continued on page 156*)

[4] Approximately 7/16-inch diameter. A kit of two suitable toroids is available for $1.00, postpaid, from Alcom Electronics, 2025 Middlefield Road, Mountain View, California, 94040.



The "MOBILOOP"

--*An Improved Multi-band Mobile Antenna System*

BY JAMES E. TAYLOR,* W2OZH

The "Mobiloop" uses regular mobile-antenna sections for the vertical members and CB antennas for the horizontal. Extending from the front bumper to the rear, it can't help but be an attention-getter on the road!

PREVIOUS designs of low-frequency mobile antennas[1] have emphasized the desirability of decreasing the losses in conventional center-loaded whip antennas. This consideration is of paramount importance because of the extremely small radiation resistance displayed by such antennas. Recent application[2] of loop antennas for fixed-station use reemphasize the importance of loss reduction.

The basic concept of the center-loaded whip antenna can be readily extended to a true loop configuration by feeding at the front bumper of the car, extending the antenna from this point in an arch above the car, and terminating this radiating section with a series-connected coil and tuning capacitor mounted on the rear bumper.

Such an arrangement leaves two primary sources of annoyance: (a) losses in the coil itself; (b) the high r.f. voltages and restriction of bandwidth which result from the relatively high *Q* of the system.

An obvious direction of development is to reduce the coil inductance still further, thereby reducing its loss and, at the same time, reducing the reactance of the tuning capacitor. This, in turn, will reduce the r.f. voltage across the capacitor—also desirable.

At this point, a logical step suggests itself: Since the loop antenna is inductive, why not eliminate the coil entirely?[3]

The final arrangement of this system for 75 meters is shown in the sketch, Fig. 1, and in the photograph. Here, it will be seen, the coil is eliminated; we have increased the tuning capacitance (resonance at approximately 80 pf.[4]), and we have further reduced losses in the vertical sections by covering with copper shielding braid, a la W2LBB, which provides lower a.c. resistance. This is now basically a low-impedance system at the drive point, and it was necessary to increase the matching capacitor to 2800 pf. in order to obtain 1:1 s.w.r. indication in the coax line to the transceiver, and thus optimum power transfer.

A tuning capacitor having moderate spacing (about 1/16 inch) is adequate. For direct comparison of antenna current, a relic of "the good old daze" has been exhumed—namely, the

* 1257 Wildflower Drive, Webster, New York 14580

[1] Taylor, "An Improved Dual-Band Mobile Antenna System", *CQ*, May 1968.

[2] K. H. Patterson, "Down To Earth Army Antenna," *Electronics*, August 21, 1967.

[3] Webster, "Mobile Loop Antennas", *QST*, June, 1954; also, Mitchell, "Loop-Type Antennas for 75-Meter Mobile", *QST*, February, 1951.

[4] This value agrees reasonably well with that computed for resonating the loop, assuming it to comprise a simple one-turn coil.

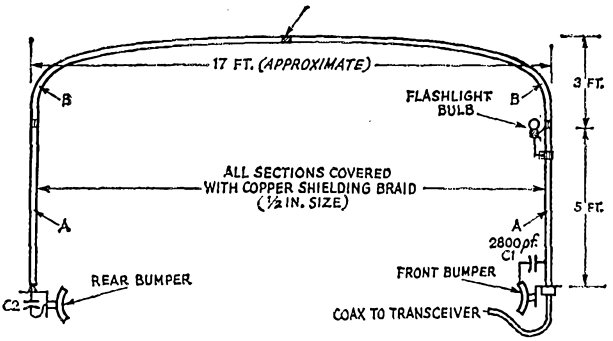


Fig. 1—The "Mobiloop" schematic. The "A" sections are standard mobile mast sections. "B" sections are 102-inch Citizens' Band whips with top ends overlapped 3 inches, wrapped with No. 18 copperweld wire, and soldered. C_1, built up from mica capacitors, is adjusted for matching 50-ohm coax with C_2, a neutralizing-type capacitor, adjusted to resonate the system. For minimum loss, the car body should be securely bonded to both ends of both bumpers and to the chassis.

flashlight bulb. This bulb, when shunted across approximately three inches of the antenna near the feed point, indicates, by its brightness, r.f. current in the antenna. A more valid or less expensive indicator is hard to come by!

Performance

Reliable comparative tests of low-frequency mobile antenna systems are rather complicated, due to the variability of propagation conditions with reference to angle of radiation and polarization effects.

The Mobiloop system has performed better than all previous configurations tried. Signal reports in comparison with a center-loaded whip typically favor the new antenna by several S-units. Numerous comparative reports have been obtained where the signal using the Mobiloop has been compared with that using a good 75-meter half-wave dipole. A coax switch was used to change antennas quickly. These comparisons have included operation at night—a time when 75-meter mobile results are, at best, marginal. The results favor the dipole, but typically only by a couple of S-units, despite the fact that the mobile antenna was on the car in the garage![5]

Mobiloop operating results more than compensate for the aspersions cast because of the nonconventional appearance of the system. The system has now been road-tested on trips covering several thousand miles with consistently superlative results.

A note should be added concerning ignition noise with the loop antenna systems. One might expect that since the receiving sensitivity compared with the simple loaded whip has been increased, the ignition noise level would be similarly increased. Actually, the increase has been smaller than expected. It is surmised that this can be attributed to the known sensitivity of the loop antenna for inductive rather than capacitive pick-up.

The author is indebted to Bill Murphy, WA2QLT, for the suggestion of the name "Mobiloop." Bill has also applied this design for use in the 160-meter band on a Volkswagen!

QST

[5]In making such a test care must be used to see that the "regular" antenna system is well detuned from the operating frequency. If it is not, it may pick up considerable energy from the close-by small antenna and reradiate it.—*Editor.*

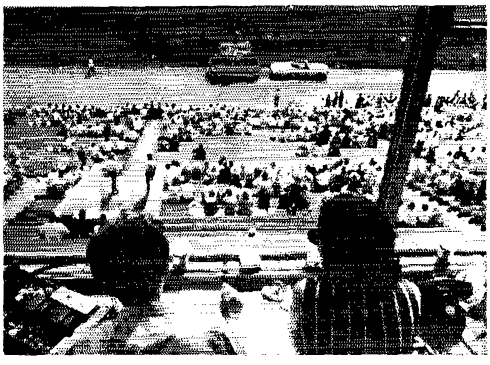
Strays

Stolen Equipment

A Swan 350 Transceiver Serial No. 685559 was stolen the night of August 16 from a locked car parked in an underground garage at a motel in New Haven, Conn. Please notify F. F. Willingham, WA4EWC, 2543 Warwick Rd., Winston-Salem, N. C. 27104.

—•••—

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.



Providing 2-meter f.m. communications for the six-hour, 15,000-strong Shriner's parade earned Chicago hams accolades from Medinah Temple. Amateurs at 14 locations along the line of march kept the marshal, medical staff and participants in touch and on schedule. Here WA9IYG and K9DOT "man" the control booth during a rehearsal. Others participating were WA9KTT, K9IFB, W9HEP, W9QKE, K9QJI, W9BNZ, W9HPG, K9BPO, W9LKK, K9AZB, K9MFY, W9YLB, WA9PNS, K9DQU and W9FKJ,

Absorptive Filter for TV Harmonics

And A Novel Filter Construction Technique

BY RICHARD WEINREICH,* KØUVU and R. W. CARROLL**

Although the antenna load on a TVI filter usually can be adjusted to match the filter characteristic impedance at the operating frequency, the termination in the stop band is subject to wide variations and usually is unpredictable. The result is that the theoretical attenuation of a filter often isn't realized in practice. The solution: a high-pass/low-pass circuit arrangement that offers the filter a constant load throughout the stop-band.

CONTEMPORARY commercial and military h.f. transmitter specifications often include a requirement for extremely-low radiated-harmonic power. Prior to about 1963 standard procedure was to add a "garden-variety" *L-C* low-pass filter, but this expedient often gave disappointingly small harmonic reduction. (Indeed, in some cases, certain harmonics would actually become worse!) Fortunately, this problem has come to be understood in recent years, and a discussion of it and its solution follows.

Most low-pass filters are designed to be driven from a *purely* resistive source impedance and loaded into a resistive termination. The typical transmitter output impedance is resistive *only* at the frequency to which the transmitter is tuned and is highly reactive at harmonic frequencies. It is quite possible that the transmitter reactance will partially or (in especially unfortunate instances) wholly cancel the filter input reactance at one or more harmonics of the transmission frequency. The results of this mechanism are part of a rather unhappy chapter in filtering.

The solution to this dilemma is to use a low-pass filter which achieves filtering by absorption rather than reflection. This approach requires the use of two contiguous filters, one low-pass and one high-pass. The general configuration and its theoretical response are shown in Fig. 1. The theoretical input v.s.w.r. of this filter can be shown to be 1:1 at *all* frequencies (including harmonic frequencies). As usual, however, the non-ideal nature of "real-world" coils and capacitors precludes this ideal behavior. The problem of fabrication of capacitors with sufficiently low series inductance is especially severe.

The text below discusses a novel and practical means of fabricating an absorptive filter which maintains its effectiveness well into the u.h.f. band.

The Filter and Its Fabrication

Fig. 2 and 3 show the response of a nine-element absorptive TVI filter which was constructed for purposes of comparison using standard high-quality mica capacitors. Although the input v.s.w.r. (Fig. 3) represents an immense improvement over a conventional low-pass filter, filtering effectiveness is seen to be only nominal at u.h.f. and higher.

The performance of the filter fabricated by the means described here is seen to be almost perfect over the same frequency range, by contrast. (See Figs. 4 and 5.) The reason for this improvement is the use of double-clad circuit-board material to fabricate extremely-low-inductance capacitors and interconnects. The details of this mechanical construction are illustrated in the photographs of the hand-made model of the filter. As can be seen, the copper surfaces not only provide low-inductance capacitors and interconnects, but provide a natural r.f. shield as well. The filter shown in the photos is the unit on which the performance checks of Figs. 4 and 5 were made. This filter will handle transmission power up to 1 kilowatt, by actual test. As would be expected, at higher power levels electric-field concentration at

*2645 1st Ave., Marion, Iowa 52302
** Collins Radio Co., Cedar Rapids, Iowa.

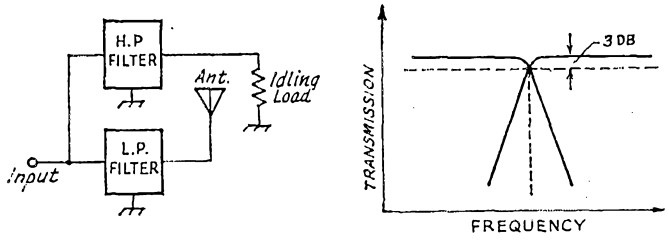
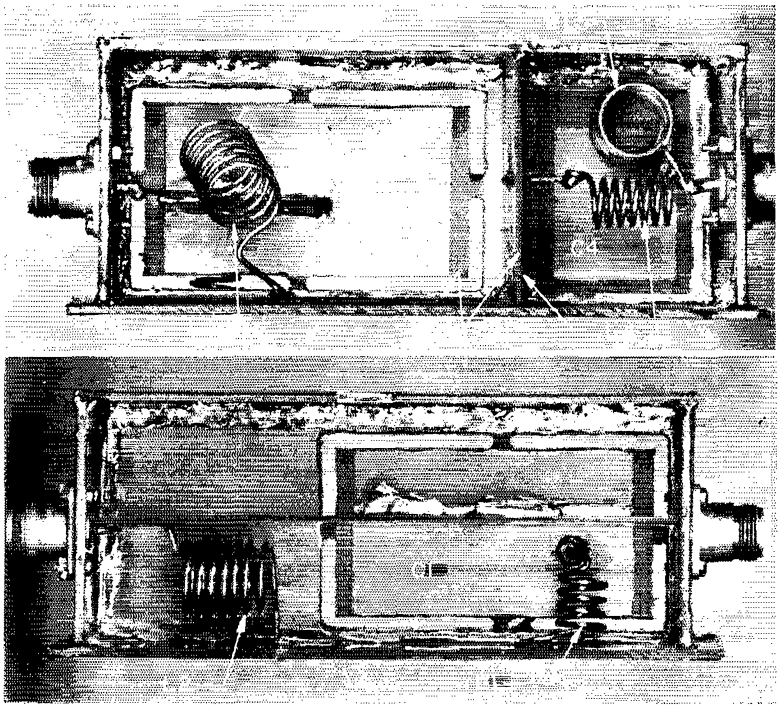


Fig. 1—General configuration and theoretical response of absorptive TVI filter.



Two views of the etched-board filter using the circuit of Fig. 4. Top: low-pass side; bottom: high-pass side. The partition and sides of the container are double-sided copper-clad board, making a self-shielded box with integral capacitors. C_2 is the edge-on board crossing C_1 between the coax fittings.

sharp corners causes arcing; this problem is solved by rounding the corners of the pattern at all high-voltage points.

The significant advantages of this construction technique are summarized below:

1) The extremely low inductance associated with planar capacitors and interconnects makes the filter useful well into the u.h.f. band.
2) R.f. shielding is automatically provided when proper layout is used.
3) The cost is low when compared with other TVI-filter approaches having equal power-handling abilities.

Improvement of Close-In Filter Rejection

The need for very high rejection relatively close to the filter cut-off frequency often arises. The basic absorptive filter provides an attenuation of approximately $6n$ db./octave above its cutoff frequency, where n is the number of reactive elements in the low-pass section of the filter. Filters of practical complexity may not provide sufficient rejection at frequencies close to the edge of the h.f. band—e.g., Channel 2 at 56 MHz.

Experiment has shown that one or more of the shunt capacitors in the low-pass section can be series-tuned at the unwanted harmonic frequencies to provide very deep "holes" in the rejection characteristic. If this is done properly, the passband attentuation and the out-of-band v.s.w.r. are affected very little. It is also possible to achieve substantially the same result by parallel-tuning one of the series coils.

Design Formulas

The design formulas for the basic absorptive filter and the resonant traps are given in

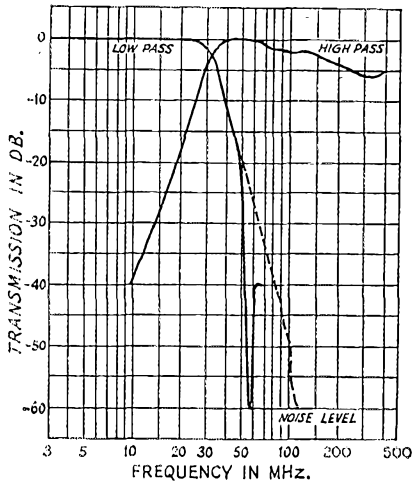


Fig. 2—Attenuation curve of filter using mica capacitors (cutoff frequency 32 MHz.). Dashed extension of the low-pass curve shows response before using series trap to provide an attenuation peak in Channel 2.

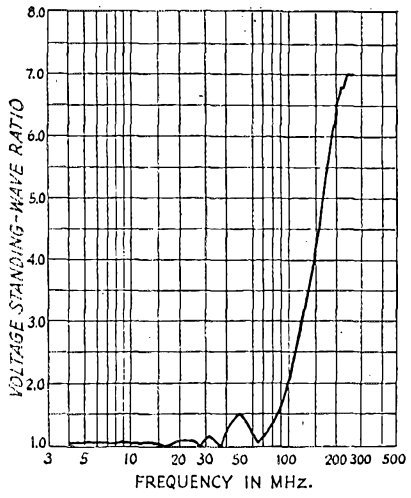


Fig. 3—V.s.w.r. of filter using mica capacitors.

Table I. The formulas for the basic filter are exact. Typically, little or no "tweaking" is required to obtain satisfactory operation. The formulas which apply to filters having resonant traps, however, are approximate in the sense that some pass-band degradation may occur if the exact computed values are used. Usually, some small readjustment of the filter element values is required. This is discussed further in the section on experimental results.

Experimental Results

So far, sixteen of these filters have been built for use locally. The results indicate that the six-pole filter shown in Fig. 6 is the best overall filter from the standpoint of all-channel protection. This makes it easy to use two series-tuned traps, giving a very steep cutoff.

When series coils were added to C_2 and C_3 of the low-pass section, the resulting v.s.w.r. was 2.5:1 at 10 meters. This was corrected by increasing the inductance of L_1 and L_2 and reducing L_3. The computed values of L_1 and L_2 were increased by approximately 10 to 15 percent, and L_3 was reduced by 15 to 20 percent. This resulted in a v.s.w.r. under 1.25:1 and good pass-band characteristics as shown in Fig. 6. The second series trap was set at 60 MHz. to pull in a "pop-up" in the response. Originally this trap had been set to the third harmonic of 10 meters. This, however, produced very little attenuation between Channels 2 and 6.

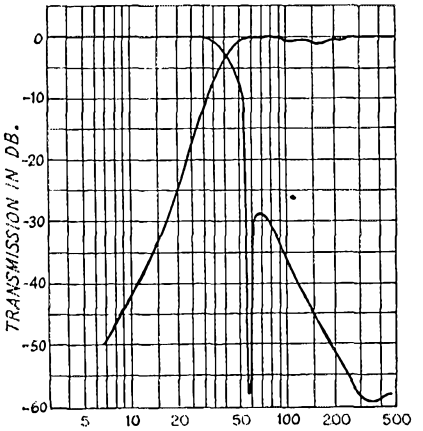


Fig. 5—Attenuation curve of the filter shown in the photographs and Fig. 4.

In cases where the antenna reactance at a harmonic frequency is such as to produce an effective low-impedance series resonance at the input of the low-pass portion of the filter, the filter will not function properly. (It does, however, provide protection against a high-impedance resonance at the low-pass input.) In the event that a low-impedance antenna-filter resonance does occur it can be changed into a high-impedance resonance by changing the length of the feed line by a quarter wavelength at the harmonic frequency. Cases where the "wrong" kind of resonance occurs are probably quite rare, however. Fig. 7 shows the v.s.w.r. measured on a typical beam antenna installation, both with and without the filter that is shown in the same figure. A set of data for a vertical antenna is given in Fig. 8. The potential problem of low-impedance antenna-filter resonance is obviously not occurring in either of these cases.

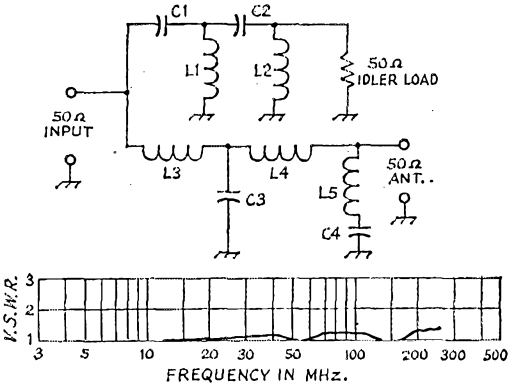


Fig. 4—Circuit of the p.c.-board filter shown in the photographs. The board used is MIL-P-13949D, FL-GT-.062", C-2/2-11017, Class 1, Grade A, Polychem Bud Division. Capacitance between copper surfaces is 10 pf. per square inch. Values are as follows for a design cutoff frequency of 40 Mc. and rejection peak in Channel 2:

C_1—52 pf.	C_4—21.6 pf.	L_3—0.3 μh.
C_2—73 pf.	L_1—0.125 μh.	L_4—0.212 μh.
C_3—126 pf.	L_2—0.52 μh.	L_5—0.24 μh.

Construction and Test Techniques

If good performance above 100 MHz. is not a necessity, this filter can be built using con-

TABLE I

Filter Design Formulas

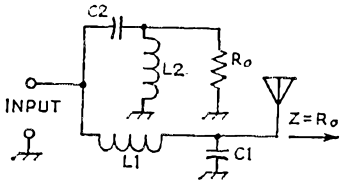
(a) Basic Absorptive Filters

$\omega_C = 2\pi f_C$ $\quad f_C$ = cut-off freq.

R_O = effective load resistance due to antenna

All reactances are positive and are computed at f_C, i.e. $X_L = \omega_C L$, $X_C = \dfrac{1}{\omega_C C}$

2-POLE FILTER



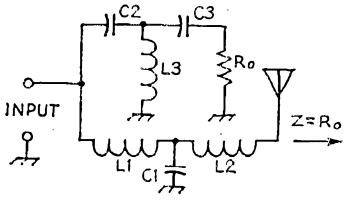
$X_{L2} = 1.414\ R_O$

$X_{C2} = X_{L2}$

$X_{C1} = 1.414\ R_O$

$X_{L1} = X_{C1}$

3-POLE FILTER

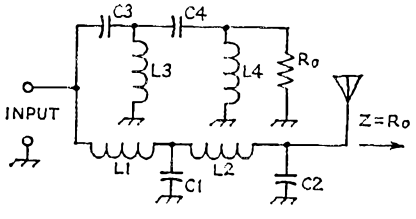


$X_{C3} = X_{L2} = 0.5\ R_O$

$X_{L3} = X_{C1} = 1.489\ X_{C3}$

$X_{C2} = X_{L1} = 2X_{L3}$

4-POLE FILTER



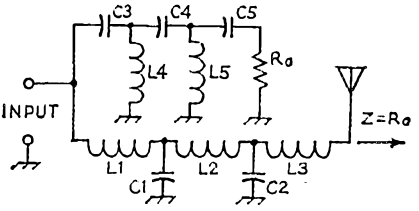
$$X_{L4} = \frac{R_O}{.383} = X_{C2}$$

$$X_{C4} = X_{L2} = \frac{X_{L4}}{2.435}$$

$$X_{L3} = X_{C1} = 0.585\ X_{C4}$$

$$X_{C3} = X_{L1} = \frac{X_{L3}}{0.415}$$

5-POLE FILTER



$X_{C5} = X_{L3} = 0.309\ R_O$

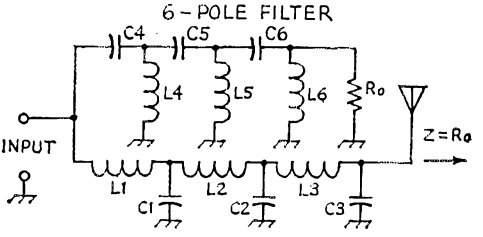
$X_{L5} = X_{C2} = 3.61\ X_{C5}$

$$X_{C4} = X_{L2} = \frac{X_{L5}}{0.81}$$

$X_{L4} = X_{C1} = 0.428\ X_{C4}$

$$X_{C3} = X_{L1} = \frac{X_{L4}}{0.383}$$

6-POLE FILTER



$$X_{L6} = X_{C3} = \frac{R_O}{0.259}$$

$$X_{C6} = X_{L3} = \frac{X_{L6}}{5.11}$$

$X_{L5} = X_{C2} = 1.102\ X_{C6}$

$$X_{C5} = X_{L2} = \frac{X_{L5}}{0.536}$$

$X_{L4} = X_{C1} = 0.367\ X_{C5}$

$$X_{C4} = X_{L1} = \frac{X_{L4}}{0.367}$$

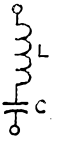
(b) Formulas for Resonant Traps

$X(\omega_C)$ = Design value of reactance at the cutoff frequency (f_C). See (a) above.

f_{trap} = Trap frequency

All reactances computed at f_C.

Series Trap (Shunt capacitor of filter series-tuned)

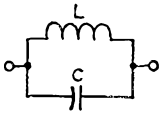


$$X_L = \frac{X(\omega_C)}{\left(\dfrac{f_{trap}}{f_C}\right)^2 - 1},\quad X_C = X(\omega_C) + X_L$$

Parallel Trap (Series coil of filter parallel-tuned)

$$X_C = X(\omega_C)\left[\left(\frac{f_{trap}}{f_C}\right)^2 - 1\right]$$

$$X_L = \frac{X_C X(\omega_C)}{X_C + X(\omega_C)}$$



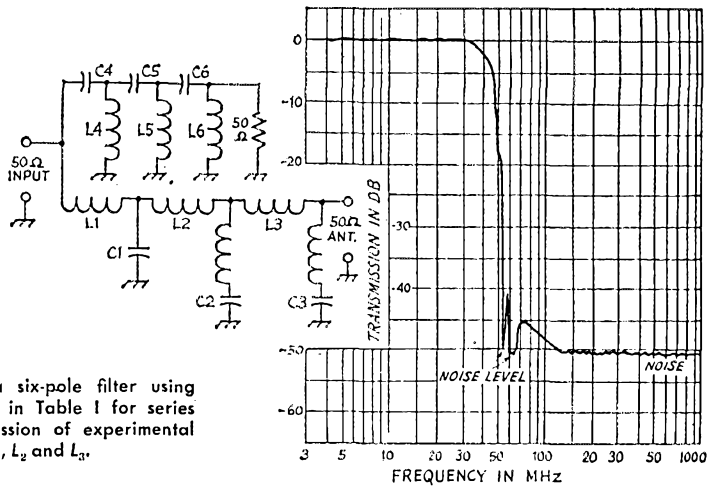


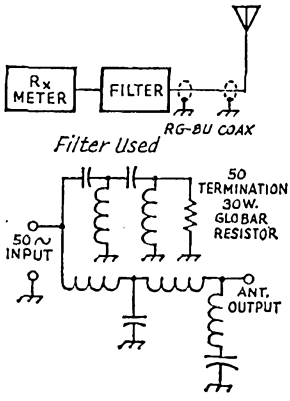
Fig. 6—Attenuation curve of a six-pole filter using the circuit shown. See formulas in Table I for series trap values, and refer to discussion of experimental results for effect on L_1, L_2 and L_3.

ventional fixed capacitors. Copper-clad Teflon board may not be readily available in small quantities from many supply houses. Regular fiber-glass-insulated board is satisfactory for low power. One such filter has been used with an SB-100 transceiver running 100 watts out. Although the Q of the fiberglass capacitors will be lower than that of Teflon-dielectric capacitors, this should not greatly affect the type of filter described here.

Test equipment needed to build this filter at home includes a reasonably-accurate grid-dip oscillator, a v.s.w.r. bridge, a reactance chart or the ARRL Lighting Calculator (for L, C, and f), a 50-ohm dummy load, and your transmitter.

Once the value of a given capacitor has been calculated, the next step is to determine the capacitance per square inch of the double-clad circuit board you have. This is done by connecting one end of a coil of known inductance to one side of the circuit board, and the other coil lead to the other side of the circuit board. Use the grid-dip oscillator, coupled lightly to the coil, to determine the resonant frequency of the coil and the circuit-board capacitor. When the frequency is known, the total capacitance can be determined by working the Lightning calculator or by looking the capacitance up on a reactance chart. The total capacitance divided by the number of square inches on one side of the circuit board gives the capacitance per square inch. Once this figure is determined, capacitors of almost any value can be laid out with a ruler!

High voltages can be developed across capacitors in a series-tuned circuit, so the copper material should be trimmed back at least ⅛ inch from all edges of a board, except those that will be soldered to ground, to prevent arcing. The capacitor surfaces should be kept smooth and sharp corners should be avoided.



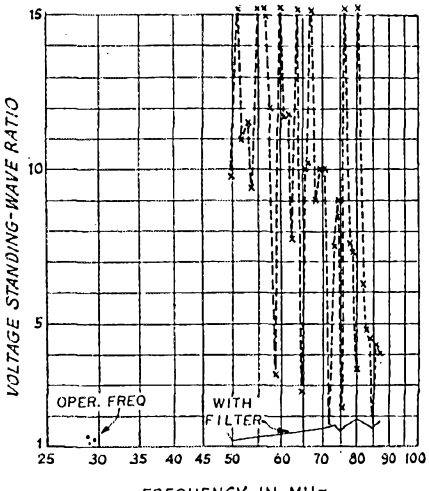


Fig. 7—Setup and results of measurement on a 3-element beam, height 45 feet, with 70-foot feed line. Results of measurements both with and without the filter are shown.

If the filter box is made of double-clad fiberglass board, both sides should be bonded together with copper stripped from another piece of board. Stripped copper foil may be cleaned with a razor blade before soldering. To remove copper foil from a board, use a straight edge and a sharp scribe to score the thin copper foil. When the copper foil has been cut, use a razor blade to lift a corner. Careful heating with a soldering iron will reduce the effort required to separate the copper from the board. This technique of bonding two pieces of board or two sides of a piece of board can also be used to interconnect two capacitors when construction in one plane would require too much area. Stray inductance must be minimized and sufficient clearance must be maintained for arc-over protection.

Capacitors with Teflon dielectric have been used in filters passing up to 2 kw. p.e.p. The only failure to date has been one 10-watt ter-

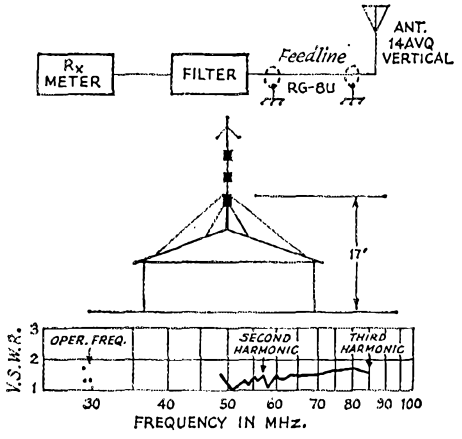


Fig. 8—Measurements on a vertical antenna with 50-foot feed line, using same filter as in Fig. 7.

minating load when the filter was connected to a mismatched load with a 15:1 v.s.w.r.

One further word of caution: No low-pass filter will be fully effective until the transmitter with which it is used is properly shielded and all leads filtered. In a recent operating test in a Channel 2 fringe area transceivers of four different makes were operated, and none had adequate shielding or filtering, as they stood, to allow the low-pass filter to do its job properly.

The terminating loads for the high-pass section of the filter can be made from 2-watt, 10-percent tolerance composition resistors. Almost any dissipation rating can be obtained by suitable series-parallel combinations. For example, a 16-watt, 50-ohm load could be built as shown in Fig. 9. This load should handle the harmonic energy of a signal with peak fundamental power of 2 kilowatts. With this load, the harmonic energy will see a v.s.w.r. under 2:1 up to 400 MHz. For low power (under 300 watts p.e.p.), a pair of 2-watt 100-

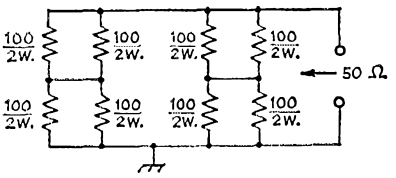


Fig. 9—Dummy load for the high-pass section of the filter.

ohm resistors in parallel would be adequate.

We'd like to thank Bob Tellefsen, WØKMF, for helping straighten out the manuscript.

QST

Strays

Change in GEOALERT Broadcasts from WWV–WWVH

On October 1, 1968, the system for broadcasting GEOALERTS (see March, 1968, *QST*, page 21) by WWV and WWVH was slightly modified, the procedure now being as follows:

GEOALERTS for a given day are first broadcast at 0418 GMT by WWV, then at 0448 GMT by WWVH. The broadcasts are repeated at hourly intervals until the new alert is issued. The message begins with the prefix GEO in Morse, followed by three sets of code groups which indicate, respectively, observations or forecasts of solar events, time of occurrence of solar events, and time of occurrence of geophysical events. The codes are:

First three-letter group:

EEE — No forecast or STRATWARM observation
III — FLARES expected.
SSS — PROTON FLARE expected.
TTT — MAGSTORM expected.
UUU — FLARES and MAGSTORM expected.
VVV — PROTON FLARE and MAGSTORM expected.
HHH — STRATWARM observed.
DDD — STRATWARM observed and FLARES expected.
BBB — STRATWARM observed and PROTON FLARE expected.
MMM — STRATWARM observed and MAGSTORM expected.

Second three-letter group (PROTON EVENT):

MMM — 00-06 GMT day before alert issued.
TTT — 06-12 GMT day before alert issued.
HHH — 12-18 GMT day before alert issued.
SSS — 18-24 GMT day before alert issued.
III — 00-04 GMT day of issue.
GGG — In progress.
EEE — Nil.

Third three-letter group (GEOMAGNETIC STORM):

UUU — 00-06 GMT day before alert issued.
AAA — 06-12 GMT day before alert issued.
BBB — 12-18 GMT day before alert issued.
DDD — 18-24 GMT day before alert issued.
NNN — 00-04 GMT day of issue.
PPP — In progress.
EEE — Nil.

A Divide-By-Four Frequency Divider For 100-kHz. Calibrators

BY E. H. CONKLIN,* K6KA

With the coming of the new subbands, a new problem has been added to the old one of frequency calibration, which formerly fell largely on even 100-kHz. points. It is now desirable to have calibration markers at least every 25 kHz., if not at more frequent intervals.

If your receiver has a 100-kHz. calibrator, the desired markers can be readily produced by adding integrated-circuit J-K flip-flops. A single flip-flop will divide by two and produce 50-kHz. markers, two flip-flops will divide by four and produce 25-kHz. markers, and four flip-flops can be made to divide by ten and produce 10-kHz. markers. All three arrangements produce strong harmonics well beyond 30 MHz.

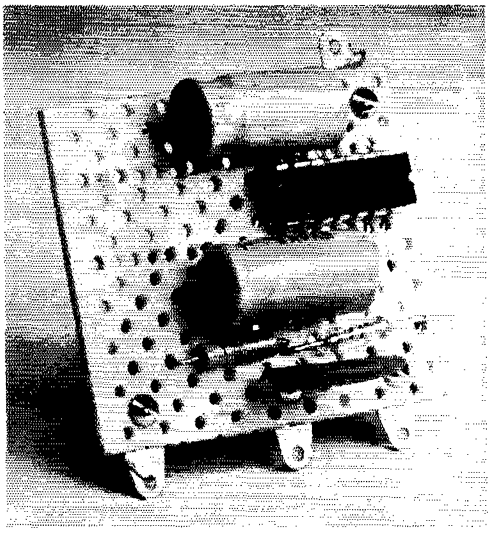
Circuit Details

Fig. 1 and the photograph show a 25-kHz. unit, put together in a few minutes, for installation in the Collins 75S-3 receiver. This circuit should work in other receivers, provided a suitable value is chosen for R_1.

CR_1 rectifies the 6.3-volt a.c. output of the receiver's filament line, and C_1, R_1 and C_2 filter the resulting pulsating d.c. and provide the proper operating potential (less than 5 volts maximum) for the Fairchild 9093 dual J-K flip-flop.[1] C_3 couples the output of the set's calibrator to the clock input, CP, of the first flip-flop, FF_{1A}. The output, Q, of FF_{1A} is coupled to the clock input, CP, of the second flip-flop, FF_{1B}, and the output, Q, of the latter is coupled through a very small capacitor (the one formerly used to connect the plate of the calibrator tube to the antenna) to the antenna lead.

Construction and Installation

The frequency divider was built on a 1½ × 2-inch prepunched Vectorbord. Although additional holes had to be drilled to mount the IC, circuit board is now available with $\frac{1}{10}$-inch spacing between holes, making it possible to directly mount dual-in-line ICs. In the writer's 75S-3 the board was mounted under the socket of the calibrator, V_1, but there is no reason why the divider cannot be installed at another spot if the builder so desires.



Only a handful of components make up the 25-kHz., divide-by-four calibrator and power supply. The gadget can easily be converted into a 10-kHz., divide-by-ten calibrator by installing another IC to the left of the one shown and rewiring the unit (Fig. 2B). Parts arrangement is not critical, permitting any convenient layout to be used.

To wire the unit in the 75S-3, perform the following steps:

1) Connect the ground end of the divider to the function switch (S_5) end of the calibrator's cathode resistor, R_{45}.

2) Connect the anode of CR_1 to pin 4 (6.3 volts a.c.) of V_1.

3) Connect C_3 to pin 5 (plate) of V_1.

4) Disconnect the lead (not R_{23}) going to the antenna from pin 5 of V_1 and connect it to the output (Q of FF_{1B}) of the divider.

To install the divider in other receivers, follow the next four steps:

1) Connect the anode of CR_1 to the hot side of the 6.3-volt a.c. filament line. If the a.c. input is greater than 6.3 volts (for instance, if the receiver has a 12.6-volt filament supply), increase the value of R_1 so that the voltage applied to the IC will be 5 volts or less.

2) Connect C_3 to the calibrator output.

*Box 1, La Canada, California 91011.

[1] Fairchild ICs may be hard to find. For the name of your nearest distributor, write Fairchild Semiconductor, Marketing Services Dept., P. O. Box 1058, Mountain View, California 94040.

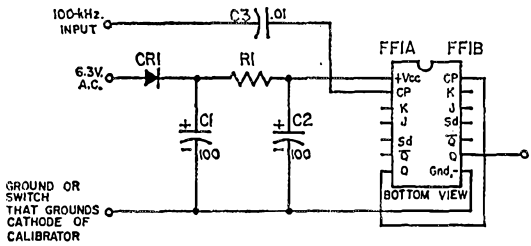


Fig. 1—Circuit of the calibrator divider and power supply.
C_1, C_2—100-μf. or more, 15-volt electrolytic.
C_3—0.01-μf. disk ceramic.
CR_1—100 p.i.v., 1-amp. silicon diode.
FF_1—Dual J-K flip-flop (Fairchild 9093).
R_1—App. 200 ohms, ½-watt composition. See text.

3) Disconnect the output coupling capacitor from the calibrator and connect it to the output (Q of FF_{1B}) of the divider.

4) If the function switch turns the calibrator on by completing the cathode circuit of the calibrator, connect the ground end of the divider to the switch side of the cathode circuit. This will permit the divider to be turned on by the function switch. If the calibrator is not turned on as mentioned (for example, if it is controlled by switching the B-plus lead), connect the ground end of the divider to the receiver ground. With this hookup the divider will run all the time; however, it won't put out signals unless the calibrator is turned on.

Use

Some amateur equipment does not have the 1-kHz. dial accuracy of the Collins and Heathkit sets. In these cases, there may be difficulty in identifying *which* 25-kHz. harmonic is being heard. If so, frequency division can be stopped by grounding the J and K terminals on FF_{1A}. Some decade ICs do not have this facility, and some flip-flops require a plus V_{cc} voltage on J and K or on S and C to stop frequency division. In any event, plus V_{cc} voltage on the IC input (CP) will stop the dividing action and probably leave enough leakage for one to recognize the 100-kHz. harmonics.

Without a temperature-controlled calibrator crystal, one cannot place great reliance on the crystal accuracy, especially during the first hour of receiver warm-up. During this period it is best to make frequent checks of the calibrator against WWV.

There is another source of error, the dial calibration between check points. In my Collins 75S-3 this error varies from zero to 350 Hz. and back again to as much as zero to 1 kHz. and back again, generally in a fairly smooth curve between end points on the dial. Many receivers and transceivers have a greater error. This error can easily be measured and logged for future reference, particularly if the new frequency divider is built to produce 10-kHz. or 5-kHz. harmonics.

Other Arrangements

There are several decade divider circuits for the Fairchild 9093 and similar flip-flops that toggle or divide when the J and K inputs are at a plus voltage. A simple circuit consisting of four flip-flops and an AND gate (two diodes and a resistor) is shown in Fig. 2A. The gate can be eliminated by using the more complicated wiring of Fig. 2B. If 5-kHz. harmonics are desired, half of a dual J-K flip-flop can be used before or after the decade divider.

Although at $7.45 the Fairchild 9093 is more expensive than some dual J-K flip-flops, it was chosen because it operates easily from sine waves, saw-tooth waves, and other wave forms. Less expensive types can be used, of course, but they may require a squaring amplifier or trigger between the crystal oscillator and the first flip-flop. Some of the attractively-priced units include the Motorola MC790P dual J-K flip-flop at $2.00, the Motorola 5-volt MC838 decade divider at $7.55, the Signetics LU321A dual J-K flip-flop at $2.48, and the Signetics N8280A decade divider at $8.30.[2] QST

[2] Signetics, 811 East Arques Ave., Sunnyvale, California 94087.

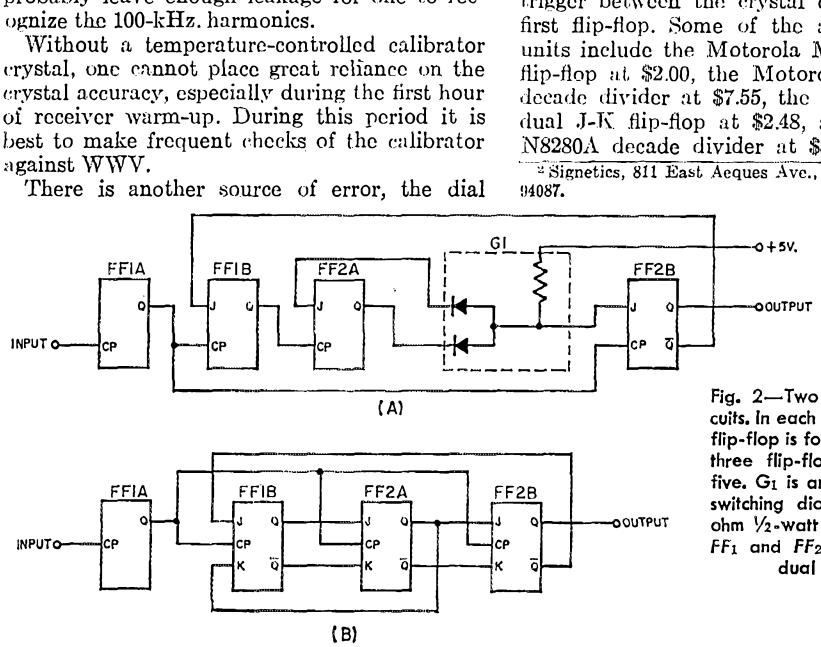
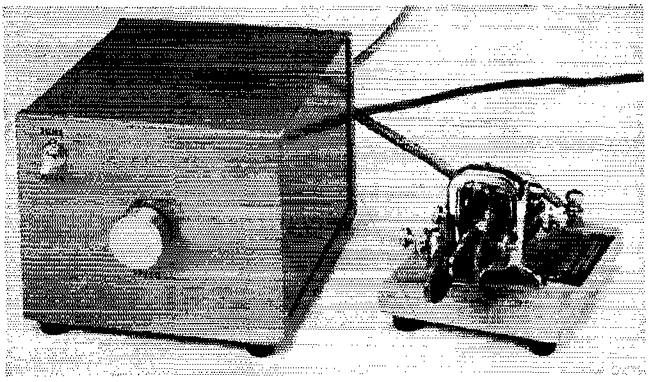


Fig. 2—Two decade divider circuits. In each case a divide-by-two flip-flop is followed by a group of three flip-flops which divide by five. G_1 is an AND gate using two switching diodes and a 10,000-ohm ½-watt composition resistor; FF_1 and FF_2 are Fairchild 9093 dual J-K flip-flops.

ICKEY—An Integrated-Circuit Electronic Keyer with Dot and Dash Memories



"ICKEY" is a keyer with both dot and dash memories, and can be actuated either by a single-lever paddle, as shown, or by a dual-lever key for "squeeze" operation.

Carrying the Micro-TO a step (or maybe two) farther, ICKEY will insert either a dot among dashes or a dash among dots. With the "squeeze" keying technique, this means fewer motions for some characters, an operating simplification once you get the hang of it.

Since preparing this article, the author has added another feature—automatic spacing of the correct length between letters. Two more inexpensive IC packages and an extremely simple change in the circuit given here are all it takes. Details in an early issue.

BY FRANK VAN CLEEF,* W1WCG

SEVERAL years ago I sat looking at the schematic diagram of a transistorized electronic key with dot and dash memories, dreaming of the smooth, effortless code soon to be mine, not to mention the relatively miniscule amount of power needed. Since the junk box was well stocked (and cold cash hard to come by) many liberal substitutions were intended. After much fussing and fretting, the keyer was finally put into operation, only to prove discouragingly r.f.-sensitive. The plain old self-completing keyer was plugged back into the rig, and all further key-building activity was temporarily suspended.

New interest in a key project was sparked by Chet Opal's article on the Micro-TO keyer,[1] using integrated circuits. The attractive possibility of adding an integrated-circuit memory to this excellent keyer resulted in the circuits presented here. No special parts are needed, apart from the output relay and the ICs themselves. The Motorola MC700-series industrial integrated circuits were used, both because of the low cost and because they are readily available.[2] Unfortunately, the ICs do not come with data sheets and if you must know what's inside the things, you will have to write to Motorola for the information.

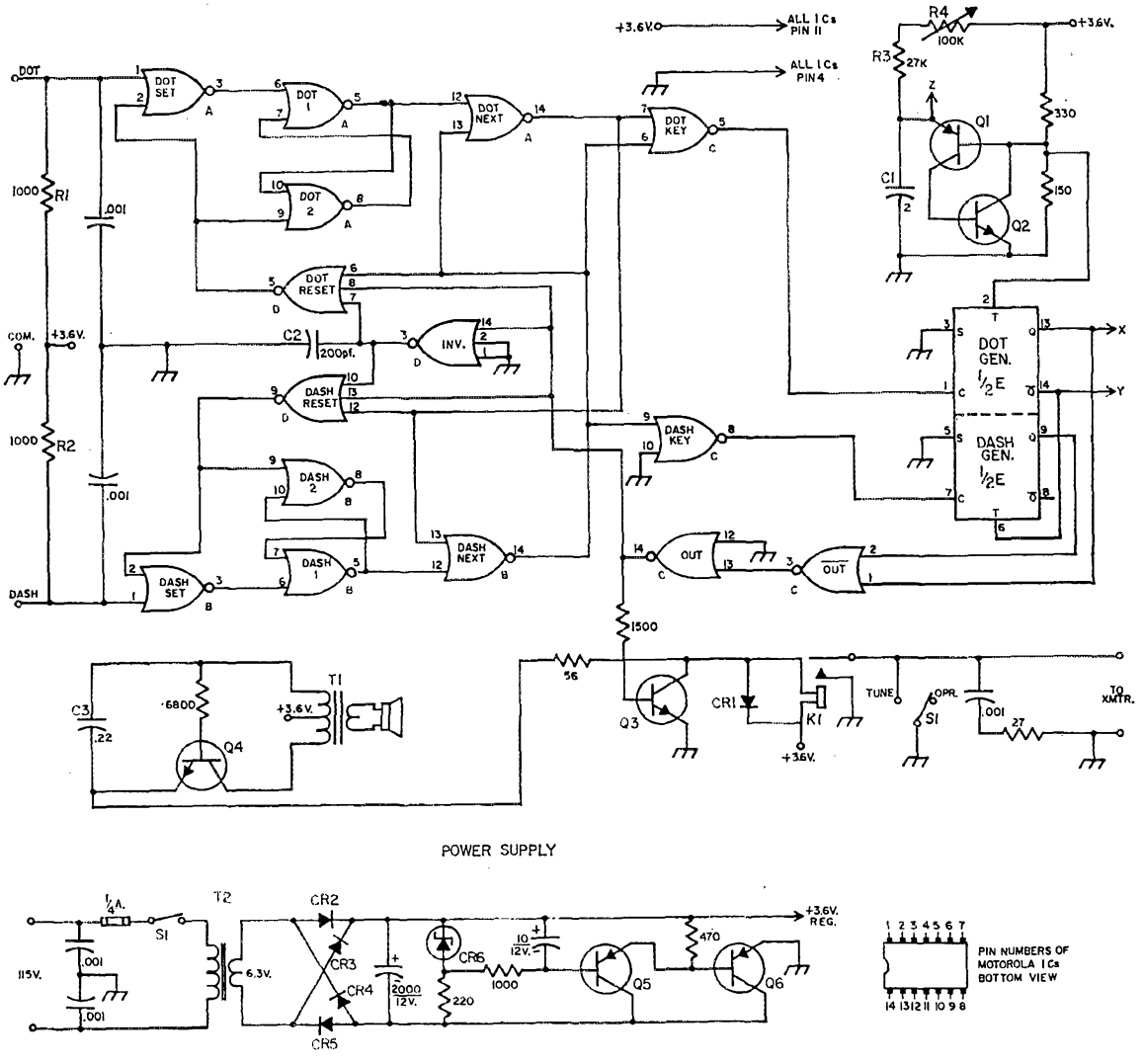
Operation

Since the basic keyer, which includes the time base, dot and dash generators, relay output and monitor, is almost identical to the Micro-TO keyer, not much will be said about it. As Chet points out, a memoryless keyer with a free-running time base can be a problem to use, but since memories have been added, the time base is left free-running to enhance spacing between characters. When the paddle is depressed to either the dot or the dash side, the corresponding memory is actuated, and at the next pulse from the time base the requested character begins. At the end of the character, the memory is reset and the keyer is ready for

* R.F.D. 2, Tolland, Conn. 06084.

[1] Opal, "The Micro-TO Keyer," *QST*, August, 1967.

[2] The author obtained these and the Magnecraft relay from Cramer Electronics, 320 Needham St., Newton Upper Falls, Mass. The integrated circuits and relay also are available from Allied Radio, 100 N. Western Ave., Chicago, Ill. and Newark Electronic Corp., 500 N. Pulaski Road, Chicago, Ill.—*Editor.*



POWER SUPPLY

Fig. 1—Circuit diagram of the keyer. Fixed resistors are ½-watt composition; resistances are in ohms; K = 1000. Except as indicated, capacitances are in μf. Fixed capacitors with polarity indicated are electrolytic; others not listed below are disk ceramic.

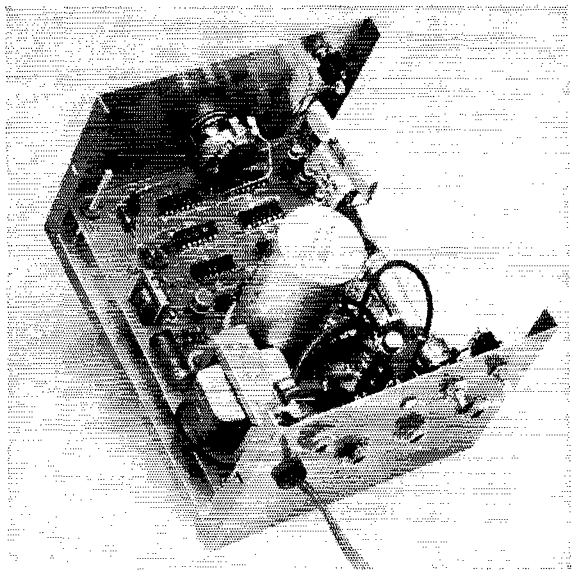
Logical 1 (high) 3.6 volts and logical 0 (low) 0.3 volt, approximately. Logic rules for all gates: Any input high gives low output (NOR); all inputs low give high output (NAND). Integrated circuits are designated A, B, C, D, E, to identify gates included in a particular unit. Pin numbers are shown alongside.

A, B, C—Quad 2-input gate (Motorola MC724P).
D—Triple 3-input gate (Motorola MC792P).
E—Dual JK flip-flop (Motorola MC790P).
C_1, C_3—Mylar.
C_2—Dipped silver mica.
CR_1—Any small silicon diode.
CR_2-CR_5, inc.—Silicon, 1 amp., 50 p.r.v.
CR_6—Zener, 5.6 volts.
K_1—Reed relay (Magnecraft W102X1).
Q_1—HEP52 (Motorola).
Q_2, Q_3, Q_4—2N706.
Q_5—HEP51 (Motorola).
Q_6—2N268 or equivalent.
R_1, R_2, R_3—For text reference.
R_4—100,000-ohm control, linear taper.
S_1—S.p.d.t. toggle.
S_2—S.p.s.t. toggle.
T_1—Transistor output, 500 ohms to voice coil, center-tapped primary.
T_2—6.3-volt, 1.2-amp. filament transformer.

another input. Both memories may be actuated concurrently, in which case the memory first actuated is emptied first. If a squeeze paddle is used and both contacts are held closed, a string of alternate dots and dashes results, starting with the character whose contact was closed first.

The Circuit

At this point, a few definitions will save a lot of words. A "character" is a dot or a dash. A

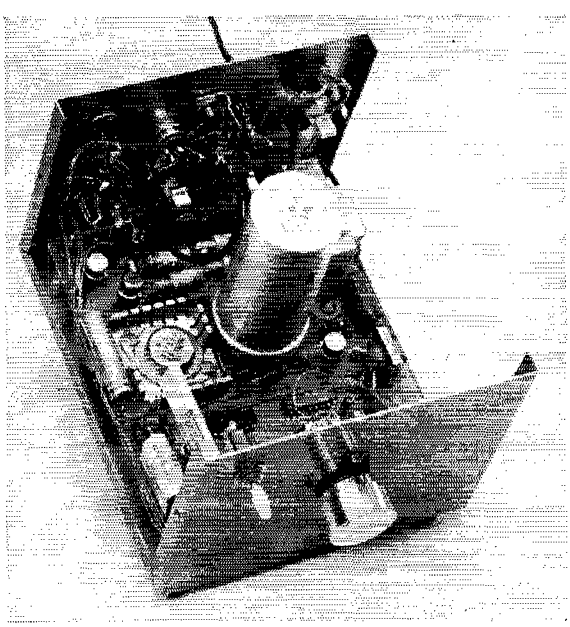


This view from the rear shows the ICs and associated components. The rear panel, foreground, has jack connections for external circuits, including one for the monitor speaker. (These jacks are not shown explicitly in the circuit diagram.) The variable resistor and switch at the top right of the rear panel are for the optional weight circuit of Fig. 2.

"set" memory is one storing a dot (or a dash). Since the memory circuit is symmetrical, it will be explained for dots, and it will be assumed unless stated otherwise that the dash side operates in a similar fashion. And, throughout the discussion of the circuit, "high" means a voltage greater than about 2 volts positive to ground, while "low" means a voltage less than 0.5 volt positive to ground. All of the gates used follow the same logical rules—*all* inputs low result in a high output; *one* input high results in a low output. Any unused input must be connected to ground to prevent it from affecting the other inputs in any way. Keeping these things in mind, we will go on to the details.

Dot Memory

Gates DOT 1 and DOT 2 are interconnected to form a bistable flip-flop. In the idle condition, the output of DOT 1 is high and the output of DOT 2 is low. The output of DOT SET is also low, due to the high on input 1 through R_1. The output of DOT RESET is low at this time. When the paddle is operated to the dot side, pin 1 of DOT SET is grounded, making all its inputs low and its output high. This high, applied to pin 6 of DOT 1, makes pin 5 of DOT 1 go low, which in turn



Ultra-compact construction was not attempted in this keyer, although the volume could be reduced considerably if desired. The power supply occupies the rear section of the 4 X 5 X 6 box. The integrated circuits are mounted on the insulating circuit board near the front panel.

causes the output of DOT 2 to go high, thus holding DOT 1 in the present state, with its output low. The dot memory is now set. The operation of DASH SET, DASH 1 and DASH 2 is identical for storing a dash.

Sequence And Control

The gates DOT NEXT and DASH NEXT insure that the first memory actuated is the first memory cleared. Both of these gates have a low output when neither memory is set. If a dash has been previously memorized (pin 5 of DASH 1 low), the high from pin 14 of DASH NEXT to pin 13 of DOT NEXT prevents a dot from being sent at this time. If no dash has been memorized, the low at pin 13 of DOT NEXT, together with the low to pin 12 from DOT 1 when set by the paddle, causes the output of DOT NEXT to go high. This high to pin 7 of DOT KEY makes its output low, allowing DOT GEN to begin keying a dot at the next pulse from the time base. Operation for a dash is similar, except that the high output from DASH NEXT activates both DOT KEY and DASH KEY to form a dash.

Reset

Either memory must be reset immediately upon completion of its character, and this is the function of gates INV, DOT RESET and DASH RESET. The output of gate OUT, which is high during key down, is an input to all three of these gates, and at the end of a character an extremely fast pulse is delivered to the dot or the dash memory, depending upon which character was being sent. The 200-pf. capacitor is an important factor in determining the length of this pulse, which must be neither too long nor too short. The memory that gets the reset pulse is determined by input 6 to DOT RESET and input 12 to DASH RESET. Both of these inputs cannot be high at the same time. Assuming from the previous discussion that a dot is being sent, the output of DOT NEXT is high, forcing the output of DASH NEXT low (through input 13 of DASH NEXT), regardless of the state of DASH 1 and DASH 2. The low from DASH NEXT to pin 6 of DOT RESET allows the fast reset pulse to be applied to DOT SET and DOT 2, forcing a reset of the dot memory regardless of the state of the paddle, and allowing a dash to be sent next if the dash memory is set. If the reset pulse is too long, the dash memory might be reset immediately after the dot memory is reset, due to the change in output from DOT NEXT. If the paddle is held continuously to the dot side, the dot memory stays set except during the extremely short reset pulse. If a squeeze paddle is used with both contacts closed simultaneously, then during the reset of one character the memory for the other character is allowed to take control, resulting in alternate dots and dashes.

Power Supply

Early consideration was given to a regulated power supply, to provide a ripple-free tone from the monitor. It proved to be a necessity as well, to keep the large change in load during key-down conditions from affecting the pulse generator. Three Nicad cells of the "D" size could probably be used if a silicon diode were placed in series with the battery to drop the resulting 4.12 volts down to 3.62 volts. Whatever power arrangements are made, the circuit should be supplied with about 3.6 volts d.c. at 250 ma., with minimal ripple.

Construction

No special effort was made to miniaturize the keyer. The unit is housed in a 6 × 4 × 5-inch aluminum utility box with plenty of room to spare. A piece of unpunched, unclad epoxy fiberglass board was obtained, and all components were mounted on this board by drilling holes for the leads and then connecting to them on the other side of the board. Layout is not critical, but it seems better not to crowd the ICs too closely together, or it will be difficult to get the wiring connected to them. Due care should be exercised when soldering to the pins of the ICs—use a low-wattage iron and complete the soldering operation as quickly as possible.[3] The transistors used were readily obtainable from the same source as the integrated circuits, but any high-frequency silicon transistors should be satisfactory. The driver transistor, Q_5, in the power supply should be capable of at least 300 mw. dissipation. No difficulty with r.f. sensitivity has been encountered so far, using the amount of bypassing shown.

The keyer has been used on the air almost every night for the past several months, with very satisfying results. The speed control is not particularly linear, but the values of R_3 and R_4 can be adjusted to provide almost any desired range. No weight control is necessary with this type of key, although one could be added if desired (Fig. 2). Some difficulty in getting the proper weight was experienced in the beginning at my station, and the problem turned out to be a slightly-long time constant in the differential keying circuit of the transmitter in use.

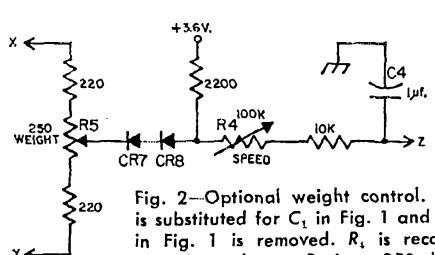


Fig. 2—Optional weight control. C_4 is substituted for C_1 in Fig. 1 and R_3 in Fig. 1 is removed. R_4 is reconnected as shown. R_5 is a 250-ohm linear control CR_7, CR_8—Any small silicon diode.

I wish to thank Bob Spindel, WA1HSN, for the advice, helpful criticism, and moral support he supplied during the construction and testing of the keyer. QST

[3] A simple heat sink for use during soldering can be made from a small piece of copper sheet. See "Hints & Kinks," *QST*, September, 1968.

Antipodal Reception of Oscar Signals

BY RAPHAEL SOIFER,* K2QBW

OSCAR-Australis,[1] a transmitting satellite designed and built by Australian amateurs, is tentatively scheduled for launch sometime this winter. The inclusion of a ten-meter transmitter as part of the package opens the way for many amateurs not equipped for v.h.f. operation to experience the fun of participating in amateur satellite experiments.

Such experiments are particularly interesting at high frequencies because of the many interactions which take place between satellite signals and the ionosphere, giving rise to propagational peculiarities which can be observed by the alert listener. This area has held this writer's interest for a good many years — in fact since the first Sputniks let loose on 20.005 MHz. in 1957.[2,3]

Of the strange things that happen to signals as they pass through the ionosphere, perhaps none is so fascinating to observe as the antipodal reception effect — literally, propagation leading to an increase in received signal strength (or even the sudden reappearance of a signal) as the satellite passes above a point exactly at the opposite side of the earth from the receiving station. This effect was first reported in print by W5LFL, then a graduate student at Stanford, in the March 1958 issue of *Proceedings of the I.R.E.* I personally noted the antipodal reception effect during approximately 10% of the 20-MHz. satellite passes observed at K2QBW during the International Geophysical Year, 1957–58.

In its typical occurrence, the satellite signal would peak at S7 or S8 while the transmitter was directly overhead, and then would gradually fade out entirely as the transmitter approached and passed through the radio horizon on its way around the world. About forty minutes later, while the satellite was somewhere over the eastern Indian Ocean some 12,000 miles away, the signal would pop out of the noise, reach S2 or S3 with a somewhat fuzzy c.w. note, then fade out again after perhaps two minutes. Then, silence again until the satellite reappeared over the midwestern U.S.A. on its next regular pass.

What is particularly strange about this is that there is often antipodal reception in the absence of skip at shorter ranges. Why should a satellite signal fade out around 2000 miles range (radio horizon) only to reappear at 12,000 miles? Why not 4000 or 6000 or 9000 miles? For a transmitter located within or above the propagating layers of the ionosphere, what we have come to expect about skip zones from conventional earthbound transmitters does not always apply. As may be seen from Fig. 1, some of the signal waves emanating from the satellite are very nearly tangential to the ionosphere, resulting in a skip zone (for those waves) which is very nearly infinite — no signal reflected to earth except for scatter. This would show an increase at the antipodes because of the convergence of such waves from all directions. Such ionospheric scatter would also explain the fuzzy note. Is this the only cause of antipodal reception? Probably not, but it is typical of the strange things which can be encountered in this field. Lessons learned from antipodal reception and similar satellite experiments have been of significant value to shortwave broadcasters and others concerned with improving h.f. propagation performance.

Antipodal reception has also been observed (although very rarely) at 144 MHz. in connection with earlier Oscars. As yet, no fully satisfactory explanation of these v.h.f. sightings is available, and the existence of an Oscar-Australis with transmission on both bands at once may help to provide more clues.

It is the purpose of this article to call the attention of amateurs to these phenomena in advance of the Oscar-Australis launching to permit them time to design experiments of their own which make use of this amateur radio transmitter in outer space. It is entirely fitting that

* 60 Rockledge Road, Hartsdale, New York 10530.

[1] "Australis-Oscar Arrives in U.S.," *QST*, July, 1967.

[2] Soifer, "High-Frequency Satellite Scatter," *QST*, July, 1960.

[3] Soifer, "The Mechanism of Amateur Space Communication," *QST* December, 1961.

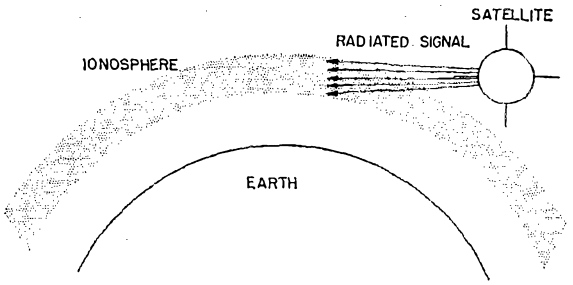


Fig. 1—Some signals radiated from the satellite are nearly tangential to the ionosphere.

American amateurs take an active role in antipodal reception, since the transmitter will have been built by hams in Australia, the nearest country to the antipodes for much of the United States. Truly, this will be an international amateur event.

The output of the h.f. transmitter aboard Oscar-Australis will be approximately one watt to a dipole antenna at a frequency of 29.450 MHz. Emission will consist of a series of telemetry tones using double sideband, full-carrier a.m. At present, this transmitter is slated to be command-operated, but it is expected to be on the air during most of the time that the batteries are operative. This is, of course, purely a telemetry beacon and no ground-based signals will be retransmitted as with Oscars III and IV.

I have gathered together in Table I the kind of information which would be of particular interest in connection with antipodal reception observations. In addition to your own experiments possibly involving additional kinds of information, you may wish to keep a log modeled after Table I which should be submitted to Project Oscar, Foothill College, Los Altos Hills, California *after the 29-MHz. transmitter has gone silent.*

Antipodal listening periods should, of course, be scheduled to center around times approximately one-half an orbital period before and after the time of the nearest satellite approach during any series of passes. Project Oscar will collect any such logs received and send them on to me, and I will compare them to see if any patterns emerge. I shall focus my attention on: correlation between occurrence and strength of antipodal signals and observed ionospheric conditions; comparison of different paths and locations for occurrence of antipodal effects; and characteristics of antipodal signals.

Owing to the large volume of regular tracking reports expected by Oscar Headquarters, it is important that these antipodal logs be kept separately and sent in at the conclusion of the satellite's active life. It will be difficult, if not impossible, for Oscar personnel to cull these out from the tracking data should they become intermixed.

If you have specialized equipment required to make particularly sophisticated observations of received signals, by all means go ahead. However, all that is really required for sending in a meaningful log and having some fun is a good receiver, an accurate clock, a reasonably good antenna, and orbital predictions from W1AW or self-generated from your own tracking data. Good luck! QST

Table I

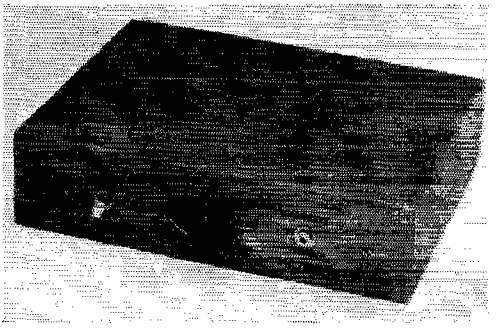
Log Data For Antipodal Reception Experiments.

General

Name, call, address
Latitude and longitude of receiving station
Receiving equipment for 29 MHz.
Antenna and height above ground (or surrounding terrain)

For Each Listening Period Logged

Beginning and ending times of listening period (GMT only)
Beam azimuth (if any) in degrees from true north
Was antipodal reception observed? (Yes/No)
If Yes: Times signal In Out (GMT)
Maximum strength (db. above noise)
Signal characteristics (Doppler, fading, frequency dispersion etc.)
Satellite position (at center of listening period or time of maximum received antipodal signal strength — specify which):
Subsatellite point (latitude, longitude)
Altitude (statute miles)
Band conditions during listening period:
Was ten meters open or closed?
If open, where to? How strong?
Any other comments, including special or v.h.f. observations.



The FS-1 makes a neat package in its "papered" 6 x 8 x 2-inch chassis. A variety of high-accuracy marker frequencies is available, switch selected. Simple temperature compensation in the oscillator circuit maintains the basic crystal oscillator frequency constant to within a few parts in ten million over the normal range of room temperatures.

The Mainline FS-1 Secondary Frequency Standard

BY IRVIN M. HOFF,* W6FFC

High stability through the use of an h.f. close-tolerance crystal with simple temperature compensation, and high reliability in frequency division because of integrated-circuit flip-flops—these are outstanding features of the frequency standard described in this article. The assorted frequency markers take care of practically any amateur requirement.

EVERY amateur needs some sort of device to tell him what frequency he is on. In many cases the receiver alone is sufficient, since most modern receivers are quite stable and have good frequency readouts compared with even the best receivers of 10-15 years ago. This has been accomplished in part by going to "ham-bands-only" receivers instead of the general-coverage type formerly popular.

However, unless you are content to rely entirely upon the receiver dial or upon your fellow amateur's accuracy, you will probably want something that will at least mark the band edges with reasonable accuracy. In other cases, you will want special calibration points for net operation, schedules, and activities such as MARS. Consequently, many receivers come equipped with a 100-kHz. calibrator—or, at least, such an accessory is available.

For most purposes, these calibrators are quite adequate, but there are some problems involved with the typical calibrator already installed in the receiver:

1) It is usually difficult to set. The trimmer in most calibrators is such a coarse adjustment that it is quite hard to find exactly the right setting. If the calibrator could be adjusted to match WWV easily, it would help a lot.

2) In practically every instance, you have to raise the lid, at least, to get at the adjustment. I've often wondered why no manufacturer makes a front-panel screwdriver adjustment available. In one popular receiver, you have to turn the entire receiver upside down to get at an adjustment hole in the bottom!

3) It doesn't hold frequency well. This is caused by a combination of circumstances, one being that the operator is usually reluctant to

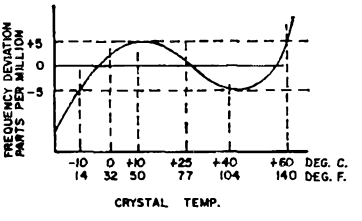


Fig. 1—Illustrative curve of frequency vs. temperature for an AT-cut crystal designed for 0.0005 percent frequency tolerance over a temperature range of −10 to +60 degrees C. (Adapted from information in International Crystal Co. *Crystal Bulletin*, Vol. 1 No. 1.)

*12130 Foothill Lane, Los Altos Hills, Calif. 94022.

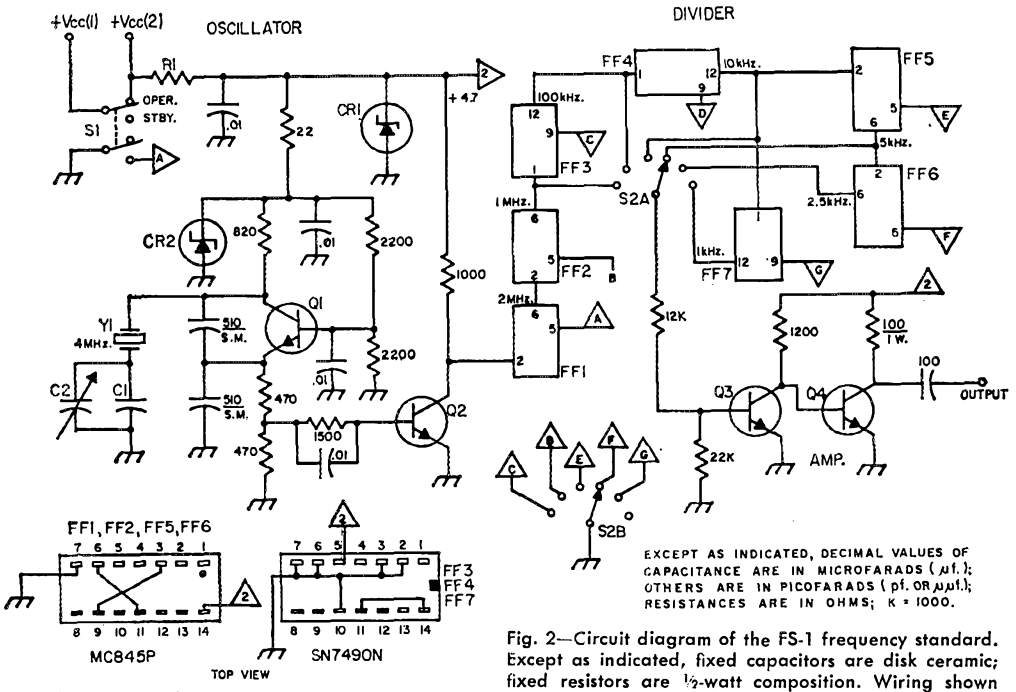


Fig. 2—Circuit diagram of the FS-1 frequency standard. Except as indicated, fixed capacitors are disk ceramic; fixed resistors are ½-watt composition. Wiring shown on the integrated-circuit layout drawings (bottom) is the same on all ICs of the same type; additional connections are shown in the main circuit diagram. Output marked "B" from FF_2 (not used, as shown) is available for v.h.f. use if desired.

C_1—Composite, silver mica and N750 (see text).
C_2—0.8-4.5-pf. glass piston trimmer (JFD VC21GY).
CR_1—Zener, 4.7 volts, 1 watt; (1N4732 or equivalent). Not required for flashlight-cell supply.
CR_2—Zener, 4.3 volts, 1 watt; (1N4731 or equivalent)
FF_1, FF_2, FF_5, FF_6—Clocked flip-flop (Motorola MC845P).
FF_3, FF_4, FF_7—Decade divider (Texas Instruments SN-7490N.
Q_1-Q_4, incl.—N-p-n, v.h.f. type (Fairchild 2N4274, Motorola MPS2369, etc.).
R_1—Not required for flashlight-cell supply; see text.
S_1—D.p.d.t. miniature.
S_2—Miniature ceramic rotary, 1 section, 2 poles, 6 positions, non-shorting (Centralab PA-2003).
Y_1—4000-kc. low-drift crystal (International HA-1).

leave the receiver running 24 hours a day—which would help tremendously in the stability of the receiver as well as the stability of the calibrator. While the receiver will be approximately at room temperature until turned on, the chassis and the air surrounding the 100-kHz. crystal, as well as the calibrator components, will eventually be well above room temperature. This, of course, causes the calibrator frequency to change.

Thus the 100-kHz. calibrator really should be readjusted to WWV whenever it is to be used for reasonably accurate checks. For finding the band edges, it is probably quite adequate. Most fellows on voice wouldn't dream of getting within perhaps 3 kHz. of the band edge anyway, and most on c.w. wouldn't stick their necks out to get within 1.-1.5 kHz. of the edges. But for s.s.b. nets, 500-1000 Hz. would be totally inadequate. For many other purposes much more accuracy than this is desired, in addition to which the 100-kHz. marker points are entirely insufficient. We can't *all* operate on 3600, 14,300, and other even-hundred kHz. frequencies.

So we start looking around for something that will put out additional markers—hopefully, with additional accuracy.

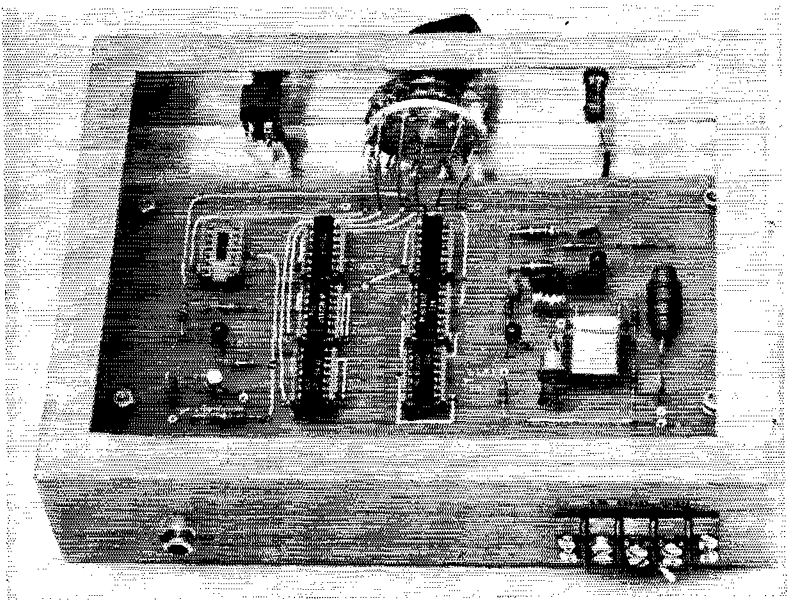
High-Frequency Crystals

A basic problem with the 100-kHz. crystal is its inherent instability with wide temperature changes. Although the crystal cut used for low frequencies (usually the "5-degree X" cut) can give a zero temperature-*vs.*-frequency coefficient at a selected temperature, the coefficient rapidly becomes poor either side of the design temperature.

For holding frequency over a wide temperature range, high-frequency AT-cut crystals are much superior, and most of the better commercial frequency standards these days use crystals in the vicinity of 5 MHz.

Fig. 1 is a typical curve of frequency *vs.* temperature for a high-frequency AT cut such as is used for the International Crystal Corp. type HA-1 crystal.[1] Note that in the region of 50 degrees F. to 104 degrees F ("room-temperature" range) the curve is rather linear. As the room temperature goes up the crystal frequency goes down, indicating that it should be possible to compensate for this drift by use of negative temperature-compensating capacitors. Although the subject of temperature correction becomes quite involved if great temperature changes are antic-

[1]International Crystal Manufacturing Company, Inc., 10 North Lee, Oklahoma City, Oklahoma 73102.



With the exception of the selector switch, standby switch, and *trimmer capacitor*, the parts are mounted on a double-sided etched board somewhat smaller than the chassis. The oscillator and buffer circuits are to the right (the r.f. choke was eliminated from the circuit after this photo was taken). Integrated circuits are mounted in sockets; one (at the left) has been removed to show the socket more clearly in this view.

ipated—as in a mobile installation inside the trunk of an auto where the temperature may get very high in the summer and very low in the winter—we find that it is quite easy to get excellent temperature compensation for normal room temperatures of, say, 60-90 degrees F.

The amount various crystals would drift, with no compensation, over a 60-90 degree F. variation is surely open to speculation. The primary reason why the FS-1 frequency standard was designed, however, was that the 100-kHz. crystals are entirely unsuitable for precision work unless used in an oven, and even then rarely compare favorably with the results obtained with the HA-1 crystal used in the FS-1 circuit.[2] Although the following figures represent maximum frequency deviation with temperature variations (−22 to +140 degrees F.) far in excess of those amateurs would be likely to encounter in the home, they are at least representative of the relative drift from one grade of crystal to another supplied by the same manufacturer. As such, they are adequate for comparative purposes:

100-kHz. crystal ($13)	± 0.02 percent
General Purpose 4-MHz. crystal ($4.00)	± 0.005 percent
Commercial Standard 4-MHz. crystal ($6)	± 0.003 percent
HA-1 4-MHz. crystal ($9)	± 0.0005 percent

If you could compare the harmonics of these with WWV, you would find the HA-1 *could* be up to forty times as stable as the more expensive 100-kHz. crystal, up to ten times more stable than the General-Purpose type, and up to six times more stable than the Commercial Standard. Regardless of how you interpret the figures, the fact remains the HA-1 is a superior type of crystal.

Converting these figures to something useful, we can take some data furnished with a recently-purchased HA-1 crystal (such data is now furnished by the manufacturer with each HA-1). The data indicates that at 15 MHz. you would get around 1 Hz. change for each degree Fahrenheit change. Now you can imagine how much drift you would get with a 100-kHz. crystal with, say, a 10-degree F. change — not much of a change when you start firing up radio equipment! — and can understand why, for precision work, the 100-kHz. crystal without close temperature control is so unreliable, and why the HA-1 crystal was chosen for the FS-1. Even in an oven of the type amateurs are likely to use, the temperature might vary enough so that a 100-kHz. crystal would drift 10-20 cycles when compared with WWV on 15 MHz. The FS-1 with no oven will stay within 1 or 2 cycles indefinitely at normal room temperatures with the slight compensation described later.

If we select a 4000-kHz. crystal, we could leave it running continuously and none of the harmonics would fall directly in any amateur band or on any WWV frequency. The only real hitch is that 4000 kHz., as such, doesn't do you much good. It might mark the top end of the 80-meter band, or enable you to find 28.0 MHz., but that's hardly enough to create much interest. So we need a method of converting this stable frequency into useful markers.

Here is where micrologic circuits enter the picture. A number of articles have described how a "flip-flop" can be used to divide by 2, or how several flip-flops can be combined to

[2] The author is speaking here of the inexpensive small oven which gives comparatively coarse temperature control. High stability requires "proportional"-type control with the operating temperature closely matched to the zero-coefficient temperature of the particular crystal used. — *Editor.*

provide decade dividers that divide by 10.[3,4] (You can also get other divisors, such as 5.) We shall not go into this aspect, then, but instead will show how the integrated flip-flops may be used, rather than delving into why they work.

The Mainline FS-1 Secondary Frequency Standard

The circuit used for the FS-1 standard, Fig. 2, has a Colpitts oscillator with a 4000-kHz. crystal. The output is taken from a tap on the emitter resistance so the oscillator will be lightly loaded for best stability. A buffer amplifier then feeds the 4000-kHz. signal into the first of the micrologic stages. This stage divides by 2 for 2000-kHz. output. The next stage divides by 2 again for 1000-kHz. output, which then goes into a decade divider with 100-kHz. output. Following another decade divider for 10-kHz. output, we then go either to a third decade divider for 1-kHz. output, or to another flip-flop for 5-kHz. output, followed by a final stage of divide-by-2 for 2.5-kHz. output.

Depending upon which of these outputs you select, you have available 4, 2, or 1 MHz., and 100, 10, 5, 2.5 or 1 kHz. A 6-position switch is used, and for 3-30-MHz. work just the last six outputs were selected for our purpose. Those interested in v.h.f. or u.h.f. probably would want the 4-MHz. and possibly the 2-MHz. outputs rather than the 1- and 2.5-kHz. outputs.

The output of the selector switch goes to a lightly-loaded buffer amplifier which acts like a low-power switch to drive the output stage. This stage, which has a small collector resistor for a stiff load, switches very hard from on to off, making excellent square-wave output with very strong harmonics. The second section, S_{2B}, of the selector switch is used to prevent the following logic from toggling; thus you only get the output frequencies you have selected. If this section isn't used, the leakage through the switch will create weak markers in the receiver at the other points. While this switch section may be omitted, the results make using it worth while.

Alternative inputs for the power-supply voltage are shown on the schematic. The first (1) turns the voltage on and off. The other (2) leaves the voltage running continuously and merely turns off the first logic stage so there is no output other than 4 MHz., which will not affect the receiver unless it is tuned very close to that frequency.

It is easy to temperature-compensate this circuit for really superior stability. Using a 10-pf. N750 temperature-compensating capacitor, my drift has not been over 1-1.5 Hz. in the past month when compared with WWV on 15 Mc.—approximately 1 part in 10^7. Greater stability than this would be unnecessary for typical amateur use (I am already having difficulty measuring the drift even with a digital counter with oven-controlled clock!).

[3]Pos, "Digital Logic Devices," *QST*, July, 1968.
[4]Staples, "Integrated-Circuit Frequency Dividers," *QST*, July, 1968.

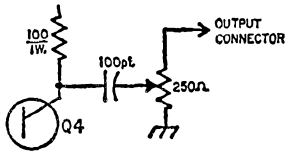


Fig. 3—Added potentiometer for controlling the output amplitude. Components aside from the potentiometer are shown in Fig. 1.

How Strong Is the Output?

On the 1-MHz. output, the 30th harmonic (10 meters) practically pins my S meter. As 10 meters is the 30.000th harmonic of 1 kHz., the output will be much less in this position, but in my case was still S9. The unit was hand-carried to ARRL Hq., where it was run through its paces. It gave very strong markers on the 2-meter band, and good usable markers on the 450-MHz. unit at ARRL. This will help in weak-signal work in cases where it is difficult to get markers to set receivers and transmitters for schedules.

The 1-kHz. output is strong enough to run a pair of headphones, and can be used as an audio reference tone for setting a variable audio oscillator. You can also substitute a 3400-kHz. crystal for the 4000-kHz. one and get markers at 850 and 2125 Hz. on the last two positions, to an accuracy far greater than ever would be needed. This would be of particular interest to those on RTTY (thanks to W4ZAG for this idea!).

Components and Construction Techniques

Most any type of high-speed high-frequency transistor (n-p-n type) will work. The Fairchild 2N4274 or Motorola MPS2369 are excellent for the purpose. The Motorola HEP57 and others will also be suitable. The 4000-kHz. crystal was specified for room temperature, 32-pf. load, and F-700 case (wire leads for soldering). The 0.8- to 4.5-pf. glass trimmer (JFD VC21GY) gives an excellent vernier action for accurate frequency adjustment with respect to WWV. With a prefabricated printed-circuit board[5] most of the work is already accomplished and the entire unit can be constructed in less than one evening's time. Only a few holes need be drilled in the chassis for the various switches and the output jack. The author used imitation-wood "shelf paper" over his chassis; it is attractive and

[5]A kit of all the parts needed to construct this unit, including the printed-circuit board but less the power supply, is available from Truman Boerkoel, K8JUG, (FS-1 Group), Newark Industrial Electronics Corp., 2114 South Division Ave., Grand Rapids, Michigan 49507. The circuit board is $6.25; components, $76.79; board and components complete, $77.00. All prices include postage.

professional-looking, and at the same time offers some thermal insulation of the unit for better short-term stability. A bottom plate was covered similarly. The shelf paper can be obtained at nearly any hardware or department store. "Rub-on" decals were then affixed for the final touches.

The circuit board is suspended inside the chassis on little "L" brackets holding it to the sides so the chassis top is not used. (W4ZAG used 1-inch 6-32 bolts with extra nuts on to hold the board off the chassis.) The chassis size is somewhat larger than the board to facilitate easy removal.

Power Supply

The flip-flops and the decade dividers are designed to operate at up to +5.5 volts input. We originally planned to use a 5.1-volt Zener, but the cheaper Zeners are only 10 percent types, and we felt this was coming too close to the 5.5-volt limit. Also, by using 4.7 volts it is possible to use either external batteries or an a.c.-operated power supply.

You can use three flashlight cells in series if you like; this is just right for 4.7 volts. The current drain of the FS-1 is approximately 140 ma., and in intermittent operation "D" cells will last a long time (this is about one-third the current of a normal 2-cell flashlight bulb).

With the proper dropping resistor, R_1, to limit the current, you can use practically any low-voltage power supply. R_1 should be selected to limit the current to 150-180 ma. This allows the Zener in the FS-1 to pull 10-40 ma. for best regulation. The following are typical resistor values for various voltage sources:

9-volt source:	24 ohms, 6.5 watts
12-volt source:	43 ohms, 6.5 watts
15-volt source:	56 ohms, 11 watts
24-volt source:	120 ohms, 11 watts

Receiver Connections

There are various ways in which the unit may be connected to the receiver. Probably the best way is to put a "T" connector on the antenna-changeover relay where the receiver is connected. For a while the author had it connected directly to an antenna selector switch in a vacant spot. One day (as you can guess by now!) the switch was accidently left on that particular position and a full kilowatt of carrier put on the transmitter for tuning on another band. It took only a few moments for the truth to soak in as to why the transmitter wouldn't load right, but by this time the damage had been done. Quite surprisingly, all that happened was that the last two transistors blew out. This involved approximately $1 total repair costs. W4ZAG accidentally did the same thing, so now all of us have it connected directly to the receiver instead of through some antenna selector switch.

To most easily check against WWV, some means of making the strength of the signal from the standard equal to that of WWV is beneficial, so that optimum beat-note amplitude will result. If desired, you can include the optional circuit shown in Fig. 3. You can also try different switch positions.

Selecting the Temperature-Compensating Capacitor

The capacitance of C_1 in the diagram will be approximately 30 pf. In four of these units built and tested all over the United States—Florida, New York, California and Michigan—the value of this capacitor has varied from about 27 to 33 pf. It is merely to get the piston trimmer within range of adjustment to WWV. You will probably need to hand-pick a capacitor that will allow this to occur. This only takes a few minutes, and thereafter the piston trimmer will be quite adequate, giving outstanding vernier tuning.

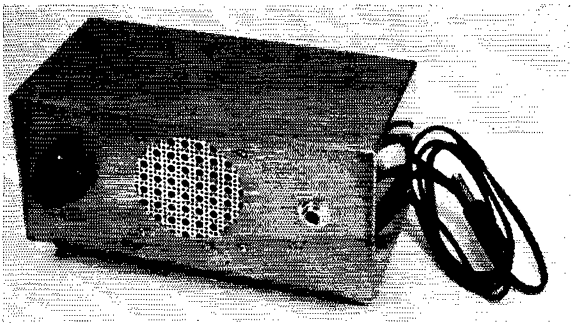
C_1 is actually several small capacitors in parallel. In the author's case, it is a 10-pf. N750 in parallel with a 22-pf. fixed no-drift capacitor. We suggest you start with this combination. If the piston trimmer will not quite reach WWV, try 15 pf. in place of 22 pf. You will soon get the right combination.

To temperature-compensate the circuit, first let the FS-1 run for several days if you are using an a.c. power source, or use it for several days in intermittent operation if you are using flashlight batteries. Then when the room is about as cold as it normally ever gets, carefully set it to WWV. Turn to the receiver's s.s.b. position and tune for some pleasing audio note, such as 1000 Hz. (It is best to use the 500-Hz. selectivity setting, if you have one.) Turn on the FS-1 and carefully adjust the trimmer for the same audio tone. As you approach the exact tone, the S meter will waver slowly back and forth as the beats come into phase and go out. You'll never be able to completely stop the S meter for long, due to atmospheric effects on the incoming WWV frequency. When you have zeroed the best you can, count the beats in, say, a 30-second period. If it comes out to be 30 beats, you are only 1 Hz. off, and that's about as close as you can get. Then go about your business.

Hours later, when the room is about as warm as it will get (and while the WWV signal is still usable), come back and try counting beats again. If there has been a change, very carefully adjust the trimmer, noting whether you are turning it clockwise or counterclockwise to adjust the frequency correctly. If clockwise, the frequency increased with temperature, and that probably would be caused by too much negative temperature compensation. Remove the 10-pf. N750 capacitor and replace it with a 5-pf. N750. Try this system for the next few days. It should now be just right; so far, no-

(*Continued on page 152*)

A Simple Method of Monitoring Your Fist



The knob at the left is the combination switch and audio gain control. At the right is the jack for the headphones. The receiver headphone line is coiled at the rear.

An R.F.-Actuated C.W. Monitor

BY LEWIS G. McCOY,* W1ICP

As any ham quickly discovers, it is very difficult to send c.w. with properly formed and spaced characters without monitoring one's own sending. Even the most experienced c.w. operator likes to monitor his "fist." The majority of c.w. operators above the Novice grade make most of their contacts on the same frequency as the station they are working. This in turn means that they can use their receivers to monitor their sending. This usually entails lowering the r.f. and audio gain controls on the receiver to prevent r.f. overload of the receiver, but it is possible to monitor in this fashion.

However, in the case of the Novice, receiver monitoring is difficult because Novice contacts are usually made on different frequencies since the two stations are both crystal-controlled and it is unlikely that both crystals are on the same frequency. In order for a Novice to monitor his fist he must have a monitor separate from his receiver.

This article describes the construction of a monitor that will enable the user to monitor his sending. One point that bears mentioning is a definition of the word "monitoring" as we are using it. The device described here will *not* monitor the actual transmitted signal. It *will* provide an audio tone that will enable the user to form the code characters correctly. Methods of monitoring the transmitted signal are described in detail in *The Radio Amateur's Handbook* and won't be treated here.

* Novice Editor

Having trouble monitoring your sending? Here is a transistorized r.f.-actuated c.w. monitor that can easily be applied to any transmitter. While described for the Novice, many General Class hams will want to add this unit to their transceivers if they don't have a "side-tone" oscillator.

Monitor Details

The monitor shown in the photographs and in Fig. 1 requires no internal connections to either the station transmitter or receiver. The monitor is connected in the coaxial output lead of the transmitter. A very small amount of the r.f. output voltage is rectified by CR_1 and this rectified voltage is used to power a multivibrator tone oscillator in the monitor. When the transmitter is keyed, the tone oscillator is turned on and off at whatever rate the key is operated. Audio from the tone oscillator is fed to the station headphones, which should be plugged into J_3. P_1 is plugged into the receiver headphone jack so that when the transmitter isn't keyed, audio from the receiver is fed through the monitor to the 'phones.

Some hams prefer speaker operation rather than headphones so this monitor has an audio amplifier and speaker as part of the unit. The amplifier obtains its power from a 9-volt battery. If desired, the monitor can be used as a code-practice oscillator by connecting a key to TB_1 terminals 1 and 2. Speaker audio is more than adequate for code practice groups.

Getting The Parts

All of the items used in constructing the monitor are standard items available from most radio parts distributors. Q_1, Q_2 and Q_3 are shown as 2N406 or SK3003, the latter being a general replacement type. It should be mentioned that

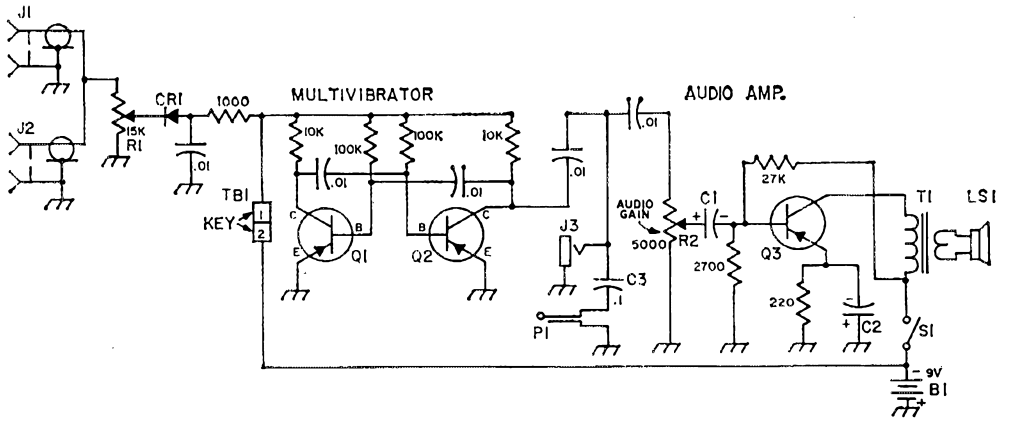


Fig. 1—Circuit diagram of the c.w. monitor. Unless specified, all resistors are ½ watt; resistances are in ohms (K = 1000). All values of capacitors are in microfarads (μf.), all 0.01-μf. capacitors are disk ceramic. Capacitors marked with polarity are electrolytic.

B_1—9-volt battery.
C_1, C_2—25-μf. electrolytic, 25 working volts or more.
C_3—0.1 μf. paper, 25 working volts or more.
CR_1—1N277 or 1N34A.
J_1, J_2—Coax chassis receptacle, type SO-239.
J_3—Open-circuit phone jack.
LS_1—Speaker, 3-inch diameter, 4-ohm type.
P_1—Phone plug.
Q_1, Q_2, Q_3—2N406, SK3003, or equivalent.
R_1—15,000-ohm, 2-watt control.
R_2—5000-ohm control with single-pole, single-throw switch, S_1, mounted on rear.
T_1—Output transformer, 2000- to 5000-ohm primary, 4- to 10-ohm voice-coil secondary; see text (Lafayette 99 H 6101 or similar).

the 2N406 costs about 35 cents and the replacement type is about three times that figure so it would pay to shop around. The main reason we point this out is that if you go to a radio store and ask for a 2N406, the clerk may give you an SK3003 and tell you it is the same transistor. It *will* do the same job as a 2N406 but the cost isn't the same. Along the same lines, a breadboard version was built first and several surplus p-n-p. transistors were tried in the circuit. All the transistors worked, so if you have a junk box, don't be afraid to try different types.

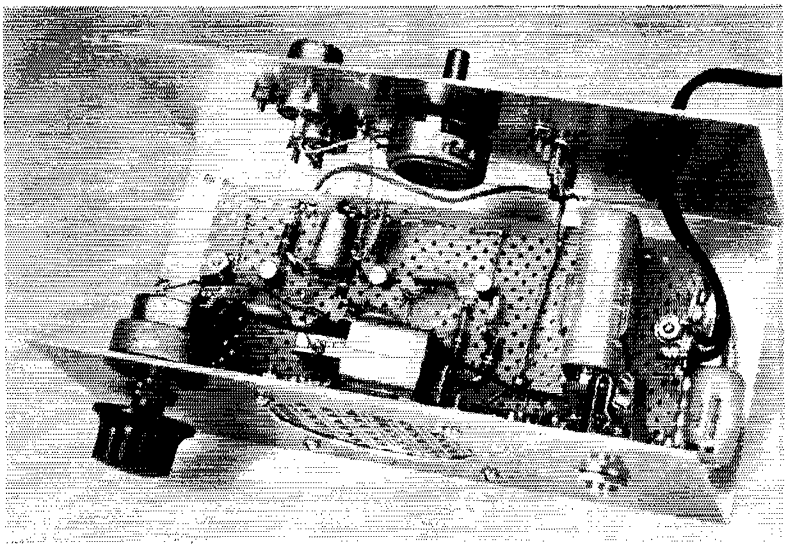
Along the junk box line, if you have a defunct transistor radio — and they seem to be getting quite common — you can strip it down for parts, particularly for T_1 and the speaker. Practically any transistor output transformer can be used for T_1.

The cabinet used to house the monitor is a fairly new item, an LMB type W-2C, and it may be difficult to find locally. A letter to the address below[1] should provide the name of the nearest distributor.

Construction Information

A piece of perforated Vectorbord, 2 × 5½ inches, was used to mount most of the com-

[1] LMB, 729 Ceres Ave., Los Angeles, Calif. 90021.



This view shows the general arrangement of the internal parts of the monitor. Along the rear, from the left, are the two coax chassis jacks; next is the control for setting the operating voltage level, and to its right, the key terminals for code practice work. The battery is mounted on the Vector board at the right, in a battery holder. If desired, the battery holder could be eliminated and the battery wired directly into the circuit.

ponents. The Vectorbord is easy to use and consists of an insulated board that is liberally perforated with small holes. Terminals of the "push-in" type are easy to install in the Vectorbord holes, providing connection points in the circuit. The wired board is mounted on ½-inch high stand-off pillars inside the cabinet. However, before installing the circuit board, the speaker, R_1, R_2, TB_1, J_1, J_2, and J_3 should be installed in the cabinet. After the circuit board is mounted, the other components can be wired up. When soldering the transistor leads and the leads on CR_1, hold the lead being soldered with a pair of pliers in order to conduct any heat from the iron away from the body of the component. Too much heat can easily ruin the transistors or diode.

Layout of the components is not particularly critical. In our breadboard version a piece of wood was used for a chassis, and this unit, with haywire layout, worked just as well as the version shown in the photographs.

In the unit shown, a common ground bus was run around the back and sides of the board and all components mounted on the Vectorbord that required a ground connection were grounded to this bus. This ground bus must be connected to the cabinet in order to complete the ground circuit.

Installation and Adjustments

When the unit is wired, connect a key to the two terminals on TB_1 and plug a set of headphones into J_3, or if you don't want to use phones, turn on S_1 and turn up the audio gain and close the key. You should get a nice, clean, audio tone. If not, recheck your wiring carefully for any wiring errors or poor connections.

To use the unit as a monitor, connect a length of coax from your transmitter to J_1, and the antenna feed (which is normally connected to your rig) to J_2. Set R_1 so that the arm of the control is at the ground end. Connect a voltmeter between terminal 1 on TB_1 and chassis ground. Next, tune up your rig to normal input and then adjust the arm on R_1 so that the voltmeter reads about -7 or -8 volts. Under these conditions the monitor oscillator should be generating a tone, and if you have S_1 turned on and the audio gain control, R_2, turned up, you should hear a loud, clear note. The multivibrator oscillates with any voltage from about -5 to -10 volts, so set R_1 in that range.

For headphone use, plug your phones into J_3 and plug P_1 into the receiver headphone jack. When receiving, the audio from the receiver will be piped through the monitor. When going to transmit, you'll hear the multivibrator oscillator tone in the phones, providing your monitoring note.

The battery drain for the amplifier is about 2 ma. While this amount is small, it is a good idea to leave S_1 switched off when the speaker setup isn't used.

You don't have to disconnect the monitor from the r.f. line in order to use the unit as a code practice oscillator. Just connect a key to terminals 1 and 2 of TB_1, turn on S_1, and the unit is ready for use.

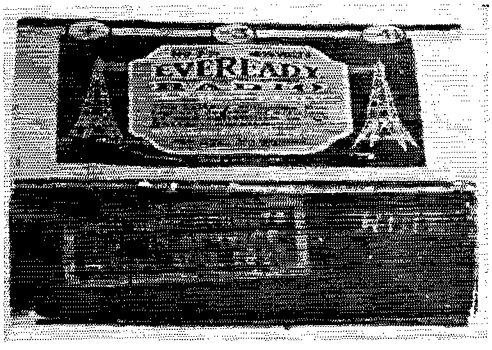
Some of the "hotshot" speed merchants of c.w. may wonder if the unit will follow a fast bug or automatic key. We tested the monitor with a bug and at 35 w.p.m., clean, crisp code was obtained from the unit. QST

Strays

Who says that some batteries have a short shelf life? Maybe there's some truth to the old saying, "They don't make 'em like they used to," for here's proof that after 42 years at least one dry-cell battery shown at the left was able to withstand the rigors of time.

Pictured here is an Eveready No. 771 C-type battery which was unearthed by Gordon Douglas, W8PMK, of Luther, Michigan, in 1967 while rummaging through an old deserted barn near his home. The battery was still connected to an old 2-tube t.r.f. radio which was somewhat weathered and whose cabinet was badly broken. This writer managed to talk W8PMK into parting with the battery so that it could be added to the ARRL museum.

Surprisingly, the battery was unfaded, had no bulges or leak marks, nor was it marred in any way. The stamp on the bottom reads, "For best results put in service before Aug. 1927." When our museum curator, W1ANA, saw the prize he jokingly suggested that it be checked for d.c. potential. Lo and behold, its unloaded output proved to be 4.3 volts! Loaded by a 1-transistor oscillator which drew 10 ma., the output dropped to 4.1 volts and the oscillator "played." It's something to think about the next time you throw away a flashlight, or transistor radio that has been eaten up by leaky batteries. — *W1CER*



Stolen Equipment

The following equipment was stolen on September 4 between 7:00 and 8:30 P.M.: Collins KWM-2 transceiver Serial No. 10185 and a Collins MM-2 microphone Serial No. 4812. A reward is offered for information leading to the arrest and conviction of the thief and/or the return of the property. Jack D. Muff, WA5DGR, 5475 Jackwood, Houston, Texas 77035 (Tel. 713-668-5229).

The "Square-Rigger" Mast

64-Foot Unguyed Support for Large Antenna Areas

BY STANLEY C. SPAETH, WB6QFE

ANYONE who has investigated the prices of free-standing towers capable of handling antenna areas of the order of 15 square feet, even for 30-lb./sq. ft. regions, need not be told that the cost runs high. In my case, this area is represented by a two-element 40-meter Yagi and a three-element tribander.

In considering a home-brew approach, a conventional lattice structure was ruled out, because I simply could not find the time that assembly would require, in my 25-hour-a-day schedule. The alternative arrived at is shown in the sketches and photographs. Construction involved only a little over 10 hours of labor, and the result is a clean-looking structure, less obtrusive than a lattice tower in a residential area, yet fully adequate to handle the required wind load.

In brief, the mast consists of approximately 30-foot lengths of 4-inch (5/16-inch wall)[1] and 6-inch (¼-inch wall)[2] square steel tubing, plus a 14-foot rotatable extension shaft (drill pipe 2 inches o.d., ⅜-inch wall) which carries the antennas. See Fig. 1. The 4-inch column telescopes into the 6-inch column, and a winch-and-cable system permits lowering the rotator to a level of about 25 feet above ground.

The 4-inch column is maintained central in the 6-inch column by guides at the top of the 6-inch column, as shown in Fig. 2, and slides at the bottom of the 4-inch column, as shown in Fig. 3. The guides are made by welding two pieces of steel angle back to back, and are fastened to the column with ⅜-inch bolts tapped into the column. Felt padding is cemented over the inner faces of the guides to prevent scraping the paint off the 4-inch column when it is raised or lowered.

The slides (Fig. 3) are short pieces of 2-inch channel steel welded across the corners of the 4-inch column. The corners of the channel are rounded slightly with a file to make a loose fit inside the 6-inch column. Originally, large single-ball bearings were set in the faces of the channel pieces to bear against the inner corners of the 6-inch column, but this refinement was found to be unnecessary.

* 224 East Hillcrest Blvd., Monrovia, Calif. 91016.

[1] 14.52 lbs./ft.

[2] 18.82 lbs./ft.

The "Square-Rigger" mast as installed at the author's location.

Three plates are welded to the 4-inch column, as shown in Fig. 4, to provide mountings for the rotator and two shaft bearings. The top bearing is a self-aligning thrust bearing, which carries the weight of the antenna and extension shaft. A setscrew secures the shaft to the bearing coupling. The lower bearing is a sleeve made of a 2-inch pipe coupling with the threads reamed out. The sleeve is welded into a hole cut in the supporting plate. A collar made similar to the sleeve bearing is fastened to the shaft, above the bearing. This provides insurance, should the setscrew in the thrust bearing work loose. The two bearings remove any lateral strain from the rotator bearings, thus the only stresses imposed on the rotator are those of torque. The arrangement makes it possible to remove the rotator for servicing without having to dismount the antennas.

It is a good idea to weld on a pair of ears, one above the other, about 2 feet apart, near the top of the 4-inch column. The ears can be drilled for U bolts for temporarily fastening a gin pole to aid in mounting the antenna assembly.

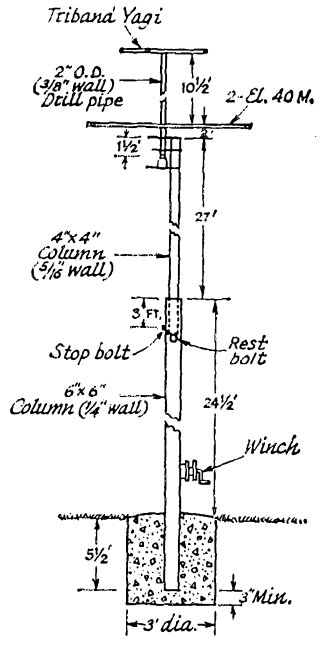


Fig. 1—Approximate overall dimensions of the "Square-Rigger" mast.

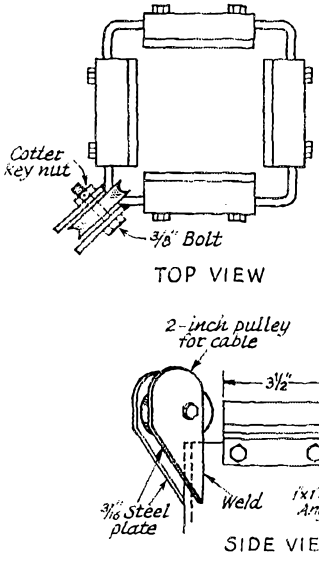


Fig. 2 — Sketches showing the guides and cable pulley at the top of the 6-inch column.

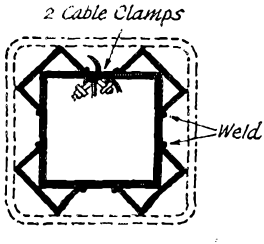


Fig. 3—This sketch shows how short pieces of channel iron, welded across the corners of the 4-inch column near its bottom end, keep the inner column central in the outer column. The corners of the channel pieces should be filed slightly round to make a loose fit.

A hole for a ½-inch bolt should be drilled through the 6-inch column at a point 3 feet, 4 inches down from the top. A 7-inch bolt is inserted after the upper section has been raised to relieve the cable of any permanent strain. Another hole should be drilled and tapped for a short ⅜-inch bolt which serves as a stop to prevent raising the mast inadvertently beyond the safe overlap limit. This hole should be placed 3 feet down from the top of the column, and in such a position that one of the slides on the 4-inch column will encounter it when the mast is raised to its safe limit.

A 3/16 × 2-inch strap should be welded across the bottom end of the 6-inch column to keep the 4-inch column from sliding out during the erection, and also to keep concrete from running up inside the column.

A mounting for the winch is welded onto the 6-inch column at a comfortable level above ground. The winch should be a good one. The one I use is rated at 1000 pounds, and has a 4-to-1 gear ratio. The cable (¼-inch aircraft steel) runs from the winch, up along the 6-inch column, over the pulley, and back down inside in the space between the two columns, to a hole drilled near the bottom of the 4-inch column. The end of the cable is passed through the hole, and then secured by attaching two cable clamps to the cable, as indicated in Fig. 3. Be sure to file the edge of the hole smooth so that it will not cut the cable.

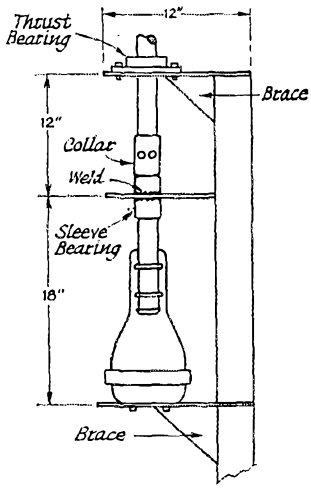
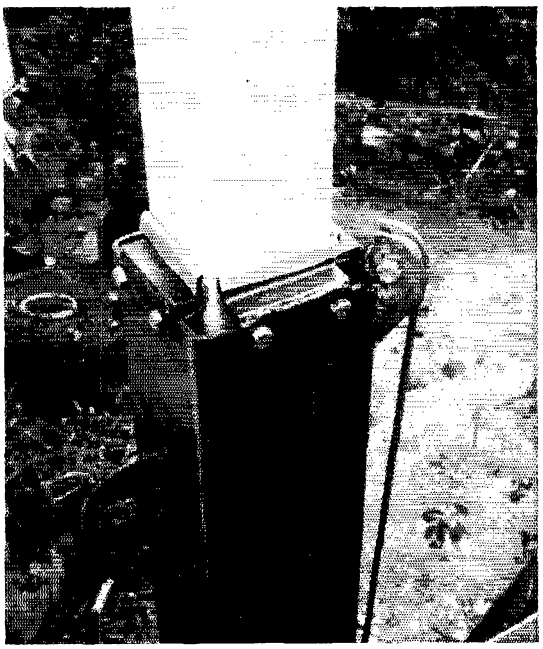
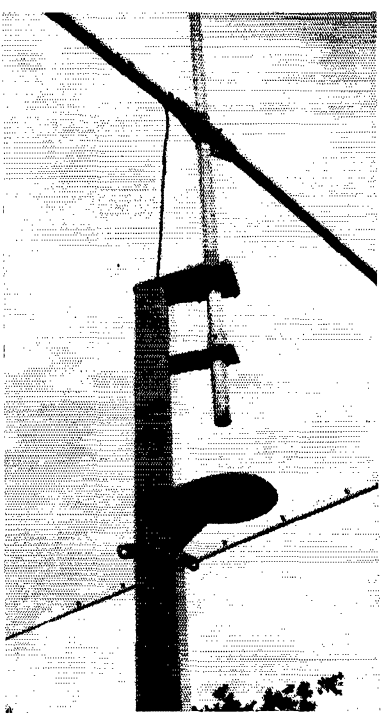


Fig. 4—Sketch showing plates for mounting shaft bearings and the rotator at the top of the 4-inch column. The plates are made of 3/16-inch steel. Top and bottom plates have triangular braces of the same material. The sleeve bearing is welded in a clearance hole in the center plate.



The pulley and guide arrangement. The large ear is for hoisting the mast into place.

A winch mounting is welded to the 6-inch column at a convenient level above ground.



Bearing and rotator-mounting plates are welded to the 4-inch column. The central plate is simply butted against the column. The top plate is tapered toward the column to cover its open end with a slight overlap. The rotator mounting is also tapered, with a square cutout to fit around three sides of the column. The tabs below the rotator shelf are for guy wires (not used by the author).

All surfaces should be given a coat of Rustoleum primer before painting with a good enamel paint. I painted the 4-inch column sky blue, and the 6-inch column white to match the side of the house.

When it comes to putting the mast up, don't take any chances. If you do not have the proper equipment, and are not thoroughly familiar with the procedures and precautions necessary in handling heavy weights, have a professional do the job. A local sign contractor, using his crane, set this mast up with the greatest of ease, and at nominal cost. One important point to remember is that a professional carries insurance, in case of an accident.

The free-standing mast requires a concrete footing not less than 3 feet in diameter and 5½ feet deep. If the mast is guyed at the top of the 6-inch column, the wall thickness of this column may be reduced to 0.2 inch,[3] and the concrete foundation can be reduced to a 2-foot cube. If less antenna area is used, the wall thickness of the 4-inch column may also be reduced.

The design of the tower and footing was checked by a local registered engineer. However, if building codes are in effect in your area, don't undertake the construction of this mast, or any other mast or tower, without first making sure that its installation will be permitted. Requirements may vary considerably from one locality to another.

The cost of materials for the mast will vary in different parts of the country. Here in California, where Japanese-import steel is available, the cost ran slightly over $100. QST

[3] 14.41 lbs./ft.

Strays

TVI And The Cable

(From *X-MITTER*, Penn. Wireless Assn., Inc.)

We've been rather anxiously awaiting a TVI case involving Lower Bucks Cablevision and off-cable reception, and the first one came in early July. The result was most encouraging.

The case involved both a thoroughly typical TVI problem and problems with the cable system, and so was ideal from the Committee's point of view: it provided an excellent demonstration of how amateur interference is affected by the switch to cable from rooftop antenna, and also gave us an intensive course of instruction on analysis of cable malfunction.

The complaint was of interception on the low channels from six meters.

Of course the initial step was the standard checkout of the amateur station. Here again the findings were absolutely typical: a rather high-power six-meter rig, the amateur's TV set in comparatively poor condition, but equipped with a Drake filter properly installed, and absolutely no sign of pickup on the amateur's TV set.

The complainant had a Sears color set, several years old. It was checked first on direct pickup from the rooftop antenna, and there showed medium overload (KYW, Channel 3) with distinct evidence of low front-end gain and intermittent poor contacts in the tuner. The Bristol Interference Committee recommendation was that a Drake filter be installed, and that at the time of the next service call the tuner be cleaned and checked for gain.

The interference condition was set up on the complainant's TV, and the local antenna removed and the cable connected. All signs of amateur pickup disappeared, though the six-meter signal could be detected when the set was tuned to Channel 2.

Since this particular case was the first involving the cable, we had invited John Zettick, LBCV's Chief Engineer, to witness and consult in the checkout. John, of course, was most interested in the signal quality from the cable, although all phases of the checkout were significant to him. In this particular instance, which was in Red Cedar, cable service had begun in the previous week, and final acceptance checks had not been made. John was not at all satisfied with the quality of signal being delivered, and he pointed to numerous flaws involving crosstalk, adjacent channel interference, co-channel beat notes and poor linearity with loss of high frequencies.

None of the cable flaws were inherent in the system; they simply were what we considered normal adjustment problems in a rather complex system in its first days of use. Naturally, John did not enjoy seeing problems of any sort, but we welcomed the opportunity to witness the cable working, as it were, at its worst, in a typical home, with competent instruction regarding the several difficulties. We'd seen the cable working well in sections where it's been operative for a while, but we learn from fault conditions.

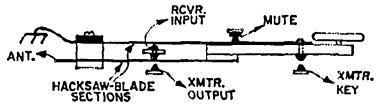
Cooperation between amateurs generally and the Interference Committee especially, and the Cable management will necessarily be close and continuous. Both have much to gain. We will likely uncover incipient cable troubles before they become serious, and thus simplify their maintenance problems.

The most important finding, however, is that the Cable reduces TVI by a tremendous factor. It's not a complete cure, but the severe cases become minor, and the minor cases are eliminated. — David L. Heller, W5NFJ/K3HNP, 14 Darkleaf Lane, Levittown, Penna. 19055.

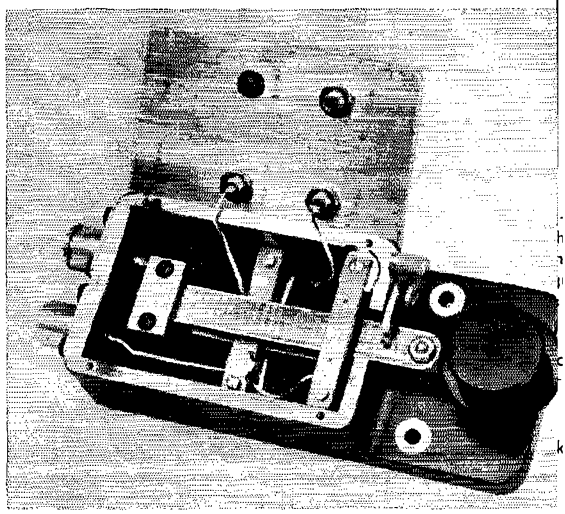
Break-in Key

THIS ingenious break-in key was designed and built by Harry Habig, K8ANV. When the key is closed, the receiver muting terminal is ungrounded (muting the receiver), the receiver input is shorted, the antenna is connected to the transmitter, and the transmitter is keyed, in that order. When the key is released, the keying contacts open, the antenna is connected to the receiver, the receiver input is unshorted, and the muting terminal is grounded, in that order. Since the receiver is muted before switching takes place, and is not unmuted until after switching takes place, change-over is silent. Also, since the antenna is connected to the transmitter before the keying contacts are closed, and disconnected from the transmitter after the keying contacts have opened, there is no r.f. voltage at the change-over contacts while the antenna is being switched. Proper sequencing is principally a matter of relative contact spacing. As the antenna switching is done at low impedance, the contact spacing can be quite small. The key works very well at all ordinary hand-keying speeds.

In the sketch, solid areas are metal; open areas are insulation. The two long metal strips



are sections of hacksaw blade. In the photo, the lever at the right-hand end of the enclosure may be used to hold the key closed. QST



Technical Correspondence

LOOP MEASUREMENTS

Technical Editor, *QST*:

Considerable interest was aroused on this side of the ocean by the article in *Electronics* of August 21, 1967, "Down-to-Earth Army Antenna."

The nonexistence of an overhead null in the vertical radiation pattern, as stated in the article, was of great importance to our firm, as we are interested in h.f. short-distance communication out of deep valleys, where ground-wave links are not possible.

The small dimensions, ease of setting up the self-supporting structure, and the simple matching network without coils were all very attractive features for our application.

Convinced of the low radiation resistance of the loop structure described in *Electronics*, we took the following measures to keep the losses as low as possible:

1) We increased the side length of the octagon from 5 feet to 2 meters (6.55 feet), thus increasing the radiation resistance three times.

2) We increased the tubing diameter from 1.5 inches to 50 mm (1.97 inches).

3) The junctions were made by heavy sleeve clamps making large-surface, high-pressure contacts between the antenna sections.

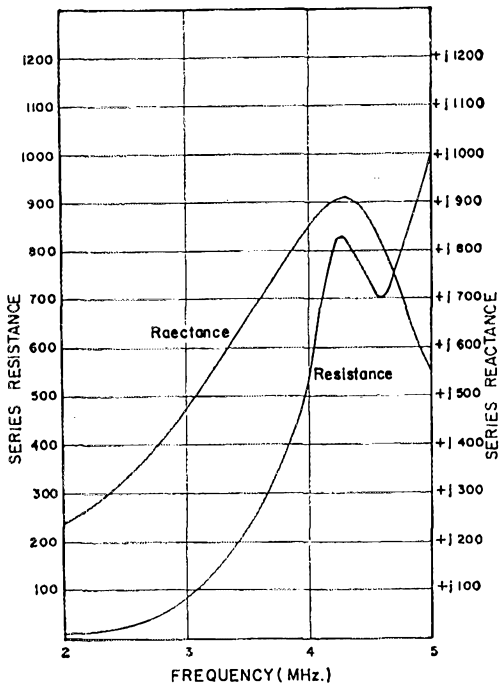


Fig. 1—Measured resistance and reactance of the loop antenna over the 2- to 5-MHz. frequency range (HB9AGK)

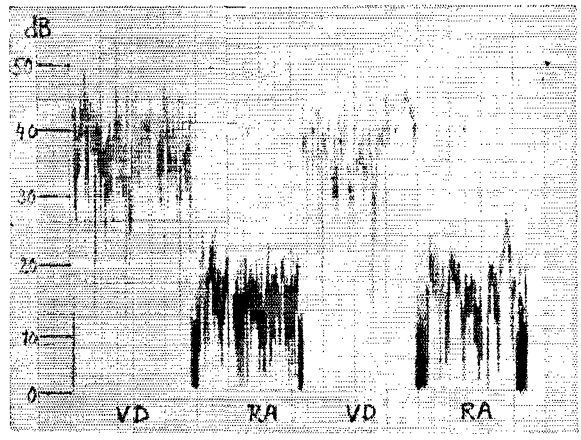


Fig. 2—Relative field-strength recordings at 2 MHz., made as described in the letter from HB9AGK. VD—Inverted-V dipole; RA—loop antenna. This figure and Fig. 3 are representative of a number of such recordings taken over the frequency range and supplied by HB9AGK; only those close to amateur bands are reproduced here.

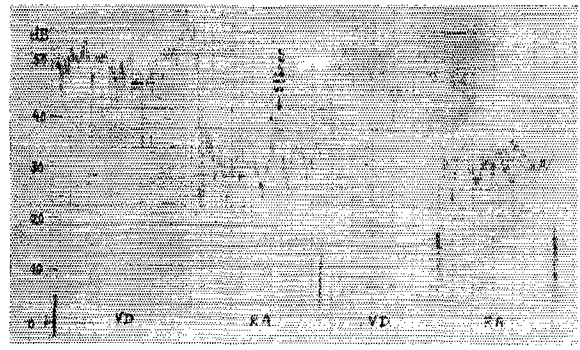


Fig. 3—Same as Fig. 2, except recordings made at 3.499 MHz. "Störer" indicates interference.

4) By using bent sections, only 4 clamps were needed.

5) The connection to the matching unit was made by gold-plated wing nuts, two for each antenna end.

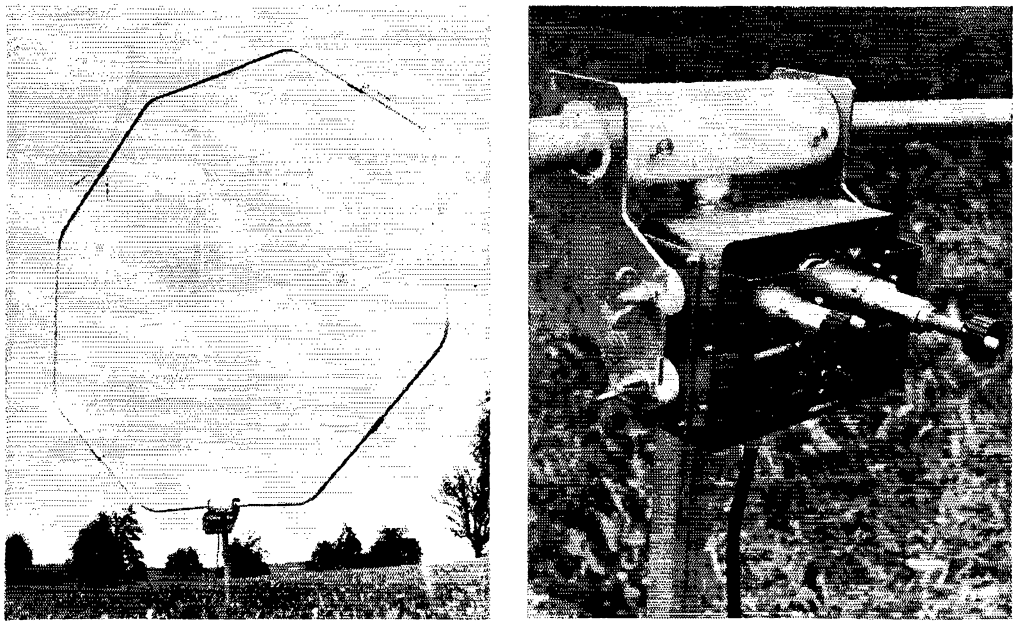
6) The matching unit was built up with Jennings vacuum capacitors, known for low losses and high current capability.

The impedances measured at the antenna binding posts are shown in Fig. 1. The calculated radiation resistance at the lowest frequency to be used (2 MHz.) was 8.53 ohms, according to the equation indicated in Mr. Patterson's article. Considering the measured real part of the antenna impedance (14.8 ohms) the antenna efficiency at 2 MHz. should be:

$$\frac{8.53}{14.8} \times 100 \text{ percent} = 57.6 \text{ percent},$$

a not-too-bad figure at the first glance, although a half-wave dipole could be shortened considerably before dropping to this efficiency.

Measurements with the loop antenna were made by recording the field strength on a Hewlett Packard recorder, at a straight-line distance of about 20



The loop antenna used in the high-angle tests described in the letter from HB9AGK. The tuning/matching box at the right uses vacuum variables to reduce losses.

miles from the transmitting location, using the loop as transmitting antenna and comparing the results with those of an inverted V half-wave dipole, supported at its center by a 40-foot mast. High-angle radiation was measured, the receiving site being enclosed by high hills.

Measurements were carried out by transmitting 5 minutes with the inverted V, then 5 minutes with the loop antenna, this cycle being repeated two or three times for elimination of errors due to changes in propagation conditions with time. Then QSY was made to the next measuring frequency. After this, measurements were repeated on three frequencies with the loop antenna turned 90 degrees with respect to its previous position to check for possible directional effects.

In the accompanying figures typical results of the loop antenna are marked RA (ring antenna), and those of the inverted V are marked VD (variable dipole).

The half-wave inverted-V dipole always gave a 15- to 20-db. better signal than the loop. — *J. Wessendorp, HB9AGK, Sonnenbergstr. 47, 8610 Uster, Switzerland.*

K9CPZ IC FREQUENCY COUNTER

Technical Editor, *QST*:

Mr. Staples' (K9CPZ) article on an integrated-circuit frequency counter (July 1968) is excellent. Such projects and articles should be encouraged by *QST*, as they keep the amateur abreast of the rapidly changing technology in this field.

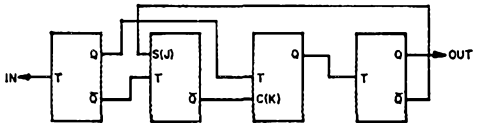


Fig. 4 Divide-by-10 circuit using four flip-flops and no added gates.

I would like to comment on the decade counter as shown in his Fig. 7. Mr. Staples states that when flip-flops 2 and 8 go on, to complete a count of 10, the reset pulse turns them off and the count starts over. If you follow the logic through the counter in Fig. 7, it appears that when flip-flop No. 2 is pulsed off, its carry would then turn on flip-flop No. 4. If so, the counter would count by 6s instead of 10s. However, this is prevented by the finite amount of time, as mentioned by Mr. Staples in his article, for the signal to pass through the gate, the flip-flop, and the time difference between outputs 1 and 0. This time is called propagation delay (T_{pd}) and is measured in nanoseconds (nanosecond = ns. = millimicrosecond). T_{pd} varies widely in flip-flops and can be as short as 2 ns. or more than 100 ns. This propagation delay is what limits the speed of a circuit. The delay is useful in many applications and the factor must be taken into consideration when selecting integrated circuits for specific applications.

The inherent characteristics of the 923 flip-flop are as follows (refer to Fig. 7): The 10th count toggles flip-flop No. 2 on. Outputs 1 and 0 complement, but the T_{pd} of each is different. The specifications show maximum T_{pd} as t_2-5- = 50 ns., and t_2-7+ = 80 ns. This means output 0 can go low a maximum of 30 ns. *before* output 1 goes high.

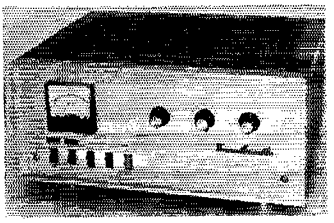
Since the reset pulse is controlled by output 0, the pulse sequence is started before output 1 has time to reach sufficient high level. In effect, flip-flop No. 2 does not go on completely, nor does output 1 have sufficient pulse width or duration to toggle flip-flop No. 4. This delay does not affect the operation of flip-flop No. 8, as it was toggled on by 2 previous counts.

By using the J-K steering inputs (sometimes referred to as S and C inputs, respectively) a simple decade counter can be made *without* the use of extra gates, as shown in Fig. 4. — *James R. Whitmore, WA4JNI, ex-W9ZUU, 410 N.W. 117th St., Miami, Florida 33168.* QST

Recent Equipment

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

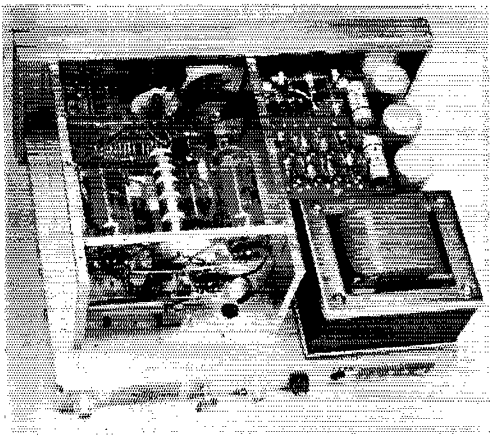
Yaesu Musen FL-2000 Linear Amplifier



A RECENT arrival to the American market, the FL-2000 linear amplifier provides table-top r.f. power amplification from 3.5 to 29.7 Mc. Though the equipment appears to have been designed as a companion to one of the Yaesu transceivers, it is compatible with most American transceivers in the 50- to 100-watt power-output class. It is rated at 1200 watts p.e.p. input (600 watts d.c. input) and operates with four color-TV sweep tubes in grounded-grid, and in parallel.

Some interesting features of the equipment are forced-air cooling, a self-contained power supply, switch-through provisions for transceiving while the amplifier is in standby, a built-in s.w.r. bridge, a broadly-tuned input circuit for 28-Mc. operation; and a.l.c. takeoff for use with the exciter.

The manufacturer uses four 6KD6 sweep tubes in this circuit. These tubes are quite rugged and have a 33-watt plate-dissipation rating. Long-term operation in an experimental amplifier proved them to be reliable and long lasting[1]. A small amount of fixed bias is applied to the control grids of the tubes to establish AB_2 operating conditions. R.f. chokes are used in the filament leads and in the cathode circuit to keep those elements above r.f. ground. The control grids are bypassed for r.f., and the screen and suppressor grids are grounded directly. A series-parallel filament hookup permits the use of a 12-volt filament supply.



Looking into the top of the FL-2000 amplifier (p.a. compartment cover removed) the power supply is on the right half of the chassis. The diode rectifiers are on a circuit board near the front panel (beware of high voltage here). Looking into the p.a. compartment on the left half of the chassis, the four 6KD6 tubes are side mounted to permit the cooling fan to direct an air stream against their envelopes. The fan is directly below the tubes and is not visible. The plate r.f. choke is mounted between the top two tubes. Looking at the rear outer wall of the p.a. cage one can see the cathode r.f. choke (far left).

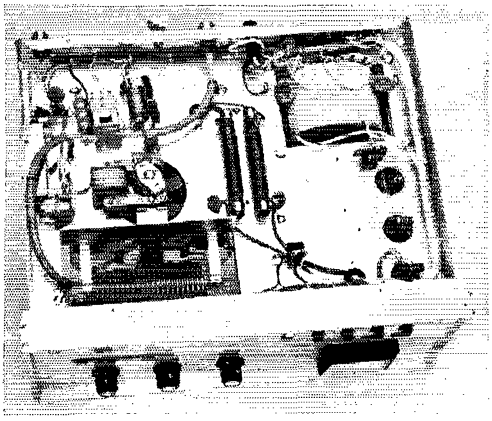
A pi-network plate tank is used and works quite well on all bands although its Q is not as high on 3.5 Mc. as it would be if a higher CL ratio were employed. At the recommended p.e.p. plate current, 1 ampere, with the operating voltage, 1200, provided for the plates, the plate load impedance is on the order of 750 ohms. At this low value the tank capacitances provided are sufficient for an operating Q of about 5. The performance on 80 meters is slightly inferior to that of the four higher bands as far as power output versus IMD (intermodulation distortion) is concerned.

A Monimatch-type s.w.r. bridge is connected to the output of the amplifier to aid in tuneup. It uses a printed-circuit carbon control as a terminating resistor in each pickup lead. These controls are used for nulling the bridge during initial adjustments at the factory. The indicating meter for the bridge is located on the front panel of the amplifier and doubles as a plate-current meter when the selector switch on the panel is moved to that position.

A full-wave bridge rectifier provides 1200 volts d.c. for the 6KD6 plates. Silicon diodes are used in the rectifier circuit, and the three series-connected output capacitors provide approximately 33 μf. of capacitance. The primary sides of the plate and filament transformers are arranged for use from either 115 or 230-volt mains.

The physical layout of the amplifier might well be termed "sanitary" in that everything appears to be arranged in a logical and orderly fashion. The quality of the components seems to be excel-

[1] "Some Ground Rules For Sweep-Tube Linear-Amplifier Design," *QST*, July 1968, p. 30.



Looking into the bottom of the chassis, the tank coil is visible at the lower left, inside the chassis cutout. Directly behind it is the high-speed cooling fan. Behind the fan is the 10-meter tuned circuit which is between the input jack and the cathodes of the amplifier. The two filament chokes are wound on ferrite rods and are mounted at the center of the chassis.

lent, and the amplifier compartment is arranged for maximum cooling of the tubes according to the placement of the 6KD6s and the high-speed fan. A solenoid-type r.f. choke is used in the plate circuit. It was checked on an *RX* meter and proved to be quite suitable for the plate load impedance of the amplifier — 50,000 ohms on 80 through 15 meters, and 25,000 ohms at 30 Mc., offering assurance that the choke is not apt to burn out from series resonances.

An attractive heavy-duty cabinet houses the amplifier. The cabinet is dark gray and the panel is brushed aluminum. A protective layer of plastic covers the panel, but it can be removed if the operator wishes. Panel controls include plate tuning, band switching, amplifier loading, power on, standby, meter switching (s.w.r. and plate current), forward and reflected power, and meter sensitivity.

An instruction booklet accompanies the amplifier. It is well presented and is to the point as far as operating instructions are concerned. A complete and easy to read schematic diagram is included, as are top and bottom photos of the interior of the equipment. A parts list is given, and the part numbers are marked on the photos.

A spectrum analysis of the equipment showed that it was capable of delivering 350 watts of two-tone output (700 watts p.e.p.) on 80 meters while still having acceptable IMD — 25 db. below one tone (31 db. below p.e.p.). On the remaining bands a power output of 425 watts could be obtained under the same conditions. Considerably more power output was available, but the third- and fifth-order products became objectionable at the higher levels. The latter condition would of course cause a broad signal.

Like all sweep-tube amplifier stages, one must not hold the key down for more than a few seconds at a time for fear of overheating the tubes. If this precaution is observed, the operator should have no trouble tuning the amplifier and operating it — *W1CER*

Yaesu Musen FL-2000

Height: 6 5/16 inches.
Width: 14 9/16 inches.
Depth: 11 7/16 inches.
Weight: 15 pounds.
Power Requirements: 115 volts a.c. or 230 volts a.c., 50/60 cycles.
Price Class: $250.
Distributor: Spectronics Co., Los Alamedos, California.

NEW BOOKS

From Spark to Space. The Story of Amateur Radio in Canada, published by the Saskatoon Amateur Radio Club, Box 751, Saskatoon, Sask. 160 pages, 6 by 9 inches, paper cover. $2.50.

This volume represents a monumental effort on the part of four dedicated radio amateurs. They are amateur authors as well, but you'd hardly suspect this. Of perhaps greater interest to Canadian amateurs than others, it is nevertheless a good documentary to have on hand.

After the idea was born, three years ago, came an enormous amount of research work, correspondence with old timers, etc. Some thirty clubs sent in their own contributions, together with many interesting and historical photos. Beginning with Marconi's coming to Newfoundland in 1901 and the first transatlantic radio reception, the story of the amateur's part in the development of private radio communication is well set forth. There apparently is little record of amateur experimentation prior to 1908; perhaps the right old timers have not come forth with something earlier. With the American activity which was known to be relatively extensive in the 1900s, it is almost certain that some information drifted across the border at that time.

Congratulations to SARC for a nice job!

Integrated Circuits: Fundamentals & Projects, by Rufus P. Turner. Published by Allied Radio Corp., 100 N. Western Ave., Chicago, Illinois 60680. 96 pages, including index, 5½ x 8½ inches, paper cover. Price, 75 cents.

The primary purpose of this text is to provide the reader with a basic, nontechnical introduction to integrated circuits. Two introductory chapters quite adequately discuss such topics as the historical background of ICs, the nature of the IC, the types of ICs available, how ICs are used and their installation in actual circuits, and IC electrical ratings. In addition 20 quite helpful construction tips are listed. Six construction projects are described in the text, each project using only one IC. The large amount of detail provided with each project is just what the beginner needs. Each project is described with a brief text, a photograph of the actual project, pictorial wiring diagrams, a schematic diagram of the circuit as well as of the IC, construction tips, testing information, and a complete parts list. The projects described are: two a.f. preamplifiers, a ¼-watt audio amplifier, a crystal frequency standard, an a.f./r.f. signal tracer, and a d.c. voltmeter.

Hints and Kinks For the Experimenter

SB-101 IMPROVEMENT

IN their instruction manual for the SB-101 transceiver, Heath states that although the DRIVER PRESELECTOR control peaks at a slightly different position in transmit than in receive, for transceive operation the control should be peaked on transmit. However, this method of tuning doesn't work out well on 21 MHz. and above where the receiver input circuits must be carefully peaked for optimum receiver performance.

The reason for the different settings of the DRIVER PRESELECTOR control may be found by studying the transceiver schematic. The same tuning capacitor, C_{422B}, that is used in the receiver r.f. amplifier grid circuit is used in the transmitter driver plate circuit, and the same tuning capacitor, C_{421B}, that is used in the receiver r.f. amplifier plate circuit is used in the transmitter driver grid circuit. Because under dynamic conditions the input and output capacitances of the 6AU6 r.f. amplifier are quite different from those of the 6CL6 driver, to compensate for these differences the DRIVER PRESELECTOR control, which tunes C_{421B} and C_{422B}, has to be repeaked when going from transmit to receive.

Fig. 1 shows a circuit modification which will result in maximum receiver sensitivity and maximum drive occuring at the same setting of the DRIVER PRESELECTOR control. By the application of B-plus from the receiver screen supply bus in only the receive mode, CR_1 and CR_2 are forward-biased to effectively switch trimmers C_1 and C_2 in parallel with C_{421B} and C_{422B}.

The mechanical layout of the modification shown in Fig. 3 should be closely followed to secure correct operation. Directly solder ceramic trimmers C_1 and C_2 to the unused lugs on the left side of C_{421B} and C_{422B} as viewed from the front panel. As a precautionary measure, slip the rubber drive bands off the capacitors so that the bands will not be in the vicinity of the soldering iron during the modification. Take care that the trimmers are vertical and that their mounting flanges are at the same height. Be sure the trimmers do not short to the adjacent sections of the tuning capacitors, but do not use any insulating material for this purpose.

Prepare the small fiber glass printed circuit board shown in Fig. 2 and slip it over the mounting collars of trimmers C_1 and C_2. At this

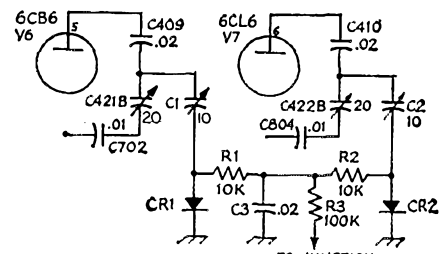


Fig. 1—Circuit of the SB-101 modification. Components not listed below are original Heath parts.
C_1, C_2—1-10-pf. piston trimmer.
C_3—Disk ceramic.
CR_1, CR_2—0A91 used; 1N38B, 1N55A, 1N70A, 1N98 and 1N270 suitable.
R_1, R_2, R_3—½-watt composition.

point, mark the position of the hole for the ground solder lug on the chassis apron, remove the board, and drill the ground lug hole from the outside of the chassis. Then replace the board, secure it to the trimmers with the nuts provided, and bolt the ground lug to the apron wall. Next run the B-plus wire down to the chassis, dress it in the gap between the RF-

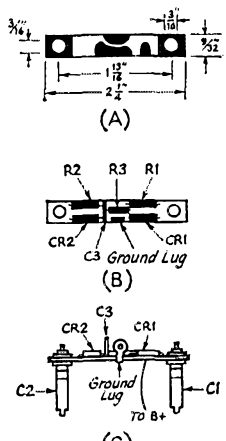
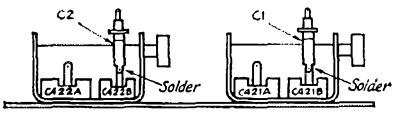


Fig. 2—Bottom (A), top (B), and side (C) views of the circuit board used in the SB-101 modification.



Not to scale

Fig. 3—C_1 is soldered to the stator of C_{422B} and C_2 is soldered to the stator of C_{422B} so that the mounting flange of each trimmer clears the end supports of the variables and is the same height above the chassis.

DRIVER circuit board and the chassis wall, and string it along the front edge of this board to a point opposite the 100,000-ohm resistor, R_{406}, located midway between V_6 and V_{11}. Complete the wiring by connecting this wire to the high voltage end (the one nearest the rear of the chassis) of the resistor.

To tune up the modified rig, set trimmers C_1 and C_2 at minimum capacitance, fire up the transmitter on 21.3 MHz., and adjust the DRIVER PRESELECTOR control for maximum drive. Then return the equipment to receive and adjust C_1 and C_2 for maximum receiver sensitivity without altering the position of the DRIVER PRESELECTOR control. After repeating this operation, peak all r.f. circuits and reset the DRIVER PRESELECTOR control as directed by Heath in the instruction manual section headed "Receiver Alignment." It should now be possible to change from receive to transmit without having to do any retuning.—*T. A. Dineen, VK3TD*

INSTABILITY IN THE DRAKE 2B

I HAVE owned a Drake 2B receiver for about seven years. Until the last few weeks I have never experienced any difficulty with the unit. Then the receiver became plagued with a slow steady drift, and it also leap-frogged about two kilohertz every now and then.

Changing all the tubes did no good, and measuring the voltages and resistances throughout the set didn't reveal the trouble. The drift persisted.

In desperation I began to search for a loose anything in the receiver. As luck would have it, I discovered that one of the two screws that secures the v.f.o. shield can to the variable capacitor had worked itself loose. I tightened the screw, and the excellent stability of the 2B was restored. — *Carl Abrams, K1WIM*

KEYING TIP

To solve the problem of tuning the transmitter when using an electronic keyer, I have always used a straight key in parallel with the keying line. This has been done either by installing a key jack in the back of the keyer itself or by utilizing a Y-type jack at the transmitter end. Not only has this provided a quick and easy means for transmitter tuning, it has also made it possible to quickly reduce my keying speed for working Novices and others who could only copy below the speed range of my keyer.—*James R. Hadlock, K7JRE/W7BNV*

DECAL SEALERS

SOME method for sealing decals to the panel or chassis is usually required when decals are used to identify controls of radio equipment. Otherwise the decals dry up and crack, or fall off when brushed against.

Darling Technical Laboratories, Costa Mesa, California, not only manufactures decals (Tekni-Cals), but sells a 1-ounce bottle of sealer (Tekni-Solv) for finishing purposes.

Recently, when temporarily out of Tekni-Solv solution, the need arose for a sealer to complete a construction job. It was discovered that standard Plastic Wood solvent, available at most hardware stores and lumber yards, worked extremely well as a substitute. It is very low in cost, and a can should last a long time.

Either sealer should be applied with a small artist's brush after the decals are completely dry. Allow the fluid to completely cover each decal, making certain that some fluid flows under the decal as well. — *W1CER*

IMPROVED SPOTTING FOR THE SB-400

THE Heathkit SB-400 is a fine transmitter, but it is difficult to set on a desired frequency in a hurry. If you ever listen on 3999 kHz. at about 5 P.M., you will hear a bunch of sharpshooters who will give you a going over if you are not on the exact frequency, and I mean EXACT!

Morris Hughes, W1FGL, sent me the following modification details, which enable the SB-400 to be put on the exact frequency quickly and easily. The normal operation of the transmitter is not affected in any way.

1) Pull the set out of the case just far enough to expose the MODE switch.

2) Referring to Pictorial 13 in the SB-400 instruction manual, remove from switch contacts MS3-F6 and MS2-R4 the bare wire coming through contact MS1-F4 from the ground lug under the shaft assembly.

3) Connect a wire from MS3-F6 to the ground lug or MS1-F4.

4) Connect a 6200-ohm, ½-watt resistor between MS3-F6 and MS2-R4.

5) Connect one lead of a normally closed push-button micro-switch to MS3-F6, and connect the other lead to MS2-R4.

6) Locate a spot 5⅛ inches from the right edge of the panel (not the case) and 1¾ inches from the bottom edge, and bore a hole for the switch.

7) Secure the switch to the panel.

8) Slide the transmitter back in the case.

To locate a frequency, turn the FUNCTION switch to SPOT, and the MODE switch to either USB or LSB, as needed. Push down the micro-switch button with your little finger and hold it down. This will unbalance the modulator, and make a note near the desired operating frequency. With your free fingers turn the dial to the exact null of the note, release the micro-switch, and you will be on the exact frequency. Finally turn the FUNCTION switch back to TRAN.

— *George W. Bailey, W1KH/W2KH*

Results, 1968 Field Day

June 22–23, 1968

REPORTED BY BOB HILL,* W1ARR

"CLUBS, 56-Mc. operators, *all* hams with licenses for portable stations, attention!!" Thus did the clarion call go out from W1BDI in June 1933 *QST*, summoning one and all to participate in the first "International Field Day — June 10th–11th." Added F.E.H.: "Besides offering an opportunity to get out in the open in this fine spring weather, the real object of this contest is to test 'portables' wherever they may be available. If successful we want to make it an annual affair." Well, it was successful enough so that this year's festivities marked the 35th anniversary of Field Day. September 1933 *QST* reported FD activity by no less than fifty stations, and the writeup consumed a *whole page* of the magazine! *This* issue will chronicle the efforts of 3117 stations, manned by some 12,200 people, for a total of 1227 entries — and will require about ten or twelve pages to tell the story. Like nearly every other phase of ham radio, Field Day has grown incalculably since its beginning.

As a rule, there are certain similarities from year to year in FD: the cranky generator, the hordes of insects, the interference between setups, the delicious/abominable chow (pick whichever one applied to you), the shortage of decent c.w. ops, the indecipherable logs (K1ZND was Hq. logchecker this year and somehow even lived to tell about it), the beery-weary feeling at 3 A.M. — and most of all, setting up and taking down all that junk!

Which brings us to a real bright spot: about 95 percent of comments were solidly in favor of the new rule that includes set-up time within the 27-hour limits of the contest. Many groups mentioned that, with only a limited time available in which to get everything ready, they were motivated to use their setup time more efficiently than in past years, and were able to start operating without being completely pooped from the outset. A few regretted the end of those casual Friday-night setup-*cum*-social sessions of yore; a couple of participants felt that the new rules penalized smaller groups unfairly. But, as we say, we're basking in the unaccustomed warmth of overwhelming approval by a vast majority of the gang. (Wonder what we did wrong!)

On the minus side, we dropped the signal report from the exchange and (to put it as philosophically as possible) *that* didn't work out too well. Seems most of us are going to give and get reports on FD no matter what! There were lots of re-

* Assistant Communications Manager, ARRL.

Class A Call-Area Leaders

(Calls in bold-face type represent overall class leaders)

1A	2A	3A	4A	5A	6A	7A	8A	9A	11A
W1VB/1	**W1TX/1**	K1KDP1	**W1OP/1**	W1FW/1	W1KWX/1	W1BIM/1	W1NEM/1	W3EIA/3	W2LI/2
W2WS/2	W2CCL/2	W2QQ/2	K2ZSS/2	W2JCI/2	K2PCQ/2	**K2AA/2**	.....	**W6CX/6**	W3[illegible]CN/3
WA3EPT/3	W3WPW/3	K3MTK/3	K3SSC/3	K3HKK/3	W3SK/3	W3CWC/3	.....	K9ROM/9	**K6BAG/6**
W4EIA/4	W4LX/4	W4NWT/4	W4IZ/4	**W4SKH/4**	WA4BAW/4	K4YTZ/4	K4DPZ/4		W7DK/7
W5PDI/5	KZ5AA/KZ5	**W5DDL/5**	K5TYP/5	W5DPA/5	W5SWS/5	.....	.....	10A	VE3WE/3
KH6GGI/KH6	K6STI/6	WB6NWK/6	K6SDR/6	W6MRO/6	K6SYU/6	K6QEZ/6	.....	**W6ULI/6**	W1QV/1
W7GPN/7	K7SKW/7	W7FD/7	W7IO/7	W7GV/7	W7BB/7	.....	.....	WB2FFL/2	12A
W8NP/8	W8[illegible]EA/8	W4FU/8	W8FY/8	W8IXL/8	**W8ICS/8**	W8JIII/8	K8BYI/8	W5ANR/5	W1NY/1
W9VNE/9	WA9IXF/9	W9DE/9	W9LM/9	K9AVE/9	K9CXU/9	W9PUS/9	W9SW/9	**VE3VM/3**	**W6RO/6**
WØDX/Ø	WAØCJU/Ø	WØFK/Ø	WØEQU/Ø	WAØJBX/Ø	WAØNDB/Ø	WØOUI/Ø	.....		15A
VE4BV/4	VE5NN/5	VE3OE/3	VE3CRW/3	VE3DC/3	VE3BA/3	VE3NAR/3	VE3JJ/3		**W2RJ/2**

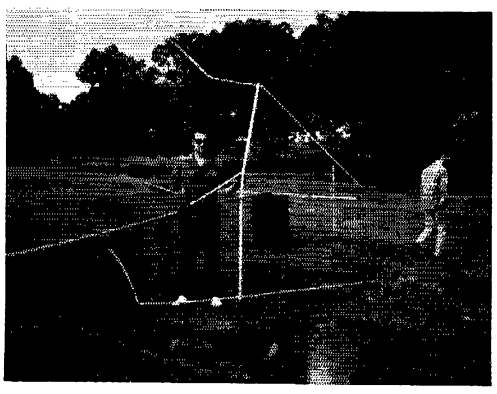
quests to put RS(T) back in, while even the groups that liked its omission found they had to give reports or be scratched from the logs of their disgruntled contacts. Probably 90 percent of the QSOs included signal reports one or both ways.

Most popular entry class in 1968 was 2A, in which the Connecticut Wireless Assn. (W1TX/1) piled up a new record of 2016 QSOs for 15,174 points. In second-most-popular 3A, it was W5DDL/5 (Lafayette ARC) pacing the field by a goodly margin. All the leaders in the various categories are shown in a tabulation elsewhere in this writeup.

In brief, good weather and popular new rules (and let's not forget the new 10-watt battery multiplier, either) resulted in a thoroughly successful FD. We've come a long way since 1933!

Soapbox

"After a long and tiring weekend one of the operators tottered home and sat down at the dinner table, whereupon he ended the customary grace with an inadvertent 'over'."—**W6CAE/6.** "Our vote is thumbs up for the new rules. We used to start at 6 a.m. on Saturday; this time we got on the air (more or less) in two hours and weren't nearly so pooped."—**W4KVK/4.** "Good fast c.w. operators are hard to come by, but phone yappers are in abundance in any club."—**WA2PNU/2.** "Boy, do I hate cold beans and leftover potato salad for Sunday breakfast."—**K6ASU/6.** "We were happy to meet the challenge of the new rules. We had a ball! If others think that they can profit by bending the rules to suit themselves, that's their problem."—**W3OF/3.** "The rain let up just long enough for us to get our antennas up and then we had to quit five hours early because of tropical storm Candy. Certainly surprised when XW8CAL came back to our CQ FD and gave us a '579 SOUTH LAOS'."—**W5MS/5.** "Our biggest problem was interference caused by the close proximity of our five stations. Next year we plan to spread out more and possibly employ wavetrap filters for each of the receivers."—**WB6SST/6.** "Good crew, beautiful weekend, fine equipment, efficient antennas, and the generator didn't start."—**W8VPV/8.** "Did we have the only air-conditioned tent and 60-watt stereo on FD?"—**W4JNB/4.** "Please go back to requiring signal report as part of exchange—it's useful sometimes."—**K2AA/2.** "Can you explain the report I go from several stations in the U.S.: 'Your signal's real strong, old man, but because of heavy QRM you're only 5/5.'? Perhaps there is a new SRT code replacing the RST one."—**VE3GEJ/3.** "The DX contests are so much easier."—**KH6GLU/KH6.** "Why did everybody want a signal report? The rules didn't require it in the exchanges. We figured we had to go along with the pack to keep requests for reports from lengthening the QSO."—**KØQWM/Ø.** "The neighbors gave us no trouble at all. We operated next to a cemetery."—**W3EAN/3.** "Everybody else must have done great."—**WN4HXE/4.** "We will have to find a new location next year; everybody fell through the floor at least once."—**W9SOM/9.** "This was first FD in 16 years when I couldn't go into the field. Awaiting imminent childbirth. Both operations were successful."—**W6OYJ.** "A.m. is dead for sure as far as contests go. I could not find another a.m. station in the contest on 40 meters. All my contacts were with s.s.b. stations."—**WA2CKU.** "Sunday morning 2 meters had as much QRM as 80 meters, with several mountain portables working extended ground-wave."—**WA3JDT.** "Very sorry about the condition of the log sheets. The copying machine showed no mercy as it ripped one sheet after another."—**W8NP/8.** "Goof of the year: locating too close to the Illinois Central's main line. You could not only hear the racket, you could actually feel it."—**K9MLF/9.** "I would like to register my vote to have the RST put back into the exchange. Even if all stations aren't honest, a large enough proportion will let you know how your signal is. This is especially necessary in FD, where one is using an untested setup."—**K2BMI/2.** "As we closed down, everyone was saying that this was absolutely the last FD ever! (We also said that last year, the year before, etc. . . .)."—**K8WBL/8.** "We had no trouble setting up this year, as we accomplished this in record time. The new rule provided an extra incentive."—**K9BGL/9.** "The nearest gas station was about 12 miles down the hill. The owner got to know us pretty well—we woke him up at 6:30 a.m. Sunday, one of the many times we bought gas for the greedy guzzling generator."—**W6HKV/6.** "As a result of used '807s,' the antenna next year will be a homebrew beer-can vertical."—**WA4WWK/4.** "No output could be had from the generator until one member realized that the extension cord's three leads were connected to the same terminal."—**W7DMC/7.** "The only complaint about this FD was that so many people didn't read the blasted rules, about the fact that there was no signal report required. Actually got almost testy with a few guys who threatened to remove us from their logs if we didn't give them a signal report."—**W3RQZ/3.** "Congrats on the new rules; we thought they were great. It took us two hours to get on the air. In that time we accomplished what took us 7 hours last year."—**W4NBJ/3.** "Liked new 10-watt class; will be there next year."—**WA6EUZ/6.** "We had 1518 contacts in the logs, but careful editing turned up 127 dupes."—**K2CW/3.** "Fifty W8s worked in 10



K1NQG/1

W6OZC/6

hours on 2 meters; total for that band: 14 states, Canada, 23 ARRL sections with only 10 watts phone! Location was outstanding but we had to climb a three-mile trail to get to it. We were visited by HB9RL and his XYL, who had climbed the mountain on Saturday afternoon."—**W2GTF/2.** "The plan to operate from Isle Royale National Park developed into a small DXpedition within the continental U.S. All told, our party of seven moved some 2000 pounds of equipment and food to and from the island. The 60-foot tower (20 feet long when cranked down) had to be floated with driftwood logs and towed to the site. Even though there are three moose per square mile, none dropped in to visit us."—**WØAA/8.** "Ten-watt battery operation has much to be said for it."—**W8TFZ/8.** "We had four generators on the site, and 1600 watts of lighting as a stabilizing load. Murphy knew when he was licked this time."—**K8TII/8.** "The biggest problem we had was convincing everyone we worked that you didn't have to exchange signal reports. Finally we found it easier to exchange them than to argue."—**W7OBE/7.** "Things got so dull that at one point it was more of a thrill to watch the slow freights go by. Results were disappointing, but we'll be back next year with a few more ops and rigs."—**WA8PVU/8.** "Experience teaches that he who transmits with broken coax for 18 hours shall not succeed."—**K7ICY/7.** "As you can see from our logs, there was total confusion about sending signal reports. On phone we sent them just to make the people happy, i.e., those who didn't read the rules."—**W9YT/9.** "It only took nine hours to set up. At least we ate well."—**K6JRR/6.** "We took advantage of a 140-foot commercial tower on the site already existing for seven years. A 75-meter dipole at 140 feet increased our score tremendously!"—**VE3OE/3.** "Best FD ever. Love those new rules."—**WØGCH/Ø.** "Glad to see the changes in the rules. The inclusion of setup time and the revised power-multiplier break points are good."—**W3ISE/3.** "New setup times rule very challenging *and lots of fun.*"—**VE2ARC/2.** "We were quite happy with our results, considering that none of our operators had been on the air in over a year."—**VE7FO/7.** "Last year our generator quit and stayed quit. This year it quit occasionally, burned a gallon and a half of oil, and dropped frequency two cycles when the sideband rig went on—but we stayed on the air about 20 hours and topped last year's score by four points!"—**W4CUE/4.** "The rules prohibiting construction were not a problem. We fired up the generator and got three stations on the air quickly with whip antennas. Permanent antenna installations were completed within 3 hours for all four stations."—**WB2RMW/2.** "Would be nice to have a second Field Day in August, but suppose paperwork at ARRL would be prohibitive."—**WØWLO/Ø.** [Arrggghhh!!!—*Ed.*] "The new rules regarding setup time, in our opinion, added spice to the activity. Since we were inexperienced, this made things more interesting. Of course, we didn't say that at the time!"—**WB2BDJ/2.** "We're glad you left out RST —why didn't everybody?"—**W8IXL/8.** "Some provision should be made to encourage operation of transmitters in the Novice portion of bands."—**KH6WO/KH6.** "W6QY's crossbow made it a rapid and rather painless operation to get 16 lines over the Ponderosa pine-trees as high as 125 feet, and eight antennas for 80, 75, 40F and 40CW were hauled up in short order."—**K6BAG/6.** "We won't mention *any* names, but one position got its beam all installed and ready to operate and then found they had failed to connect the coax line to the radiator. In lowering the beam, they let it slip and broke an element. However, with all of that they were on the air by 2100 hours."—**W2LI/2.** "Starting at 1900Z Saturday, it took our two-man operation nearly three hours to set up the antennas (including a triband quad and Yagis for v.h.f. atop a 34-foot wooden tilt-over tower), erect the tent, set up all the gear, and get the battery power and recharging systems going."—**K6YNB/6.** "Ever try to buy a gallon of gas at 3 a.m.?"—**WØAWW/Ø.** "Murphy manifested himself in the form of a goat and tried to butt our generator. Fast footwork and diversionary tactics by K6COD (who, incidentally, spent the next 15 minutes in a tree) saved the generator. A strong rope fence around the generator prevented further attacks."—**K6COD/6.** "Thanks for the fine contest, and keep that setting-up time limit."—**WA8ZEL/2.** "Didn't expect to be on for FD, 'cuz we're in the process of moving into our new house; however, I even got a chance to try out the 3-hour setup period as I frantically scrounged together a station and a 15-meter dipole."—**WAØRAG.** "Haven't had so much fun since the Orioles won the pennant!"—**WA3ICN.**

CLUB AGGREGATE MOBILE SCORES

Radio Amateur Mobile Society (Calif.)	24,152
Long Island Mobile Amateur Radio Club	20,856
Argonne Amateur Radio Club (Ill.)	2915
Yolo County Civil Defense Amateur Radio Club (Calif.)	1948
Friendly Amateur Radio Transmitting Society (Md.)	943
Texas Southmost Amateur Radio Club	758
Mobile Amateur Radio Club of South Bend (Ind.)	670

SCORES

Class A stations are clubs and groups in the field with more than 2 operators. Scores are tabulated according to the number of transmitters operated simultaneously at each station. The figures and letters following each call indicate the number of valid contacts, the d.c. power inputs used, the number of participants at each station and the final score. The "power classification" used in computing the score is indicated by the letters A, B, C or D after the number of QSOs shown. A indicates power up to and including 10 watts (multiplier of 4); B indicates power over 10, up to and including 50 watts (multiplier of 3); C indicates over 50 watts, up to and including 200 watts (multiplier of 2); D indicates over 200 watts (multiplier of 1).

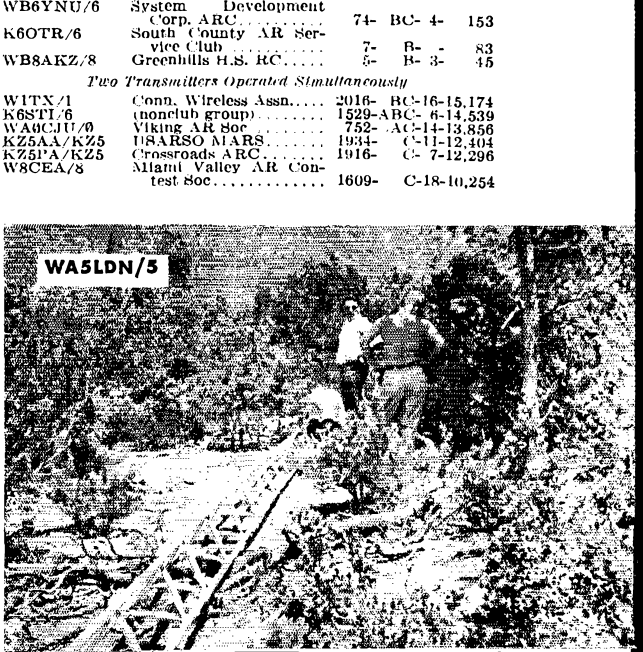
CLASS A

One Transmitter

W9VNE/9	(nonclub group)	1382-	BC-	3-12,183
WA3EPT/3	Hopkins ARC	771-	AB-	21-11,103
K2CW/3	Hudson Wireless Assn.	1391-	BC-	11-10,888
W5PDQ/5	Clarksdale ARC	974-	B-	6- 9166
W8NP/8	Massillon ARC	900-	AB-	18- 8509
WA8MSW/8	Orange H.S. ARC	860-	B-	10- 8140
W2WS/2	RA of Greater Syracuse	967-	ABC-	6- 7740
KH6GGI/KH6	Hilo H.S. ARC	826-	B-	4- 7634
WB6KGJ/6	San Diego Independent Contest Club	791-	B-	4- 7319
W1VB/1	Candlewood AR Assn.	756-	B-	15- 7204
K8AFF/8	International Order of Lizards	1152-	C-	6- 7112
W7GPN/7	Ogden ARC	1008-	ABC-	23- 7098
W9YH/9	Syuton ARC	385-	AB-	4- 6740
WA8RUJ/8	Radio Free Franklin ARC	726-	B-	3- 6734
W7EU/7	Utah ARC	987-	BC-	23- 6627
W6VLD/6	Douglas Space Systems Center ARC	691-	B-	12- 6619
K3ZSK/3	Teenage ARC of the Lehigh Valley	556-	AB-	6- 6446
W9LJ/9	Lake County ARC	707-	BC-	5- 6112
W2GTF/2	AR Soc. of St. Peter's College	398-	AC-	7- 6106
WØDX/Ø	Newton AR Assn	305-	A-	3- 6090
WAØAGM/Ø	(nonclub group)	969-	C-	3- 6014
WØAA/8	Minnesota Wireless Assn.	712-	BC-	7- 6002
W4EMI/5	Mid-South AR Assn.	951-	AC-	7- 5930
W8TFZ/8	Aviation RC of North American Rockwell	656-	ABC-	16- 5880
W9FB/9	(nonclub group)	900-	BC-	3- 5795
K7EFA/7	Yellowstone RC	893-	C-	21- 5758
W4FJA/4	Beaches AR Soc	891-	C-	11- 5746
K9DHN/9	(nonclub group)	690-	BC-	3- 5653
WA2UKA/2	(nonclub group)	447-	A-	3- 5574
K8WWP/8	Tri-County VHF Radio Assn	673-	BC-	11- 5536
K8TII/8	Henry County ARC	517-	B-	10- 5253
W7OTV/7	Tualatin Valley Emergency RC	588-	BC-	12- 5235
W3NNL/3	Schuylkill River Rats	281-	AB-	5- 5206
W1OS/1	Easton RC	515-	AB-	4- 5146
K9MMH/9	Crooked Lake RC	672-	BC-	4- 5075
W9BF/9	Tri-State College ARC	533-	B-	3- 4997
K3QBD/3	First State ARC	500-	B-	11- 4900
WB6QIT/6	California DX Team	730-	C-	3- 4780
WØDEP/Ø	(nonclub group)	482-	B-	3- 4738
W5YL/5	Thibodaux ARC	702-	C-	16- 4612
K7WWR/7	Sumoe Valley ARC	702-	AC-	3- 4436
KØQMH/Ø	Montrose County ARC	639-	C-	5- 4434
VE4BV/4	(nonclub group)	696-	C-	7- 4376
W8EQ/8	Lima Area ARC	592-	C-	25- 4372
WB2OVV/2	(nonclub group)	453-	B-	3- 4277
W5GHQ/5	Caprock AR Soc	1088-	CD-	11- 4141
WA5NKV/5	Galveston County Hamcross	621-	C-	7- 4126
K9MLF/9	(nonclub group)	434-	B-	6- 4106
WØDD/Ø	North Star Hibanders and North Suburban Wireless Assn	571-	AC-	10- 4064
W7OBE/7	Univ. of Wyoming ARC	382-	B-	3- 4038
WA7DNZ/7	Wyoming Teenage Field Day Soc	601-	C-	6- 4006
K8VHN/8	Kent RC	601-	C-	15- 4006
W9EJ/9	Soc. of Radio Operators	601-	AC-	25- 3872
K2RMJ/2	Cape May Crew	610-	C-	3- 3860
K6LDA/6	Emergency Radio Net	485-	ABC-	18- 3721
WAØNJS/Ø	(nonclub group)	343-	B-	3- 3707
WA9PCB/9	Worth Township ARC	537-	C-	15- 3622
WB4ESE/4	Marshall County ARC	502-	C-	15- 3612
W7FO/7	(nonclub group)	531-	C-	11- 3586
K5CAY/5	Enid ARC	564-	C-	16- 3584
W5YM/5	ARC of the Univ. of Arkansas	493-	BC-	14- 3478
W7ED/7	Gallatin ARC	508-	C-	12- 3448
WA7DIA/7	Wassuk Range RC	337-	B-	4- 3433
K7OEG/7	Anaconda RC	465-	C-	11- 3390
K8ONV/8	(nonclub group)	531-	C-	3- 3386
WA7FKD/7	Green River Gang	497-	C-	5- 3382
K8URY/8	(nonclub group)	480-	C-	4- 3280
K4CG/4	Coast Guard ARC	513-	C-	3- 3278
WB4BDS/4	Sarasota AR Assn	448-	C-	4- 3088
KØGIA/Ø	Air Capitol AR Assn	447-	C-	9- 3082
VE2PJ/2	(nonclub group)	442-	C-	3- 3052
K2JVR/Ø	(nonclub group)	309-	BC-	9- 3043
WA8JEB/8	(nonclub group)	435-	C-	3- 2990
KØKYK/Ø	Tri-State ARC	847-	D-	18- 2941
WA9RPQ/9	Cooney RC	423-	C-	5- 2938
W8BVU/8	Cooley Electronics Club	300-	AC-	5- 2935
W6BLY/6	Whittier Radio 50 Club	407-	BC-	10- 2932
W8RTR/8	Canton ARC	402-	BC-	10- 2930
W6CAE/6	The Non-Club Group	390-	C-	6- 2760
K7SGI/7	Coronado ARC	389-	C-	4- 2734
WØSBR/Ø	Minnetonka Village Civil Defense	388-	C-	5- 2728
W9CHD/9	Poison Ivy Rainmakers Wireless Assn	421-	C-	7- 2726
WA7EXW/7	Rodeo City RC	387-	C-	7- 2722
KH6ETG/KH6	Tiki Mobile Club	385-	CD-	6- 2692
W7IDA/7	Bonner City ARC	380-	C-	9- 2680
K8WBL/8	Xavier Univ. ROTC	411-	C-	6- 2666
WA5QBP/5	Run-A-Muck ARC	374-	C-	4- 2644
VE7UBC/7	Univ. of B.C. AR Soc.	404-	BC-	13- 2639
WAØNLP/Ø	Honeywell RC	439-	C-	15- 2634
KH6RS/KH6	Maui ARC	626-	CD-	- 2553
W5DSC/5	Victoria ARC	261-	B-	5- 2549
W1AEC/1	S.E.Mass. AR Assn.	357-	C-	10- 2542
VE3UOW/3	Univ. of Waterloo ARC	351-	C-	3- 2506
WA2EXT/2	(nonclub group)	348-	C-	4- 2488
WA5REV/5	Fayetteville H.S. ARC	342-	AC-	4- 2458
K6GHO/6	Scripps RC	334-	C-	5- 2418
KØOYM/Ø	Mid Mo ARC	301-	BC-	11- 2395
W6KIL/6	Dunsmuir ARC	330-	C-	4- 2380
WA9RVY/9	(nonclub group)	354-	C-	3- 2324
WAØQFS/Ø	Albert Lea Spiderweb AR Assn	319-	C-	4- 2314
WA4WWT/4	Rabbit Hash Field Day Operators	311-	C-	5- 2266
W4BS/4	Delta ARC	300-	C-	9- 2200
W7LBP/7	(nonclub group)	324-	C-	3- 2144
W8MRM/8	Motor City RC	231-	ABC-	- 2144
VE3HK/3	(nonclub group)	257-	C-	4- 2142
WA3ERJ/3	(nonclub group)	236-	ABC-	3- 2116
K6HM/6	Douglas Aircraft Group ARC	278-	C-	7- 2068
W4FIG/4	(nonclub group)	301-	C-	4- 2006
VE3GOG/3	Dryden ARC	267-	C-	4- 2002
VE1JV/1	Pictou County ARC	331-	C-	12- 1986
W8BAA/8	Chippewa ARC, Group A	195-	B-	9- 1955
WB6OTK/6	Santa Clara H.S. ARC	169-	AB-	4- 1924
K6BGM/6	Santa Clara County RACES Group	211-	AB-	4- 1905
VE7AWJ/7	Powell River ARC	236-	BC-	10- 1822
WØYLC/Ø	Niobrara Valley RC	229-	C-	11- 1774
WAØLEK/Ø	(nonclub group)	769-	C-	3- 1738
W2TND/1	Chatham AR Group	140-	B-	4- 1660
K8DXF/8	Mason County RC	140-	B-	6- 1660
WØZWY/Ø	Sioux Falls ARC, Phone Group	208-	C-	8- 1648
VE1AO/1	Truro ARC	202-	C-	14- 1612
WN8ACF/8	COSI Novices	106-	B-	11- 1564
VE3NDR/3	No. Dorchester ARC	189-	C-	13- 1534
W2ZJ/2	Elmira AR Assn	186-	BC-	6- 1519
W9AXD/9	Rockford AR Assn	219-	C-	6- 1514
KØKBX/Ø	Benton County ARC	138-	C-	4- 1428
WA7ISO/7	DEII ARC	171-	C-	4- 1426
VE3UOT/3	Hart House ARC	234-	C-	5- 1404
WA6ZPL/6	(nonclub group)	200-	C-	3- 1400
W5ABF/5	Mineral Wells ARC	162-	C-	8- 1372
WA3JKH/3	Montrose H.S. ARC	152-	C-	10- 1312
WØAJA/Ø	Coon Valley ARC	174-	BC-	6- 1289
VE7UT/7	Kamloops ARC	177-	C-	6- 1262
VE3TM/3	The Big Four	594-	C-	4- 1188
WA8PVU/8	Dry Bones Field Day Conglomeration	149-	C-	3- 1094
WA3EVY/3	Baltimore Polytechnic Institute RC	126-	C-	3- 956
W5SXA/5	Shawnee ARC	110-	C-	5- 860
WØREA/Ø	Saint Paul Mobile RC	81-	AC-	6- 758
W3EEK/3	Panther Valley Wireless Assn	440-	BCD-	8- 753
WØQDN/Ø	Huron ARC	91-	C-	7- 746
K9DUZ/9	Manorcrad RC	114-	C-	3- 684
W9ANF/9	Fenwick H.S. Alumni ARC	77-	CD-	5- 653
WA4YNP/4	(nonclub group)	24-	A-	3- 632
W5OYC/5	Six-Meter Club of Dallas	48-	B-	3- 632
WNØUCZ/Ø	Hiawatha AR Novices	22-	C-	6- 532
W4PLB/4	Orlando ARC	53-	C-	10- 518
K7ICY/7	Beaverton H.S. RC	13-	C-	9- 478
W1FWH/1	Newington AR League	101-	CD-	4- 378
WB6YNU/6	System Development Corp. ARC	74-	BC-	4- 153
K6OTR/6	South County AR Service Club	7-	B-	- 83
WB8AKZ/8	Greenhills H.S. RC	5-	B-	3- 45

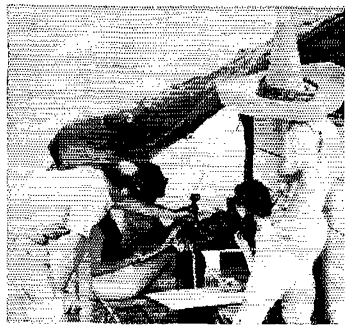
Two Transmitters Operated Simultaneously

W1TX/1	Conn. Wireless Assn.	2016-	BC-	16-15,174
K6STI/6	(nonclub group)	1529-	ABC-	6-14,539
WA6CJU/Ø	Viking AR Soc	752-	AC-	14-13,856
KZ5AA/KZ5	USARSO MARS	1934-	C-	11-12,404
KZ5PA/KZ5	Crossroads ARC	1916-	C-	7-12,296
W8CEA/8	Miami Valley AR Contest Soc	1609-	C-	18-10,254



WA4YRB/4

W1OP/1



K6LGR/6

K0GSS/0	(nonclub group)	1053-	BC-	7-10,078	W4IGW/4	Humboldt ARC	617-	C-12- 4302
W8COE/8	Kanawha RC	1545-	C-25-	9870	W9QXO/9	Chilburban RC	614-	BC- 6- 4290
W2CCL/2	(nonclub group)	1142-	BC-	5- 9669	WA0SKH/0	Hewlett-Packard Loveland ARC	641-	C- - 4246
W8JSU/8	Order of Boiled Owls of Ohio	1396-	C-	8- 9196	W5BAB/5	Siloam Springs ARC	571-	C- 5- 4226
WA9IXF/9	(nonclub group)	837-	AB-	4- 9168	W2MO/2	Livingston ARC	481-ABC-15- 4180	
W4LX/4	Ft. Myers ARC	1397-	C-15-	8982	WB2ZGR/2	Camden County Radio Assn	417-	B- 5- 4153
W5AC/5	Memorial Student Center ARC	1460-	C-	9- 8980	K7UGT/7	Sierra Nevada ARC	587-ABC-34- 4149	
W8LT/8	Ohio State Univ. ARC	1046-	BC-	18- 8418	WA0LMI/0	MIA RC	588-	C- 7- 4128
K7SKW/7	Mt. Baker ARC	1228-	C-	18- 8168	WA4TFZ/4	Albemarle ARC	572-	C-11- 4032
K5AGI/5	Ozone ARC	1187-	C-	19- 7922	W8GLX/8	Chippewa ARC, Group B	446-	BC-23- 4012
K0AXU/0	N.W. St. Louis ARC	1236-	AC-	8- 7828	W5DTR/5	(nonclub group)	491-	BC- 8- 4008
W0LB/0	Jayhawk AR Soc	1507-	CD-40-	7747	KL7GI/KL7	Juneau ARC	526-	C-10- 3972
W6UOS/6	Monterey Bay RC	778-	B-15-	7602	WB2NXI/2	Scotch Plains—Fanwood H.S. RC	556-	AC- 8- 3942
W9YT/9	Badger AR Soc	1147-	C-	8- 7482	W3FBF/3	Tamaqua Area Sideband AR Assn	505-	BC- 7- 3930
W1HEB/1	Middlesex ARC	985-	BC-	- 7467	W2YNU/2	Ridgewood H.S. RC	473-	BC-13- 3909
W6KA/6	Pasadena RC	659-	AB-17-	7436	VE1HE/1	Dartmouth ARC	551-	C-18- 3906
W8QBC/8	Oak Park ARC	1136-	C-21-	7416	WA0RJE/0	Wichita Tec-Ni-Chat ARC	545-	C-25- 3880
W8MBL/8	Peach Grove AR Soc.	1131-	C-	7- 7386	W6AF/6	Oroville AR Soc	544-	C-11- 3864
W9UDU/9	Racine Megacycle Club	1104-	C-12-	7224	VE2BGN/2	Club RA St. Hyacinthe	669-	CD- 7- 3813
WA0JXT/0	Forx ARC	1101-	BC-16-	7153	WA2DFP/7	(nonclub group)	533-	C- 7- 3798
W5PDO/5	Los Alamos ARC	1041-	C-25-	7046	VE7CAR/7	Columbia ARC	522-	C- - 3732
W0BRI/0	St. Louis Contest Club	1052-	C-	- 6912	WB6WPS/6	Thousand Oaks H.S. RC	520-	C- 9- 3720
W8OHN/8	Northern Ohio AR Soc	1050-	C-	9- 6700	W3BEL/3	Bowie ARC	553-	C- 8- 3718
W4KVK/4	Henderson ARC	972-	C-16-	6632	W1KOO/1	Burlington ARC	480-	BC- 9- 3715
W3WPW/3	Chesapeake ARC	832-	BC-	- 6624	W8JLN/8	Iosco ARC	374-	B-10- 3696
K5VBF/5	Eastern Arkansas Radio Soc	823-	BC-	7- 6537	WA0QYC/0	Bloomington AR Club	480-ABC-	9- 3693
K8UZW/8	Parma RC	908-	BC-20-	6531	K4HUF/4	Washington County RACES Network	505-	C- 7- 3630
W8KEB/8	Saginaw Valley AR Assn.	952-	C-14-	6512	K7LIX/7	So. Oregon RC	503-	C- 7- 3618
W2LZ/2	Walton Radio Assn	807-	BC-12-	6459	W9INL/9	Bloomington ARC	491-	AC-12- 3600
W9HHX/9	Milwaukee School of Engineering ARC	790-	AC-	5- 6436	WA0DGW/0	Steele County ARC	498-	C- - 3588
W0FA/0	Arapahoe RC	806-ABC-16-		6399	K8QIK/8	Lancaster and Fairfield Counties ARC	471-	BC- 8- 3567
WA9IVI/9	Nicolet H.S. ARC	959-	C-15-	6354	W0KUY/0	(nonclub group)	443-	AC- 7- 3558
K8GVK/8	West Park Radiops	976-	C-15-	6266	K8DVR/8	Kalamazoo County RACES	510-	BC- 5- 3520
W0RFU/0	Bandhoppers RC	966-	BC-13-	6226	W4SGE/4	(nonclub group)	519-	C- 7- 3514
W2DAW/2	Overlook Radio Soc	993-	BC-19-	6157	W6MSO/6	Inglewood ARC	163-ABC-	6- 3505
WA5NOT/5	(nonclub group)	923-	C-	7- 6138	W0MXW/0	Rochester ARC	549-	C- - 3494
W8ABT/8	Univ. of Penna. ARC	890-	BC-	8- 6061	W8SGG/8	Newark AR Assn	364-	BC-11- 3487
W4AB/4	Broward ARC	885-	BC-40-	6039	W9OSF/8	Michigan City ARC	446-	BC-12- 3480
W0ERH/0	Johnson County RAC	784-ABC-15-		5984	K3UIB/3	Naval Supply Depot ARC	475-	C-18- 3450
VE5NN/5	Regina AR Assn	828-	C-16-	5798	WB6UNI/6	(nonclub group)	508-	C- 3- 3448
VE3ZN/3	(nonclub group)	856-	C-10-	5736	W5WI/5	QCWA Members	473-	C- 4- 3438
W5ABD/5	Westside ARC	850-	C-15-	5700	WA4ZUK/4	Clemson Univ. ARC	503-	C- 5- 3418
VE3RAM/3	Ottawa Valley Mobile RC	803-	C-14-	5618	W9GFD/9	Prairie ARC	459-	BC-12- 3414
VE1FO/1	Halifax ARC	836-	C-18-	5616	W2LCA/2	North Country RC	500-	C- 5- 3400
W8VRB/8	Edison RA Assn	694-	BC-12-	5599	K8UTT/8	Tin Lizzy Club	499-	C-15- 3394
K9BGL/9	Belleville AR Foundation	736-	BC-	5- 5598	W0OTQ/0	Ten After AREC Group	496-	C-10- 3376
VE2WE/2	Montreal FD Assn	700-	BC-	7- 5520	W9HRF/9	Big Thunder ARC	382-ABC-13-	3295
W3BN/3	Reading RC	819-	C-20-	5514	VE4BB/4	Winnipeg ARC	447-	C-12- 3282
K4CF8/4	Five Flags AR Assn	812-	BC-16-	5475	WA9SLR/9	Waupaca ARC	476-	C-10- 3256
W4AM/4	Frye ARC	811-	C-25-	5466	W7DF/7	Walla Walla Valley RAC	361-	BC-20- 3234
W6JSY/6	Humboldt ARC	805-	C-	8- 5430	K6ASU/6	Nevada County ARC	437-	C- 5- 3222
WA0PHZ/0	(nonclub group)	776-	AC-18-	5298	WA0KSS/0	Bell ARC	470-	C- 5- 3220
W2AXJ/2	Diode Disintegrators Club	744-	BC-14-	52	WA9DNZ/9	Western Electric ARC	416-	BC-15- 3213
K8IEK/8	Port Huron AR Organization	773-	C-25-	5238	W2BB/2	Tryon RC	422-	AC-11- 3186
K2ID/2	(nonclub group)	785-	AC-	9- 5152	W4KVF/4	North Augusta-Belvedere RC	431-	C-10- 3186
WA9UDX/9	(nonclub group)	788-	C-	5- 5128	W9QV/9	Chicago Radio Traffic Assn	386-	AC- 6- 3184
W6TO/6	Fresno ARC	729-	C-13-	5024	WA4QPL/4	GLERC ARC	430-	C-12- 3180
W5BQN/5	Point Comfort ARC	734-	C-10-	5004	W3KQE/3	Losers	321-	BC- 3- 3160
K3ZFP/3	Shenango Valley Field Day Operators	551-	BC-	5- 4994	W5MYZ/5	No. Arkansas AR Soc	448-	C- 5- 3088
K4BV/4	Daytona Beach AR Assn.	488-	B-18-	4992	WB6VFG/6	(nonclub group)	505-	C- 3- 3030
VE4DF/4	Flin Flon ARC	732-	C-	5- 1992	WA5BBY/5	Plantation District RC	434-	C-12- 3004
K7CBP/7	Klamath Basin AR Assn.	728-	C-	9- 4968	W6OTX/6	Palo Alto AR Assn	286-	AC- 6- 2980
W1EDH/1	Middlesex AR Soc	726-	C-15-	4956	K3FWN/3	Explorer Post 114	313-ABC-15-	2946
VE1DH/1	Greater St. John AR Assn	714-	AC-	6- 4902	WA9BRE/9	Argonne ARC	387-	C- - 2922
W0EBE/0	S.W. Missouri ARC	689-	C-33-	4734	W4WSB/4	Ancient City ARC	416-	C- 4- 2896
W3KW/3	ARINC ARC	687-	C-12-	4722	K6JRR/6	Slow Setter-Uppers	415-	C- 5- 2890
W5GKF/5	(nonclub group)	699-	BC-10-	4675	W2EJ/2	(nonclub group)	481-	C- 7- 2886
W9UQA/9	(nonclub group)	1014-	CD-12-	4669	K8SAM/5	Edmond AR Soc	378-	BC- 9- 2871
W4NVU/4	Dade RC	718-	BC-14-	4634	VE3HVC/3	Humber Valley ARC	321-	BC- 4- 2829
W7RGL/7*	AR Communication Service	482-	BC-	3- 4581	W7TD/7	Apple City RC	470-	C- 4- 2820
K0TKF/0	Hiawatha ARC	629-	C-10-	4574	K0SOQ/0	Hastings ARC	369-	C-11- 2814
WA2PNU/2	Larkfield ARC	594-	BC-12-	4571	VE7NA/7	Nanaimo ARC	367-	C-12- 2802
K9LOD/9	Midwest ARC	585-	BC-15-	4491	W9SA/9	North Shore ARC	310-	BC- 8- 2767
W2OFQ/2	Rome RC	645-	C-18-	4470	W3YP/3	Villanova Univ. ARC	770-	D- 5- 2710
K9REE/9	Point RA, Ltd	805-	CD-14-	4338	W2RHM/2	Black River Valley ARC	351-	C-15- 2706
K1PXE/1	Milford Civil Defense	571-	BC-	4- 4336	WA6GYC/6	Tuolumne County AR Soc	347-	C- 7- 2682

* Did not conform to setup-time requirements

K7RJM/7	Polk County ARC	270-	ABC-	5-	2665
W2QTA/2	Post 673	296-	AC-	4-	2632
WA2BCT/2	(nonclub group)	365-	C-	3-	2590
W8OHR/8	Detroit Metropolitan RC	360-	C-	6-	2560
W8PIF/8	M and M RC	324-	BC-	12-	2547
WB2WRP/2	Cherry Hill H.S. West ARC	424-	C-	3-	2544
W8FDK/8	ARC of Margaretta H.S.	212-	B-	7-	2508
W3FT/3	Baltimore ARC	311-	C-	15-	2466
WA9PBZ/9	Pike H.S. RC	334-	C-	8-	2404
W4VMT/4	Biscayne ARC	309-	AC-	10-	2392
K8RNN/8	(nonclub group)	362-	C-	4-	2372
WA8ONO/8	VHFers	224-	B-	-	2416
VE4QD/4	Brandon ARC	290-	C-	6-	2340
VE3FAR/3	Pioneer ARC	323-	C-	14-	2338
W8GUI/4	Brightleaf ARC	289-	C-	-	2334
WA1HRC/1	WELI Hamden RC	288-	C-	8-	2328
WA0HOU/0	Blue Valley ARC	282-	BC-	13-	2298
K4FDN/4	McCoy AFB MARS	475-	CD-	10-	2287
W0ZRT/0	Bismarck Area RC	275-	C-	12-	2250
W0FLO/0	Pine Ridge ARC	263-	C-	9-	2238
WB6MMC/6	Calif. Air National Guard RC	302-	C-	5-	2232
K9QDE/9	Kokomo ARC	271-	C-	-	2226
WA8RZD/8	Fairview H.S. ARC	439-	CD-	10-	2221
W9DUP/9	DuPage RC	256-	BC-	14-	2209
W0CUO/0	Grand Island AR Soc.	235-	BC-	17-	2209
K7VDR/7	(nonclub group)	449-	CD-	8-	2182
W3PSH/3	Keystone ARC	197-	AB-	7-	2176
W8MOP/8	East River RC	262-	C-	10-	2172
WA0OLA/0	Coon Rapids ARC	293-	C-	6-	2158
W0ZCN/0	Theo. Roosevelt ARC	286-	C-	6-	2136
W0FLN/9	St. Louis Univ. ARC	285-	BC-	4-	2113
W8TV/8	Marion ARC	271-	BC-	-	2112
W3BMD/3	Indiana County ARC	155-	B-	11-	1995
K2HJY/2	Medford Wireless Assn.	203-	BC-	12-	1972
W6HKV/6	Kingsburg H.S. Strand Memorial ARC	214-	BC-	7-	1968
W1BD/1	Central Vermont ARC	214-	BD-	8-	1960
W9QYQ/9	Hoosier Hills Ham Club	214-	BC-	11-	1957
WA6YKY/6	Northrop Institute of Tech. RC	224-	C-	4-	1944
WB2WGP/2	Midcounty Net ARC	207-	BC-	7-	1921
WA8VGK/9	Mobileers	126-	AB-	12-	1911
W8ODJ/8	Buckeye Shortwave Radio Assn	403-	BD-	20-	1885
WB6UPW/6	Shack Rats	247-	C-	5-	1882
W9MRZ/9	Ninth Area RC	177-	BC-	10-	1764
K0QIK/0	Lake Region ARC	218-	C-	5-	1708
K9UNI/9	Valley VHF Club	145-	B-	10-	1705
K7WYV/7	(nonclub group)	214-	C-	4-	1684
W9CZH/9	Winslow AR Soc.	220-	CD-	10-	1659
WB2ZGS/2	(nonclub group)	168-	C-	3-	1608
W0VQN/0	Tri-City ARC	190-	C-	4-	1540
WA1DEZ/1	Port Chester CD Communications	124-	B-	3-	1516
W9BXO/0	Brookings Radio Research Club	185-	C-	8-	1510
WA4WWK/4	(nonclub group)	182-	C-	6-	1492
WA7IUQ/7	Phoenix Camping Club	156-	BC-	4-	1468
WA9TZY/9	Horlick H.S. ARC	237-	BCD-	11-	1458
W1ECV/1	Southington AR Assn.	129-	BC-	8-	1404
WA0DOY/0	Spencer AR Klub	208-	BCD-	8-	1397
W8VY/8	Kalamazoo ARC	126-	AC-	8-	1372
W9CRM/9	Decatur AR Soc.	254-	D-	4-	1362
WA0RME/0	(nonclub group)	151-	C-	-	1295
WA7FOC/7	No. Utah ARC	113-	AC-	8-	1284
K4JVA/4	So. Miami RC	129-	C-	8-	1174
WB4FNR/4	(nonclub group)	122-	BC-	3-	1168
WA5IPE/5	Wheat Straw ARC	81-	BC-	6-	1140
W3FZC/3	VIZ ARC	119-	BC-	5-	1127
WA2FDJ/2	Ogdensburg ARC	134-	CD-	10-	1065
W8QLY/8	Mahoning Valley AR Assn	70-	B-	10-	1030
W6LS/6	LERC ARC	383-	BC-	17-	956
K3MNT/3	(nonclub group)	669-	CD-	3-	944
WA0DHJ/0	O'Brien County AR Assn	94-	CD-	9-	903
W0BZN/0	Newton ARC	63-	AC-	4-	790
WA3BYN/3	Capitol Institute ARC	216-	B-	8-	648
W9JCL/9	Neenah-Menasha ARC	168-	C-	6-	536
WA0NQA/0	Independence ARC	259-	CD-	-	489
W4AHA/4	Columbus ARC	223-	C-	4-	446
WA9IZJ/9	Marshall County ARC	200-	BC-	7-	415
K9OGM/0	Tri-State ARC	108-	C-	6-	216

Three Transmitters Operated Simultaneously

W5DDL/5	Lafayette ARC	2465-	BC-	20-	19,232
K3MTK/3	Suburban ARC	1683-	B-	30-	15,947
W5KHB/5	Old Natchez ARC	1998-	BC-	16-	15,389
VE3OE/3	(nonclub group)	1554-	B-	5-	14,806
W0FK/0	Explorer Post 11	1618-	BC-	8-	14,714
W4NWT/4	Louisville's Active Radio Operators	1549-	BC-	13-	13,810
W7FD/7	Western Washington DX Assn	2106-	C-	19-	13,436
W9DE/9	Joliet AR Soc.	1322-	B-	20-	12,498
WA5CKF/5	Irving ARC	1962-	BCD-	18-	12,044
W2QQ/2	Niagara Frontier DX Assn	1921-	BC-	11-	11,856
W4FU/8	Ohio Valley AR Assn.	1714-	BC-	10-	11,792
W3ISE/3	Society for the Preservation of Key Clicks, Splatter, TVI, and Three Letter Calls	1672-	AC-	8-	11,636
WB6NWK/6	Bodids	1325-	ABC-	5-	11,085
K2TRN/2	Lockport AR Assn.	1292-	BC-	20-	10,745
W7AW/7	West Seattle ARC	1089-	B-	9-	10,601
W4TRC/4	Kingsport ARC	1615-	C-	29-	10,490
W4JJ/4	Panama City ARC	1222-	BC-	15-	9933
WB2QBP/2	American Red Cross Emergency ARC	966-	AB-	-	9501
W6HS/6	Crescenta Valley RC	1071-	BC-	21-	9215
K1KDP/1	Marlboro AR Assn.	1345-	BC-	10-	9122
W9CQO/9	Ozaukee RC	1215-	ABC-	23-	9105
W6JBT/6	Citrus Belt ARC	1165-	BC-	30-	8342
VE2ARC/2	Montreal ARC	1126-	ABC-	24-	8195

W4NWT/4

W8ICS/8

K2BMI/2

K2GQ/2	Irvington ARC	1254-	BC-	40-	7992
W2BSC/2	Stevens ARC	1132-	BC-	16-	7838
VE7FO/7	Lower Mainland Field Day Assn	1193-	BC-	9-	7833
VE7ARV/7	Vancouver ARC	1109-	ACD-	10-	7789
W0GCH/0	Pikes Peak RA Assn	972-	BC-	30-	7724
K8EMY/8	Southeast ARC	848-	AC-	-	7608
K6CLZ/6	Aerojet RAC	833-	ABC-	17-	7604
K6GJ/6	Foothills AR Soc.	856-	ABC-	14-	7485
W2WW/2	Suburban ARC	697-	ABC-	17-	7484
W0VZG/0	Pilot Knob ARC	1096-	BC-	18-	7370
W8TO/8	Columbus AR Assn.	931-	BC-	18-	7308
W9YB/9	Purdue ARC	859-	BC-	10-	7221
VE3RC/3	Ottawa ARC	1062-	C-	25-	7172
W8VA/8	Tri-State AR Assn.	914-	AC-	23-	7058
W9REG/9	Tippecanoe AR Assn.	1020-	BC-	32-	7025
VE3PRC/3	Peel ARC	1023-	C-	25-	6948
WA5SOD/5	Oklahoma Central VHF ARC	905-	ABC-	25-	6915
W6OZC/6	Voice of Tiburon ARC	700-	B-	6-	6900
K3AER/3	Lake Shore AR Assn.	995-	C-	10-	6770

K9VHF/9	Hamilton-Southeastern H.S. ARC	777-	BC- 6-	6746
W9BFO/9	S.E. Illinois Ham Soc.	985-	C-15-	6710
W4FVV/4	Anderson RC	822-	BC-20-	6569
W3OK/3	Delaware-Lehigh ARC	956-	BC- -	6525
W9MJL/9	Vermilion County AR Assn.	1568-	CD-40-	6511
W9AA/9	Hamfesters RC	904-	AC-15-	6480
W8DSO/8	(nonclub group)	549-	BC-25-	6438
K9JSI/9	LaPorte ARC	838-	BC-12-	6425
K6QHQ/6	So. Bay AR Soc	1222-	ACD-11-	6327
WA8UCB/8	Monongalia Wireless Assn.	790-	BC-15-	6296
W7NBR/7	Spokane ARC	898-	C-15-	6188
W2RUK/2	Auburn AR Assn	682-	ABC-12-	6122
WA4IXA/4	Knox Church RC	748-	ABC-18-	6086
W5FC/5	Dallas ARC	870-	BC-22-	6077
W1AQ/1	Associated RA of S.E. New England	856-	BC-18-	6071
W5KYD/5	Richardson ARC	877-	C-14-	6062
WA3DFM/3	Two Rivers ARC	1113-	CD-20-	6032
VE4AA/4	Winnipeg DX Club	863-	AC-11-	6020
W9EAS/9	(nonclub group)	869-	C- 6-	6014
K2BR/2	So. Counties AR Assn.	945-	BC- -	5970
W4PQP/4	RA Transmitting Soc.	853-	C-12-	5918
W8GFG/3	Shenango Valley AR Field Day Group	763-	ABC- 9-	5798
W1GB/1	Hamden AR Assn	818-	AC-13-	5774
W5OK/5	Electron Benders	827-	C-15-	5762
W9BRN/9	Three Rivers ARC	821-	BC-10-	5747
VE3BSQ/3	Quinte ARC	777-	BC- 5-	5742

WA9UDW/9

WA7EUT/7	Coconino County ARC.	814-	C-15-	5684
W8ZPF/8	CRES RC	786-	BC-16-	5490
W9MKR/9	Flint Hills ARC	778-	C-15-	5468
W7DMC/7	David Douglas H.S. ARC	773-	C- 7-	5438
W5PFC/5	Jackson ARC	838-	ACD-14-	5435
WA1BIQ/1	Newton South H.S. ARC	736-	AC- 5-	5414
W2DLT/2	Key Klikers ARC	462-	B-12-	5178
VE1LC/1	Loyalist City ARC	570-	BC-15-	5102
W8DC/8	Grand Rapids AR Assn.	706-	C-15-	5036
W8VVL/8	Queen City Emergency Net	523-	ABCD-25-	4971
W5GZG/5	Dallas Ten Meter Net	779-	BC-18-	4949
W9KUS/9	North Iowa ARC	657-	C-15-	4942
W6AK/6	Sacramento ARC	703-	ABC-18-	4938
W9WYV/9	Bellevue ARC	710-	C-20-	4860
W9IIL/9	Story County AREC	643-	C-13-	4858
W8MF/8	Calhoun ARC	617-	BC-27-	4811
WB2YCZ/2	Thorofare ARC	453-	B- 3-	4677
WA3DFU/3	Warminster ARC	509-	BC-25-	4677
W8YDK/8	Milford ARC	534-	BC-17-	4625
W9VT/9	Tri-Town RAC	643-	ABC-35-	4614
W8QK/8	AR Soc of Calhoun County	624-	AC-12-	4610
W9BLK/9	Black Hills ARC	626-	BCD-15-	4502
W5RIN/5	Beaumont ARC	611-	C- 7-	4466
W3OI/3	Lehigh Valley ARC	597-	C-25-	4382
WA4YRB/4	(nonclub group)	561-	C- 6-	4366
W2GLA/2	Levittown ARC	471-	ABC- 9-	4358
W5QA/5	Key City ARC	626-	C- -	4356
K4KJQ/4	Blue Grass ARC	474-	BC- 6-	4338
WA5BRF/5	(nonclub group)	401-	ABC- 6-	4310
WA9HCY/9	(nonclub group)	866-	CD- 5-	4294
VE3DRT/3	Skywide ARC	582-	C-18-	4292
VE6ASN/6	Border RC	609-	C-16-	4254
K5VOZ/5	Lawton-Fort Sill ARC	571-	C-23-	4226
K9GTQ/9	Lincoln Amateur Wireless Soc	745-	CD- 6-	4226
WB2RLO/2	Fair Lawn ARC	493-	AC-20-	4208
K6QDD/6	(nonclub group)	664-	BCD- 3-	4152
WA5LDN/5	Kirtland AFB ARC	580-	CD- 6-	4130
VE3AJ/3	Lakehead ARC	553-	C-12-	4118
W2BX/2	Cumberland RC	586-	C- 7-	4116
WA3JZR/3	L.B.M. ARC	586-	C-30-	4116
W8NIT/8	Six Meter Nomads	458-	BC-12-	4110
K9FVL/9	Clinton County VHF RAC	520-	BCD-20-	4100
WA9MXQ/9	(nonclub group)	490-	BC- 7-	4094
W2HCS/2	Albany AR Assn	659-	ABCD-20-	4058
WB4BSD/4	Rowan AR Soc	538-	C- 8-	4048
KP4ID/KP4	RC de Puerto Rico	714-	BCD-25-	4028
W8AEX/8	Soc of AR Operators	556-	AC-20-	4026
W4WVJ/4	Loudon County ARC	470-	BC- 8-	3979
K9CJU/9	RA Megacycle Soc	474-	AC-18-	3968
VE7IP/7	E. Kootenay ARC	526-	C-10-	3956
W6AB/6	Satellite ARC	556-	C-10-	3930
WØLAC/Ø	Blackhawk ARC	521-	C-18-	3926
W4CUE/4	Birmingham ARC	512-	BC-11-	3921
W4NLX/4	Indian River ARC	518-	BC-15-	3916
KZ5CZ/KZ5	Canal Zone AR Assn.	639-	CD-30-	3726
W8FO/8	Toledo RC	613-	CD- 6-	3723
K1BWB/1	Bow RC	471-	BC- 8-	3695
VE2CVR/2	Club Vallee Richelieu	506-	C- 8-	3636
VO1HI/VO1	(nonclub group)	411-	AC- 3-	3634
K4GG/4	Manatee ARC	469-	C-15-	3614
K2LSA/2	State Line RC of N.Y. and N.J.	398-	BC-14-	3559
VE3QCD/3	Kingston ARC	452-	C- 7-	3522
VE7AP/7	Point Grey ARC	442-	C-14-	3472
W4BHR/4	Greenville Mike and Key Club	474-	C-15-	3444
K2CCP/2	Woodbury RC	426-	AC-23-	3432
K8SJU/8	(nonclub group)	432-	C- 6-	3392
VE3SRS/3	Sudbury and District ARC	336-	BC- 8-	3329
W1UQH/1	Whaling City Hi-Banders ARC	370-	BC- 9-	3290
K9IYP/9	PICO RAMS	415-	C-14-	3290
W6JW/6	Santa Clarita ARC	396-	BC- 9-	3258
W7AXL/7	(nonclub group)	397-	C- 4-	3182
K3BFO/3	Jefferson County AR Assn.	492-	C- 5-	3152
VE3AEA/3	Peterboro ARC	387-	C- 8-	3122
W4LEN/4	Triangle ARC	407-	C-20-	3042
W9CAE/9	Chicago ARC	340-	CD-11-	2939
W8SGJ/3	Beaver Valley AR Assn.	310-	AC-10-	2888
WA3BQT/3	Brandywine H.S. ARC.	339-	AC-10-	2882
GM3WON/W2	(nonclub group)	379-	C-12-	2874
WA8LVE/8	(nonclub group)	323-	BC- 6-	2828
K7ODJ/7	New Sevens	332-	C- 6-	2792
WA0BAX/Ø	Albert Lea ARC	331-	C- 9-	2786
W7ECA/7	Electric City RC	329-	C- 9-	2774
W5GAD/5	Jefferson ARC	427-	BCD- 9-	2756
WA8THE/8	South Shore RC	395-	CD-12-	2744
KØAQO/Ø	Harrisonville AR Klub	428-	BD- 7-	2724
K3FLT/3	Milton ARC	595-	CD-10-	2706
W1VSR/1	(nonclub group)	282-	BC- 7-	2672
K7CCH/7	Coos County RC	343-	C-11-	2658
WA9CJN/9	Kishwaukee RC	259-	BC-16-	2588
W4BUW/4	Patrick Henry ARC	283-	BC-11-	2549
WØKFZ/Ø	Soo RC	269-	C- 8-	2414
W9BXR/9	Montgomery County AREC	262-	BC- 9-	2393
WB8AOA/8	RC of Lawton Schools	245-	BC- 8-	2370
K2YBN/2	Rancocas Valley AR Assn.	268-	AC- 7-	2353
WØAZR/Ø	Austin Area ARC	285-	C-25-	2310
WA5IGP/5	Duncanville ARC	281-	C-11-	2286
W4DV/4	ARC of Augusta	479-	AD-10-	2264
W8AX/8	Thumb ARC	270-	C- 7-	2220
VE5AA/5	Saskatoon ARC	380-	CD-12-	2214
VE7ARA/7	Richmond ARC	124-	ABC- 7-	2204
WA1JTG/1	Milford AR League	168-	ABC- 8-	2081
VE3SWA/3	So. Waterloo ARC	206-	BC- 6-	2070
WA6BAL/6	Tulare County ARC	215-	ABC- 7-	2067
WA3JBE/4	ARC of St. John's College H.S.	233-	BC- 7-	1998
W2CQC/2	Bloomfield ARC	942-	BC- 7-	1934
W6LMN/6	San Mateo County ARC	150-	ABC- 7-	1899
K8JHG/8	Ottawa ARC	165-	AC-17-	1892
WB2PMB/2	Arthur L. Johnson Regional H.S. ARC	186-	BC- 4-	1890
WA8SAN/8	AREC-Civil Defense RC	147-	BC-15-	1883
W5WEI/5	I Tappa Ke Club	149-	BCD- 4-	1880
K4UXE/4	Brandon AR Soc	158-	BC- 7-	1871
WA6HMP/6	Madera ARC	179-	AC- 3-	1836
KL7EJM/KL7	Moosehorn ARC	204-	C-10-	1824
W9BZN/9	IMO VHF RC	362-	BCD- 4-	1803
WB2VFY/2	Chemung County AREC Assn.	122-	AC-13-	1750
WA8LGE/8	Sparton RC	168-	BC- 5-	1632
VE7ASC/7	Chilliwack ARC	225-	AC-10-	1616
W4GOY/4	Tri-County RC	169-	C- 7-	1614
W3LWW/3	(nonclub group)	151-	ABCD-10-	1494
WA9TKV/9	Ruskin H.S. ARC	121-	BC- 9-	1377
W1GES/1	North Shore RC	193-	AC-10-	1362
K9UXZ/9	National Trail ARC	88-	ABC- 6-	1167
WB2STN/2	Chatham Central H.S. ARC	66-	ABC- 6-	1161
W3DGB/3	Shamokin Area ARC	123-	BC- 8-	1091
WØVMN/Ø	Pingville AR Assn.	422-	CD-16-	844
W9CAV/9	(nonclub group)	59-	C- 4-	754
W3FQR/4	Dit-Happy Dash-Hounds	294-	BC- 7-	598
W2BMW/4	Tu-Boro RC	153-	BC- 7-	366

Four Transmitters Operated Simultaneously

W1OP/1	Providence Radio Assn.	2009-	ABC-25-	18,292
K2ZSS/2	Seven-Eleven ARC	1795-	AB-25-	17,452
W4IZ/4	No. Florida AR Soc	2232-	AC-55-	14,474
W8FY/8	Van Wert ARC	1447-	B-34-	14,223
K6SDR/6	So. Pacific AR Contest Soc	1941-	BC- 7-	12,569
K5TYP/5	Keesler ARC	1700-	BC-44-	12,205
W9LM/9	Northwest ARC	1678-	ABC-25-	11,779
W6NWG/6	Palomar RC	1687-	C-30-	11,122
WA2LQO/2	Grumman ARC	1358-	ABC-23-	11,089
K8SSZ/5	(nonclub group)	1671-	C- 6-	11,026
K3SSC/3	Delmont RC	1610-	BC-18-	10,753
W8MAA/8	Central Michigan ARC	1332-	BC-25-	10,732
W8HLD/8	Catalpa AR Soc	1607-	C-25-	10,662
W7IO/7	Arizona ARC	1567-	C-80-	10,602
W5NGL/5	Ft. Worth Kilocycle Club	1555-	BC-20-	10,390
W5MS/5	Corpus Christi ARC	1521-	C-14-	9926
W2YKQ/2	Lake Success RC	1160-	BC-15-	9844
K2YCJ/2	Communications Club of New Rochelle	1244-	BC-12-	9576
K2EIU/5	Randolph AFB ARC	1338-	BC-17-	9537
W6SJ/6	East Whittier RC	946-	AC-12-	9508
WB2RMW/2	New Providence ARC	1282-	BC-24-	9418
K7ZQZ/7	Pink Panthers	913-	AB- 6-	9089
W2CP/2	Order of Boiled Owls	1299-	C-12-	8594

W2EM/2

WB2RLO/2

K6BAG/6

WA2DJS/2	Wayne ARC	864-BCD-20-	8100
WA9OMR/9	Naperville Community H.S. ARC	1216- C- 8-	8096
K9TSM/9	Goshen ARC	1138- BC-15-	7972
WØEQU/Ø	Ak Sar Ben RC	1114- BC-29-	7935
W2EMI/2	Holmdel ARC	986-ABC-22-	7922
K4ILW/4	Bristol ARC	1120- C-22-	7920
KØLDP/Ø	Lincoln ARC	1179- C-11-	7874
W9YW/9	Rho Epsilon AR Assn	751- BC-15-	7496
WAØUGU/Ø	P.H.D. AR Assn	1045- BC-41-	7330
W2HFP/2	Union County AR Assn.	1062- BC-14-	7325
W8ZHO/8	Muskegon Area AR Council	1415- CD-47-	7084
WA9HQR/9	Fall Creek ARC	957- BC-14-	6957
W1SYE/1	Newport County RC	907- BC-26-	6829
W5CZ/5	Central Louisiana ARC	1001- C-15-	6806
K2GH/2	Raritan Bay RA	877- BC-17-	6514
W4MG/Ø	N.E. Iowa AR Assn	777- BC-12-	6391
W9JJB/9	Motorola AR Operators	1003- CD-12-	6375
W1MV/1	Massasoit AR Assn	792- BC-25-	6316
K8SCH/8	Oh-Ky-In VHF AR Soc.	846- AC-13-	6238
W9CCU/9	Wheaton Community RA	906- C- -	6236
K6HAI/6	North Shores ARC	890- C- -	6140
W5QEG/5	ARC of S.W. Louisiana	1020- C-49-	6120
W2AAD/2	Harmonic Hill Radio League	983- CD- 6-	5749
W2MMD/2	Gloucester County ARC	789- C-20-	5734
VE3CRW/3	Clinton ARC	787- C-30-	5722
VO1CU/VO1	Soc of Newfoundland RA	773- BC-15-	5662
W1TKZ/1	Wellesley AR Soc	727- BC-15-	5642
K2IQ/2	Utica ARC	709- AC-17-	5446
W7AGE/7	Awfully Grubby Engineers	669- BC- 6-	5372
K7NW8/7	Boeing Employees AR Soc	905-ACD-45-	5365
WA9UMN/9	Univ. of Illinois at Chicago Circle ARC	517-ABC-14-	5264
VE7FG/7	Ft. George RAC	736- C-15-	5216
W2BCX/2	East Brunswick ARC	576-ABC-27-	5050
WA9UHY/9	Wabash County ARC	675- C-12-	5050
W2DMM/2	QRP Chapter 1 N.Y.C.	446- B-11-	5014
W3EQ/3	Haverford Township Emergency Radio Net	671- BC-22-	4905
WB2ELW/2	South Towns AR Soc	645- C-20-	4870
W8ADR/8	Michigan Six Meter Club	564- BC-15-	4764
WA4UCE/4	Tennessee Tech AR Soc.	626- C-11-	4756
W5VAA/5	Four States AR Team	609- C-12-	4654
VE6NC/6	Northern Alberta RC	633-BCD-24-	4633
W4BWL/4	Whistler Youth ARC	812- CD- -	4616
W3AD/3	Lancaster Radio Transmitting Soc	466- AC- -	4598
WA8JBG/8	Clinton County AR Assn	533- AC-15-	4570
WA5RAA/5	Manzano H.S. RC	566- C- 9-	4396
W3UU/3	Harrisburg RA Club	563- C-25-	4378
WA9BWH/9	Notre Dame H.S. RC	576-BCD- 8-	4203
K4DD/4	Platinum Coast AR Soc.	700- C-10-	4200
K1MAK/1	Capeway RC	454-ABC- -	4058
WA9PKM/9	Beloit ARC	542-BCD- -	3991
K3HDO/3	District Heights RC	415-ABC-12-	3959
WAØRQU/Ø	Worthington ARC	479- C-12-	3874
K3JGJ/3	(nonclub group)	565-BCD- 4-	3827
WA6BGS/6	ARC of El Cajon	477- BC-12-	3809
WA3GV1/3	Easton AR Soc	459- AC- 6-	3766
W7VE/7	AR Assn of Bremerton	401- AC- 7-	3752
K6BJ/6	Santa Cruz County ARC	457- C- -	3742
K8PBO/8	Mayhams RC	438-ABC-13-	3713
W7AIA/7	Clark County ARC	342- BC-10-	3702
W3QV/3	Philmont Mobile RC	411- BC-15-	3682
K5PXP/5	Arkansas Valley ARC	447- BC- 8-	3521
W5HPI/5	Terry County ARC	416- C-16-	3496
VE4JK/4	S.W. Manitoba AC	410- BC-12-	3469
K2OPI/2	West Jersey RC	338- BC-15-	3424
K1UMP/1	Whitman ARC	288- B-10-	3392
W8VTD/8	Warren AR Assn	382-ACD-15-	3280
KØJOQ/Ø	Crete ARC	301-BCD- 6-	3250
WA7KGQ/7	Eagle Rock RC	396- BC- 6-	3191
W4MOE/4	Buncombe County ARC	364- C-10-	3184
WB6GYK/6	Estero ARC	344- BC-13-	3070
WB4ENE/4	Sideband Soul Brothers of Hiram Percy Maxim	373- C- 8-	3038
W1BCG/1	Shoreline ARC	290-BCD- 8-	3035
W7EK/7	Cascade RC	336- C-20-	3016
K4EO/4	Yadkin Valley ARC	334- C- 9-	3004
W5ND/5	Orange ARC	357- BC-11-	2966
W3VV/3	McKean County ARC	327- C-12-	2962
K2YNT/2	Metuchen YMCA RC	483- BC-20-	2955
KØHFX/Ø	(nonclub group)	564- CD- 8-	2831
K9RHH/9	Falls RAC	406-ABD-15-	2818
WØWLO/Ø	S.W. Nebraska Gang	276- BC- 6-	2689
WA8TMS/8	Tri-County AR Assn	271- AC-19-	2644
W9EJH/9	Madison County RC	206- BC-25-	2556
WB2BDJ/2	Brookhaven National Lab ARC	273- BC- 6-	2519
WA1HOB/1	Boston Center AR Assn.	256- C- -	2456
W6ZGC/6	Barstow ARC	249- AC- 5-	2330
W3SYP/3	(nonclub group)	251- C- 8-	2306
K9HDH/9	Elkhart Red Cross ARC	206- BC- 7-	2257
WA8VFA/8	(nonclub group)	181-ABC- 4-	2163
KØLIR/Ø	St. Louis ARC	314-BCD- 8-	2135
WB2GVU/2	Sparta J.H.S. ARC	200- AC- -	2090
W4AP/4	Montgomery ARC	331- C-10-	1986
K5INH/5	Temple ARC	264- C-12-	1784
WØPMW/Ø	Boothill ARC	164- C- 9-	1784
WØPZT/Ø	Mobile AR Corps of Hennepin County	289- BD- -	1685
WA9NYW/9	Jay AR Soc	108-BCD-11-	1531
K7UFT/7	Washington H.S. RC	63- BC- 7-	1292
W3KGN/3	Adams County AR Soc.	351-ACD-10-	881
W5BYR/5	Greene County ARC	283- BC- 8-	798
WA4TBN/4	Gulfstream Soc of AR Operators	242- BC- 8-	492

Five Transmitters Operated Simultaneously

W4SKH/4	Oak Ridge Radio Operators Club	2202- BC-29-17,342
W2JCI/2	Bergen AR Assn	1747-ABC-15-17,266
K3HKK/3	Nittany ARC	1672- BC-25-13,479
W6MRO/6	Newport AR Soc	1930- BC-18-13,281
K2AE/2	Schenectady AR Assn	1987- C-52-13,122
W6ZF/6	Orange County ARC	1789-ABC-30-13,041
K6LGR/6	Baldwin Park Civil Defense	1765-ABC-41-12,588
W1FW/1	Merrimack Valley ARC	2189-BCD-21-11,973
WA3GCO/3	R.F. Hill ARC	1246-ABC-23-11,934
WB6SST/6	West Valley ARC	1620-ABC-16-11,685
W1HIL/1	1200 RC	1635- BC-17-11,655
K1MIJ/1	Eastern Conn. AR Assn.	1617- AC-17-11,262
W6TJ/6	Riverside County AR Assn	1435- BC-15-10,365
W3BTN/3	North Penn ARC	1292- BC-21- 9497
K3BKG/3	So. Chester County ARC	1302-ABC-40- 9171

W4CA/4	Roanoke Valley ARC	1326-	C-22-	9156
K2UBA/2	Ft. Monmouth RC	1158-	BC-13-	8901
W8IXL/8	Mud Lake Michigan Monster Hunting Coho Fishing UFO Sighting Field Day Soc.	1256-	BC-31-	8826
W2PE/2	AR Assn. of Tonawandas and Radio Assn. of Western N. Y.	1207-	BC-38-	8559
W2GLQ/2	Nutley AR Soc.	1100-BCD-22-		8267
W2CGJ/2	Ridgewood RC	1110-	BC- -	8221
W7GV/7	Old Pueblo RC	1123-	AC-25-	8210
W6PW/6	San Francisco RC	1094-	AC-11-	8130
KH6WO/KH6	Honolulu ARC	1112-	CD-36-	7694
WAØJBX/Ø	Western Electric ARC	1062-	C-18-	7372
W8ID/8	Seneca RC	993-	AC-17-	7282
VE3DC/3	Hamilton ARC	953-	BC-15-	7203
K9AVE/9	Illinois Valley Radio Assn.	958-	BC- 8-	6984
W5DPA/5	Houston ARC	984-	C-24-	6904
W7PUL/7	Spokane Dial Twisters	1044-2CD-20-		6669
W4AVW/4	Forsyth ARC	828-	BC-21-	6342
W3CSL/3	Monessen ARC	850-	C-16-	6300
W7FEL/7	Clallam County ARC	755-	BC-20-	6230
K6AGF/6	Tri-County AR Assn.	618-	AC- 8-	6026
W4BFM/4	Decatur ARC	714-	AC-25-	5844
W7EKB/7	Hellgate RC	800-	C- 8-	5800
K5SLD/5	Arlington RC	787-	CD-17-	5796
WA3KOQ/3	Springbrook H.S. ARC	523-ABC-15-		5728
WAØTIR/Ø	Storm Lake ARC	737-	BC-30-	5625
W3UGA/3	Aero ARC	659-	BC-15-	5428
W6MLK/6	Hi-Freq Amateur Mobile Soc.	528-ABC-16-		5310
W5US/5	Red River ARC	608-	BC- -	4987
W3HZW/3	Kent County RC	450-ABC-20-		4768
W1BRE/1	Quinebaug Valley RC	553-ABCD-	-	4482
W1RFF/1	Avon AREC	468-ABC-	5-	4251
WA8MTX/2	Monroe County Radio Communications Assn	494-	BC-12-	4246
W9AZ/9	Kankakee Area Radio Soc.	437-ABC-27-		4214
WA9JYL/9	Greenwood ARC	414-	AC- 7-	4098
W2DQ/2	Suffolk County RC	452-	BC- -	4086
WB6HUM/6	Lodi ARC	464-	AC-10-	4078
VO2AI/VO2	ARC of Western Labrador	502-	BC-12-	4060
W8NJH/8	Stu Rockafellow AR Soc.	388-	BC- 7-	3990
W8VFV/8	Cuyahoga Falls RC	475-ABCD-15-		3879
WB6UHI/6	Communicators	410-	BC- 9-	3873
W6SD/6	San Fernando Valley RC	500-ABCD-	6-	3858
W9GYN/9	Elk Grove ARC	441-	BC- 8-	3805
W4JNB/4	Muscle Shoals ARC	403-	AC-20-	3714
W9NUE/9	Suburban Field Day Assn	436-	BC- 7-	3706
K5AXA/5	San Angelo ARC	441-	AC- 8-	3658
K6FB/6	Hewlett-Packard ARC	400-	C- 9-	3600
W5NIR/5	N.W. Arkansas ARC	375-BCD-11-		3450
W8UMD/8	Treaty City AR Assn.	484-	BC- -	3039
WB8SWK/6	Westinghouse ARC	426-BCD-12-		3016
WA8BSF/8	Opequon Radio Soc.	254-	C-13-	2724
W9ZWT/9	DeWitt County ARC	211-	BC- 8-	2490
KL7AA/KL7	Anchorage ARC	321-ACD-21-		2374
K8LUC/8	Evendale AR Soc.	147-	AC-11-	2124
WA3GYE/3	Whitehall RC	167-	BC- 5-	2113
K4CPO/4	Nashville ARC	113-	AC- 9-	1726

Six Transmitters Operated Simultaneously

W8ICS/8	Indian Hills RC	2116-	C-35-14,296	
W3SK/3	Penn Wireless Assn.	1835-	BC-15-13,479	
K6SYL/6	Anaheim AR Assn.	1800-	AC-35-13,406	
W6VB/6	TRW Systems ARC	1569-BCD-30-11,783		
W1KWX/1	Valley ARC	1605-	C-40-11,039	
K6LL/6	North Bay AR Assn.	1469-ABC-30-10,895		
W8ACW/8	Genesee County RC	1594-ABCD-50-10,349		
WA4BAW/4	(nonclub group)	1117-	BC-12-10,035	
W6BWK/6	Delta ARC	895-	BC- 8-	9253
W4BBB/4	RAC of Knoxville	1141-	BC-15-	8399
K4BFT/4	Huntsville ARC	943-	BC-19-	7940
W3EXW/3	Etna RC	1176-BCD-18-		7788
K9GXU/9	St. Clair ARC	896-ABC-35-		7619
K6IS/6	North Hills RC	841-ABC-14-		7165
K2PCQ/2	Northern Chautauqua ARC	818-	BC- -	6780
W7BB/7	Lake Washington ARC	1004-BCD-10-		6515
W1AQE/1	Chelmsford AR Assn.	943-	BC-10-	6351
WB4FYP/4	Limestone ARC	808-	AC-15-	6298
W8NCM/8	Springfield RC	776-	BC-24-	6186
K4TXK/4	Middle Tennessee AR Soc.	750-ABC-15-		6149
W6DCC/6	Corona Gang	626-	BC-10-	6010
W6CUS/6	East Bay RC	759-	BC- -	5937
VE3BA/3	Brantford ARC	666-	AC-18-	5894
W1HPM/1	Manchester RC	487-ABC-15-		5783
W3CTC/3	Delaware Valley ARC	891-ABCD-14-		5657
W8SW8/5	Chetimachi ARC	690-	BC-15-	5403
WB2GPR/2	(nonclub group)	653-	BC- 7-	5310
WA1BGM/1	Townsend AR Soc.	534-	BC- 8-	5306
W1ACT/1	Fall River ARC	575-	BC- -	5072
W1MIY/1	No. Connecticut ARC	532-ABC-	6-	4862
K6GIP/6	Monterey Park ARC	527-ABCD-15-		4778
W2RCX/2	Genesee RA	586-BCD-21-		4716
W8KGG/8	Huron Valley AR Assn.	388-ABC-13-		4365
K4HTA/4	Vienna Wireless Soc.	459-	AC-19-	4316
W9CEQ/9	Fox River Radio League	426-ABC-10-		4248
WAØNDB/Ø	Empire RC	436-ABC-	9-	4046
WØKQU/Ø	Central Kansas ARC	318-ABC-10-		4038
W8GET/8	Lorain County AR Assn	430-BCD-	-	3716
W3ZIC/3	Ft. Venango Mike and Key Club	298-ABC-15-		3524
K3WEB/3	Cumberland ARC	300-ABC-	8-	3503
WA8UPU/8	Hazel Park ARC	294-ABC-11-		3429

Seven Transmitters Operated Simultaneously

K2AA/2	South Jersey Radio Assn	2515-	BC-40-17,524	
K6QEZ/6	Ampex Employees ARC	2085-	AC-28-14,554	
W2OYH/2	Morris RC	1468-	BC-25-13,737	

WØKJR/3

WA6GFY/6	Lockheed ARC	1373-	BC-15-12,912	
VE3NAR/3	Nortown ARC	1802-	BC-40-12,637	
W9PCS/9	York RC	1521-BCD-23-11,227		
W8JUU/8	Van Buren County ARC	1239-ABC-28-		9580
W3CWC/3	Antietam Radio Assn.	1143-	BC-22-	8503
VE3MRC/3	Metro ARC	1142-	BC-24-	8351
VE6NQ/6	Calgary ARC	983-	BC-34-	7450
K3CSG/3	Abington ARC	823-	BC-18-	7195
W2RAK/2	Flatbush RC	809-ABC-35-		6827
W8PO/8	Intercity RC	773-	AC-17-	6702
W9DUA/9	Sangamon Valley RC	824-ABC-23-		6667
W9OUI/9	Denver RC	801-ABC-18-		6571
W9JZ/9	Four Lakes ARC	851-BCD-19-		5967
WA9SIP/9	Wood Dale ARC	519-ABCD-12-		5101
K4YTZ/4	Rock Hill ARC	533-	AC- 8-	4804
W1BIM/1	Central Mass. AR Assn.	482-	BC- 8-	4556
W9FJP/9	RA Downstate Illinois Organization	258-	B- 7-	2722

Eight Transmitters Operated Simultaneously

W6ULI/6	Fullerton RC	2242-ABC-25-17,462		
VE3JJ/3	West Side RC	1752-ABC-37-13,585		
W9SW/9	Chicago Suburban Radio Assn.	1950-BCD-60-13,155		
W9FLP/9	West Allis RAC	1442-	C-18-10,452	
K6EAG/6	Hayward RC	963-ABC-22-		9237
K8BYI/8	S.E. Michigan AR Assn.	807-ABC-27-		8545
K4DFZ/4	Gainesville AR Soc.	1142-	BC-14-	8509
W1NEM/1	Hartford County AR Assn.	1102-	AC-22-	8434
W8HHF/8	Toledo Mobile Radio Assn.	941-ABC-22-		7911
W4HFH/4	Alexandria RC	935-ABCD-20-		7209

Nine Transmitters Operated Simultaneously

W6CX/6	Mt. Diablo ARC	1321-	BC-25-11,357	
K9ROM/9	Twin City ARC	1508-ACD-25-10,305		
W6BXN/6	Turlock ARC	981-BCD-25-		8514
W6LFJ/6	Sonoma County RA	1008-	BC-21-	8360
W3EIA/3	Lebanon Valley Soc of RA	663-BCD-24-		5288

Ten Transmitters Operated Simultaneously

VE3VM/3	Niagara Peninsula ARC	2219-	AC-21-15,922	
W1QV/1	Tri-City ARC	1328-ABC-15-10,296		
W5ANR/5	Ft. Smith Area ARC	1306-	C-16-10,236	
WB2FFL/2	Taconic ARC	953-ACD-16-		7503
K2VSU/2	Mt. Vernon H.S. RC	476-ABC-16-		5635

Eleven Transmitters Operated Simultaneously

K6BAG/6	Pacifico RC	4990-ABCD-24-39,973		
W2LI/2	Tri County Radio Assn.	2736-	AB-42-29,067	
W7DK/7	RC of Tacoma	2450-	BC-34-19,304	
VE3WE/3	Scarborough ARC	1776-ABC-50-18,865		
W3RCN/3	Rock Creek AR Assn.	2297-	BC-61-16,698	

Twelve Transmitters Operated Simultaneously

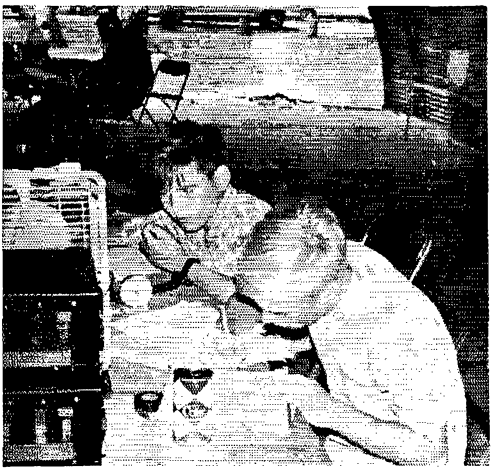
W6RO/6	Associated RA of Long Beach	2792-ABC-40-20,922		
W1NY/1	Hampden County Radio Assn.	963-ABCD-26-		8893

Fifteen Transmitters Operated Simultaneously

W2RJ/2	Englewood AR Assn.	2710-	AB-65-28,333	

W2DLT/2

W5ABD/5



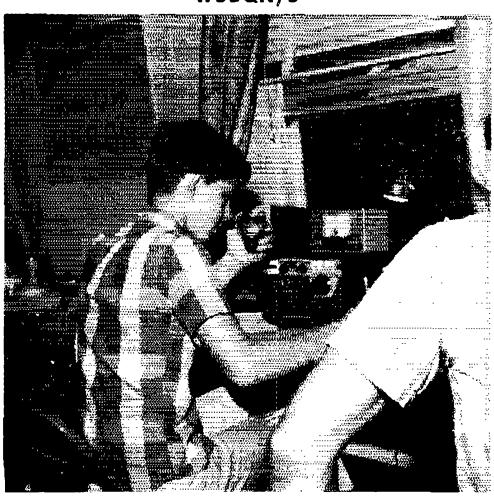
CLASS B

Grouped in this listing are the scores of portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is given below that of the amateur whose call was used. Figures following the calls indicate number of contacts, power and final score.

VE3FOY/3	354- B-3586	WA9HZL/9	276-B-2684
VE3FOA		WA9HCZ	
K5LXY/5	564- C-3584	K9IHG/9	412- C-2672
K5BWU		K9WGN	
K6COD/6	366- C-3494	WA2YSQ/2	402- C-2612
WA6ALL		WB2HLM	
KØMSP/Ø	513- C-3488	W6PFE/6	259-BC-2602
WAØUKD		WA6HUQ	
KØEKR/Ø	363- B-3467	WA8HON/8 (2 oprs.)	398- C-2588
KØMGG		K9ZKN/9	388- C-2528
K6JRV/6	178- A-3404	WA4RPI/4 (2 oprs.)	381- C-2486
W4NBJ/3 (W3YVQ, WØHXB)	354-AB-3398	W4RUS/4	268-BC-2459
WA5NWB/5	413-BC-3230	K2BYF	
WA5JWU		KØQWM/Ø	165-AB-2437
WA6EUZ/6	206-AB-3211	WAØNLK	
WB6YGX		WØKJR/3	247- B-2423
WØRGS/Ø	461- C-2966	W3DUP/3	366- C-2396
KØQCQ		WA3HCO	
K9ORP/9	303-AB- 2960	WA9TFB/9	325- C-2350
K9QGL		WA9TDM	
K3KHG/3	220- B-2916	WA8UDS/8	319- C-2314
WA4USI		WA8RCN	
K8NGQ/8 (2 oprs.)	279- C-2911	WA3GGV/3	335- C-2210
WA9QFT/9	277- B-2893	WA3GEP	
WA9RFB		WA9ETL/9	297-AC-2194
VE2AQV/W6	294-BC-2731	WA9PVV	
WB6UKR		VE3BNA/3 (2 oprs.)	215- B-2135
W5DO/5	261-AB-2690		

WN4HXE/4

W5BQN/5



K7VDR/7

W4YE/5 206- B-2054
W6VOD/6 293- C-1958
W6YGC
WA9SLM/9 255- C-1930
WA9UZU
W8LXE/8 187- B-1883
W8SQI
W8AZA/8 184- B-1856
WA8ADJ
WA9SNQ/9 271- C-1826
WA9LYR
WA3HEO/3 155- B-1795
WA3UEP
WB2ZJZ/2 (WB2s VVS VVF) 519-ABC-1702
K3SPX/3 164- B-1676
WA3APH
WA0RKR/0 241- C-1646
WA0RKQ
K9HVW/4 105- B-1618
WA1FJU/1 202- C-1612
WA1FGN
K1ALL/7 155- B-1595
WØBML/0 230- C-1580
WA0NVZ
WB6HPJ/6 216-BC-1503
WB6WRF
W9UGG/9 215- C-1490
WA9MGY
K9VSD/4 143- B-1487
WB6UTA/6 214- C-1484
WB6UWR
WB4DJO/4 328- D-1384
WA5NHI/5 191- C-1346
WA5MAC
WA9NVY/9 220- C-1320
WA9RUD
W3EAN/3 184- C-1304
W3EBY
WA6BAN/7 78- B-1253
WN6YNP
W9ADZ/9 (2 oprs.) 190- C-1140
WØFIL/Ø 119-AC-1130
WA2AFG/2 148- C-1088
K2VKZ
K8OVP/8 61- B-1024
W8QDIL
WA0AIY/7 99- C- 994
WA0OOU/9 281- C- 962
WA0ODW
WB6VYX/6 120-BC- 947
WA1GYZ/1 40- A- 920
K1ZSZ
W1GYQ/7 117- C- 902
W7DFO/7 84-AC- 860
WA7JRY
WA0FLL/0 99- C- 794
WA8LJS/8 80- B- 720
K4HAV/4 701- D- 701
WA5TNB/5 667- D- 667
WA8VBY/8 149- B- 647
WA8VRB
K2PKK/2 24- A- 632
K2PKL
WB6VYU/6 286-AC- 620
WN0SEF/0 32- C- 592
WN0TVQ
W2PXL/2 21- A- 578
WA5OOH/5 71- C- 555
K5RNJ
WA9UDW/9 14- B- 526
WA9VIV

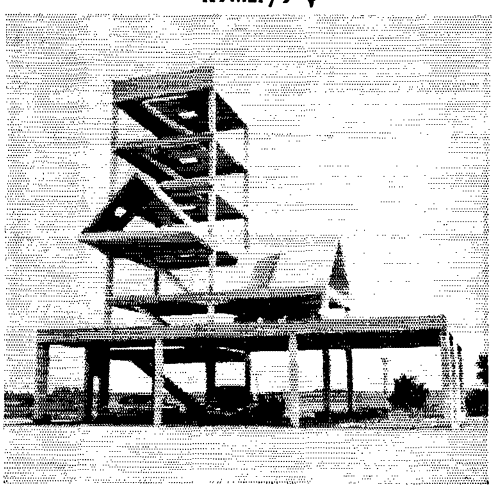
K9PYR/5 42- C- 452
WB6RXR/6 144- B- 432
WB6ZNY
WA3IOB/3 15- B- 403
WA0RUF/0 193- C- 386
KØZBW
W1HDQ/4 8- A- 344
W0UER/Ø 8- A- 344
WA3IUV/2 110-BC- 318
WA2COU/2 157- C- 314
W2FUL/2 6- A- 308
W3FHR/3 276- D- 276
WA2CHJ/2 8- B- 272
WN2EBU
WB2ZUB/2 125- C- 250
WB2ZQE
WN4HXE/4 3- B- 241
WA0SND/0 10- D- 230
W1BB/1 3- B- 227
K3LSX/7 89- C- 178
W1EAW/1 77- C- 154
W1JB
WN8ANV/8 69-BC- 154
WN8ANW

CLASS C

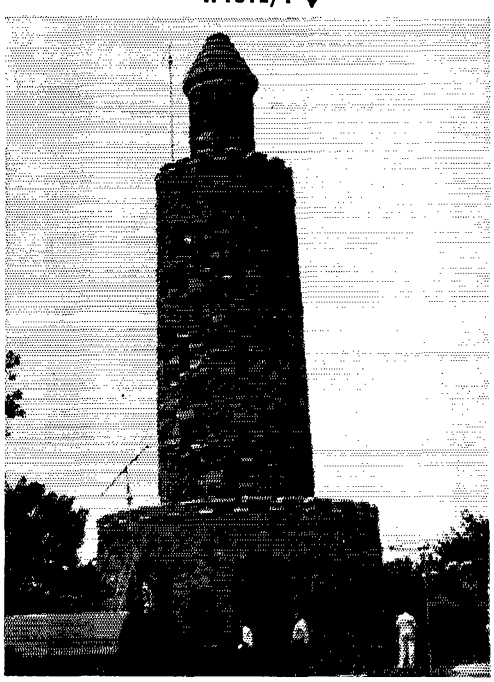
W3ATR/3 (13 oprs., 2 xmtrs.) 770-AB-7956
K3IVO (11 oprs., 7 xmtrs.) 437-ABC-4052
W6OT (10 oprs., 5 xmtrs.) 402-BC-3430
W5HBM (41 oprs., 3 xmtrs.) 347- C-2882
WA0JUS (2 oprs.) 318-BC-2621
WA9MVP/9 (15 oprs., 2 xmtrs.) 351- C-2506
VE2RM (5 oprs., 2 xmtrs.) 320- C-2390
K2IOJ (K2IOJ, W2NCI) 355- C-2330
K6NCG (8 oprs., 5 xmtrs.) 771-BC-2270
WA9RGW (4 oprs., 2 xmtrs.) 217-BC-1942
WA8BBB (6 oprs., 2 xmtrs.) 194- C-1564
K9HDZ (2 oprs., 2 xmtrs.) 660- C-1540
K5WPH (6 oprs., 2 xmtrs.) 219- C-1314
WB6TEE (WB6s TEE TLQ) 522-BC-1268
W8AN 170- C-1220
WA0PRR 509- C-1018
K7IDX 125-AC- 968
K6BEP 536-CD- 930
WA2CAL 172- B- 916
WB6TZQ 313-BC- 916
K6DDD (2 oprs.) 293- B- 879
W2PA 29- B- 861
K5VVN (3 oprs., 2 xmtrs.) 39-BC- 855
WA8ZDT (2 oprs.) 94- C- 764
K5QHD/5 (16 oprs., 3 xmtrs.) 274- C- 748

WA1JTG/1

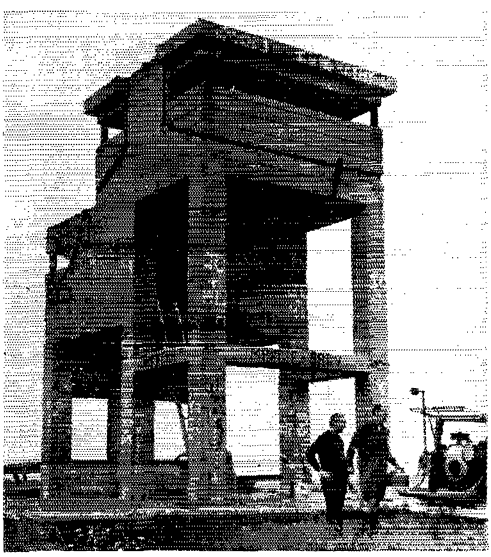
K9MLF/9 ↓



W1SYE/1 ↓



W1AEC/1



W4KVK/4

K8SJU/8

WAØQYC/Ø

K2YCJ/2

WA2GCX (W2PDS, WA2GCX, 2 xmtrs.)	712-	CD-	744
VE3BMR	200-	B-	600
KH6GJT	373-	CD-	551
WA4KQO	263-	C-	526
WB6WWJ	53-	C-	518
W2LEJ	258-	C-	516
WA4ZUI	152-	B-	456
W8RCC (12 oprs.)	244-	D-	454
W6PIY (8 oprs., 3 xmtrs.)	187-	BC-	397
WB2AJU (2 oprs., 2 xmtrs.)	88-	C-	376
WB4AEG	184-	C-	368
WA5NQE	89-	C-	326
W1OKA	159-	C-	318
W3GN	315-	D-	315
WA7FXD/Ø	155-	C-	310
WA3GQJ	154-	C-	308
W1IXL	153-	C-	306
WØJUV	271-	D-	271
W8KMF (K3TVF, W8KMF)	131-	C-	262
WB2WVY	129-	C-	258
K3KUE (2 oprs.)	248-	D-	248
WB4IOJ	124-	C-	248
WA2DEI	83-	BC-	234
W7GYF	108-	C-	216
WB4ENX	214-	CD-	215
W1WMH	105-	C-	210
WN4JFT	2-	B-	206
WA3ICN	79-	BC-	202
WB4DJT (WB4s DJQ DJT)	100-	C-	200
WA1HXH	192-	CD-	197
WA2EDN	31-	C-	186
WAØRAG	93-	C-	186
WA7IOK	89-	C-	178
K9CQV	89-	C-	178
W6BHZ/6 (WA4LYK, opr.)	85-	C-	170
WA1JCX	82-	C-	164
WA5DTK	111-	CD-	153
WB2ZTZ	68-	C-	136
WA3KOI	68-	C-	136
W1MRW	40-	B-	120
K7WQO	39-	B-	117
WB4FNF	58-	C-	116
K9UQN	56-	C-	112
VE1AE	56-	C-	112
K5RSH	54-	C-	108
WB2UCR	52-	C-	104
WN4HRA	52-	C-	104
WA5SXR	104-	D-	104
W2CKQ	51-	C-	102
W5RO	50-	C-	100
W6GBB	49-	C-	98
K9KKX	49-	C-	96
W9JJT	98-	D-	98
WB6RYQ/6	48-	C-	98
W6FAW	5-	A-	90
WAØEIA	45-	C-	90
WA1HVL	44-	C-	88
W6OYJ	32-	C-	84
W1AW (WA1CYT, opr.)	70-	D-	80
W4KFC	80-	D-	80
W6OJW	80-	D-	80
K9DNW	20-	A-	80
WB2NSV	25-	B-	75
WA5MBC	38-	C-	76
W2MEO	25-	B-	75
K3ZNP	75-	D-	75
WA6FAC	25-	B-	75
W4LEJ	37-	C-	74
WA8YBV	37-	C-	74
WA1IPT	36-	C-	72
WN6ZSU	23-	B-	69
W2MTA	33-	C-	66
WN3JBN	22-	B-	66
WA2CKU	32-	C-	64
WB2VIA	32-	C-	64
WN8ZBA	21-	B-	63
WNØWLF	31-	BC-	63
K6LKG	31-	C-	62
WB4GGA	29-	C-	58
W2NIIH	19-	B-	57
W7IY	28-	C-	56
WAØMBL	28-	C-	56
K7KHA	54-	D-	54
WN4IUA	16-	B-	48
W5EGW	24-	C-	48
VE3DZB	22-	C-	44
WN8ATX	22-	C-	44
WA3EWY	20-	C-	40
WN8ZME	13-	B-	39
WB6YGG	38-	D-	38
WA6CPY	37-	D-	37
WA7EYN	18-	C-	36
WN8YHN	12-	B-	36
VE3FHQ	16-	C-	32
W2UAL	29-	D-	29
WB4FOT	14-	C-	28
WN2FCZ	9-	B-	27
W5TFW	12-	C-	24
WN8ZAV	8-	B-	24
WNØTSV	8-	B-	24
WB2PGR	5-	A-	20
WB2CHO	6-	B-	18
WA3JDT	3-	A-	12
WB2BCI	5-	C-	10
W6AM	10-	D-	10
WNØTAS	2-	C-	4
WH6GMB	1-	B-	3
W1FK	2-	D-	2

CLASS D

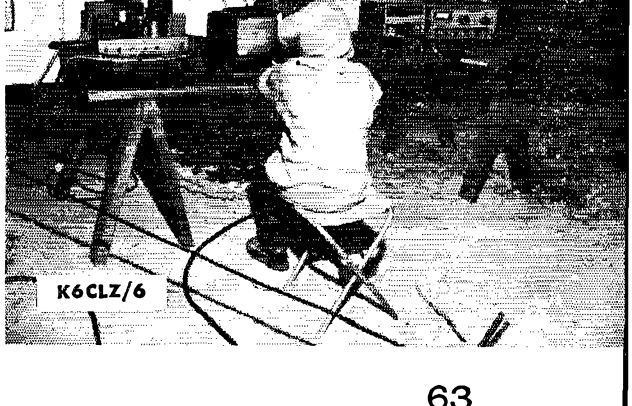
WB6SHO/6	305-	ABC-	4426
W4OZF/4 (W4OZF, WB4EJE)	423-	C-	4007
W2QNR/2	255-	B-	3642
W9RHV/9 (2 oprs.)	340-	C-	3260
W1BKI/4 (W1BKI, W4RIG)	215-	ABC-	3251
WA2FSD/2	213-	B-	3076
WA2BVU/2	211-	B-	3049
K6ZJY 6	206-	B-	2981
K3STB/3 (K3s STB UXM)	287-	C-	2783
WB2FNT/2	178-	B-	2603
W6FQF/6	169-	B-	2482
W6TEE/6	140-	AB-	2454
W6NAA/6	146-	B-	2371
W8EEE/8 (3 oprs., 2 xmtrs.)	144-	AB-	1795
K2DTQ/2	114-	B-	1739
WB2JJW/2	114-	B-	1739
K6HJJ/6	170-	C-	1730
K5LQL/2	166-	C-	1694
W2PQZ/2	106-	B-	1550
K6GIQ/6	100-	AC-	1490
WA6OHP/6	131-	C-	1379
W6KDJ/6	104-	AC-	1208
WA6QGF/6	104-	C-	1206
WA6WMF/6	73-	B-	1186
VO1DZ/VO1	107-	C-	1163
WA0KBZ/0	97-	C-	1073
W2FWV/2	62-	B-	1037
WB6IAW/6	92-	C-	1028
K6YBV/6	86-	C-	974
W6QHP/7	82-	AC-	947
W3AOH/3 (5 oprs.)	55-	B-	943
K6TMW/6	81-	BC-	938
W2LFX/2	53-	B-	916
WA8MFF/8	74-	B-	866
K2DGI/2	19-	B-	862
WA3HGV/3	70-	C-	830
WA9CIO/9	65-	C-	785
WA2ZBV/2	38-	AB-	781
W1TKG/1	42-	B-	767
K5STG/5 (WA5GZI, opr.)	62-	C-	758
K6SBL/6	29-	A-	722
K6SEA/6	29-	A-	722
WA6IVL/6	52-	C-	668
W9AVF/9	34-	B-	659
K6GUS/6	33-	AC-	644
W2NIB/8	47-	C-	623
K3PER/3	47-	C-	623
K6DLY/7	46-	C-	614
WB6AQM/6	11-	A-	598
WA6TQJ/6	22-	A-	596
WB6OXD/6	19-	A-	542
WB6EAG/6	36-	C-	524
W8CHT/8	8-	B-	508
WB6SAT/6	17-	A-	506
W9ACU/9	34-	C-	506
W6FRE/6	22-	B-	497
K1QPN/1	30-	C-	470
K9HPW/9	19-	B-	457
W9BZU/9	25-	BC-	434
W2WSP/2	15-	B-	403
WB2TWY/2	15-	B-	403
W6EFM/6	22-	C-	398
WA6HGH/6	21-	C-	389
W7IY/7	13-	B-	376
W6LVI/6	19-	C-	371
WA9BVL/9	19-	C-	371
WA2GBS/2	12-	B-	362
WA8WNK/5	17-	C-	353
VE6AVQ/5	18-	CD-	344
WA9IPM/9	16-	B-	344
WA9KQD/9	8-	A-	344
WA6THT/6	15-	C-	335
WB6WPH/6	27-	D-	322
WA9CHY/9	10-	AC-	299
K6UMV/6	7-	B-	295
WA9SPA/9	7-	B-	295
W9WJL/9	9-	C-	281
W9BYD/9	4-	A-	272
WA9CFK/9	5-	AC-	263
K1QQX/1	4-	B-	254
WB2PIX/2	2-	AB-	232
WA6RUQ/6	1-	C-	209
WB6KZN/6	1-	C-	209
K9QKA/9	58-	BC-	118
K9MQA	16-	B-	48
WN4HOI/4	11-	A-	44
WA2JKT/2	13-	C-	26
WN2EPV/2 (2 oprs.)			

Two Transmitters Operated Simultaneously

K6CCM/6	438-	B-	4742
K6DQA			
K7NSL/7	503-	C-	3818
WA6MDL			
W4BRB/4	522-	C-	3732
W4EPO			
WAØNBZ/Ø	495-	BC-	3663
WAØKXD			
WA1GYS/4	499-	C-	3603
WA9OHV			
WA1GWS/1	471-	C-	3226
WA2BMF			
WA9TON/9	407-	C-	3042
WAØMPT			
W2DSC/3 (WB2s DZZ TUL)	395-	ABC-	2842
W9SOM/9	323-	C-	2538
K9PPZ			
WA8ZEL/2	214-	AB-	2326
WB2ULS			
K3VMG/3	309-	C-	2254
K3QKP			
K5EPH/5	288-	C-	2128
WA5PJY			
W9GTC/1	201-	BC-	2041
K1SCO			
K8ABS/8	137-	C-	1743
K8JCB			
WAØNFN/Ø	187-	C-	1722
WØFBY			
WN6ZFP/6	127-	B-	1543
WN6WYR			
KØQKW/Ø	1345-	D-	1345
KØCVA			
W8CAR/8	151-	AC-	1318
WB8AAH			
WAØLJE/Ø	107-	CD-	1206
WAØPEC			
WA1HSU/1	108-	BC-	1090
WN1IQJ			
WA5NSA/5	283-	C-	766
WA5DXI			
KØAGF/Ø (2 oprs.)	37-	BC-	637
K3ZOM/4	117-	A-	632
K3ZYB			
WA1DOB/1	61-	B-	549
WA1DSZ			
W8QIH/8 (WA8s UAV UOE)	84-	BC-	418
WB6VKK/6	143-	C-	286
WB6WJO			

Check logs: W1BNB, W2MMD/2, K2OJP, W4s JUK, RAE UQ, W5CWE, WB6ZKM, W8KEB/8, K8QKT, WA8TYF, VE1DB, EL9C.

QST



K6CLZ/6

Happenings of the Month

Director Elections

ARRL Asks FCC Keep 6 M Open

New Chance For Novice

U.S. President Lauds Amateurs

Modulation Policy

ELECTION RESULTS . . .

In the current elections, two nominees were declared elected as directors and two as vice directors because they were the only eligible candidates for the office.

Robert York Chapman, W1QV, will start his third term (on January 1, 1969) as director from the New England Division. A second term as director from the Roanoke Division goes to **Victor C. Clark, W4KFC.**

In the Hudson Division, **Stan Zak, K2SJO,** has a third term as vice director. **L. Phil Wicker, W4ACY** vice director from the Roanoke Division since 1967, also was reelected without opposition.

. . . AND BALLOTING

The remainder of the offices in the current election were contested. Phil Haller, W9HPG, the current director and Robert C. Erwood, K9AAU, are on Central Division ballots for director. In the Hudson Division, incumbent director Harry J. Dannals, W2TUK, faces James Lawson, W2PV. A three-cornered race in Northwestern pits incumbent Robert B. Thurston, W7PGY against Raleigh A. Munkres, W7HAZ and William R. Watson, W7BQ. Director Carl L. Smith, W9BWJ and Bois R. Council, K0ATZ are on Rocky Mountain Division ballots. In the Southwestern Division, candidates are John R. Griggs, W6KW, the present director, and Ray E. Meyers, W6MLZ. Incumbent Ray K. Bryan, W5IQ, is pitted against Roy L. Albright, W5EYB, in the West Gulf Division race.

For Central Division vice director, the ballot offers Edmond A. Metzger, W9PRN, who is presently serving, and Sidonius M. Pokorny, W9NRP. Vice Director Bigelow Green, W1EAE, and Walter S. Rogers, W1DFS are candidates in the New England Division. In the Northwestern Division the ballot features incumbent R. Rex Roberts, W7CPY, David O. Bennett, W7QLE and Laverne W. Van Dyke, K7CTP. Rocky Mountain candidates are the current vice director, John H. Sampson, Jr., W7OCX and Thomas G. Banks, Jr., W5HJ. The Southwestern Division vice director contest is between Arnold Dahlman, W6UEI and Gary A. Stilwell, W6NJU. Favian M. Adair, W5FKE, Lester L. Harbin, W5BNG and Eric B. Hjerpe, W5FCD are candidates for vice director in the West Gulf Division.

During the second week in October, ballots were mailed to all those who were full members of the above divisions on September 20, 1968. The completed ballots must be received at headquarters by noon of November 20, 1968.

Governor Raymond P. Shafer proclaims amateur radio week in Pennsylvania September 1–7, 1968, coinciding with the ARRL Board's "Founder's Week" observance. Flanking the governor are W3YA, ARRL Atlantic Division Director and W3HK, section communications manager for Eastern Pennsylvania. Looking on, left to right: K3WEU, W3SMF, WA3CTP, WA3CFV, and W3AES, section emergency coordinator for Eastern Pennsylvania.

ARRL ASKS FCC TO KEEP 6 METERS OPEN

The League has filed a petition for reconsideration in RM-1287. The Federal Communications Commission in August denied a petition of K6EDX and K6RNQ which would have set aside restrictions on six meters scheduled to become effective November 22, 1968 and November 22, 1969 (October *QST*, page 86). An earlier request of ARRL to the same end was also denied by FCC.

The League, although a strong supporter of incentive licensing, feels it is currently not applicable to v.h.f. It believes that the FCC action (reserving 50.0–50.1 MHz to Advanced

and Extra starting on the 22nd) will cut Technician Class licensees off from the opportunity of communicating with skilled amateurs in the Morse Code and thereby will hinder their progress to higher grade licenses rather than promote it.

Moreover, the six-meter band is unique in that in some areas a large portion is in reality a guardband, protecting TV viewers from adjacent-channel interference. Amateur activity is, therefore, concentrated at the low edge. Technician, Conditional and General Class licensees will lose 62.5% of the more-usable portion of six meters by the end of 1969 if the language of Section 97.7 remains in effect in respect to the band.

Additional reasons why ARRL feels the six-meter band should be unrestricted appear in the actual petition, reproduced below.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of Amendment of Section 97.7(a) of the Amateur Radio Service rules relating to operation in the 50–50.25 mHz frequency band.	RM-1287

To: The Commission

PETITION FOR RECONSIDERATION

The American Radio Relay League, Incorporated, by its General Counsel, respectfully requests the Commission to reconsider and set aside its Order adopted August 9, 1968, and released on August 13, 1968 (Mimeo 20844), and to issue a notice of proposed rule making inviting comments upon a proposal looking toward amendment of Section 97.7(a) of the Commission's Rules and Regulations to remove certain restrictions for the sub-band 50.0 to 50.25 MegaHertz which become effective on November 22, 1968, and November 22, 1969. In the alternative, the Commission is respectfully requested to issue a simple order suspending the November 22, 1968, effective date pending further study in the light of this pleading.[1]

In support whereof, the following is respectfully submitted:

Introduction

The notice of proposed rule making in the incentive license proposal of Docket No. 15928, released April 1, 1965, invited comments upon proposed major changes in the licensing structure of amateur radio, including proposals to reserve portions of various amateur frequency bands for use only by holders of the higher classes of amateur operator licenses. In comments filed July 15, 1965, the League expressed general concern that further study was needed before reservations be adopted for the amateur bands of 50 MHz and above. In its report and order, released August 29, 1967, 9 FCC 2d 814, 11 RR 2d 1563, the Commission amended Section 97.7(a) to provide, *inter alia*, that the subband of 50.0 to 50.1 MHz would be available

[1] It may be desirable for the Commission to consider this pleading as a petition for partial suspension of Section 97.7(a) or a petition for rule making. This pleading is submitted as a petition for reconsideration only because of the recent action upon a similar proposal in RM-1287.

Cincinnati, too, observed Founder's Week as amateur radio week in the city. Chief of Police W8DZ chats with Mayor Eugene P. Ruehlmann after the proclamation. Amateur radio was actively demonstrated by W8WC, Great Lakes Division director, who brought his equipment to City Hall. WA8COA, K8WVJ and W8HQK also played important roles in marking the occasion.

for use only by holders of Amateur Extra and Advanced Class licenses on and after November 22, 1968, and that the restriction would be expanded to include the subband 50.0 to 50.25 MHz on and after November 22, 1969. Proposed restrictions in amateur bands above the 50 MHz band were not adopted.

The soon to become effective restrictions in the 50 MHz band have been the subject of continuing study by the League. At the annual meeting of the League's Board of Directors in May 1968, the League's earlier position was discussed at length in light of numerous comments by members to their Directors. The discussion reinforced the views expressed in the League's earlier comments to the Commission and led to the unanimous conclusion that the Commission should be requested to hold in abeyance the effective date of the restrictions in the 50 MHz band. Knowing of the pendency of a somewhat similar proposal in RM-1287 and that the minutes of the Board of Directors meeting were available to the Commission, the League has withheld its comments until this time.

The League reaffirms its often asserted position that the principles of incentives are in the long-term interest of amateur radio, and that the practical application of those principles as embodied now in the amateur rules are appropriate implementation as they apply below 30 MHz. However, there are several important reasons why incentives based upon subbands differ between the HF and VHF amateur bands.

Band Occupancy

The League for many years has advocated use of the VHF bands for regularly-scheduled communications over short distances so as to lighten the load on the crowded lower frequencies and increase regular occupancy of the VHF bands. Some progress has been made in this direction, and steady increases in activity in the amateur VHF bands have resulted.

The 50 MHz band, while interesting territory for all classes of amateurs, has been most widely

used by Technician Class licensees. Although some of these amateurs will be encouraged by the subband restrictions to try for higher license status, most are believed to be either incapable of achieving Advanced or Extra Class status, largely because of the code requirements, or are unwilling to attempt it. The end result will be either an abandonment of the 50 MHz band, reversing the current trend toward more effective use of this assignment, or the shift of operations to portions of the band fraught with interference problems.

Television Interference

The 50 MHz band is unique in amateur radio allocations, in that it is the only band immediately adjacent to a television broadcast channel. The broadband nature of television transmission and reception makes difficult the design of television receivers capable of accepting the entire 6 MHz television channel from 54 to 60 MHz (Channel 2) and, at the same time, capable of rejecting amateur signals in the 50 to 54 MHz amateur band. From years of experience and innumerable instances of interference complaints, both to and from television in Channel 2, amateurs using the 50 MHz band have learned to live with this most difficult problem, if not entirely solving it.

The Commission recognizes the problems of adjacent channel interference in other services by carefully controlling adjacent channel assignments and by providing guard bands between services. No such controls or guard bands have been established with respect to the 50 MHz amateur band and television Channel 2, which, because it is the lowest frequency of all of the television channels, is the most widely used and received channel throughout the United States and Canada. The required protection to reception of Channel 2 has been provided voluntarily by the amateurs through a combination of well designed and operated transmitters, installation of filters on the inputs of television receivers, and confining operations to the lower frequencies of the 50 MHz band. Although the highest frequency which may be used without causing interference to the reception of Channel 2 depends upon many variables, including the relative strength of the signals and the characteristics of the television receivers, the most critical factor is the basic design of most television receivers. In recent years, practically every television receiver manufactured has been of the intercarrier type. Because of the separation between the channels of the visual and aural transmissions, amateur signals on 50.75 MHz are the most critical. Many thousands of actual experiences have shown that operations above 50.4 MHz are unwise except under the most ideal conditions. The end effect has been to render virtually useless in many areas almost 90% of the 4 MHz of the band.

The restrictions of Section 97.7(a) will work great hardships upon the holders of Technician Conditional and General Class licenses, particularly after November 21, 1969. On November 22, 1969, they will have lost 250 kHz of the useable 400 kHz of the band, or 62.5%. Of that 250 kHz, 150 kHz now may be used for voice transmissions. Thus, on November 22, 1969, amateurs engaging only or primarily in voice transmissions will lose 50% of the useable voice frequencies. The result most certainly will be greatly increased and severe mutual interference between amateur stations, thereby destroying the unique usefulness of the band.

Another consideration is the propagation characteristics of signals via the F^2 layer of the ionosphere. The band may be "open" for long distance communications only at the low edge, and "closed" at frequencies only 250 kHz higher. This problem will be aggravated by the greatly increased usage of frequencies just above 50.25 MHz, because weak distant skywave signals will be buried under stronger ground wave signals. Thus, some of the basic objectives of the amateur radio service, to study propagation, may not be achieved.

The Dilemma of the Newcomer

The VHF bands are ideal territory for the newcomer to amateur radio. Normally, high power and the most sophisticated equipment are not necessary, and the beginner can start with relative simple low cost equipment and add to it as he progresses. Experimentation and construction of one's own equipment and antennas, of particularly significance in training newcomers, are still widely practical among VHF enthusiasts. The opening of the 50 MHz band to Technicians in 1955, with which the League approved, resulted in a very large influx of newcomers to the band. Their appearance on the 50 MHz scene made use of this band more interesting to all classes of licensee, and occupancy levels have been consistently higher each succeeding year.

The number of new calls heard at any time on the 50 MHz band shows that many amateurs are getting their first taste of intersting voice operation on this band. A good percentage of these amateurs are quite happy with what they have, and see little reason to try to obtain a higher class of license. This has been the main argument for some kind of incentive program for the VHF bands, but the program should be so devised as to give the newcomer as well as those licensed tor more than two years the incentive and opportunity to progress. The Commission's plan, as embodied in Section 97.7(a), makes it harder to upgrade, through experience on the 50 MHz band, than at the present time.

Improving one's skill in use of the code is one of the problems confronting the VHF-oriented new amateur. Admittedly, the code is relatively little used in VHF communication by amateurs, but it could be used more than it now is, with proper band planning and incentives. Instead, the 50 MHz plan, as embodied in Section 97.7(a), will make it much more difficult for the amateur who needs practice in code work to obtain it on that band.

The segment of the band from 50.0 to 50.1 MHz is currently set aside for use of c.w. communication only. The reasons advanced in favor of that assignment are still valid, and the 100 kHz subband is used effectively during periods of unusual propagation. It is also used, to some extent, by operators who either like to communicate in code, or are interested in improving their skill in doing so. To restrict the use of this segment to the two top grades of license will have the practical effect of cutting the Technician or General Class licensee off from the opportunity he now has of communicating with more skilled amateurs in code. The 100 kHz subband has a low enough level of occupancy ordinarily so that it provides an ideal spot for local communication with code. The high level of occupancy of lower frequency bands presents a constant interference problem to beginners, whereas in the 50 MHz band they can have interference-free communication a very high percentage of the time.

Conclusions

The foregoing discussion has not been a repetition of that contained in the petition for rule making,

WHO THE DEVIL IS WHO?

Seventh 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*
W1EO	WA1FCB	W2VR	K2JJR	W4SZ	W4LUW	W7KH	W7GUV
W1GD	K5UJH	W2VY	W2OCL	**W5**BB	W5JLI	W7JG	W7UMJ
W1GR	W1AFZ	W2ZZ	W2LQP	W5BT	W5YXH	W7KI	K7ANY
W1IU	W1EIQ	**W3**CS	W3FLY	W5ED	W5LOK	W7KJ	W7FVI
W1JD	W1LER	W3DS	K3HDR	W5EE	W7GEU	**W8**FI	W8EXP
W2CX	W2NBJ	W3JH	W3CVW	W5ER	W5RVD	W8GK	W8DSP
W2EG	WA2NGP	W3MM	WA3COD	W5GM	W5EGR*	W8GR	W8ISH
W2FM	W2JKY	W3MY	W3BWK	W5IK	K5CWE	**W9**DB	W9PFK
W2HU	K2HFU	W3QU	W3LCC	W5IO	W5BGP	W9DV	W9SFM
W2MQ	W2CES	W3RC	W3LFC	W5IW	W5QGV	W9ED	W9VKN
W2OZ	W2NNK	W3SO	W3DPM	**K6**EB	W6SHZ*	W9EE	W9RZP
W2QU	WB2CNO	W3SP	W3FFN	K6FJ	W6YHB*	W9EK	W7JQU
W2SJ	W2FTX	W3SY	K3RWY	K6FZ	WB6TYO*	W9EL	W9JJC
W2TF	W2ENY	W3TA	W3MER	K6JB	W6FLT	**W0**GR	W6NDH
W2UO	W2MII	**K4**AR	W4UGJ	K6JR	W6TZN	W0HP	W0MPW
W2VE	W2IPJ	W4NK	W4PHJ	W6QB	W6WGC	* Corrections from earlier listings.	
W2VN	W2YEH	W4ST	W4VXC	**W7**AK	W7HKA		

RM-1287, which was denied by the Commission's order released August 13, 1968, although some of the same facts have been cited. The League recognizes that at least some of the points raised in this and earlier pleadings were considered by the Commission when it adopted its Report and Order in Docket No. 15928. Nevertheless, the comments in that proceeding were submitted almost three years ago. It is respectfully submitted that the 50 MHz band is a special and unique case and requires further consideration.

Wherefore, the premises considered, the Commission is respectfully requested to reconsider and set aside its order denying the petition for rule making, RM-1287, to stay the November 22, 1968, effective date of that portion of Section 97.7(a) of its Rules which relates to the 50 MHz amateur band, and issue an appropriate notice of proposed rule making.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
ROBERT M. BOOTH, JR.
Its General Counsel

September 13, 1968

NEW JERSEY LICENSE PLATES

Ed G. Raser, W2ZI, ARRL section communications manager for Southern New Jersey, reports the following procedures for the newly-available call-letter license plates:

Applicant must submit photocopy of his FCC license, of his driver license, and of his automobile registration. Only one set of plates will be issued, and only in the name of the amateur, whose driving and criminal records will be checked. A fee of $10 is charged, but the applicant should not send it until notified to do so. An application should be obtained from the Courtesy Plate Unit, New Jersey Motor Vehicle Department, 427 North Montgomery Street, Trenton, New Jersey.

Incidentally, Ed credits Northern New Jersey SCM W2ZZ and the NNJ clubs for much of the success of the current drive for the plates, after years of failure. New Jersey is the 49th state to grant call letter license plates; the lone hold-out is Kentucky, where the State Constitution forbids special privileges to groups except in direct relationship to services furnished.

ARRL SUPPORTS "RETREAD"

The Executive Committee, in accordance with Minute 44 of the 1968 ARRL Board Meeting, at its meeting September 28 directed the filing of comments with FCC in Docket 18266 supporting eligibility of ex-amateurs for Novice Class licenses after one year out of amateur radio. However, based on further comments of members relayed through directors, the League also asks that present holders of the Technician Class license who have not held the Novice license in twelve months be made eligible, too. (The FCC version would end dual Novice-Technician license-holding; see page 83-84, September *QST*.)

GIGAHERTZ BAND CHANGE OKAY

The League has expressed willingness to go along with a possible rearrangement of frequency allocations above 17.7 GigaHertz. As part of United States preparation for the World Administrative Conference on Space, scheduled for 1970 or 1971 by the International Telecommunications Union, FCC issued a Notice of Inquiry, Docket 18294, in which it asked for discussion of several allocations changes. One would move the amateur band presently at 21-22 GHz. to 23.0-24.25 GHz., shared with radiolocation. Since harmonic relationships are not involved up here, and the present number of amateur experimenters involved in work on the band is limited, ARRL sees no objection to the shift.

This is a working document only, not yet a formal proposal for change, and in any case is still a long way off. Neither the agenda nor the date of the conference has yet been established except in the broadest terms.

Kansas Amateur of the Year for 1968 is Harold R. Fick KØJDD, shown here holding the Raymond E. Baker Memorial Trophy. Presentation was at the Kansas-Nebraska Hamfest in Concordia August 4. It was based on KØJDD's service as president of Boothill Amateur Radio Club, EC work, n.c.s. duties, message deliveries and volunteer-examiner chores.

FCC POLICY ON MODULATION

In response to a letter from a leader of the "Society to Promote Advanced Modulation," the FCC has clarified its policies toward modulation measurements:

"This is in response to your letter concerning 'super' modulation and the Amateur Radio Service Rules concerning modulation.

"There has been a test case, Docket 12877, resulting in the suspension in 1960 of the amateur license of Frederic C. Doughty. It was established that in spite of the use of a 'reduced' carrier level or an enhanced sideband level, the radiation of modulation products at less than 40 db below carrier level, at frequencies more than 4 kc/s from the carrier, constituted spurious radiation outside the normal bandwidth for the type of emission employed (double sideband). The Commission considers this to be a reasonable application of Section 97.73 of the Amateur Radio Service Rules. In addition to prevention of over modulation on negative peaks, limiting the emission band to a normal width requires good design and careful operation when using any of the so-called super modulation systems. Additionally, a power limit must be observed.

"The requirements for reasonable compliance with the general 1 kilowatt plate circuit power input limitation of Section 97.67 are as follows:

1. For single sideband transmitters and for other amplitude modulated transmitters employing a reduced carrier, a suppressed carrier, or controlled carrier modulation, the average input power on modulation peaks, as indicated by a plate current meter having a time constant of not more than 0.25 second, shall not exceed 1 kilowatt nor shall the peak envelope input power exceed 2 kilowatts.
2. For single and double sideband transmitters employing 'full' carrier, the unmodulated carrier input shall not exceed 1 kilowatt, and with modulation, the average carrier power input shall not exceed 1 kilowatt and the peak envelope power input shall not exceed 4 kilowatts.
3. For type A1 and the FM emissions the carrier input power shall not exceed one kilowatt under any condition (keyed, key down, modulated, unmodulated)."

— James E. Barr,
Chief, Safety and Special
Radio Services Bureau
Federal Communications Commission

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 323

September 28, 1968

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Statler-Hilton Inn, Greensboro, N. C., at 10:45 a.m. September 28, 1968. Present: President Robert W. Denniston, WØDX, in the Chair; First Vice President W. M. Groves, W5NW; Directors Charles G. Compton, WØBUO, Harry J. Dannals, W2TUK, Noel B. Eaton, VE3CJ and Carl L. Smith, WØBWJ; and General Manager John Huntoon, W1LVQ. Also present were General Counsel Robert M. Booth, Jr., W3PS, Atlantic Division Director Gilbert L. Crossley, W3YA, and Central Division Vice Director Edmond A. Metzger, W9PRN.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies: Bloomington Amateur Radio Club, Bloomington, Minn.; Calhoun Amateur Radio Club, Battle Creek, Mich.; Coast Guard Amateur Radio Club, Alexandria, Va.; Delaware Valley Amateur Radio Club, Morton, Pa.; Gem State Amateur Radio Club, Boise, Idaho; George W. Hewlett High School Amateur Radio Association, Hewlett, N. Y.; Key City Amateur Radio Club, Abilene, Texas; Knights of the Airwaves Amateur Radio Club (H.S.), Uniondale, New York; Lamar College Engineers Amateur Radio Club, Beaumont, Texas; The Lee De Forest Radio Club of Hemet, Hemet, Calif.; Maple Shade Amateur Radio Club, Maple Shade, N. J.; Mike and Key Radio Amateur Club, Camarillo, Calif.; The New Providence Amateur Radio Club, New Providence, N. J.; New York University Amateur Radio Society, Bronx, New York; Niskayuna High School Amateur Radio Club, Schenectady, N. Y.; Northrop Institute of Technology Radio Club, Inglewood, Calif.; The Ottawa Amateur Radio Club, Ottawa, Ohio; Penn State Amateur Radio Club, University Park, Pa.; Radio Section, Murray School Science Club (H.S.), China Lake, Calif.; Ruskin High School Amateur Radio Club, Kansas City, Mo.; Sacramento Army Depot Radio Club, Sacramento, Calif.; Santa Fe Trail VHF Club, Inc., Gardner, Kansas; Simsbury High School Radio Club, Simsbury, Conn.; The South Shore Radio Club, East Cleveland, Ohio; Utelei High School Amateur Radio Club, Pago Pago, American Samoa; Vero Beach Amateur Radio Club, Inc., Vero Beach, Fla.; Virginia Tech Amateur Radio Association, Blacksburg, Va.; West Virginia University Amateur Radio Club, Morgantown, W. Va.

On motion of Mr. Dannals, approval was unanimously GRANTED for the holding of a Southeastern Division Convention in Miami, Fla., January 18–19, 1969; a Michigan State Convention in Grand Rapids on May 9–10, 1969; and a West Gulf Division Convention in Amarillo, Texas, on August 17–18, 1969.

On motion of Mr. Eaton, unanimously VOTED to confer Life Membership upon the following: Art Bates, W1RY; Joseph G. Chaet, W1RGH; Richard W. Ehrhorn, W4ETO; Stanley A. Fierston, KX6FJ/W1BRJ; James J. Freeman, WB2NHP; Ervin G. Havas, WB2MOG; Ronald J. Hesler, VE1SH; John D. Holmes, WA7BXL; Fred G. Holzhausen, W2VKR; Frank E. Hope, Jr., K5CEF; William D. Hudgins, W2JS; Dr. Perry I. Klein, K3JTE; O. Lewis Levitt, WB2NDI; William Magoon, WA8OEE; David U. Maier, K8BGZ/-W1BAT; Alfred G. Roach, W6JUK; Charles B. Smack, Jr., W3NB; Walter C. Snyder, W5IPH/-W2DVC; Raymond John Thill, WA9EXP; Warren R. Torrington, WØDZN; James L. Vass, III, W2GSF; William R. Watson, W7BQ.

The Committee was in recess from 11:45 A.M. to 12:55 P.M., during the course of which Roanoke Division Director Victor C. Clark, W4KFC, joined the meeting.

The Committee proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial radio connections. The Committee made findings and ordered actions as detailed below, all by unanimous action.

CENTRAL DIVISION

For Director:

Donald A. Miller, W9WNV, was found lawfully nominated but ineligible due to lack of the required membership continuity. Robert C. Erwood, K9AAU, and Philip E. Haller, W9HPG, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Edmond A. Metzger, W9PRN, and Sidonius M. Pokorny, W9NRP, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

HUDSON DIVISION

For Director:

Harry J. Dannals, W2TUK, and James L. Lawson, W2PV, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Stan Zak, K2SJO, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-laws, to be duly reelected as Vice Director from the Hudson Division for the 1969–1970 term without membership balloting.

NEW ENGLAND DIVISION

For Director:

Gerald A. Cohen, WA1CYT, was found lawfully nominated but ineligible because of failure to meet the age requirement. Robert York Chapman, W1QV, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the New England Division for the 1969–1970 term without membership balloting.

For Vice Director:

Bigelow Green, W1EAE, and Walter S. Rogers W1DFS, were found lawfully nominated and eligibl and their names ordered listed on ballots to be sen to Full Members of the Division.

NORTHWESTERN DIVISION

For Director:

Raleigh A. Munkres, W7HAZ, Robert B. Thurs ton, W7PGY, and William R. Watson, W7BQ were found lawfully nominated and eligible an their names ordered listed on ballots to be sent t Full Members of the Division.

For Vice Director:

David O. Bennett, W7QLE, R. Rex Roberts W7CPY, and Laverne W. Van Dyke, K7CTP, were found lawfully nominated and eligible and thei names ordered listed on ballots to be sent to Ful Members of the Division.

ROANOKE DIVISION

For Director;

Victor C. Clark, W4KFC, was found lawfully nominated and eligible. Being the only eligibl nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the Roanoke Division for the 1969–1970 term without membership balloting.

For Vice Director:

L. Phil Wicker, W4ACY, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Vice Director from the Roanoke Division for the 1969–1970 term without membership balloting.

ROCKY MOUNTAIN DIVISION

For Director:

Bois R. Council, KØATZ, and Carl L. Smith, WØBWJ, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

(Continued on page 146)

U.S. PRESIDENT LAUDS AMATEURS

The ARRL Southwestern Division Convention at Phoenix, Arizona, August 30–September 1, 1968 was in receipt of the following telegram:

"MY CONGRATULATIONS TO THE AMATEUR RADIO OPERATORS WHO INDIVIDUALLY AND AS MEMBERS OF THE MILITARY AFFILIATE RADIO SYSTEM ARE PROVIDING A RADIOTELEPHONE AND RADIOTELEGRAPH MESSAGE SERVICE BETWEEN OUR MILITARY PERSONNEL OVERSEAS AND THEIR FAMILIES HERE AT HOME. I HAVE LEARNED THAT YOU ARE NOW HANDLING OVER 30,000 PER MONTH. YOU MAY BE PROUD OF THIS FINE EXAMPLE OF VOLUNTARY PUBLIC SERVICE WHICH HAS PROVIDED A SIGNIFICANT BOOST TO THE MORALE OF OUR MILITARY SERVICES, ESPECIALLY THE MEN IN VIETNAM. MAY YOUR SIGNALS NEVER FAIL!"

— LYNDON B. JOHNSON

Advisory Committees:

A Pilot Project

WHAT is needed in our League, many have pointed out, is greater opportunity for direct participation in League affairs by more members, more organized ways for members to register their ideas and their opinions, particularly in the various specialty areas of interest and activity.

There is an increasing tendency on the part of amateurs today to concentrate our interests in such diverse fields as v.h.f. repeaters, contests, DX, nets, emergency communications and many more. As this trend toward specialization has grown, so has the need to develop additional formal channels to reflect and represent those interests.

ARRL Board action in May initiated several months of effort and planning by a working group for a project intended to add a whole new dimension to the League's program, to stimulate membership communications and participation. This is the creation, on a trial basis, of two pilot Advisory Committees — one on VHF Repeaters and the second on Contests — composed of qualified amateurs nominated from the membership at large. These groups will function as a further bond among the League's membership and its management (Board and staff) on matters pertaining to their particular areas of interest.

Except for minor editorial revisions, the rules and regulations governing the establishment of national advisory committees are the same as published on pages 72–73 of July *QST*. In essence, advisory committees may be proposed by any director on any subject, along with supporting data on the purpose and scope of activities. Assuming Board approval, the President will appoint up to ten members active and experienced in the specific field. One director and one Hq. employee are appointed by the President to provide liaison with the Board and staff, respectively. Both Board and staff may refer current questions, proposals, inquiries, etc., from the general membership to the advisory committee for study and recommendation. The Committee may also initiate proposals and recommendations based on its own expertise and grass-roots direct membership contact in its field.

Nominations Requested

Guidelines have been developed by the planning group (Directors W4KFC, W3YA, W2TUK) covering qualifications for Advisory Committee membership: a League member for two years and an amateur (Technician or higher class) for three years prior to nomination, currently and consistently active and qualified in the specialty area of the field served by the Advisory Committee. Nominations may be submitted by three or more members having personal knowledge of the candidates qualifications.

The Contest and VHF Repeater Advisory Committees are soon to be established; nominating forms for membership may be obtained from your director, SCM or Hq. Or a letter to Hq. will suffice if it is signed by three current members and has complete data — name and call of nominee, license class, date first licensed, length of League membership, and a detailed statement of qualifying activities in the specialty area; it should also be affirmed that the nominee has been contacted and is willing to serve. In order to establish the two pilot committees with the least delay, only nominations received by December 2 can be considered for the initial committee membership.

To a considerable extent, of course, membership participation in League affairs has had expression via many channels: direct correspondence with headquarters, field trips and conventions, the field and net organizations, the affiliated club program, and, importantly, through the directors themselves, their club visits, their correspondence, their vice- and assistant directors.

An Invitation

Now we are to have an opportunity to broaden the channels of communication and membership involvement substantially, especially in the areas of individual members' particular interests. There are a number of problems, of course, to be resolved in the process of developing truly effective advisory committees (for which reason only two are being initiated at this time), and your director would welcome any comments which you may have now or later concerning the project.

A lot of time, effort and careful thought have gone into the preliminary planning. The results will now depend on the capabilities and enthusiasm of the pilot committee members, and especially on the response from the membership as a whole. QST

How I Learned To Love A Contest

BY E. B. REDINGTON,* W4ZM

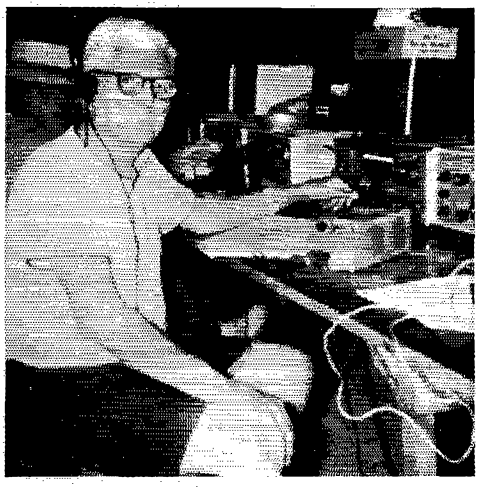
You know, this bit of acrimony that is manifesting itself within our ranks would be amusing if it didn't have serious potential. Anyway, it must be pretty serious because "they" write letters to the Editor and seem to be all upset because these contest phobes are showing up on their own special frequencies, upsetting a phone patch to Aunt Minnie who probably requires five minutes of explanation as to her relationship with the other end. From what I see in foreign amateur journals, this is getting to be a sort of international disease. Right now, it seems to be the current fad to belittle the contest and to be in favor of only one thing — yak, yak, yak. Some of us like to yak and some like to contest and some others like to do both. Well, I happen to be one who likes to do both. For a long time, it was the former until I discovered how much fun you can have in a contest. And you meet the nicest people.

I guess that the first real contest was organized by the League about 1930 when the ARRL DX Tests began. Since then we've had the ORS Parties (which became the CD Parties) and the Sweepstakes, and so on. You've got to admit they caught on. I was never very active in any of them but they didn't make me see red. I just assumed in my naive way that they had as much right to use the frequencies as I did, especially if they got there first.

And you know how contests took up with a bang right after we got back on the air after WW II. Lots of guys found them to be a real shot in the arm in contrast to everyday, run-of-the-mill operating. Besides, a lot of DX only shows up at contest times. Anyway, they were popular and each one was bigger than the one before. I still couldn't get interested. Contests seemed like harmless fun and, Lord knows, there were lots of other things I could find to do. Even with the bands full of "CQ Contest" and right where I wanted to operate, I could always shut off the rig. There would be other week-ends. They didn't bother me; I could take 'em or leave 'em.

Once in a while, though, I'd go in a contest very casually. I went in the Sweep Stakes in 1953 and decided that I'd amuse myself by knocking off the 73 sections, one by one, and call it quits. Me with a Ranger and an 80-meter antenna 20 feet off the ground. Just like that, what an idle dream! Another time, I took a crack at Field Day and what did I get? — Sunburned, a lot of lost sleep and mosquito bitten. But I'll have to admit, I also had some fun. Contests are OK, I said but . . .

I didn't know it but just about that time I was going to have my eyes opened and what an awakening. In 1955, the Commandant of the U.S. Coast Guard decided that I was needed at Headquarters in Washington, D.C. I decided to renew my old friendship with W4CC. I didn't realize then what an effect this would have on my attitude toward contests. Jack insisted that I attend a meeting of his radio club with him, at which time he proposed me for membership. Now, I've been involved with quite a few radio clubs in my time but never with a club like his. It *was* different. In fact, after the first few meetings, I began to wonder what I had done to get mixed up with a gang like this. I began to suspect that the old saying about "You don't have to be crazy, etc." was true. But I must say, in all fairness, that it only seemed that way; they all turned out to be amateurs in the real tradition of amateur radio. You have probably guessed by now that I'm talking about the Potomac Valley Radio Club.



The author, now a contest convert, at K4CG/4 during a recent Field-Day Contest.

Such meetings they have! It was an eye opener. Never an argument about money or Robert's Rules of Order and so on, they just talked about amateur radio — how to beat Frankford R.C. in the SS or what sly tricks to use in a DX contest. Just amateur radio. What heresy!

This was the summer of 1955 with the Sweepstakes a few short months away. So it was inevitable that the major topic was the annual fall madness. I'm sure you recall reading about that radio club the OM used to tell about, the one with Final Authority and Radical in it. Well,

(Continued on page 144)

*3912 North Upland St., Arlington, Va. 22207

November 1943

. . . Editorially, K. B. Warner, W1EH, is already contemplating amateur amateur operations in the post-war period. He invites correspondence with amateurs on the matters such as: should we stress technical excellence, operating ability or what? He points out that in most other countries, experimental work is a must to retain a license. Many countries and services will demand part or all of our precious frequencies, claiming we do nothing to advance the art, even though admitting that amateurs have in the past contributed mightily to the art and supplied a vast number of highly trained operators and technicians.

. . . Frederick A. Long, ex-W8NE, ex-W8BSL, describes a 1944-style CO-WERS mobile transmitter and receiver. It is entirely self-contained and needs nothing but a source of power and an antenna. It is designed to be permanently installed in a car but may also be operated on 110 v.a.c. if near such a power source. It is not a transceiver but may be operated push-to-talk. Uses a modified "J" antenna.

. . . Hollis M. French, W1JLK, Assistant Technical Editor, has an interesting piece on Astronomy and Amateur Radio, discussing sun-spots, the various reflecting layers, etc. and their influence on radio transmission in general. He gives many references on several aspects of the phenomena.

. . . A pack-set walkie-talkie for WERS is described by Frederick M. Burkle. This enables the operator to go just about anywhere be on the spot. It uses three 1Q5GT tubes, one volters, of course. He puts 165 volts on the plates. The photo shows the constructor with one on his back. He is leaning just a little bit forward!

. . . in HAMDOM, we have a short radio biography of Fred Schnell, W9UZ, now a Captain in the Navy, and William J. Lee, ex-4XE, also a Captain. Schnell is Base Communications Officer at an unnameable Naval Base and Lee is Assistant Director of Naval Communications for the Administration in Washington. Both have, of course, very notable careers in radio. Fred is currently (1968) operating W4CF in Bradenton, Fla.

. . . There are four pages of pictures showing the Signal Corps Exhibit at the Army War Show in Washington. The show is put on in connection with the Third War Loan drive.

. . . An Interpolation Oscillator described by Frank H. Mills, W9HQH, uses a 100-kc. bar and a 10-kc. multivibrator, as a valuable aid in frequency measurement. This rig would still be plenty useful today. The author claims an accuracy of part in a million. — *W1ANA*

COMING A.R.R.L. CONVENTIONS

January 18–19, 1969 — Southeastern Division, Miami, Florida.
May 9–10, 1969 — Michigan State, Grand Rapids.
June 20–22, 1969 — NATIONAL, Des Moines, Iowa.

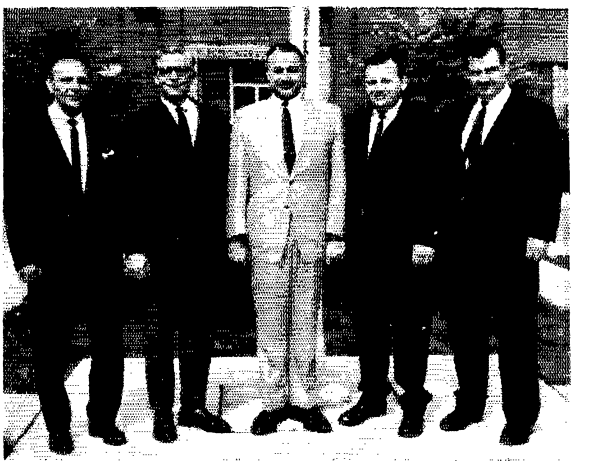
NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.

Hamfest Calendar

New York—The Fulton ARC Annual Birthday Party and Hamfest will be held Saturday, November 16 at Volney Town Hall, 2 miles east of Fulton on Route 3. Starting at 1500 on the Flea Market, there will be contests and other activities. At 1800 there will be a roast beef dinner. Only 100 tickets to be sold. $3.00 per person. Write Hamfest Tickets, Fulton ARC, P.O. Box 26, Fulton, N.Y. 13069.

Oklahoma—The Annual Texoma Radio Amateurs Hamarama will be held on the 15, 16 and 17 of November at Lake Texoma Lodge on Lake Texoma in Oklahoma near Kingston. There will be the customary program of technical discussions, a swap and shop, mobile hunt and an auction. All of the programs except for the mobile hunt will be indoors so that weather will not be a factor. For more information write Charles Vanderpool, W5NT.

Strays



The Naval Ship Engineering Center, Great Lakes Division, Great Lakes, Ill., employs six electronics engineer hams, including, l. to r.: Leonard Eckman, W9AKO; Paul Schmidt, W9IDP; Robert "Rip" Powell, W9KPO; George Hale, WA9ULQ; Bill Randall, W9IPS and, absent, Bill Fullerton, WA9SBO. These NAVSEC hams operate c.w., a.m., f.m., and s.s.b. from 2 meters through 160, including MARS frequencies, and form an emergency communications team. Now in planning is a tie-in with the area tornado alert monitoring system. *(Official Navy Photograph)*

The Ruptured Rhombic

BY JAMES W. VOORHEES,* W8EGR

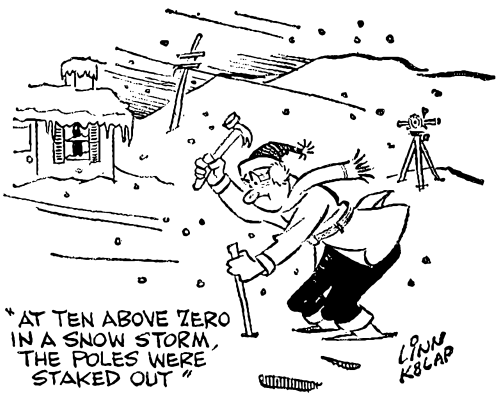
THIS will not be a technical article complete with graphs and technical information rather, a loose coupled story of one ham and his antenna. The project was initiated more by chance than design with the arrival of the fourth sixty-foot pole, surplus to a local utility. Three of these poles had been in use supporting a dipole and a 600 foot long-wire antenna.

The fourth pole lay in the snow until some use could be figured for it — but you can't say "no" to free poles! To a ham with any tenure at all, four poles can mean only one thing: a rhombic. W8EGR radiates from the middle of twenty acres and space is no problem. Thus, shortly after the first of the year, the plot began to thicken. I have a long file of *QST*s and reread the November 1936 [1] article on the subject — a dogeared memory of the high-school radio club. I can assert that this article is correct and makes no claim which is not true thirty-three years later.

Research led to a design which measured 600 feet long, 225 feet wide and occupied the better part of five acres. This yielded 360 foot legs or six wavelengths per leg at twenty meters. The pole at the end of the long wire was in fine position for the southwest end of a rhombic aimed at fifty degrees which is a good DX heading for this location. A transit was borrowed and at ten above zero in a snow storm, the poles were staked out. A week later, the utility company moved the three remaining poles, and the die was cast.

Seven-hundred feet plus of uninterrupted wire — Copperweld of course — is not easy to come by in this area and I needed two pieces. This created a two-week delay until a patient volunteered that the several small telephone companies in this area were no longer using Copperweld wire for phone lines. This proved a good tip and I found several *mile-long* rolls waiting in an unattended warehouse. If you intend to purloin wire in that length, help will be needed, for I had trouble liberating a roll which held some 2000 feet. The telephone boys provided some fittings and their crimper for holding the ends of the wire in the insulators. You've got to scrounge and I am sure that there must be miles of such wire unused in rural telephone warehouses.

Two CBers helped measure and erect the wire on the poles in the middle of a snow storm, but, when it was up it was a thing to behold! Even when the far end could not be seen in the blizzard! The feed line was the usual 600 ohm deal with six-inch ceramic spacers donated



by WA8FLL and wrapped for shipment by his wife in you-can-guess-what paper, individually wrapped, too. By chance, the feed line measures one-hundred-thirty feet from coupler to antenna. The array tuned fine on seventy-five meters, but the results were anything but exciting. W9BDG in Fort Wayne reported that the dipole was ten db. louder. After considerable checking, this holds true over a radius of three-hundred miles. However, one night during a meeting of the Wolverine Net, another net was giving us trouble and I switched to the rhombic. Several annoyed fives called in to see what was going on. Clare, K8HGA, eavesdropping on vacation in New York State, told me later that I was louder than the locals in that area. This has been checked out over a two-month period. At six-hundred miles, the rhombic will run rings around a good dipole on 75.

The antenna first demonstrated its gain one afternoon when on 21,300 kc. VR6TC was heard in QSO with a W5 who was MCing the frequency. With the barefoot TR-4, Tom was called while the W5 was transmitting. Tom came back at the start of his transmission with a "please stand by W8EGR." Oh boy! It works. Tom is off the Southwest end of the affair and will verify that he hears me barefoot or no. Off the other end on 15, GD3RFK verified that I was as loud as any W he was hearing — barefoot again. Doug wanted to hear it with the amplifier (4-1000A) going, so I fired it up and the signal became head and shoulders over anything else he was hearing. This has been the case on 15 meters and the amplifier has not been used on that band.

In its present unterminated condition, the antenna is very directional and you don't hear or work stations other than in the proper directions.

(Continued on page 148)

*97 S. Broad St., Hillsdale, Mich. 49242

[1] "Plain Talk About Rhombic Antennas," Hull and Rodimon, *QST*, Nov 1936, pg 28.

Armed Forces Day 1968

Communication Test Results

THIS year's annual Armed Forces Day communication tests sponsored by the Departments of the Army, Navy, and Air Force once again proved to be a highly successful event.

Four military radio stations — WAR (Army), NSS (Navy), and AIR (Air Force), located in the Washington, D. C. area and NPG (Navy) in San Francisco — conducted the communication tests on 18 May 1968. The tests included military-to-amateur crossband operations and receiving contests for both continuous wave (c.w.) and radio teletypewriter (RTTY) modes of operation.

Crossband Results

WAR, NSS, NPG, and AIR had a combined total of 9048 QSOs during the twelve hours and forty-five minutes devoted to the military-to-amateur crossband portion of the communication tests. Commemorative QSL cards have been mailed to all contacts that could be identified in the Spring 1968 issue of the *Radio Amateur Callbook Magazine*. Any amateur who has not received a QSL card confirming his contact should address a request for clarification to the Armed Forces Day Contest, Room 5B960, the Pentagon, Washington, D. C. 20315. This request must include the amateur's call sign, the station worked, time of contact, and the frequency utilized by the military station.

C.W. Receiving Contest Results

There were 457 perfect entries for the 25 w.p.m c.w. Broadcast Message originated by the Secretary of Defense. The complete text of the 25-word-per-minute c.w. message is printed below followed by the call signs or names of individuals who received a Certificate of Merit for submitting a perfect contest entry:

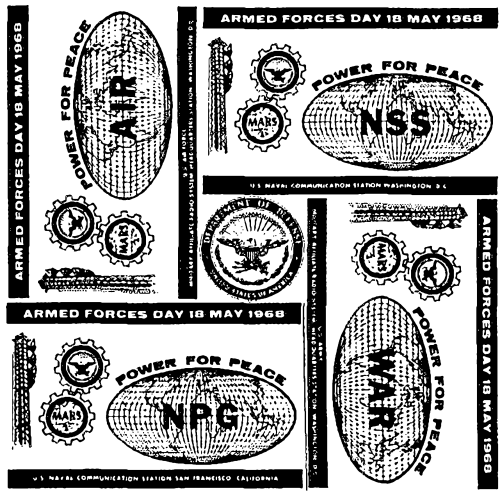
— R — 182100Z MAY 68

— FM WASHINGTON DC

— TO ALL ARMED FORCES DAY PARTICIPANTS

GR 203 BT

EACH YEAR ON THIS DAY THE COMMUNICATIONS SERVICES OF THE MILITARY DEPARTMENTS JOIN IN CONDUCTING A SPECIAL RADIO COMMUNICATIONS PROGRAM FOR RADIO AMATEURS PD THIS ANNUAL PROGRAM CMM WHICH FEATURES THE AWARDING OF SPECIAL ACKNOWLEDGEMENT CARDS AND CERTIF - CATES OF MERIT CMM ALSO SYMBOLIZES THE APPRECIATION AND GRATITUDE OF THE MILITARY DEPARTMENTS FOR THE TECHNICAL AND PUBLIC SERVICE CONTRIBUTIONS OF RADIO AMATEURS TO THE MILITARY COMMUNICATIONS SERVICES FOR MORE THAN A HALF CENTURY PD THROUGH THEIR PARTICIPATION IN THE MILITARY SPONSORED MILITARY AFFILIATE RADIO SYSTEM DASH MARS DASH PROGRAM CMM SEVERAL THOUSAND RADIO AMATEURS ARE NOW VOLUNTARILY ASSISTING IN PROVIDING AN EXPANDED VOICE AND MESSAGE SERVICE BETWEEN OUR SERVICEMEN IN SOUTHEAST ASIA AND THEIR LOVED ONES AT HOME PD THIS SERVICE CMM WHICH IS OF INESTIMABLE VALUE TO THE MORALE AND WELFARE OF OUR



FIGHTING MEN CMM IS A NOTABLE PUBLIC SERVICE CONTRIBUTION IN THE HISTORY OF MILITARY DASH AMATEUR RADO ASSOCIATION PD AS SECRETARY OF DEFENSE CMM I AM PLEASED TO CONVEY TO RADIO AMATEURS EVERYWHERE THE APPRECIATION OF THE MILITARY DEPARTMENTS AND MY OWN PERSONAL THANKS FOR YOUR MANY VALUABLE PAST AND PRESENT CONTRIBUTIONS SGD CLARK M CLIFFORD CMM SECRETARY OF DEFENSE BT

QRU AR

C.W. Certificate Winners:

W1AIJ, W1BDI, W1BMW, WA1DRS, WA1EKB, WA1FGN, W1GBB, W1GBW, W1IKE, W1IKU, W1LZL, W1MCG, W1MTQ, K1RYD, W1SGU, W1SMO, W1TO, W1WPR, W2AUS/4, WA2AUZ, W2BLV, W2BPT, W2BVE, W2BXW, W2CDS, K2CFG, WA2CFG, W2CLX, W2COG, W2DBQ, WB2DDQ, WA2DEX, W2DU, W2EAF, W2EHZ, WB2ERQ, WB2EVA, WB2FGQ, WB2FOV, W2HAZ, K2HBA/3, W2HX, WA2JAN, WA2JSW, WB2JWC, W2LC, WB2LHF, W2LRW, W2LYH, W2MLE, W2MTA, W2MZB, WA2NDC, W2NVB, WB2OGK, WB2OUZ, W2OWP, K2QDG, WB2QYZ, WA2RCF, W2RN, K2SEN, K2SIV, W2SKX, W2TUK, K2UGZ, K2UTT, W2UZN/3, WA2VSQ, WA2VYS, W2WEX, WB2WME, W2YWO, W2ZCZ, W2ZMK, WB2ZXG, W3ABC, W3ADE, W3BFF, W3BHK/4, W3CA, W3CAY, W3CSZ, W3CWU, W3DMK, W3ECP, K3EMA, W3EOV, W3FA, K3GOH, WA3GXD, K3HNP, K3HPG, K3HTZ, W3IDO, WA3IHX, W3IVD, W3JET, WA3JHB, WN3JJJ, W3JM, W3JZY, K3KZB, W3LS, W3MAA, W3MBL, K3MNT, K3MQE, W3OSX, W3PYW, W3QPB, W3RUB, W3TRC, W3VGF, W3WR, W3ZLP, W4AAY, WA4ABY, WB4AEG, K4AHS, WA4AIY, K4AO, K4AT, K4AWY, W4BGO, VE3BMR, W4BP, W4CCC, W4CCD, K4CDY, K4DC, W4DIY, DL4DK, K4DSX, W4EFV, K4EID, WA4ESL, WB4FIN, W4FP, W4FU, WB4GAN, K4GJW, W4GJY, WA4GKF, K4GSP, K4HOE, W4HOS, K4IEX, WA4IKV, W4ILE, WB4IOJ, W4JDR, W4JRA, W4JXM, WA4KFH, W4KIS, W4KMG, W4KR, W4MJY, W4MKU, W4NEI, W4NG, W4NPG, K4MRY, W4NTE, W4NVX, WA4OMI, W4OXX, WA4PWF, W4RHZ, WA4RPU, K4RUQ, WA4SSB, K4UMK, W4UMO, W4UX, WA4VKP, K4VQT, WA4VYZ, WA4YAK, WA4YSX, WA4ZRU, K4ZSX, W4ZY, K5AEU, W5AHC, W5AIR, W5AJG, WA5BNK, K5CAT, W5CEZ, K5DRC, W5ELJ, WA5ERM, W5ESL, W5ETK, W5FBJ, W5FIN, WA5GVB, W5HN, WA5HXE/6, K5JGZ, WA5KAV, W5LBG, W5MCC, WA5MIB, WA5NOM, W5NOP, K5PEV, W5PVE,

W5QGZ, K5QKH/7, K5RIR, WA5TWA, K5YKS, K6AAK, W6AAQ, WA6AEL, W6AHZ, W6AIG, KH6AIN, W6AJJ, W6ARO, K6AU, W6AWP, K6BA, W6BHG, W6BLU, W6CBX, WA6CFE, W6CHL, W6CKU, K6CL, W6DDB, WA6DEF, KH6DQW, K6DZN, W6EAQ, W6EZH, W6ELT, K6EPT, W6ESI, W6EY, W6FAX, W6FB, W6FCX, KH6FF, W6FLW, WA6FPM, W6FQ, KH6FX, W6GEN, KH6GHZ, K6GTP, W6GYH, W6HCX, W6HTS, W6HW, K6IBI, W6IDU, W6INI, W6IOS, W6IPW, WA6IVD, W6KF, W6KHS, W6LDO, WB6LXS, WB6MHO, W6MMG, W6MSR, K6MTX, WA6NWX, W6OJF, WB6OMB, K6OT, K6OV, W6OWP, WA6PKD, WA6PMW, K6PRN, W6PXF, W6QB, W6QIL, W6QQ, W6QWQ, W6RBK, W6RDK, K6RHW, W6ROV, W6RT, W6RXT, W6SAW, K6SHZ, W6TLX, K6TWE, W6TZD, WB6UTS, W6UTU, W6UUS, WB6VGF, W6VHN, W6VK, WB6VLI, WA6VMD, W6VNQ, WB6VYU, W6WAW, W6WJ, WA6YKO, W5YMX/MM, W6YQD, WN6ZXN, W7ADO, W7ADY, W7APE, WA7BEV, WA7BJU, WA7BYP, W7EA, W7ETK/Ø, W7EU, K7EXT, W7GAQ/6, W7GVG, W7HNA, WA7ISA, W7JMH, W7JX, VE7KN, K7KSA, K7KYG, W7LBK, K7LKH, K7MTZ, W7NGW, W7NHL, K7OFW, W7OY, W7PAE, K7PFM, W7PRM, VE7QF, W7SMR, K7WSW, W7YKG, W7YOG, W8AN, W8BC, W8BE, W8BQ, W8BTW, W8BZK, K8COU, W8DSX, W8EDP, W8ENI, K8EQN, WA8FAN, W8FUA, W8FWC, W8HSW, W8ICO, W8IHD, W8IV, W8NEM, W8OMY, W8ORD, WA8QPN, W8RLR, W8RXH, K8RYU, W8SS, WA8SYZ, W8SZU, W8TCO, W8TLW, W8TNF, WA8TWC, WA8TYF, WA8VBR, W8VPC, K8VVW, K8VWN, W8ZJY, K9AHH, WA9AXD, W9BLB, W9CBE, WA9CCP, W9CHD, W9CTI, W9CXY, W9DGA, WA9DHI, W9DM, W9DNY, W9GCZ, W9GWC, W9HMR, W9HTO, W9IDO, K9IZD, W9JNB, WA9JYO, WA9LAE, WA9MHU, WA9MOP, K9OHI, WA9QMB, WA9QOQ, K9RAA, W9SUF, WA9SYD, W9TCV, W9TGB, WA9VFA, W9WNB, W9YAC, WA9YDS, W9YPO, W9ZEN, WAØAPG, WØCCM, WØFA, WØGA, WØGB, WØGRW, WAØHHN, WAØHYS, KØOJQ, WØNHZ, KØOTH

ADCOCK, PAUL C., RM1; ARCHER, FRANCIS OLWELL, SR.; BERTELLI, PETER; BIELE, CHARLES E., CAPT, USNR (RET.); BRAILEAN, LARRY D.; BRETT, JAMES M.; BROWN, E. D., RMCM(SS); COBB, EARL R., RM1; COEN, JOHN F., RM2; DAVIS, WILLIAM; GOETZ, J. F., III; HALDANE, H. H., RM1; HALUSKA, JOSEPH W., CTC USN; HOLLINGSWORTH, LARRY L., RM2; NAVAL RESERVE TRAINING CENTER, LYNCHBURG, VIRGINIA; PLUMMER, MILT; RICHARDSON, H. W.; ROVA, W. H.; SAMS, RICHARD H., RM3; SEABERRY, BENNY J., RM1; SIMEK, ARTHUR A.; TALLEY, NORMAN M., JR.; TODENDORF AMATEUR RADIO SOCIETY; UDEU, STEPHEN M., W-1

RTTY Receiving Contest Results

There were 567 perfect entries for the 60 w.p.m. RTTY Broadcast Message originated by the Secretary of Defense. The complete text of the 60-word-per-minute radioteletypewriter message is printed below followed by the call signs or names of the successful participants who received a Certificate of Merit for submitting a perfect contest entry:

R 182130Z MAY 68
FM WASHINGTON DC
TO ALL ARMED FORCES DAY PARTICIPANTS
BT
EACH YEAR ON ARMED FORCES DAY THE COMMUNICATIONS SERVICES OF THE MILITARY DEPARTMENTS JOINTLY CONDUCT A SPECIAL RADIO COMMUNICATIONS PROGRAM FOR RADIO AMATEURS. THIS PROGRAM WHICH FEATURES THE AWARDING OF COMMEMORATIVE ACKNOWLEDGEMENT CARDS AND CERTIFICATES OF MERIT ALSO SYMBOLIZES THE APPRECIATION AND GRATITUDE OF THE MILITARY DEPARTMENTS FOR THE MORE THAN A HALF CENTURY OF TECHNICAL AND PUBLIC SERVICE CONTRIBUTIONS OF RADIO AMATEURS TO THE MILITARY COMMUNICATIONS SERVICES. THROUGH THEIR ASSOCIATION WITH THE MILITARY SPONSORED MILITARY AFFILIATE RADIO SYSTEM — MARS — PROGRAM SEVERAL THOUSAND RADIO AMATEURS ARE NOW VOLUNTARILY ASSISTING IN PROVIDING A TRULY EXTRAORDINARY VOICE AND MESSAGE SERVICE BETWEEN OUR SERVICEMEN IN SOUTHEAST ASIA AND THEIR LOVED ONES AT HOME.

Pentagon MARS Army Hc. Station WAR. Shown (l. to r.) Sgt. L. Lydon, Sgt. J. Stayton, Sgt. E. Jarrett.

A coffee break during the Armed Forces Day military to amateur radio activities. (r. to l.) Edward Schaefer, W8BE; Ralph Rickett, W8BTW; Joseph H. Ziglinski, W4DIN; Jack Shepard, W8OMY; Edward S. Liscombe, K4KNV.

A familiar fist on the DX bands, Leonard Chertok, W3GRF mans the c.w. position.

THIS SERVICE WHICH IS OF INESTIMABLE VALUE TO THE MORALE OF OUR FIGHTING MEN IS ONE OF THE FINEST PUBLIC SERVICE CONTRIBUTIONS IN THE ENTIRE HISTORY OF MILITARY — AMATEUR RADIO ASSOCIATION. AS SECRETARY OF DEFENSE, I AM PLEASED TO HAVE THIS OPPORTUNITY TO EXTEND TO RADIO AMATEURS EVERYWHERE THE APPRECIATION OF THE MILITARY DEPARTMENTS AND MY OWN PERSONAL THANKS FOR YOUR MANY VALUABLE PAST AND PRESENT CONTRIBUTIONS. SIGNED CLARK M. CLIFFORD, SECRETARY OF DEFENSE.
BT

RTTY Certificate Winners:

WA1CGM, AG1DU, K1DVI, W1EFF, W1FGL, K1FKS, WA1IUZ, WA1JPK, K1KMV, W1KQY, W1MCG, K1MMC, W1NPL, K1OCS, W1OER, W1OFY, K1RYP, W1WLZ, W1WPR, W1WRQ, W1YOE, K1YZG, K2AGI, WB2AHF, K2AMI, W2BLV, WA2BTE, W2BQB, W2BXW, W2CGX, WB2CQS, WA2CUB, WB2DDL, K2DON, K2DQL, W2DSG, W2DWE, WA2EIQ, WA2FEL, WB2FPT, WA2GPF, W2GQN, K2GUS, K2HBA/3, WB2HFJ, WB2HQD, W2HX, K2IF, W2JAV, WA2JSW, K2JTU, K2KAQ, K2KEY, W2KFM, W2KQZ, WA2KUL, WA2LKF, W2LRW, W2LVW, K2MWN, W2MXN, W2MZB, W2NCA, WA2NQR, W2NUB, W2OKO, K2OWC, K2OWD, WA2PEY, K2PHS, WB2PWX, WB2QHH, W2QLI, WB2RKP, WA2RPM(T), W2RUI, WB2RUM, WB2RVV, K2SBD, W2SEU, K2SEV, W2SUH, WB2SUQ, K2TRN, K2UMY, K2UTB, W2UZN/3, W2VLL, WB2VLT, WB2VNL, WB2VMU, WA2VSQ, WA2VYS, W2WBY, WA2YVK, W2ZMK, WA2ZVL, WA2ZYP, W3ABT, WA3AJR, W3AME, W3AUK, W3BFF, W3BHK/4, W3CA, W3CJV, W3CKM/4, W3CNG, W3CRO, WA3CTK, W3CUL, K3CYD, K3CYE, W3DMK, W3DNN, W3EIA, WA3ELR, VE3EMD, W3EOV, WA3EYG, WA3FRP, WA3FSC, WA3GIV, W3GJY, K3GWX, K3GYT, W3HID, W3IRS, W3IVD, W3JUU, W3KGN, W3KMN, W3LAT, W3LQY, W3MHB, W3MHD, K3NOX, W3NSI, VE3OE, W3PYW, K3QBA, K3QJO, K3RCM, VE3RH, K3RHO, K3RTR, W3RUB, K3SYM, K3TGY, K3UWJ, W3VYY, W3WUX, K3YSI, W3ZIV, W4AIY, K4AR, WB4ASE, K4AVA, W4AZT, W4BOL, DL4BU, W4CCC, W4CCD, K4CQJ, DL4DK, K4DNZ, W4DYE, W4EFX, WA4EHM, K4EID, K4FPW, KI4GF, K4GJW, W4GJY, WA4IBG, W4IKB, W4IRZ, W4JDR, K4JMV, W4JRA, W4KIS, W4KR, K4KZH, W4MDS, W4MHS, WA4MZZ, W4NTE, WA4NWM, W4NZP, K4OHL, W4ONO, W4PIF, W4QDQ, WA4QLB/2, WA4SPL, WA4SSB, W4TQD, WA4TWB, K4UMK, K4UOO, WA4UPI, WA4USB, W4VBD, K4VDM, WA4VYZ, K4WBR, WA4WQZ, DL4XG, WA4YAK, K4YYT, K4YZU, W4ZAG, W4ZCM, K4ZSX, WA4ZUK, W5AIR, K5AYX, W5CHJ, W5EDZ, W5EOO, K5GLJ, WA5GVB, K5GYU, W5HN, WA5HXE/6, K5JCQ, W5JWL, WA5KAV, WA5KER, K5KHY, W5LLS, WA5LOB, K5MBB, WA5MDZ/W6, WA5PGK, W5PVE, K5RIR, WA5SUB, W5USA, K5UTE, K5VHM, K5WEQ, K5YRY, K5YWX/4, W6ACN, WA6AGA, W6AIG, WB6AQR, K6ARR, W6BB, W6BHG, W6BIK, WB6BWZ, W6CBX, WB6DBD, W6DJX/4, W6DNT, W6DOU, KH6DQW, K6DTX, W6DWK, WB6EDH, WB6EDI, WB6EGH, W6EGZ, K6EPT, W6FAX, W6FFY, K6FLO, W6FLW, WB6GGL, K6GKX, W6GLG, WA6GRO, W6GSQ, W6GVW, W6GYH, W6HBU, W6HKB, W6HW, W6HZZ, WA6IAC, WB6IIU, WB6ISL, K6JAH, WB6JBX, W6JKY, W6JOX, WB6JSY, K6KCY, K6KDR, WA6KZK, W6LDE, W6LDF, K6LFM, W6LGC, W6LQK, W6LVQ, WB6MHO, WB6MZX, W6NEA, W6NPB, W6NRM, K6OOL, W6OWP, W6OZC, WB6OGD, W6PDD, WB6PKE, W6PRL, WB6PJL, K6QGR, W6QIE, WB6QJW, K6RBB, WA6RBT, WB6RJA, K6ROR, W6SAW, WA6SEY, K6SHZ, WB6SIJ, WA6SJZ, WA6TIC, WB6UJC, K6USH, WB6UUX, WA6VGE, W6VHU, K6VIN, K6VIT, K6VPO, WA6VVR, WB6VWN, K6WAN, WA6WGL, W6WIS, W6WPF, W6YLH, W6YQD, WB6YXE, W6ZJB, WA6ZPL, W6ZRR, WA6ZXT, VE7AMJ, WA7BHH, WA7BJV, WA7CCK, W7DFX, WA7DST, WA7DTF, W7EZU, WA7FAB, W7HGW, W7IE, W7JLF, W7JMH, W7KV, W7LI, W7MC, K7MLO, K7NEY, W7NFR, W7NGW, K7OFW, W7PBV, W7PHG, W7QCN/Ø, WA7QHI, K7RMG, W7TCT, W7TXD, W7TYR, K7UGD, K7UVV, K7UXK, W7VKO, WA8ADL, K8AHI, W8AN, W8BC, W8BDM, W8BE, WA8BOT, W8BTW, W8BZK, W8CXD/4, W8ERM, W8FEU, WA8FYF, WA8GDT, K8GJL, W8HPR, W8HSM, W8IHU, W8IJV, K8IPN, W8IS, K8JZW, W8KDW, W8KPT, K8KTX, W8KVV, WA8KXB, W8LBI, K8MGN, K8MRT, K8MYF, K8OGV, W8OMY, W8ORD, K8OUL, K8OXO, W8QJI/6, WA8QVI, W8RRE, W8SDZ, WA8SEL, K8SNJ, K8TID, WA8UGA, WA8VBR, K8YSK, W8ZCD/5, W8ZJY, WN8ZNF, K8ZPR, K8ZQN W8ZYW, WA9ANT, W9ATK, WA9AVM, K9BJM W9BUB, W9BUF, W9CAV, WA9CCP, WA9CHP, K9CMX, W9CUW, K9CYZ, W9DGA, W9DVJ, W9EEL, W9EPT, W9EWC, W9FME, W9FRU, W9GYL, WA9HEW, W9HMR, W9JQA, W9KJ, K9LGJ, K9MNZ, WA9MOP, WA9NOM, W9NJH, K9OJQ, K9POU, W9PRO, K9PTI, K9QNV, W9SLO, W9TQ, K9UKH, W9WNB, W9YAC, W9ABM, W9ZGC, W9ZQE, KØBEC, WAØCXY, WAØEDN, WØFA, KØFLK, WAØFOV, WØFSC, WØFUH, KØHPQ, WAØHWY, WØIBZ, KØIIE, WKØGEN, KØIQR, WØJUV, WØKDU, WØKIS, WØKUJ, WØLFH, KØLMU, WAØLQL, WØLQV, WØLUI, KØMMQ, KØMMS, KØMXU, WØQHB, WØRXD, WØYSX, WØYYM, WØZFN, WØZRU, WØZWN

ADCOCK, PAUL C., RM1; ANDERSON, ROBERT E.; BERTELLI, PETER; BLACK, JOSEPH M.; BLAKE, CHRISTINE; BROOKS, JOHN; BURGESS, S. W.; BURKE, A. S.; CRAPO, J. N., RM2 (SS) USN; CRISPIN, CHARLES B.; DE BAKER, JAMES; DRASKY, A. P.; USS EATON DD-510; ECK, PAUL J.; ELLIS, BOB G.; FEGES, PETER P., SR., SWL; FULKERSON, C. L.; GINYOLD, GERALD SHERMAN; GOODMAN, DAVID J.; GOODRICH, F. J.; GOODRICH, ROBERT E., RM2; HAMILTON, ARNOLD; HOLT, ROBERT V.; IMPERIAL BEACH NAVAL RADIO STATION; JOHNSON, DAVID B., RM1; JOHNSON, RICHARD P.; KINGSLEY, ARTHUR B., JR.; LEVERAUS, JAMES; LEVINE, STEWART; LOWE, GERALD; MAYER, WARREN H.; MAXFIELD, JOHN LEAL; MEIER, S. K.; MENADIER, PAUL T.; MINER, BOYD S., S/SGT; M. I. T. FIELD SITE; MYERS, E. N.; NAYLOR, CHARLES H., JR.; NICOLELLA, AUGUSTO H.; OAK, SUSAN K.; OAK, PHILIP A.; PATTERSON, EDWARD A.; PIERCY, BILL; PLUMMER, MILT; POLLEI, DOUG; PORTER, WILBER E.; PRICE, CLIFFORD L.; RADIO SHACK, USS WILLIAM C. LOWE; ROBERTS, CONRAD E., JR.; ROOD, LOREN K.; RONK, DAVID W., YNC USN; SCIAMMARELIA, JOSEPH C.; SIBLE, JOHNNY R.; SUCHODOLSKI, WILLIAM; THROCKMORTON, W. E.; TOOKER, WILLIAM R.; U. S. NAVAL SECURITY GROUP ACTIVITY, BREMERHAVEN, GERMANY; WENDLER, RICHARD M.; WESOLOWSKI, ADAM J.; WILHELM, DONALD L.; WILKINSON, PAUL N.; WINIGER, M. R., RM1 (SS) USN

QST

CQ Contest, de Padre Tim

BY ROBERT BRINE,* WB6RYQ

A LIGHT tropical breeze billowed out the curtains at his right and gently cooled his face and arms as Father Tim O'Neal, ZP3YV, tuned up the transceiver on the c.w. portion of the twenty-meter band. It had been another hot day in Santa Marguerita and Tim was certain that even five more years in that Paraguayan town would not bring him any closer to being reconciled with its tropical weather.

Once more he checked the meter; the s.w.r. was nearly 1 to 1. He chuckled to himself as he thought of the antenna raising party he had held to get tower and beam up on the tile roof of the priests' residence. Tim, and the three parishioners he'd ask to help, were soon joined by nearly 40 villagers who quickly gathered for the biggest event in Santa Marguerita since the mayor's daughter's wedding. All together, the antenna raising had cost him three cases of beer and several promises to give instruction in Morse. It had also cost him the good will of the aged Najero sisters who thought that the young Padre Tim could put a Saturday morning to better use than to be climbing all over the rectory roof playing with metal rods. Tim's image hadn't been improved, either, by all his arm waving to make up for his lack of technical Spanish. But somehow his helpers had understood his directions.

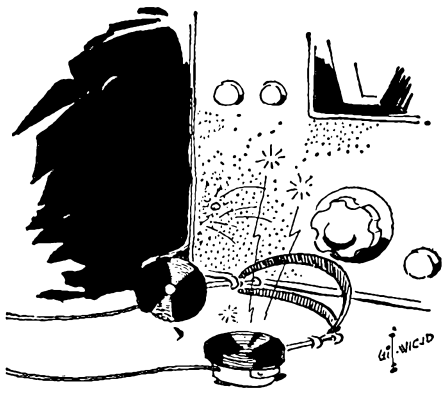
Six hours of work and festivities had at last given Tim the sort of antenna he needed for this year's big DX contest. Now, the twenty-four hour clock just above his desk showed 0040 GMT. In twenty minutes he'd really be sweating to handle the pile-ups trying to work him. A good prefix like ZP3 was no small consolation for being a missionary in South America! Of course, Tim hadn't used the ZP prefix much; as the only priest in a parish larger than 6000 square miles he'd only found time for an occasional QSO with friends back home and a weekly schedule with Father Henry in Concepcion. But now that Father Henry was here to take his place while Tim spent three months back in the States, Tim could devote this whole week-end to the contest! It was sure to give him a WAS, WAC, and maybe DXCC.

Another quick glance at the clock; 0055 GMT. Father Tim tapped out a series of Vs and a "de ZP3YV."

Just then, light from the hallway filled Tim's room. He turned to the doorway behind him. A boy of about twelve years hesitated in the hallway.

"Padre Tim?" he asked.

"Eduardo!" Tim exclaimed at the sight of his



altar boy from the village of San Phillipe. "What is it, boy?" he asked, hoping Eduardo did not hear the irritation in his voice.

Of all the altar boys who served Tim at Mass, Eduardo was the most faithful and it was Eduardo's mother who always insisted that Tim have dinner with them on his weekly visit to San Phillipe. "What is it, Eduardo?" Tim repeated.

The boy's dark eyes seemed to be burning with fear and his frail form quivered with anxiety and exhaustion from his long trip to Santa Marguerita. "Padre Tim! It is Mama. She is sick and she say Padre Tim is to come at once."

"Did you see Padre Henry? Padre Henry is taking the sick calls tonight, Eduardo. Really, he is very good and perhaps he can help your mother to get better and . . ."

"But Padre," the boy interrupted, "Mama, she say 'Only Padre Tim.' She would not like if Padre Henry were to come."

Tim knew he'd said the wrong thing and he tried to find words to repair the damage. "I'm sorry, Eduardo," he offered softly.

The chatter of c.w. signals coming in over the speaker told Father Tim that the contest had begun. He felt somehow drained into emptiness as his mind looked back on the ten years he'd been a ham. There had been the night of the Novice contest when the long-wire antenna broke in the winter cold; the chirpy forty-watter and S-38 receiver he had set up in the recreation room of the seminary; the grumpy student advisor who had made them dismantle the station because it was too "worldly," and the new sideband rig that a young instructor had set up for them some time later. He remembered, too, his station in an African mission. That station had never been put on the air! The government there was still considering his application for a license when he was reassigned to South America.

(*Continued on page 148*)

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AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NIM

Count Your Traffic Right

ALTHOUGH it may seem a minor matter to some, the "traffic count" is an important concept to many of our traffic-handling amateurs. It can be a basis for controversy as well as a means of gaining recognition for individual or net performance, and often has been both.

Some recent correspondence has led to the suspicion that quite a large segment of traffic handling amateurs are not counting traffic correctly, some through ignorance of the correct method, others because they don't agree that the ARRL standards are logical. Well, we can't do a great deal about the latter, and assume they will not submit (for BPL) traffic totals based on other than standard ARRL counting methods. Regarding the former, however, all that is needed is information.

Where do you find it? In the booklet *Operating an Amateur Radio Station*, which has been available for years free of charge to League members, a thin quarter to others (which barely covers the cost of publication). This booklet has received wide circulation and is often passed out at hamfests, conventions, even club meetings when an ARRL official attends. Its treatment of message handling by individual amateurs is comprehensive, including how to count.

One thing about message counting needs to be emphasized: Unless your traffic is handled (a) on amateur frequencies, (b) in standard *ARRL* form and (c) is duly reported and published in *QST*, it is not eligible for BPL recognition. Also, if it is not counted in *full* accordance with the ARRL rules for counting, it should not be reported for QST publication at all. There has been suspicion voiced by many in the past that some of the high-ranking BPLers play "fast and loose" with the counting rules — to their own advantage, of course.

We would hate to think this is true and sincerely hope it is not. However, just to go on record, a few things about traffic count by individual stations should be pointed out and emphasized:

(1) Traffic that is not handled in *full and complete* ARRL form may not be counted in the ARRL traffic total submitted to your SCM. An occasional slip through ignorance by a beginner can be forgiven, but consistent handling of traffic in sloppy, abbreviated, incomplete form is ground for eliminating the count from the total. Such as what? Well, short cuts such as using the word "same" in place of a message part, repeated omission of some part of a message, counting of "book" messages incorrectly, handling of illegal traffic, etc.

*Communications Manager, ARRL.

WA7HSJ (r.) helps W7GZN prepare for a climb to the top of Mount Adams in Washington. K7AYO furnished the little transceiver used to work several states and British Columbia from the 12,327 foot peak.

(2) Every traffic-handling function, to be counted as a traffic-handling point, must be an on-the-air function *except* the act of delivery. You don't get a "received" or "relayed" point for receiving or relaying a message by mail, telephone, telegram or MARS. Only if the reception or relay is by amateur radio, on amateur frequencies, using standard ARRL procedure do you get such a point.

(3) You get a "delivered" point when you put the message in the hands of the addressee by *non*-amateur-radio means — that is, you can telephone it, mail it or hand it to him in person, but if you send it to him over the air, by amateur radio, it's a "relay," not a "delivery," as far as you are concerned. If you are on the receiving end of such a message (i.e., one addressed to you), it is a "received" point, not a delivery. So, the only "delivery" must be to someone other than the receiving operator and must entail some effort on his part to effect delivery.

(4) On examining the counting method, one would assume that the "received" total must be equal to the "delivered" and "relayed" totals. Not so, for reasons apparent in the above. A message may be received for relay by non-amateur-radio means, in which case it gets no "received" count but does get a "relayed" count if sent onward by amateur means. Or, a message may be received for the operator, in which case it will get a "received" count but no "delivered" count.

(5) It should be obvious from the above that "informal" traffic is not countable at all. This includes direct communications between two

third parties, either present in the stations or through telephone connection. As meritorious as some of this is, there is no present mechanism for crediting it numerically.

Counting Net Traffic

The procedure for counting net traffic has never been formalized, but is standard on NTS nets. Basically, it is absurdly simple, but different in principle from individual traffic count. When Station A hands a message to Station B during a net, Station A gets one "relayed" count (or one "originated" if it's in that category), and Station B gets one "received" count. The *net* gets a count of one *handled*. This is the *only* category of net traffic — the "handling." It is not referred to in this manner ordinarily, but it's simply logical that when a station in a net passes a message to another station in the net, the net gets a traffic count of *one*. The net's total for a particular session is the total number of times such a procedure is completed. A "session" is the time between the NCS call-up (QND on c.w.) and the time the NCS declares the net closed or secured (QNF). The net's traffic total for the month is the number of times the process was completed in session during the month.

Simple? Sure it is, but all kinds of complications seem to arise. In the past, some nets have counted all traffic *reported*, never mind whether it was handled or not. This hardly seems kosher to us. Others have inquired whether traffic handled after the net but by net members can be included. In our view, no. Another question has been, how do you count traffic that is dispatched to another frequency during the net session but handling not completed until after the net session is over? Answer: NCS has to estimate how much of it could be cleared; either that or go find the off-frequency netters to tell them the net is secured and find out how much they cleared — then let them go ahead and clear the rest.

Another question: Suppose a message has to be relayed in the net by a third station, do you count it twice, or only once? Answer: twice if it was relayed *in toto*, otherwise only once. Then, supposing nets start to make a practice of relaying messages from one station to another to pad their traffic totals? Well, we hope nets won't do this; padding isn't very nice, and only gives a distorted view of the net's capability and efficiency.

So, fellows and gals, count your traffic right — but *count* it and report it to your SCM, so it can be credited to the public service record of the amateur. — *W1NJM*.

National Traffic System

Handling much Vietnam traffic? Quite a bit of it appears on NTS. If you will forgive a personal note, the writer originated several such messages to his son in Vietnam and has since heard that some of them were received, but about a month later. We're sure this isn't typical, but it does raise the question: what happens to this kind of traffic when it gets on NTS? Where does it go and who handles it and how does it get to Vietnam?

As you all know, NTS is a *system* and tries to behave as such; and because it is a system, handling of Vietnam traffic is on a systematic basis just as handling of all traffic on NTS. Since the system does not purport to handle traffic outside the League's field organization, Vietnam traffic is APO/FPO-San Francisco. San Francisco is in the Sixth Region, so this is where such traffic has been sent — via RN6. In the same manner, APO/FPO-NY traffic goes via 2RN and APO/FPO-Seattle traffic via RN7.

So what happens when the traffic gets through the system and lands in RN6? We understand it is transferred into MARS at that point, but this is RN6's problem. Assuming it does go MARS from RN6, what does MARS do with it? That, we have always assumed, is MARS's problem. We would have guessed that it is relayed directly across the broad Pacific on military frequencies to a MARS installation at some army, air force or naval base in Vietnam, and ultimately delivered. But this was just guessing, because once we had taken it as far as we could via NTS, it was out of our hands.

Not so long ago we were told unofficially, but by a high official, that Vietnam traffic is all centralized at the Pentagon before being sent to Viet Nam via Hawaii, presumably on a direct RTTY link. Does this mean, we wondered, that Vietnam traffic originated on the east coast goes all the way to the west coast whence it is transferred to MARS and comes back to the east coast before being sent on its way to Vietnam? Astonishingly enough, this appears to be precisely what has been happening. Those effecting the transfer at the west coast end must have been aware of this all along, but no mention has been made of it.

The obvious thing to do is change the transfer point — that is, assuming we do want to handle as much of this traffic as we can get our hands on. On the other hand, the same aforementioned high official advised that the best, if not the only, way to handle the problem is simply to put the traffic in the hands of a MARS station (*any* MARS station) as soon as possible after its origination and let MARS take it from there. This would be, in effect, admission of our incapability of handling it and leaving its handling up to the originating station. Or, to put it another way, we would simply adopt a NTS policy of "no outlet" for this traffic and originators would be on their own.

The shack of K3DSM where the Lower Merion, Pa. CD radio unit spent the FD night after being struck out by Murphy.

Members of the Redwood City Disaster Communications Net who participated in the Fourth of July Parade. Back row, left to right: WB6MED, WA6VGR, K6UKF, K6MPN, W6DEF, K6ANN, W6VQV, W6TFT, K6DRN. Front. WB6 HIX, WB6VSH, two helpers, K6GXH and W6UOK. W6CTH took the picture.

Much to be preferred is a systematic entry from NTS into MARS at some regular entry point, such as 3RN or NTS section nets in the Md.-D.C. section. Perhaps we could organize an *ad hoc* "corps" of stations to take on this responsibility via 3RN — stations active in both NTS and MARS.

While further negotiations on these points are continuing, the procedure remains the same — APO/FPO-SF traffic to RN6, APO/FPO-Seattle traffic to RN7, APO/FPO-NY traffic to 2RN. If any definite change is called for, the word will get down through the nets as soon as possible. — *W1NJM.*

August reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	62	569	.392	9.2	91.9
2RN	62	678	.705	10.9	97.3
3RN	62	639	.425	10.3	97.2
4RN	52	551	.389	10.6	76.7
RN5	62	978	.421	15.7	90.1
RN6	62	1,352	.769	21.8	100.0
RN7	61	642	.420	10.4	46.2
8RN	62	604	.406	9.7	92.5
9RN	61	1,174	.846	19.2	86.7
TEN	60	489	.502	8.0	54.0
TWN	39	233	.202	6.0	47.4
EAN	31	1,987	1.274	64.1	97.4
CAN	31	1,687	1.140	54.4	100.0
PAN	31	1,538	1.115	49.6	100.0
Sections[1]	1777	12,707		7.2	
TCC Eastern	124[2]	1,123			
TCC Central	90[2]	947			
TCC Pacific	124[2]	1,110			
Summary	2515	29,008	EAN	11.5	—
Record	2987	31,117	1.440	16.4	—

[1] Section Nets Reporting (55): BUN (Utah); ILN (Ill); PTN (Me.); WSBN, WIN (Wis.); VSBN, VN, VSN (Va.); FMTN, VEN, QFN, WFPN, GN (Fla.); MDDS, MDD (Md.-D.C.-Del.); Passaic Valley, NJPN, NJN (N.J.); WSN (Wash.); NCN (Cal.); NCNE, NCNL (N.C.); M6MTN, QMN (Mich.); OZK (Ark.); TEX, NTTN (Tex.); FCATN, KTN, KYN (Ky.); EPA, PTTN, EPaEPTN, PFN (Pa.); GSN (Ga.); NYS (N.Y.); QIN (Ind.); OSN, BN, OSBN (Ohio); HNN (Colo.); RISPN (R.I.); CPN (Conn.); MNN (Mo.); AENB, AEND, AENG, AENH, AENM, AENR, AENT (Ala.); WMN (Mass.); MSN, MJN, MSPN (Minn.)

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

K3MVO reports lots of traffic from summer fairs, but reps sometimes missing. W4SHJ reports 40 more effective than 80 meters for early summer skeds. WA6ROF reports PAN 3 schedule working out better than expected. W7BQ says Idaho has moved into second place for representation, but Washington still out in front. W9QLW bemoans the fact that representation is way down but says traffic given a big boost by Kentucky Fair. WØLGG reports activity already showing signs of improvement from summer lull. August went out with a big ending, says K2KIR, because of several fairs. W6VNQ has issued PAN certificates to W6IPC, *WA6s* BRG LFA and VE7ZK.

Transcontinental Corps. There is a large waiting list for jobs in TCC Eastern, W3EML says. On the other hand, WØLCX is scouting around for new stations with TCC interests.

August Summary:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	94.3	2750	1123
Central	90	90.0	1944	947
Pacific	124	92.7	2194	1110
Summary	338	92.6	6888	2180

The TCC roster: Eastern Area (W3EML, dir.) — *W1s* BJG EFW EOB NJM, *W2s* FR GKZ QC, K2RYH, *WA2s* BLV UWA, *WB2s* OYE UHZ, W3EML, K3MVO, WA3-CTP, *W4s* NLC UQ ZM, K4KNP, WA4EUL, *WB4s* DXX GTG GTS, *W8s* CHT RYP UM, K8KMQ, *WA8s* OCG POS ZGC. Central Area (WØLCX, dir.) — W4OGG, K4DZM, *WA4s* AVM WWT, WB4AIN, W5KRX, *W9s* CXY DND DYG VAY, *WA9s* OTD RAK VZM, *WØs* INH LCX, *KØs* AEM YBD, *WA0s* DOU MLE. Pacific Area (W7DZX, dir.) — *W6s* BGF EOT IPC IPW TYM VNQ VZT, K6DYX, WA6ROF, *WB6s* HVA LFA, *W7s* KZ ZIW, K7HLR, WA7CLF, VE7ZK.

Diary of the AREC and RACES

At 2330 GMT on July 22, WB6URR at YMCA Camp Lundeen in Nevada called WA6BWO, NCS for WCARS, reporting that a youth at the camp had been seriously cut and that transportation and medical aid were needed.

No stations in the immediate area were available, but WA6GQJ called the U.S. Forest Service at Inyo National Forest. U.S.F.S. then used their own radio link to Tahoe. Aid was on the way by 2338 and serious incident was avoided. — *WA6GQJ, EC Inyo County, Calif.*

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KØCNV, Colorado State Radio Officer, answered a call for communications to aid a search and rescue operation, about August 6. A boy was lost on the rugged Rockies five miles above Minturn. As no telephone service was available, amateurs were called on to help.

Operations on 75 and 40 meters were continued for a full week with numerous messages passed and a total of more than thirty amateurs participating. However, the boy was not found until several days after the search was called off. He had been taking food and supplies from one party to another and thus had the means to survive at the extreme altitude. — *WØSIV, SEC Colorado.*

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The report of the East Tennessee VHF Net was inadvertently omitted from the SET report in Aug. *QST*. The group operated six and two meters with K4FKO, WA4TJT and WB4IED acting as net controls. — *K4VZI, EC Knox County, Tenn.*

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VE2APT and VE2DGD manned a checkpoint, June 5, for the Shell 4000 car rally. Although none developed, the checkpoint was available for emergency and general traffic. — *VE2ALE, SEC Quebec.*

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On June 6, members of the Glen Falls Area AREC held a drill to test the feasibility of operating amateur equipment aboard USCG Auxiliary boats during emergencies.

Aboard the boat in "distress" was WB2ZTP with a six-meter walkie-talkie. *WB2s* KBQ and RPL, aboard another craft, took the initial call for assistance. W2FEM and WB2YMY were NCS from a station set up at the marina. *K2s* BHM PBE and WB2BZJ operated K2AYQ aboard an observation craft. — *K2AYQ, EC Glen Falls, N.Y.*

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The Bucks County (Pa.) AREC, on June 8, used ten meters to provide marshalling and general communications for the Croyden Fire Company 50th anniversary parade. Six mobiles and two walkie-talkies were manned by fifteen amateurs, with the call W3SK used as NCS at the reviewing stand. — *W3ICC, EC Bucks County, Pa.*

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The Redwood City, Calif., RACES provided communications for the annual Fourth of July Parade of the Peninsula Celebration Association. Under the direction of RO K6ANN and EC W6DEF were twelve amateurs manning eight portable and mobile stations along the staging area and route. — *W6DEF, EC Redwood City, Calif.*

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The Gem State Amateur Radio Club provided communications for a boat race held in Boise July 6 and 7. Two and ten meters were used with nine amateurs active in the exercise. — *W7ZNN, SCM Idaho.*

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Seven members of the Suffolk County CD, operating under the call W2TFJ, used two-meter f.m. to provide communications for the catamaran races held at Mattituck, N.Y., on July 20 and 21. — *WA2KSB.*

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On July 20, seven amateurs under EC VE2ANH provided communication for canoe races held at Cartierville, Quebec. Two-meter f.m. was used aboard the starting boat where VE2ZA had a hand-held unit. VE2BSQ, also with a portable unit, was on a follow-up boat, acting as a relay for messages between the judges and other officials. — *VE2ALE.*

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A drill simulating a storm with ensuing power blackout was held throughout the South Dakota section on July 27. Only four ECs failed to check into the net operating on 3955 kc. Twelve amateurs had emergency power capabilities and another twenty had mobile equipment. — *WA0CPX, SEC South Dakota.*

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Thirteen members of the Muskegon Area Amateur Radio Council provided a fast means of relaying election results from outlying communities whose polling places have no telephone service, August 6. Six and two meter a.m. were used in relaying to the Civil Defense Communications Center. — *WA8GVK, EC Muskegon County, Mich.*

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On the morning of August 20, weather conditions in the Montreal area were bad when VE2BU, on the Trans-Canada Highway, came on the aftermath of a serious accident. Using the VE2RM repeater, VE2ALE was notified. VE2AKM, who was called through the VE2MT repeater, reported the accident to a local broadcast station, which made announcements of the traffic jam to the public. — *VE2ALE.*

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The Tri-County Net provided communications for a Veterans of Foreign Wars parade in Detroit, Michigan, August 20. Three fixed stations and six mobiles were active on ten, six and two meters. The mobiles assisted aid stations and hospitals by transporting medical personnel, supplies and persons stricken by the extreme heat. Controlling the net from W8GIS were W8IDJ and K8IYZ under the direction of EC W8BEZ. — *W8BEZ, EC Wayne County, Mich.*

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At 0105 GMT September 8, WA0JPX was operating on twenty meters when he received a call from VP8JW with an expedition in the Antarctic. One of the expedition's sled dogs had been seriously injured and the medical officer was trying to obtain information for an operation and blood transfusion for the canine. WA0JPX called a local veterinarian and instructions were relayed to the medical officer by phone patch. — *WA0JPX.*

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Forty-three SEC reports were received for the month of July, representing 15393 AREC members. This is exactly the same number of reports as last year, but 1854 fewer AREC members. The following sections reported for July: N.M., Que., Okla., Ind., Md.-D.C., S.D., Utah, East Mass., L.A., West Fla., N.N.J., Del., S.C.V., Mo., Mich., Conn., Maine, Colo., Ky., Nevada, Wash., Ark., Ohio, East Fla., Nebr., Mont., San Diego, Kans., Ala., N.H., S.N.J., S.F., West Va., Tenn., Orange, Sask., N.C., Maritime, West N.Y., Alta., La.

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Miscellaneous Net Reports

Net	*Sessions*	*Check-Ins*	*Traffic*
North American SSB	27	557	428
Clearing House	31	420	602
7290	44	1798	1562
QTC	—	232	236
Mike Farad E & T	29	178	145
Interstate 75M SSB	31	984	586

QST

Strays

Bill Smith, WA3JHB, sent us this photograph of his unique Ohio call-letter plates. Since taking the picture, Bill has moved to Pennsylvania and had to give up the plate, but fortunately it was picked up by another ham, WA8AWD. Bill notes that Ohio **CQ 88** belongs to a CBer and a **CQ 40** belongs to another ham.

Correspondence From Members-

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

I PASSED!

¶ I passed my General amateur radio license test on August 20, 1968. This was accomplished by copying W1AW every evening. Thanks for the help.

I will be 81 years of age on December 6, 1968. — *George W. MacCool, WA3CZI, Philadelphia, Pa.*

¶ Now that I can insert "Amateur Extra" in the blank space on the renewal card, let me offer a few words of sincere appreciation to the ARRL for providing the stimulus that led to the upgrading of my license.

Frankly, my reactions were strongly adverse when you first came out with your proposal for incentive licensing, since at the time it seemed an almost hopeless goal for this aging professor of Greek and Latin to pack into his noggin sufficient up-to-date electronic knowledge to pass the Extra Class exam. But with the constant encouragement (I might almost say badgering) offered in the pages of *QST* ever since the proposal was first made, and with the helpful material contained in the recent editions of the *License Manual*, especially the current *ARRL Handbook*; the task was somehow accomplished. Believe it or not, I really enjoyed the work of preparation which proved to be much less formidable in reality than it had appeared in prospect back in 1963.

I've told my friends on the c.w. subbands that my main motivation in taking the Extra Class exam was my reluctance to get down to work and build a 25-kc frequency divider for my crystal calibrator; but just between us, it was ARRL's hectoring that did the trick. For that, my sincere gratitude to you. Keep up the good work with the goad! — *Edward W. Burke, K8VWN, Cincinnati, Ohio.*

¶ WB2NOD's Ham-ad in September *QST* shows results of "National Incentive Licensing Poll" (639 against, 178 for). There must have been hundreds, maybe thousands, of amateurs like myself who were too busy studying, practicing and passing amateur Advanced and Extra exams to take time to vote in this poll. Now that the poll is finished, I suggest WB2NOD and his "SCCARC", whatever that is, get on the ball too. — *W. E. Horner, Jr., W4IQO, Sanford, N.C.*

¶ I passed my Extra Class exam today. In all fairness, I must admit that it took some effort on my part, but I cannot overlook the effort that you expended in order that I pass it. First, of course, I could not have made it without the W1AW code practice sessions and the license manual. But I wish to express special gratitude for the excellent six-part (March–August) series on higher-class license examinations. What I most appreciated was the series of multiple choice questions that followed each article. — *Frank E. Fisher, WA4UXQ, Arlington, Va.*

¶ I want to thank you for the wonderful job in *QST*'s Questions and Answers for higher-class license examinations coupled with the study-guide reference to the *Handbook*.

No doubt, *QST*'s study outline has made it possible for me to pass (on the first try) my Extra Class exam today without any trouble. The added time at 20 and 25 w.p.m. sent by W1AW is an excellent idea.

All in all, incentive licensing has re-awakened my interest in ham radio and believe me, it was worth the effort! — *Edgar Ladeira, WA2OKN, Brooklyn, N.Y.*

¶ After having obtained the Extra Class license, I would like to express my appreciation to the ARRL for the excellent study guide furnished to us in the new *License Manual* and the *QST* series of Questions and Answers guide. This material was so well prepared and presented that it seems almost impossible for one to fail the FCC exams after having studied this guide. I feel sure that I am not alone in saluting the ARRL for this fine service. — *P. Q. Partee, W4ABI, Miami, Fla.*

DOCKET 18266

¶ During my many escapades this month I also took on the reading of the Electronic Industries Association's proposal of a change in the rules governing the Novice License. Though I am a Novice I find myself in favor of the FCC's decision. I find that the reduction in code speed, 10-meter band privilege and a 5-year term, renewable license, totally unnecessary. A Novice Class license is meant for a Novice; not an Extra. It is a license that requires study, patience and a mastery of the code from which amateur radio became what it is today.

This I might add will not help my QSL reply but then again the minority often has the good of the majority in mind. — *John D. Kelley, WN3JYV, Annapolis, Md.*

[EDITOR'S NOTE: Docket 18266 appeared on page 83, September, *QST*.]

¶ Originally, the Technician Class was instituted to encourage electronic technicians to experiment on the v.h.f. and microwave bands. Today, this license has become a glorified CB license. My own observations show more "appliance operators" and less builders among the Technicians than in any other class. . . .

I make the following alternate suggestions to improve the status of Technicians:

1) Abolish the Technician license completely and give the present Technicians the option of taking the new two year Novice license, or

2) Give the Technician who has never held a Novice license the opportunity to resign his license and take a Novice license, or

3) Make the Technician Class open only to real Technicians; that is, make the test much more

difficult either with questions specifically on v.h.f. or from the Advanced and Extra Class licenses. Give the holders of the present Technician license the option of taking the new test and remaining Technicians or taking a Novice license, or

4) Establish two classes of Technicians. The lower class would require the same test as is in use today. This class would be limited to 220 Mc. and up. The Advanced Technician class would require the more difficult theory test as in 3 above plus one year of experience and offer full privileges on 50–54 Mc., 145–147 Mc. and possibly 29.4–29.6 Mc. or a segment of 160 meters. This would give better use of 220 Mc. and 432 Mc. and should also encourage the manufacturers to bring out more and better ready made gear for these bands. This would also give the man with no c.w. interest an incentive license to work for and encourage a higher technical knowledge among these amateurs, or

5) Encourage the use of c.w. by Technicians with several methods through League action:

a. Encourage v.h.f. c.w. nets.

b. Encourage local code practice sessions on v.h.f., perhaps through radio clubs.

c. Hold v.h.f. c.w. contests with special recognition for high scoring technicians.

d. Do everything possible to encourage manufacturers of v.h.f. gear to include c.w. capability in all ready made gear.

I am offering these suggestions in hope that they will stimulate discussion and lead to changes that will improve the quality of amateur operation on the v.h.f. bands, and pull Technicians out of their blind alley. — *Harry F. Hillman, W7DVZ, Oracle, Ariz.*

TWO YEAR NOVICES

¶ Issuing of two-year Novice licenses was a mistake. All the Novices I have talked to who have a two year license (which I had also up to a couple of weeks ago) plan to just sit on their licenses until time for expiration before trying for a higher class. Therefore, you have a kid who is going to be stuck with the horrible class of Novice for two years, rather than just one, with twice as long to become discouraged and quit. As for those who advocate that the two year license is often necessary to give the kid time to assemble a station, I say it's all a lot of baloney. It took me less than a year to build my transmitter, antenna system, and a half the receiver, plus appear before the FCC twice, and I am very slow at learning the code. As for the argument that it takes time to gather up the money, I say that if a person takes a year to get up enough money to be a Novice, he'll never get enough to assemble a satisfactory station, and will quit anyway. There are many widely varying privileges granted by passing this exam; probably 75% of them aren't even touched on by the exam. — *Steve Hurder, WA9WFY, Champaign, Ill.*

THANKS

¶ The Beginner and Novice section article of July, 1968 *QST* posed the question, "Where Did The Signal Go?"

After reading September 1968 *QST* I say, "Where did Lew McCoy go?"

Whatever happened I am sure was unavoidable. I just wanted to let you know that I always look forward to the writings of W1ICP. — *Wendell Adler, Jr., WN2EQL, Saddle Brook, N.J.*

[EDITOR'S NOTE: Mac was temporarily laid low by illness some weeks ago; he's now back in full swing.]

¶ In reference to your comments on the additional code practice runs at 20 and 25 w.p.m.: by all means make this a permanent part of the late session of W1AW code practice. I feel that I owe my Extra to that additional practice. Many others either do or will soon find that these extra few minutes help learning to copy higher speeds. — *George Gorsline, Jr., WB4GWR, Blacksburg, Va.*

¶ I would like to thank your technical staff on the fine job it has done on writing the book, *Understanding Amateur Radio*. I read through that book for a few weeks and then started studying the *License Manual*. I could not believe how easy it was to get the answers and diagrams into my head. Keep up the good work, guys. — *David Anderson, WN1JXD, East Greenwich, R.I.*

¶ Please pass my bravo on to Mr. Burke, K2ENU, for his very down to earth eye opener, "Beware the Scrap Box," in September *QST*. His practical article has turned my junk box into a treasure chest. — *Dr. Robert L. Morgenstern, WN2EAW, Kew Gardens Hills, N.Y.*

¶ Thanks for the photo and write-up about [General Manager] Huntoon in the September issue. Photos, etc. about the Staff sure make us out here in the boondocks feel closer to our League. How about photos of the secretaries, lab men, etc.; even the janitor? We're interested in all of our staff. — *E. Kemper Fitch, W4DPR, Charlottsville, Virginia.*

[EDITOR'S NOTE: If our members enjoy "Behind the Diamond," we'll certainly keep it coming — roughly on a seniority basis.]

WHY THE RADIO CLUB?

¶ Why belong to a club? Of course, K6YA (September *QST*) is right about needing collective strength. He is right when he talks about the need to protect our frequencies. He is right when he talks about the need for friendly cooperation, but I joined the club for far more personal reasons.

First, the club has given me a new field of knowledge! Every clergyman should have knowledge in as many fields as possible. I can't tell you how enjoyable it is to sit with a group of men and talk electrical theory. It is a privilege simply to hear their world views. Ham radio has opened a whole new realm of information to me. "Farads," "reactance," "L/C ratio" were as foreign to me two years ago as a clergyman talking about "the eschatological significance of the Incarnation" is to the average layman.

My mind has been expanded by the club. It has given me those simple explanations that I could neither find nor understand in a book.

Secondly, the quality of men we have found in the ham ranks, especially those belonging to the club, is outstanding. There is comradeship and friendship. My son, who incidently is now a General while the old man remains a Tech. (someday I'll learn the code), has met the type of men I want him to meet. When he or I ask questions, even though they are probably on the kindergarten level, club members take their time and effort to explain a full answer. Club members are the kind of persons that I could leave my eleven year old son with on Field Day and never have a second thought to his safety or treatment. The men that we have met are from all realms of life, but they have one thing in common. They live the Amateur's Code of being gentlemen and friendly. All kinds of men, polished and rough, of great intelligence and lesser intelligence, of money and of

lesser resources, are all the same when it comes to being friendly and offering their cooperation.

The last and main reason for my enjoying the club is that I am accepted not as "the Rev." or "Father" but just plain "WA1HXK." Daily at meetings I attend, the group looks for my direction; in church groups, the final decision is often left to the rector. The buck stops with me. It is so good simply to be one of the gang; one who will be voted against when he is wrong; straightened out when he is off the track. For the first few months I even managed to keep my identity a secret. It is good to be treated as one of the boys. (Only at the last Field Day was I granted a special privilege. The boys allowed me to climb to the top of the tower to put up the two meter rotor and antenna on the basis that as a sky pilot I should know how to work near heaven!)

Yes, K6YA, we all need a radio club. We need it for obvious reasons, but I need it because of the knowledge I have received, the men I have met, and the wonderful feeling of being treated as just "WA". — *Rev. Gordon J. Stenning, WA1HXK, South Portsmouth, R. I.*

INPUT ESCALATION RACE

¶ That the League has had the fortitude to finally implement, and see through the FCC, a workable upgrading program for our game is appreciated by most thinking amateurs. This is despite the inconvenience it may have caused some of us personally. But it was the mature thing to do. Now, have we, through the League, the necessary guts to take the next step? Can we squash the "Input-escalation race"?

Most radio amateurs need a transmitter power of one kw. (or 2 kw. p.e.p.) as much as they need a hole in the head. Amateur radio is, I hope, still a *sporting activity;* a hobby. Save for an expedition or two, or some activities of MARS, we are neither expected nor requested to provide instant world communication upon request. Most amateurs, I believe, who suffer such delusions, possibly have mere ego-trouble or even that modern American disease, "status-itis". . . .

The disadvantages of greater-than-necessary radiated power are too well known to reiterate here, and are not rationally disputable at the engineering level. Why do not we, the thoughtful amateurs, through our League take the step to approach the FCC upon this matter? I leave the details to the League's wisdom, but suggest a power magnitude curtailment of ten, across the board, except for well-recognized special cases.

We are told that the power consumption of the human brain approximates ten watts. What does any amateur brain have to communicate so important as to require a hundred times this power for its dissemination? — *C.F. Rockey, W9SCH, Deerfield, Ill.*

SENIOR CITIZEN LICENSE—continued

¶ In the August *QST*, the "Senior Citizen License?" letter from OM W9MC makes a lot of sense.

Ham radio activity bulks large in my own plans for the future, and I know that it has contributed mightily to the peace of mind and well-being of numerous friends who have reached retirement age. Matter of fact, in several cases, being an active amateur has opened the door to a continuance of business activity after the boom has been lowered by the existing (and somewhat arbitrary) retirement requirements of many employers.

However, I do not agree with W9MC's discounting of technical and code requirements. I have assisted numerous chaps over 60 to obtain General tickets — and one has gone on to Extra. So for the "Senior License", I would think an examination requirement somewhere between Novice and General would be appropriate. Perhaps a code requirement of 8 or 10 w.p.m., and a technical exam tight enough to insure adequate comprehension of "who" goes on in the gear used, if for no other reason than to keep probing fingers off the power transformer terminals. A license term of five years would be appropriate, as I doubt that the FCC would go for an indefinite term.

Altogether, seems like a grand idea. It would bring some useful maturity into ham ranks. Why not put ARRL behind such a recommendation to the FCC? — *Al Smith, K3ZMS, Doylestown, Pa.*

¶ I would like to heartily endorse the suggestion regarding senior citizens licenses. This may sound selfish coming from one who is going on 67, but I doubt that I would benefit by such a generous and thoughtful change in licensing as it is usually a lengthy period from the time a suggestion is made and the time it becomes a matter of record.

However from my own experience I can say it was quite a struggle learning the code and passing the exam at 5 w.p.m. and after 6 more months of study I can only copy solid at the rate of 8 w.p.m.

With all the necessary data readily available in ARRL books the problem of becoming a good operator is negligible. Memorizing this data in order to take an exam, is another thing for one whose agility and retentiveness is not quite what it was a few years back. — *Ralph C. Bishop, WN7JKX, Grants Pass, Ore.*

¶ I operated from 1911–1925. I'm nearly seventy years old now and find I am unable to secure any form of license due to inability to learn all the things even a Novice ticket requires — technically — although I can copy *at least* 13 words per minute. I can't even be anything but an associate member, but I *have* been since my retirement. I have all of the ARRL books but even they give little consideration to us old timers due to terms there seems to be no explanations for, in so many articles. I might say that I feel sure there are many more like me that would really support ARRL *if* ARRL took sufficient interest in us oldsters who have been left out in the cold. Many of our health is such we cannot attend classes and many of us won't live long enough to learn all that is needed known. — *Jas. "Art" Wilson, Vero Beach, Fla.*

TECHNICIAN PROGRAMS?

¶ The development of a large number of permanent Technician operators interested only in phone operation would seem to justify some study of their problems and spectrum allocation . . .

The League could help the Technician by promoting development of rejecting TV boosters and requirements for such by the FCC.

Additional c.w. operation period on Novice frequencies might well appeal to Technician but their minimal use of it on v.h.f. would appear to reduce to significance.

I notice that election of directors is approaching. How about them suggesting some programs for improving the Technicians' lot and recognizing his permanent status and large representation though meager privileges. — *Fred Humphrey, K2ESF, New Paltz, N. Y.* QST

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

MONACO BECOMES MEMBER

With a unanimous vote, the *Association des Radio-Amateurs de Monaco* became the seventy-eighth member society of the International Amateur Radio Union. *ARM* is the official national society for Monaco. Its membership numbers twenty-one, and includes all sixteen of Monaco's licensed amateurs. In a message to *ARM*, IARU president WØDX said, "We are pleased to have your society as a Union member, and look forward to working with you in the interest of amateur radio."

RECIPROCAL OPERATING

Kenya recently rejected a U.S. inquiry about reciprocal operating but indicated, however, that Kenya, Uganda, and Tanzania will continue the past practice of issuing special amateur operating permits to aliens on an individual basis. Amateurs seeking further information should write the *Radio Society of East Africa*, P.O. Box 5681, Nairobi, Kenya.

The reciprocal operating agreement between the United States and the Netherlands (including the Netherlands Antilles) has been extended to include Suriname (PZ). U.S. amateurs seeking to operate from PZ may obtain the necessary information from *Vereniging van Radioamateurs in Suriname*, P.O. Box 566, Paramaribo: Suriname amateurs wishing to operate in U.S. may obtain forms from ARRL headquarters.

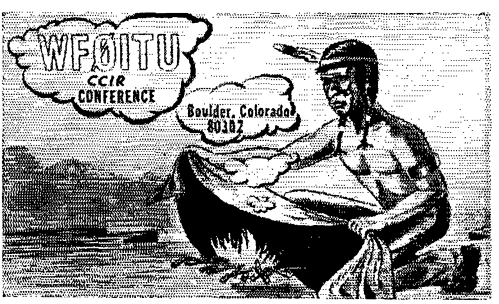
As this issue goes to press, we learn that a reciprocal operating agreement between Barbados and the United States was signed and became effective September 12, 1968.

NEW KOREAN CALLS

The Ministry of Communications, Republic of Korea has authorized the United States Forces, Korea the use of the HL9KA-KZ, HL9TA-TZ, HL9UA-UZ, HL9VA-VZ, and HL9WA-WZ series of amateur station calls. Some of the HL9U series are already assigned and will be on the bands shortly. (Info via Richard W. DeWeil, Director of Amateur Operations, United States Forces, Korea.)

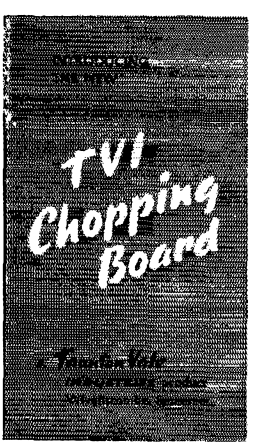
MAURITIUS ISSUES AMATEUR LICENSES

For the first time since its recent independence, the government of Mauritius has conducted examinations for amateur licenses. Despite the formidable problem of no common language (Mauritians speak French, English, Hindi, Tamil, Urdu, Creole, or Chinese.), four candidates passed the English language examination. *RSGB* and *ARRL* had supplied the *Mauritius Amateur Radio Society* with English language textbooks for their licensing program.



This is the QSL of special events station WFØITU set up for use by delegates participating in the International Telecommunications Union CCIR (study group) conference sponsored jointly by the University of Colorado, the Environmental Science Services Administration, and the National Bureau of Standards in Boulder, Colorado.

Strays



Canadian Division Director, VE3CJ received as a Christmas gift, one of the devices described in the above photo. Noel says that he hears enough of TVI without having a commercial outfit promoting it!

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

Meteors at 432 MHz.

METEOR scatter (m.s.) at 144 MHz. has been well exploited in the past dozen years, and random m.s. has received much attention in the last two years. We have found 1000-mile m.s. contacts possible almost any night we keep a schedule. There are still non-believers, but mid-western 2-meter men are changing that. Few amateurs have tried m.s. above 144 MHz., but as reported last month, four stations have been successful at 220 MHz. A handful of operators are now exploring 432 m.s. possibilities. Is an m.s. contact at 432 likely?

Some schedules have been kept, but without positive results. Pings have been heard. Whether or not they were of meteor origin is questionable. Lightning-originated pings would more likely be the case. I would be amiss to say that m.s. is not possible on our lowest u.h.f. band, but let us examine the results of a 440-MHz. radio-echo study at the Massachusetts Institute of Technology.

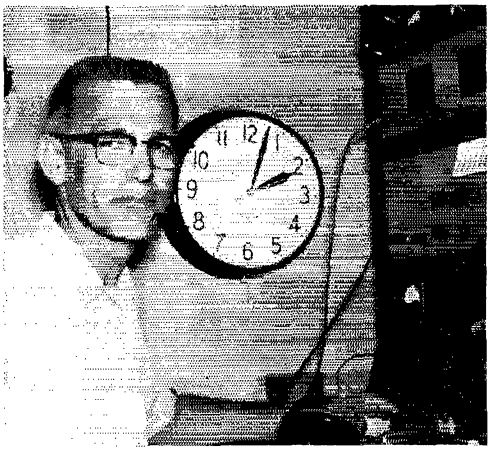
Their transmitter ran *2 megawatts*, the antenna was an 84-foot paraboloid with 37.5 db. gain over isotropic. The receiver had a 3-db. noise figure and 200-cycle bandwidth. MIT observed some three thousand meteors, 90 percent had durations of less than *one-half* second! They concluded that (a) the detected meteor height at 440 MHz. is substantially the same as at a lower frequency, so path distance would be the same; (b) the effective scattering length of the trail is short, due to an almost immediate expansion of the ionized trail, the required ionization is therefore rapidly dissipated.

The power difference between 2 megawatts and 1 kilowatt is about 32 db. You'll have to measure your own antenna gain, but converting the figures to the *best* the amateur is likely to produce, we should expect no more than *one* ping every *six to eight hours* on random meteors at 432 MHz.! Of course, the number of echo returns would be greater during a meteor shower. MIT concludes, however, at this frequency echoes are returned only from a small region close to the meteoroid head. At 144 MHz. the return also comes from the ionized trail, which, at 432 is almost non-existent. The slow-velocity Quadrantid and Geminid meteors appear to be the only ones worthy of exploration with amateur power levels.

The possibility of a 432-MHz. m.s. contact is remote, but it does, indeed, present a challenge to the serious worker. Aurora at 432 was thought impossible until two years ago. Will a 432 m.s. contact be made?

The full MIT report may be found in the *Journal of Geophysical Research*, Volume 70, Number 21, November 1, 1965.

*Send reports and correspondence to Bill Smith WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.



You have all worked, but seldom seen, John, K4IXC. He has 36 states on 144 MHz. and 1090 miles on 220-MHz. meteor scatter from Melbourne, Florida.

Pulsars — Signals from Stars?

The pulsar radio signals discovered last summer by radio astronomers at England's Cambridge University Mullard Radio Astronomy Observatory have stirred interest among amateurs. The extremely regular signals are emitted from four different locations in space. Three pulsars radiate r.f. energy at precisely 1.33 seconds, the fourth known pulsar has a 0.25-second rate. Their origin is believed to be within our galaxy, but at a distance of several hundred light-years. There has been speculation that the signals are being transmitted by an intelligent being, but the amount of electrical energy needed to produce the signals tends to make this explanation unlikely. Rather, growing conviction among radio astronomers is that the signals originate in white dwarf stars. White dwarfs are thought to be dying stars collapsed to a density thousands of times greater than water. Kitt Peak National Observatory has visually located a star believed associated with one of the pulsars. Further visual studies are underway.

The British scientists announced their discovery several months after detecting the first of the signals. Alan Parrish, K1KKP/2, Ithaca, New York was apparently the first amateur to receive the signals. He did so on the 2-meter band with a pair of 10-element Yagis and an intensity-modulated oscil-

loscope described in his January, 1968 *QST* article. It is worthy of close inspection for this and other weak-signal detection applications. Parrish says the pulsars may also be heard on a large array and a receiver with filtered output into a speaker having good bass response.

What frequency? The signals have been detected higher than 1400 MHz., and in fact, begin above that frequency, swishing down the spectrum at a rate of 30 MHz. per second at 144 MHz. K1KKP says the signals have an apparent instantaneous bandwidth of about 1 MHz.

There has been only limited material published on these signals. The interested reader is referred to *Sky and Telescope*, July, 1968. Position information is available there, or I can furnish that information to the serious worker, allowing at least two weeks for processing.

Most of us will not be able to detect the pulsar signals, or hear meteor pings at 432 MHz., but this month's material is intended for those who believe they have good systems to prove it.

K6MYC — SM7BAE QSO

Mike Stahl, K6MYC, and Kjell Rasmusson, SM7BAE, in Sweden, exchanged signal reports September 9th on 144 MHz. moonbounce. The distance is approximately 5800 miles. The contact was SM7BAE's first on e.m.e., coming about four months after schedules with K6MYC were begun. The contact lasted 32 minutes, ending at 0724 GMT, when the moon set for SM7BAE. The Swedish station was operating at an authorized input of 1500 watts, with sixteen 10-element Yagis stacked four wide and four high. K6MYC, who now has e.m.e. contacts with Australia and Europe on 144, was running his kw. and 160-element collinear.

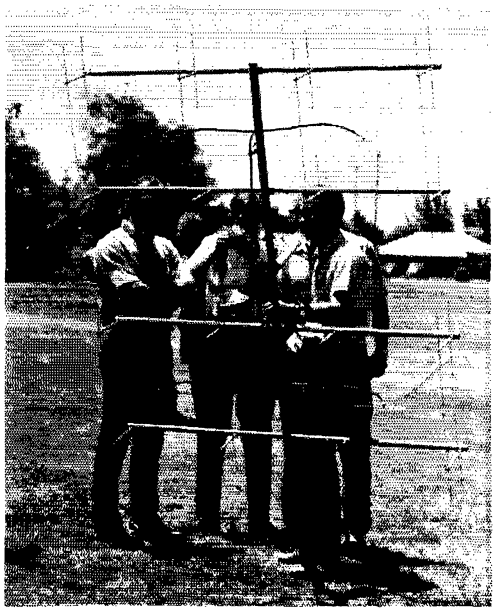
League Petitions FCC

We were disappointed the K6EDX/K6RNQ 50-MHz. petition was denied by FCC; see the October column. On September 13, however, ARRL petitioned FCC to suspend that portion of the so-called incentive licensing Docket 15928 pertaining to 50 MHz. The League's petition, RM-1287, asks FCC to review the 50 MHz. inclusion as a unique situation. (See "Haps" this issue.)

There was no FCC reply to RM-1287 at the time of this writing. Listen to W1AW bulletins for further details.

Central States V.h.f. Conference

The second annual Central States V.h.f. Conference was held at Missouri's Lake-of-the-Ozarks in late August. Some 130 of the outstanding v.h.f. men



K6JYO displays his 32-element extended collinear which measured 15.0 db. at the 1968 Fresno V.h.f. Conference. W6MMU won the 432 honors by two-tenths of a db. with a similar antenna. That is moonbouncer K6MYC with folded arms. (W6SUR photo)

from all U.S. call areas except the sixth attended. Canada and England were also represented.

Highlights of the conference were technical sessions by Bill McCaa, Jr., KØRZJ, Al Burson, K5WXZ, and Pitt Arnold, WØIPE. League Headquarters representative was V.h.f. Editor, Edward P. Tilton, W1HDQ.

The conference has been renamed the Central States V.h.f. Society. Next year's meeting is scheduled for Boulder, Colorado. In 1970 the event will be held in a more easterly city.

OVS and Operating News

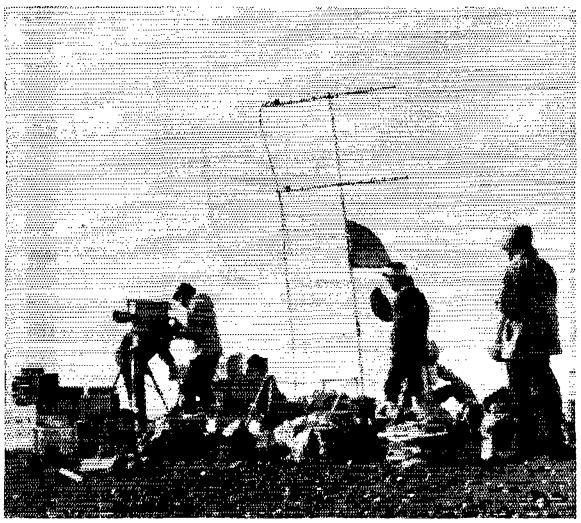
50-MHz. DX got off to an early start when KV4FU, Virgin Islands, caught transequatorial scatter (*TE*) the evening of September 4th, from CE3QG, Chile. The Chilean signal was soon joined by that of OA4C in Peru. This initial opening of the 1968–69 season lasted 2½ hours. And on the 5th, CE3QG was again copied at KV4FU. The 6th was apparently quiet, but on the 7th KV4FU worked CX7AG (Uruguay), CE3QG, OA4BR, OA4C, LU3DCA (Argentina), and had a partial contact with YV4BE, Venezuela. A solar disturbance on the 7th produced widespread aurora on six and two meters in the northern United States and Canada, but disrupted *TE* until the 10th. That night *TE* finally reached stateside as CE3QG and OA4C worked stations in Arizona, including WA7FJQ, and New Mexico for two hours. KV4FU began by working OA4C, followed by CE3QG. OA4C again worked into Arizona and New Mexico. KV4FU found similar South American openings the next five nights.

But the 16th was *the* day! The band opened for *F* between North and South America from 2200 to 2215 GMT, and then remained open via *TE* until 0400 GMT, the 17th. This was the first *F-layer* opening of the season observed in the southeastern

FLASH

Southwest Africa Worked on 50 Mc.

What may be the first 50-Mc. QSO with Africa from this country in solar cycle 20 was made on Sept. 28. W2PV, Schenectady, N. Y. was working ZS3E, Southwest Africa, early in the afternoon, on 28 Mc. They changed to 50 Mc. and worked 2-way on 6-meter s.s.b. Shortly after, W2JKI, Grafton, N. Y., also worked ZS3E. It will be remembered by 50-Mc. men who were active in the late 1950s that ZS3E was the most widely worked on 50 Mc. of any area in the southern part of Africa.



This is JA1AKA atop Mt. Fuji, Japan. Members of the Sekisen club are also exploring TV on frequencies up to K-band.

states. CE3QG's code wheel was heard at WB4HIP, Miami, 0030 GMT. The automatic transmission peaked S9 for an hour before Urly stood by. A quick report was exchanged. Then a power blackout in Santiago halted CE3QG for another 1½ hours! LU3DCA was worked by W4GDS, WB4BND, WB4HIP and WB4KUN. OA4C made history by working several stations in California, the first reported two-ways on 50-MHz. *TE* between W6 and Peru. One of those making the contact was WA6HXW, who also worked XE1PY, LU3DCA, CX6BX, and CE3QG. The opening extended as far north in California as Fresno, where K6MIO and WB6UYG worked CE3QG. WB6UYG also worked LU3EX. Stan says the signals were S9 with slow, shallow fades and no flutter. This opening was one of the best ever observed between North and South America on *TE*.

The evening of the 17th was similar. KV4FU worked PY5GK, Brazil, who runs 150 watts of s.s.b. to a 6-element Yagi. CE3QG, who has one kw. and 8 elements on a *53-foot* boom, was heard in Miami and worked Arkansas, Texas and California. OA4C was also working stateside.

South American activity appears good, with a half-dozen stations reported active in Uruguay and three or four in Chile and Argentina. All told, we can expect signals from six or eight countries on that continent, and there may well be some rare ones not already noted. Elsewhere, possibilities include ZB2BC and BO on Gibraltar; ZS1JD, South Africa; 5W1AR, Samoa; DU1FII, Philippines; numerous Japanese stations, and several Australians above 52 MHz. W8GZ is scheduling the VKs with a rhombic.

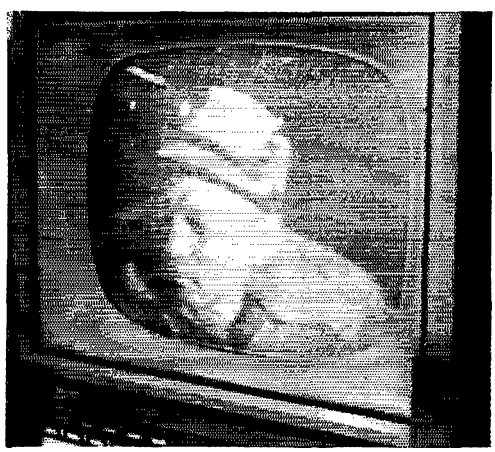
With the earlier-than-usual September openings, 50-MHz. DXers are encouraged that there will be more F_2 this month and next spring. *TE* openings undoubtedly will be numerous. We hope all 50-MHz. DXers in the United States and elsewhere will forward Cycle-20 observations, so an accurate report may be published.

E_s suffered the expected late summer and fall doldrums, but the minor December E_s peak is just a few weeks away. K8SBN/KL7, Sitka, Alaska, now signing KL7GLL, worked more than 40 Washington and Oregon stations July 31 and August 12, 14 and 16 openings. Gene's best DX was W7EGN, Montana. Excellent E_s was observed September 10th over the southeastern quarter of the country. Thanks to WA2PMW, W6DPD, K7ZOK, WA7GFP, W8NOH, and VE1ACJ for their August reports.

September v.h.f. contest scores will reflect much contrast. An excellent aurora the evening of September 7th fattened scores of VEs and W1s, 2s, 3s, 8s, 9s, and 0s, while other areas went begging for contacts and multipliers.

144-MHz. tropo has been spotty, but meteor scatter addicts continue adding to their states totals as you see in this month's standings. Last month we listed early Perseids results. Here is a final tally.

W1JSM: W4WSR, Fla; WØDRL
K2HLA: WØDRL
W2NTD: WØBFB
K4GL: K1WHS, K1WHT, K1UGQ, WA2CJK, WØEYE
K4QIF: W4CKB (twice), W5RCI, WA9DOT, WØDRL (twice), W0NXF
W4WQZ: K1UGQ
W5MCC: WA9DOT, WØDRL, KØMQS
W5RCI: K1HTV, K1WHS, K1WHT, K1UGO, K4QIF
K6JYO: W5ORH, W7UBI (Idaho), VE7BQH
K7ICW: W5HFV
WA9DOT: W1VTU, K4QIF, W4FJ, W5GVE, W5MCC, K7VTM (Wyoming)
WØDRL: K1ABR, K1HTV, K1WHS, K1WHT, W2AZL, K2HLA, K2RTH, W3KWH, K4GL, K4QIF, W5MCC, WA5MFZ, K7NII, W8IDU, WØEYE and VE3EZC.
WØENC: W3KWH, W8IDU (twice), VE3EZC
WØLCN: K1UGQ, K2RTH
WØLFE: K1ABR, W1AJR, K1HTV, K1UGQ, W1VTU, WA2CJK
WØNXF: K7VTM
VE3EZC: W5GVE, WØDRL, WØENC, WØNXF
VE3EZT: W5HFV, WØRLI
VE7BBG: WB6VYM
VE7BQH: K6JYO, K7NII



Eleven members of Japan's Sekisen Amateur Radio Club recently climbed Mt. Fuji with 435 MHz. TV equipment. The 5-watt TV picture of JA1AKA was received at JA1YNW, 144 miles, and a two-way TV contact made!

These contacts were made between July 25 and August 15, during the Aquarids and Perseids showers. This year and in 1967 the Aquarids shower (July 26–Aug. 4) received more attention than previously, and proved worthy of it.

The Perseids was W1JSM's final effort from Massachusetts before moving to New Hampshire. Don leaves his Boston location holding top honors in the first call area, 35 states, 8 call areas and 1400 miles. Now he begins anew and wants schedules. His address is Don Brown, 638 Post Road, Greenland, New Hampshire 03840. K4GL and W0EYE scored the first South Carolina to Colorado 2-meter contact August 12 on a 2-minute burst! And K4GL needed *only RRs to complete with* K5TQP *in* New Mexico. September 8th K4GL worked his state number 30, when he exchanged reports with W9UNN, Illinois, on random meteors. Showers help, but you don't *really* need them, eh Jay? In Virginia, K4QIF heard WØBFB, Iowa, on tropo August 11, 950 miles. W5GVF says the Perseids came and went without his accomplishing much, but he had long-haul schedules with K1HTV and K2HLA. Bill did manage five "routine" contacts, however, and says the Aquarids produced numerous S2-S3 bursts separated by 5 to 15 seconds of silence. K6JYO found long-haul schedules with WØDRL and WØENC disappointing. WØLCN comments on 2 meters and m.s., ". . . the stations have got to *spread out*. On August 11th and 12th I identified five stations using 144.030!" Clair is not the first to make this comment. And as activity increases, he won't be the last. There is no reason for not using more than the bottom 100 KHz. Could we encourage more Technicians to explore the long-distance possibilities of 144 MHz. by better band usage? K5BDQ, Victoria, Texas, says he is exhausted from calling CQ on 145.08 and hearing contacts in only the lower 200 KHz.

How about that WØDRL? Al has done an exceptional job representing Kansas on 2 meters during 1968. And m.s. fans welcome Wyoming's new meteor-ping artist K7VTM. A reliable Wyoming signal has been long-sought on all v.h.f. bands. K7VTM also operates 50 MHz.

KØMQS and K6MYC continue their moonbounce schedules. KØMQS hears his own echoes from a rhombic array similar to that at VK3ATN. Dick has added four more rhombics to the original stack of four. The top of the eight-rhombic array is at 50 feet.

Here is another E_s report. W4WNH/5, New Mexico, heard Florida and Louisiana f.m. broadcast stations at 2145 GMT, August 16. Any two meter contacts?

WA9OIT, Chicago, wants 144- and 220-MHz. schedules. He has 100 watts on both bands. There were no 220 reports this past month, except from WØEYE, saying he was scheduling K4GL during the October Orionids meteor shower.

420-MHz. popularity continues to grow. W4FJ has tied states-worked leader W5RCI at sixteen states. Ted's sixteenth was W1QVF in Connecticut, worked September 8th. W4FJ worked K2CBA near Albany, the same evening, as a large high-pressure area drifted across the mid-Atlantic and New England states. W1QVF runs a 4X150A and stacked 13-element Yagis. W5UKQ, Louisiana, worked his sixth state — *Louisiana* — on September 8th. They're all difficult until you work 'em, even your own! John has a pair of 4CX250Bs and a 10-over-10 J-beam up 100 feet. WA9HUV and W9WCD worked W5RCI in late August, a new one for each of the Illinois stations. WA9HUV now ranks second in the 432 standings; 15 states, 7 call areas and 780 miles. Norm is scheduling W5ORH hoping to equal W4FJ and W5RCI. The competition is getting tough on 432!

September 16th, W5RCI in Mississippi and WØDRL, Kansas, made what is apparently the first 432 *lightning scatter* contact. Both stations pointed their antennas at a very intense thunder-

(Continued on page 150)

2-METER STANDINGS

W1JSM	35	8	1400	W5HFV	27	10	1285
K1ABR	34	8	1478	K5TQP	27	7	1254
W1AZK	34	8	1412	W5MCC	23	8	1430
K1WHT	31	8	1300				
K1WHS	29	8	1300	W6GDO	17	4	1326
K1UGQ	29	8	1280	W6WSQ	16	4	1390
K1HTV	28	8	1301	W6NLZ	12	5	2540
K1BKK	26	7	1275	K6HMS	11	4	1258
W1HDQ	24	7	1040	K6JYO	11	4	1240
K1MTJ	20	7	1225				
K1JIX	18	6	800	W7JRG	27	6	1320
K1RJH	16	6	675	K7NII	24	5	1290
				K7ICW	16	4	1246
W2NLY	37	8	1390				
W2CXY	37	8	1360	W8PT	41	9	1260
W2ORI	37	8	1320	W8IDU	27	8	1150
W2BLV	36	8	1150	W8TIU	24	8	1000
W2AZL	35	8	1380	K8ZES	22	8	675
K2HLA	34	8	1300	WA8VHG	13	6	465
WA2FGK	33	8	1340				
W2CRS	26	8	1270	K9SGD	42	9	1300
K2YCO	20	7	750	WA9DOT	41	9	1303
WB2FXB	20	6	915	K9UIF	41	9	1150
K2DNR	19	6	1010	W9AAG	37	9	1200
WA2PMW	19	6	1000	K9AAJ	37	9	1200
				W9YYF	32	8	1050
W3RUE	36	8	1100	WØBFB	45	10	1350
W3KWH	33	8	1335	KØMQS	42	9	1216
W3GKP	32	8	1108	WØNXF	41	10	1326
W3BDP	23	8	1100	WØDQY	41	9	1300
K3OBU	21	7	930	WØLFE	38	9	1040
K3CFA	21	6	950	WØEYE	35	9	1380
W3HB	19	7	1310	WØENC	33	9	1334
W3LHF	19	6	700	WØDRL	25	9	1295
				WØLCN	23	6	1000
W4HJQ	39	9	1150				
W4WNH	38	9	1350	F8DO	1	1	5100
W4HHK	38	9	1280	KH6UK	2	2	2540
K4EJQ	37	8	1125	OH1NL	1	1	5850
K4IXC	36	8	1403				
W4CKB	34	8	1325	VE1AUC	7	2	500
W4FJ	34	8	1150	VE2HW	11	5	800
K4QIF	33	8	1225	VE2BGJ	9	4	600
W4VHH	33	8	1100	VE2DFO	9	4	600
W4AWS	29	8	1350	VE3EZC	33	8	1283
K4GL	24	8	—	VE3AIB	29	8	1340
				VE3EVW	22	8	1100
W5UGO	42	10	1398	VE3ASO	21	7	850
W5RCI	42	9	1280	VE7BQH	3	2	1248
W5AJG	33	9	1360				
W5UKQ	29	8	1150	VK3ATN	3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised May, 1968.

220-and 420-MHz. STANDINGS

220 MHz.							
W1HDQ	13	5	450	W3UJG	9	4	400
K1JIX	11	4	600	K3UIV	9	4	310
K1BFA	7	3	225				
				W4FJ	16	6	665
K2CBA	17	5	1090	K4EJQ	12	5	550
W2SEU	12	5	325	K4QIF	12	5	500
W2CRS	8	3	200	K4NTD	8	2	835
K2DNR	7	3	175	W4VHH	4	—	450
W3UJG	14	5	460	W5RCI	16	5	725
W3RUE	10	5	480	W5ORH	11	4	700
K3IUV	10	4	310	W5AJG	7	3	1010
				W5UKQ	6	2	500
K4IXC	3	2	1090	W5AWX	3	2	222
				W6DQJ	4	2	360
W5RCI	8	4	700				
W5AJG	3	2	1050	K7ICW	4	2	225
				W7JRG	2	2	420
W6WSQ	1	1	825				
W8PT	11	6	660	W8PT	13	7	715
				K8REG	12	5	625
WØEYE	5	2	825	K8DEO	11	6	450
				W8RQI	10	6	425
VE3AIB	7	4	450	W8HVX	9	6	465
				W8MNT	9	6	165
420 MHz.				W8FWF	7	4	450
K1JIX	10	4	385	WA8VHG	6	4	290
W1HDQ	10	3	250				
K1BFA	6	2	250	WA9HUV	15	7	780
				W9AAG	12	4	600
W2BLV	13	5	500	K9AAJ	11	5	425
K2CBA	12	6	3000	WA9NKT	9	3	400
K2ACQ	9	6	525	W9JIY	7	4	300
K2YCO	8	6	550				
K2UYH	9	4	350	WØDRL	14	4	625
WA2EUS	9	4	260	WØEYE	5	2	425
K2YCO	8	6	550				
W2SEU	6	4	220	VE2HW	3	3	750
				VE3EZC	7	5	510
W3RUE	13	6	585	VE3AIB	5	4	450

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Whodunnit, and Why?

LEGEND has a weedlike habit of growing all over our amateur radio tradition. So much of that tradition has its source in the very early days of communications history that the original idea is often mislaid and fancy, rather than fact, becomes accepted because it is limited only by the imagination. Fancy seems so much more exciting than the actual facts. There are, however, times when the real story is far more interesting than the legend that obscures it.

November marks the birthday of YLRL. In the growth of this oldest of women radio operators organizations, tradition that is exclusively feminine has developed into the symbols of the club. We are all aware of this symbolism of YLRL, but not all of us know the "WHY" of the blue and silver diamond with the scroll,

"YL on the Globe"

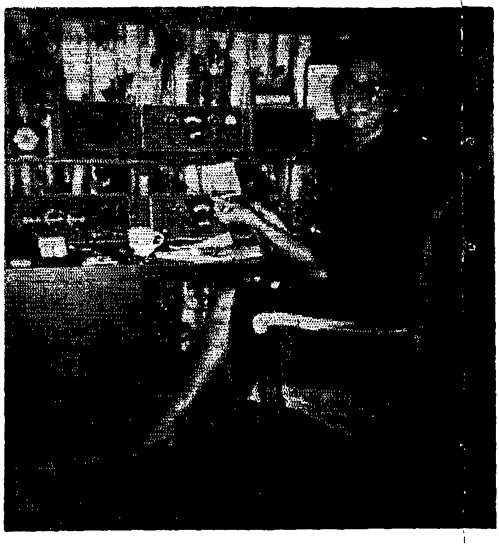
the gal on the globe of *Harmonics*, QRV as a motto, or that baffling, most questioned "33" with which we sign? Before these identification marks that *are* YLRL become obscured by some flight of fanciful theory it might be worth while to find out just who was responsible for each one, and her reasons for suggesting them. The best sources for this "whodunnit" search are the gals who thought them up.

That frothy, feminine "YL on the Globe," familiar to every member of YLRL as the design on the cover of *Harmonics*, the official publication of this organization, was the result of a contest sponsored by YLRL for an official cover design. Viola Grossman, W2JZX, submitted this winning sketch which was based on love of DX hunting, and as Viola explains it, "Any YL with her license and her equipment is literally sitting on top of the world." Formerly very active in traffic nets, a member of YLRL, ARRL, QCWA, and RSGB, Viola is now a commercial artist.

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

YLRL "Diamond Emblem"

The diamond shaped emblem has become the basic symbol of many amateur radio organizations; ARRL, RSGB, and IARU all employ this design. The dark blue diamond with the silver scroll was the idea of YLRL's founder and first president, Ethel Smith, K4LMB, then W7FWB. Ethel says: "The diamond was intended to indicate our support of ARRL, and the scroll seemed to lend itself to inscribing the abbreviation for Young Ladies Radio League." The



Marte Wessel, KØEPE, 1969 YLRL President

Clara Reger, W2RUF, the lady responsible for the introduction of "33" into the YL vocabulary

choice of colors has a simple answer, "because I liked them." As easy as that.

Anita Bien, W8TAY, one of the initial group who worked so hard to make YLRL a success, chose "QRV" from the List of International Abbreviations (that's the formal designation for what we blythly call the "Q-Code") with its meaning "I am ready" for the motto of the club. There need be no question as to whether this was an appropriate choice or not with the history of YL activity in public service, refer to the records of: W3CUL, WØLGG, W2RUF, K8LGA, KØONK, WA4SKI, read the list of Public Service Awards following a major disaster, the BPL list each month, the YLs who have served, and are serving their Sections as SCM, SEC and EC; the many, many women in Army, Navy, and Air Force MARS with their untiring efforts to keep military personnel all over the world in touch with their homes. Here is enduring proof that Anita chose wisely, and knew her YLs well when she chose that motto for us.

The real sixty-four dollar question about things YL is the one on that mysterious "33" we use as a signature with another YL. On c.w. it is a rippling combination of numbers, on voice it flows smoothly with its exclusive feminine significance. This "33" did not begin with the birth of YLRL as did our other symbolism. It began as the personal signature of Clara Reger, W2RUF. Clara explains it this way: "Long before YLRL started, when YLs were few and far between, warm friendships also started since we were working the same gals constantly. I thought we should have something other than 73, 88 was a bit too mushy, so I started using 33. It caught on as a signature between YLs.

"So frequently this friendship calls for something a little warmer than a mere 73, so when YLRL adopted it the meaning was defined as 'Love sealed with friendship between one YL and another.'" That is the answer. The 33 originated in 1935 when Clara was W8KYR, before WNY was absorbed into the second call area.

Clara, Anita, Ethel and Viola are responsible for the feminine touch in the tradition of amateur radio, and are the gals we should thank for giving us our lasting symbolism.

Results YLRL Election, 1968

The election results are in despite the Canadian Postal Workers' strike, and here are the new officers for the year 1969.

President	Martha Wessel, KØEPE
Vice President	Ebba Kristjansson, VE5DZ
Secretary	Ivy Smythe, VE3EZI
Receiving Treasurer	Tony Chapman, K8PXX
Disbursing Treasurer	Janice Fontana, WB2JCE

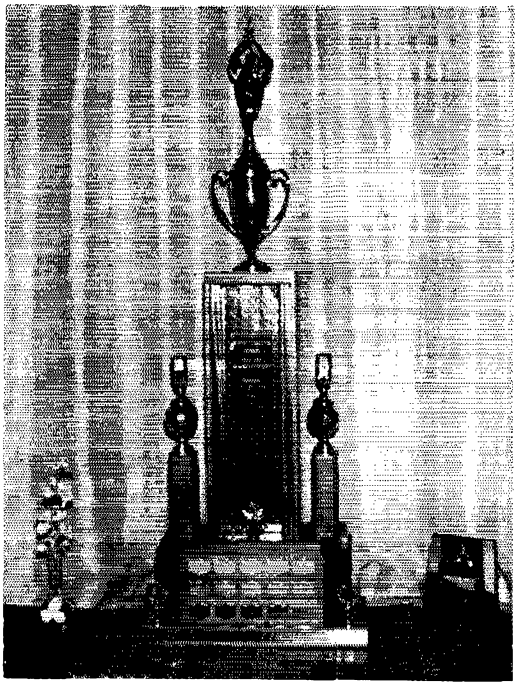
District Chairmen:

1st District	Carolyn Thompson, K1BJZ
2nd District	Gretna Longware, WA2WHE
3rd District	Harriet Creighton, WA3ATQ
4th District	Shirley Hill, W4WPD
5th District	Annie Smith, K5JKV
6th District	Deborah Willson, WA6EVU
7th District	Jane Reichlan, W7LXQ
8th District	Marge Farinet, K8ITF
9th District	Dori Leiser, W9VNG
10th District	Martha Shirley, WØZWL
KL7 District	Elaine Mitchell, KL7FNM
KH6 District	No Candidate
VE District	Mildred Graham, VE3GTI

Congratulations and best wishes to each of the successful candidates for a most successful term of office in this the oldest of all the womens' amateur radio clubs.

The Trillium Memorial Week

The Albert Theodore Jensen Memorial Trophy was donated to the Trilliums by Dot and Jack Abel in memory of a truly great amateur. In 1967 the



Albert Theodore Jensen Memorial Trophy

Trilliums instituted the Memorial Week to perpetuate his memory by on the air operating with the Memorial Trophy as an award for the highest total contacts.

The rules are simple:

Dates: November 23 to November 25, 1968.

Times 0030 GMT November 23, to 0030 GMT, November 25, 1968.

The Trilliums, being the host club, will call "CQ TMW." All others will call "CQ TOT."

Exchange signal reports, name, and QTH. Trilliums will give their club numbers.

Scoring: c.w. contacts count 2 (two) points. Phone contacts count 1 (one) point. Low power multiplier 1.25 for all transmitters running 150 watts c.w., 150 watts a.m., 300 watts p.e.p. or under.

Each Trillium station may be contacted once only regardless of band or mode. Logs must show date, time in GMT, RS or RST, band, mode of emission, TOT number, name and address, and claimed score and must be signed by the operator.

Send logs to: Bubbles Timlick, VE4ST, 1317 Magnus Avenue, Winnipeg 14, Manitoba, Canada.

A contest to perpetuate the memory of an amateur radio operator is the nicest tribute anyone could give. In this case there is an added lure for those of us who are interested in certificates, for what better way can we acquire that WAVE? In this case with exclusively feminine contest this could be a WAVE/YL because of the wide coverage of this Canadian YL club.

It Isn't Too Late

If you missed the first half of YLAP, there is still time to get into the contest for the final weekend. It is as easy as calling "CQ YL," and the results are well worth the effort of firing up the rig for this "for women only!" contest to celebrate the birthday of YLRL. See October *QST*, YL News and Views for details.

Plan Ahead

Before the holiday season knocks everything else off the "must do" list, and as soon as the new calendars appear in the shops, remember, when you are marking the birthdays and the anniversaries and contest dates, the Mid-West YL Convention in Toronto, May 16–19, 1969. The Ontario Trilliums will be our hostesses this time with Doris, VE3BBO as the list checking chairman. It will be an affair well worth attending so start planning.

Ebba Kristjansson, VE5DZ, 1969 YLRL Vice President enjoys DX and contest operation and works only c.w. Of Swedish descent, Ebba enjoys QSOs with SM-land in Swedish.

Helen Harris, W1HOY/KP4

To badly paraphrase a worn cliché, in the lexicon of the Harris family there is no such word as acrophobia, for the higher the frequency, the happier they are. There are few in amateur radio, and no one in the 50 MHz-and-up fraternity who are more familiar to all of us than Helen and Sam Harris, W1HOY, and W1FJZ, formerly co-editors of The World Above 50 MHz, in *QST*.

Helen Harris, W1HOY/KP4

Helen's amateur radio license arrived on her birthday in 1955, and to nobody's surprise her activity has remained way up near the top of the spectrum. To begin, she chose 50 MHz. as the spot where she wanted to work, and operated all a.m. emission while she was in New England. When she and Sam added the /KP4 to their call signs, she switched to s.s.b.

Helen holds sixty two certificates including WAS #55, which she received in 1958, and the 500 County Award #88. (Remember, all her operation is v.h.f.) She holds the Cup awarded to the winner of the YL VHF Contest in 1964, and YLCC plus 3 stickers. All of her awards are from this country except one, the WGSA certificate from Sweden for working two amateurs in Gothenburg on 50 MHz.

She has been a member of YLRL since 1956, ARRL, Charter Member of WRONE, and the Rhododendron Swamp VHF Society. Also was DC for the YLRL First District in 1961, and, in 1964, 1965 was YLRL Eastern Membership Chairman. A certificate of appreciation was issued to Helen for her work as Publicity Chairman for YLRL.

There are few of us who treasure a letter from FCC, but the one addressed to W1HOY was a little different. This was a request for information as to band and exact frequency she was operating on a certain date and time during the last sun-spot cycle. The FCC had received a TVI *inquiry* (not complaint) from England where W1HOY was reported to have caused a great deal of interference during a very popular TV program! The English TV frequency is in our 50 MHz. band. How's that for getting out of the back yard? During that same sun spot cycle Helen managed to work twenty two countries on 6 Meters. One of her more amusing moments is when Sam is working the low frequencies and talks to someone in Europe who tells him that he worked Helen on 50 MHz. years ago. QST

—···—

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

Strays

W-VK AFSK RTTY Tests on 28 MHz.

To facilitate communication between the Australian and U.S. Oscar groups (the Oscar satellite next in line for launching is being assembled in VK-land) an experimental program using autostart a.f.s.k. RTTY was begun on October 1, with W6HDO at the U.S. end of the circuit. Under Special Temporary Authorization from FCC, the authorized frequency is 28,890 kHz., with amplitude modulation using audio tones of 2125 Hz. (mark) and 2975 Hz. (space). Autostart is triggered by a 30-second 2125-Hz. tone before message transmission commences. Australian stations will use the same frequency and modulation.

As this is being written the tests are just getting under way and there are no firm schedules, but the usable period probably will be 2000 to 0400 GMT, with peak conditions expected around 0200. The most intensive activity is expected to be on Sundays from 2200 to 0400 GMT. Teletype standards will be those in use by W stations — 5-element code, 60 w.p.m.

RTTY stations everywhere are invited to copy the transmissions of both W6HDO and the VKs. The converter described by W6HDO and W6GXN in May 1968 *QST* is one way of translating the signals.

Recently members of the Wireless Spaghetti Network Club got together at the home of W1LQZ to welcome I1OVL. Shown from left, are WA1CTZ, W1LQZ, I1OVL, W1SUQ, K1UOV, and W1KVP. WSNC with headquarters in Rome, has an international membership of 99.

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

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

W1, K1, WA1, WN1[1] — 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, Valley Hill Rd., Malvern, Pennsylvania 19355.

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

WA4, WB4, WN4[1] — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.

W5, K5, WA5, WN5 — Hurley 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.P. Box 555, Portland, Oregon 97207.

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

W9, K9, WA9, WNØ — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.

WØ, KØ, WAØ, WNØ — Alva Smith, WØDMA, 238 East Main St., Caledonia, Minnesota, 55921.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Dorval, Quebec.

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

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

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

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

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

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

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

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

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.

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

[1] **These bureaus prefer 5×8 inch or #50 manila envelopes.**

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When:

Some of the unusual activities of our ham pal Grommethead Schultz are almost believable. Others flop somewhat short of the credibility gap. November will always bring to mind, for example, the time he invited us over for Thanksgiving goose. His secondary hobby then, we recall, was taxidermy. Stuffed birds perched all over the place.

Grom showed off the new shack while his auto-range expertly roasted our dinner, a most aromatically appetizing procedure. Plenty of fresh rare QSLs on Schultz's walls, stuff we'd been stalking unsuccessfully for some time. This turned our chitchat to antennas, particularly since Grommethead's skyhook was nowhere in sight on the premises.

"No outside antennas allowed in this subdivision," explained Schultz, "but we make out okay."

"Oh, good old No. 40 wire in an invisible beam," we surmised.

"No chance," said Schultz. "The super comes through twice a week dragging heavy chains."

"Aha, an underground antenna," we concluded.

"Not exactly. Tried a deep one but QRM from Chinese commercials was rough. Here's what I'm using now, a sort of Marconi with zip. Stand back!"

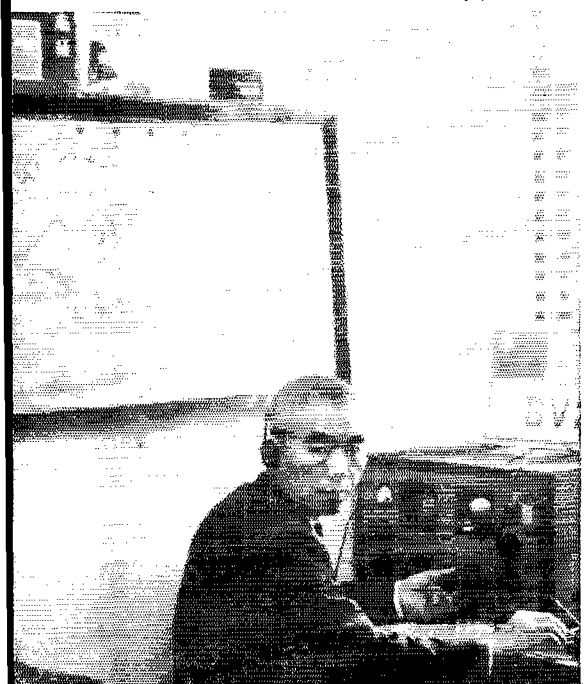
Grom turned on the rig, counted to ten, listened on frequency briefly, and sent some Vs. You wouldn't believe it. Every time he pressed the key a shiny lance-like object shot up through a tiny hole in the floor and popped out through a similar hole in the ceiling. Every time he let up on the key the darned thing whizzed back and disappeared somewhere below. Two VU2s appeared on frequency and complained about QRM.

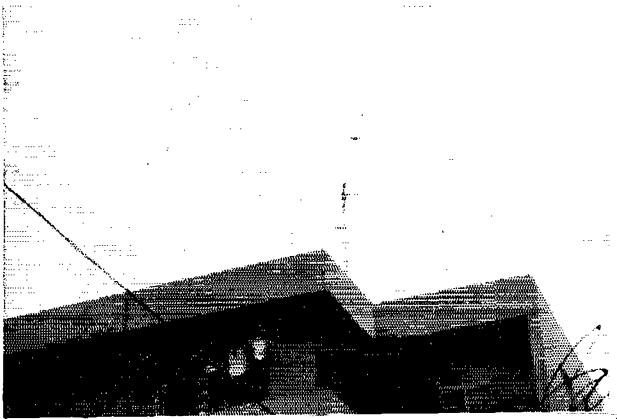
"I call it The Piston," said Grommethead, leading us down to the cellar. "Simple but effective."

Simple for Grommethead Schultz, maybe. In the basement we saw two huge flywheels whirring in opposite directions. With a test key Grom showed us how the flexible whip was flipped out by one wheel, retracted by the

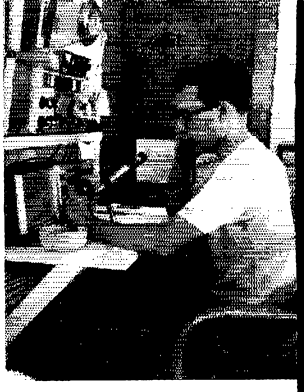
—Reprinted from September, 1954, *QST*

*7862-B West Lawrence Ave., Chicago, Ill 60656.





BV2A represents Taiwan almost singlehandedly, mainly on 20-meter c.w. Chin signed 3YW, C3YW and XU6A in a DX career that goes back to 1930. (Photo via W1ARR)



KX6FJ is a typical product of the new Kwajalein ham boom. Stan mixes in plenty of traffic and contest work with routine DX pursuit. (Photo via W1ARR)

other, almost instantaneously. "Nice c.w. shaping when properly adjusted," he added.

Upstairs once more, the savory fowl with trimmings appeared before us on a table-setting conveyor unit. Delicious! We chomped thoughtfully.

"Say, Grom, isn't that thing kind of dangerous?"

"Yup," munched Schultz, passing the gravy. "But this roof is unclimbable. Haven't been able to do anything about the birds, though. Especially on 160. Messy." Our drumstick began to taste funny. Then somebody pounded furiously on the front door.

A large weatherbeaten rustic wearing a big bright star dashed in, grabbed Schultz in one huge paw and the goose in the other. "I was watchin' that flock pass over last night when another bird disappeared, *out* of season. Dunno how you do it, fella, but I'm runnin' you in!"

We bailed him out later and settled for an anchovy pizza. Grommethead Schultz stays on 6 and 10 meters now, spearing only an occasional sparrow.

What:

Snow flurries season already—that time of year when our lowest amateur frequencies return to the DX limelight. We mean, of course,

160 meters where another double DX feature spices up the coming months. Firstly, there are the always popular and annual 1.8-MHz. Transatlantic and World-Wide DX Tests, a series of activities promulgated by W1BB and associates since 'way back in '32. Reminiscent of pioneering transatlantic crossings by Deloy, Schnell, Reinartz, Godley and others in 1921, the Tests will be held this 1968-'69 season on these mornings—December 1st, 15th and 29th, January 12th, February 2nd and 16th, 0500-0730 GMT. W/Ks are urged to call CQ DX TEST for the first five minutes of the hour, listen the next five minutes, call again during the third 5-minute period, etc., until contacts are made. W1BB emphasizes, "Set your clocks accurately! Generally speaking, eastern U.S.A. stations will be found from 1800 to 1825 kHz., westerners from 1975 to 2000 kHz. Most Europeans will use 1825-1830 kHz. VKs like 1800-1860 kHz., ZLs prefer 1875-1900. JAs are assigned 1907-1912.5 kHz., and other DX usually clusters between 1800 and 1830 kHz. Working DX on 160 is an extremely interesting challenge. Obstacles of QRN, BC harmonics, QRM, loran, QSB, etc., all require topnotch stations and careful operating techniques. Remember, these Tests are not meant to be contests." . . . . . Many 160-meter veterans think it's a fine idea to give newcomers to this band a DX break. It is therefore recommended, at 0500-0730 GMT, January 5th and March 2nd, that big-signal W/K regulars quiet down and clear the ether for "first-timers." European and African first-timers will be given the same courtesy at their ends on December 15th and February 2nd . . . . . Meanwhile, sparked by the interest of the JA-KA gang, the second annual 160-meter Transpacific Tests beckon at 1330-1600 GMT on November 30th, December 14th and 28th, January 11th, February 1st and 15th. **JA**s 1BHG 1CJQ 1GIV 1PVK 1RST 3AA 3JM, **KA**9MF, **KH6**IJ, **VK**5KO, **ZL**3RB, other top-band regulars and plenty of fresh Asia/Oceania DX talent will be on hand for the fun. Special JA-sunset tests are also recommended at 0730-1000 GMT, same dates. W1BB, as usual, offers his good offices as clearing-house for 160-meter DX news from all points . . . . . Remember that commercials KPH, WNU and WCC, on 2045, 2048 and 2036 kHz. respectively, are valuable conditions indicators for 1.8-MHz. skip. FCC-licensed amateurs new to this band should ascertain what frequency segments and power maximums prevail at their locations. Privileges may vary from state to state. Pages 72 and 73, June '68 *QST*, provide the picture. Oh, sure, we're cresting at sunspot maximum and nobody in his right mind should expect DX on 160. Tell *that* to the lads who sweated up their top-band WACs last season!

10 **phone** also deserves our attention in behalf of the daylight DX crowd. Preliminary reports from "How's" correspondents **W**s 2VOZ 4YOK 8YGR, **K**s 4TWJ 8BCK, **WA**s 1IED 3HRV 8MCQ 8MGD 9TFM and **WB2**BCI, plus a perusal of club organs underscore workables **CE**s 3RC 3UH 7DW 8CH (28,580 kHz.) 16 hours GMT, **CO2**RN, CP1CX/**OA**4, **CR**s 4AJ 6DU 6LL, 6KT 7CZ 7IC 7MS (520) 15, **CT**s 1RT 3AS, **CX**s 3BH 4DT 9CA (650) 21-22, **EA**s 3NQ 4BB 18, 6RG, **EP2**JP, **ET3**REL (574) 14, **FG7**XT (570) 16, **GD3**RFK 19, **HC1**RH, **HG0**HS (100) 19 of Hungary, **HI**s 3JHV 8XJP, **HK**s 3BAE 4AET, **HP**s 1EM (550) 17, 3RL, **KG4**s DF DO, **KH6**s BB DQ GJW GNE GLU IJ, **KM6**BI, **KP4**DBJ, **KS6**CQ (600) 23, **KV4**s AB AD (681) 20, **KW6**EJ (590) 23, **KZ5**s HC 16, MD 18, **LU**s 1DAR 2DJB 3TB 6DRB 6ECE (580) 21, 9FBL, **LX1**SK, **MP4**s BEU (552) 10, BGU 19, **OA4**PF, **OD5**s AT BA BZ EP (570) 17, **OH1**NK, **PA0**s BRM LHW XXB, **PY**s ICAD (565) 15, ICLR IFO 2AHE 21, 3APH 7OS, **PZ1**BX, **TG9**s CD EP XX 17, **TJ1**AL, **TL8**GL (705) 9, **UC2**DX, **UF6**s CR DR, **UL7**OB, **UP2**KBW, **UV3**ADG, **VK**s 3BAI (575) 23, 3VG 4TY (610) 0, 9CR, **VP**s 2IDAE 8HZ 8KF (580) 16, **VQ9**R, **VR2**DK (603) 22, **YN**s 1MAV 2RAC (600), **YS1**THS (625) 1, **ZB2**BC (550) 15, **ZC4**RB, **ZD**s 3D 7DI (550) 19-20, 7GO 8CC 8JL 8JW (608) 19-21, 8OFE 9BE (508) 18, 9BJ, **ZE**s 1BP 1BR 6JP, **ZL**1s HW KG (600) 23, **ZP9**AC, **ZS**s 1BV 1J 3HF 3HT (580) 17, 3LU 18, 4AA 4JH 4KJ 4MZ 6ADY (920) 17, 6AJK 6DW 6OG, **4A**1s CCW LLS (610) 21, **4U1**ITU, **4X4**GV (600) 18, **5N2**AAF (578) 19, **5W1**AR, **5Z4**s JH KO (550) 20, **6Y5**ET, **7Q7**s AM RM (68) 18, **8R**1s F G (548) 20, S (567), **9G1**GJ, **9J2**s BC 18-19, DT IE NW 18, VX (560) 15, **9K2**BJ, **9L1**KZ, **9Q5**s HU RV (575) 19, **9Y4**s DS and RP, a goodly percentage using carrier a.m. Wise heads will be hitting ten hard after the first of the year to clinch their 28-MHz. hundred toward ARRL's upcoming five-band DXCC. The band could start drying out in the near future as we start sliding down the sunspot curve.

Heavy art complement this month so we'll suspend further bandchecks till next column when we'll probably hear from (15 phone) **W**s 2DY 4AJJ 4GTS 4YOK 8YGR 9LNQ, **K9**CSM, **WA**s 1CJE 1DJG 3GVP 3HRV 3IID 5MIN 5PPZ 6JDT 8OJK 9AIOM 9TFM 9URY ØFRM, **WB**s 2BCI 4GSS, **KP4**DBJ, **F3VN/W2**, P. Kilroy; (40 phone) **W8**YGR, **K4**FCB; (75 phone) **K4**IEX, **OA**8V; (20 c.w.) **W**s 1VAH 2DY 3HNK 4YOK 8YGR, **K4**TWJ, **WA**s 1FHU 1GGN 3HRV 3IID 3KOS 9TFM, **WB**s 2BCI 4GSS 4GTI, **I1**ER; (20 phone) **W**s 2DY 3HNK 4YOK 8YGR, **K4**TWJ, **WA**s 1FHU 3IID 3HRV 5PUQ 9TFM, **WB**s 2BCI 4GSS 6WLH/3, P. Kilroy; (15 c.w.) **W**s 1DAL 3HMR 4YOK 7BE 8YGR 9GXR 9LNQ, Ks 4FCR 8BCK, **WA**s 1CJE 1DJG 1FHU 1FDP 2APG 3GVP 3HRV 3IID 3KOS 5MIN 5PPZ 5SOX 8MCQ 8VBY 9TFM 9URY, **WB**s 2BCI 4GSS 6VVS, **KP4**DBJ, **I1**s DFE ER, **WN**s 2FOR 2REH 3JRY 3KHZ 4IJF 4IYX 7JIG; (10 c.w.) **K**s 1HDO 8BCK, **WA**s 1DJG 8MGD, **KP4**DBJ, **I1**s DFE ER; (40 c.w.) **W**s 3HNK 8YGR, **K4**FCB, **WA**s 1DJG 1FHU 2APG 3IYS 5SOX 8MCQ, **WB4**GTI, **WN3**JRY; (80 c.w.) **W1**SWX, **K4**IEX and **WA1**FHU, together with other reporters to file. Sock it to us!

Where:

OCEANIA—"Will QSL every valid card received," assures VK2BKM concerning this month's projected Lord Howe Island go, "direct if supplied with self-addressed envelopes and International Reply Coupons, otherwise via the VK2 bureau." . . . . . "KH6IJ was buried under mountains of QSLs for his 9500 contacts in this year's ARRL DX Test," sympathizes WA1FHU . . . . . *DX News-Sheet* gives P.O. Box 204, Port Moresby, as a QSL bureau address for Papua VK9s . . . . . The same authority notes that

ZLs on Auckland & Campbell isles, Chatham and the Kermadecs henceforth may respectively append /a, /c and /k indicators to their calls. The widely scattered VK9 gang could be helped with a similar approach.

AFRICA—"I'm QSL manager for SM7TE's 3V8AB operations beginning August 16, 1968," affirms K6KQN . . . . . A2 is said to be Botswana's new International Telecommunications Union prefix, according to G. Watts's *DX News-Sheet* . . . . . The same periodical indicates that logs and QSLs for ex-5VZRQ, now back in Canada, are held ready by VE2AFC . . . . . In the *DXpress* of Holland's VERON we note that W4DQS can assist with confirmations for EAØAH QSOs made in January, 1968; no others.

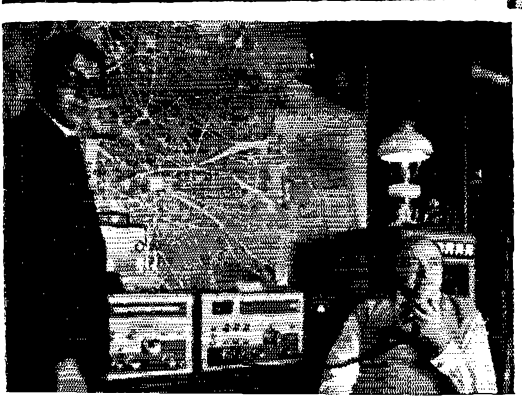
ASIA—"I've received large numbers of QSLs from W/K stations for contacts I made earlier this year," acknowledges AP2AD. "Due to illness and other reasons I could not answer all of them. I assure all those who await my cards that I hope to send them out within the next few months." . . . . . "Have logs starting January, 1967," says W5NOP, now QSL manager for 4S7NE . . . . . "I have been instructed not to respond to QSL requests that fail to include self-addressed stamped envelopes," warns K9CSM, QSL tender for 9K2s CB and CC . . . . . "My tenure as QSL manager for NW8BP commences August 1, 1968," states K6HPZ. "Only cards accompanied by s.a.s.e., or s.a.e. plus IRCs, will be answered." . . . . . "UA1CK tells me that most of the UA1CK/JT1 QSLs he sent to the U.S. first call area have been lost," reports W1DGJ. "He requests anyone still awaiting cards to reapply. Vlad says he can use mint postage or IRCs from any country." . . . . . *DX-MB* of Germany's DARC has it that VU2DB may be of assistance toward AC3PT QSLs, especially for August QSOs . . . . . Arkansas DX Association's responsibility for KR6BU QSLs starts with contacts after August 30, 1968.

EUROPE—CT1SO is often operated by visiting CR6GO, learns W1DCM. George, proprietor of LARA's QSL bureau at Luanda, offers to confirm such contacts from Angola . . . . . "Pass the word along that HBØSJ's 1968 logs are now at hand," requests W2CTN, QSL manager par excellence . . . . . DL4FS instructs seekers of ON8VW pasteboards for QSOs of September and October, 1968, to go through W81MZ, his home pad . . . . . *DX News-Sheet* says G3VCN intends to fulfill ZB2VF QSL commitments this month, also that GC8HT, promising 100-per-cent QSL, vows to catch up on his backlog shortly . . . . . Not good, says LA4ND about weirdos JW2AP and JX5J. Stein ought to know; he's QSL chief for Norway's NRRL.

HEREABOUTS—WA6AHF, QSL aide to HKØBKX, KW6s EO GA, PZ1DC, VQ9DH, ZDs 8GA and 9BL, replies to requests via bureaus unless the customary s.a.s.e., or s.a.e. plus IRCs, are supplied . . . . . "I've taken over as QSL manager for ZP9AC starting September 1, 1968," announces K1HDO. "W/K QSO's only." . . . . . W4BPD of *DX Magazine* informs W1CW of the ARRL DXCC Desk that W2MZV takes over QSL chores for his past DXpeditions. "Herm is trying to catch up on QSLs still needed by some stations. If I go on another DXpedition it is possible that W2MZV may handle a portion of the cards." . . . . . "Only PJ0CC contacts between November 16 and 30, 1968, should be QSLd via W2ADE." cautions W1BIH. That's because such Netherlands Antilles calls are lend-lease jobs; a different group or individual could be signing *PJ3CC* or *PJ0CC next month* . . . . . "My QSLs come out of my meager allowance," comments WB4GTI. "This includes the cards themselves, postage, IRCs and envelopes. Too much of the time I get nothing back. This must be happening to thousands of other DX chasers as well." Supply vs. demand, John, too many WB4s vs. too few 8P6s, so most QSL swapping is done via bureaus. All we can suggest and urge is that every DX-working W/K/VE/VO keep his local ARRL QSL Bureau manager well supplied with s.a.s.e. Slowly but surely this pays off . . . . . General Hospital, St. George, Grenada, is a variant VP2GZ address spotted in LIDXA's *DX Bulletin* . . . . . For DXtraordinarily speedy confirmations "How's" correspondents Ws 1SWX 2AH 4YOK 8YGR, K1LNJ/KL7, WAS HOB 2BPL 2HIU 8TGX 9TFM, WN3JRY and P. Kilroy salute these "QSLers of the Month": DL4QP, F9VN/FC, HL9KI, K1FNA/KG6, KA2IJ, KC6JC, KG6ST, KH6IJ, KV4AM, KX6s ER FN/KC6, PJ2MI, UG6AD, UI8AI, VKs 3HW 3ZL 4ZK/VK9, VQ8CC, XW8BS, ZB2AY, ZD9BE, 5R8CJ, 9K2CC 9M2NF, 9N1MM and 9Y4TR, as well as QSL reps W2s CTN GHK MES, WA2EFN, K9GZK, WA1ABW and VE3EUU. Any candidates for commendation on your list? . . . . . *Help!* The following italicized brethren need nudges toward QSLs from holdouts mentioned: *W4YOK*, VP5RR of 1956; *W8AFN*, JT1KAA; *W8YGR*, VU2QV; *K1LNJ/KL7*, BV2A, 9Y4DS; *WA1GGN*, VQ8CBR; *WA9KRK*, TF2WJK Nov. '65, VP5AR Feb. '66; and *WB4IGF* (W4IQO), 9G1GC. Ideas? . . . . . WAs 5UHG 7GWL, WB4HNM and WN3KHZ volunteer to act as QSL managers for DX stations in need of such assistance, the rarer the better . . . . . *DX News-Sheet* hears that PY4BK may be of assistance toward confirming contacts with April's PYØBLR Trindade DXcursion . . . . . NNRC's *Bulletin* mentions F8RU as a possible source of 4W1ADO wallpaper . . . . . Now individual quotations from the mailsack, but bear in mind that each is necessarily neither "official", complete nor accurate. . . .

FY7YP, J. M. Guerlet, B.P. 317, Cayenne, Fr. Guiana

A pictorial visit to sunny Spain introduces us to (top, left and right) EAs 2CR and 3NA, (lower) 4DO and 3KI who hail from Pamplona, Terragona, Madrid and Barcelona respectively. EA4DO stands while his father, the station's official second operator, checks the bands. (Photos via Ws 1ARR 1YYM, WB2ZQE)



LAØAD, well-traveled WØGTA, is a contest and DX enthusiast wherever the petroleum game takes him. Bob previously gave outstanding DX performances as EP2BK and 9V1LP on 10 through 160 meters. (Photo via W1ARR)

HS1EL, W. Fells, P.O. Box 1930, Bangkok, Thailand
IT1PSG, Box 366, Catania, Sicily, Italy
JW7FD, R. Schjolberg, Bear Is. Radio, via Vaervarslinga for Nord-Norge, Tromso, Norway
K1EUF/KS6 (via K2LTI)
K1FNA/KG6 (via WA1ABW)
K1LNJ/KL7, W. Howard, USNCS Box 10-1255, FPO, Seattle, Wash., 98791
K3GWA/KL7, M. Shoop, 472nd MP Co., APO, Seattle. Wash., 98731
KH6EDY, USCG Loran Stn., USNS Box 36, FPO, San Francisco, Calif., 96614
MP4BGX, Box 425, Awali, Bahrein
PJ2VD, Box 879, Curacao, Netherlands Antilles
PJØCC (to W2ADE; see text)
PK1DR, Box 1530, Djakarta, Indonesia
PYØS APS ARM (to PY7 APS ARM)
SK3AH, C. Nylander (SA13CZS), Box 3022, 850-03 Sundsvall, Sweden
TI2LSA, c/o U.S. Embassy, San Jose, C.R.
TN8BG, Box 712, Brazzaville, Congo Republic
VK2BKM/L.H. (to VK2BKM or via WIA)
VR4EL, Box C-22, Honiara, Solomons
VS5TJ, P.O. Box 308, Brunei, Brunei (or via Arkansas DX Association, Box 7323, Little Rock, Ark., 72207)
VS6DO, P. Bailey, c/o Police Hq., Arsenal St., Hong Kong
WØVXO/KV4, H. Schoenbohm, Box 310, St. Croix, V.I.

KA5MC, a Navy amateur installation, amassed a 137,000-point mike total in this year's ARRL DX Competition. (Photo via W1ARR)

YBØAB, P.O. Box 2127, Djakarta, Indonesia
ZD8s CC DG (via ZD8AR)
ZS3D, N. Palmer, P.O. Box 1205, Windhoek, Southwest Africa
4A1JJD, Box 9, Tulancingo, Hidalgo, Mexico
9K2s CB CC (via K9CSM)
9M2CL, L.M. Row, Hq., Telecommunications Dept., Kuala Lumpur, Malaysia

AC3PT (see text)
ex-CN8LE (to FO8CB)
CT1SO (see text)
F2WS/FC (to F2WS)
FØJH (to G3VAL)
FØKC/p (to G8JQ)
GC5AET (to DJ1QP)
GC5AGA (to K4II)
HBØAAI (to HB9AAI)
HBØAIC (to HB9AIC)
HBØAJC (to HB9AJC)
HBØSJ (see text)
IT1AUA (via IT1PST)
JW1CJ (via JW7FD)
KC6JC (via W2RDD)
OX3MT (via EDR)
PX1YY (to F8YY)
PZ1DC (via WA6AHF)
KG6SS (via KG6SA)
KR6BU (see text)
KS6CX (via K4ADU)
KW6GA (via WA6AHF)
LA6KJ/mm (to LA6KJ)
LZ9FWY via LZ2KBA)
LZØWYF (via LZ1KSF)
MP4TCF (via G3WAT)
MP4TWU (to DJ5WU)
OA4W (via RCP)
ON8VW (see text)
UA1CK/JT1 (see text)
VK9HR (via W2CTN)
VP1WEB (to WA4WEB)
VP5RS (via ZD8AR)
VP7CC (via ZD8AR)
VP9WB (via VP9RDA)
VQ8CBR (via WØBN)
W4BPD/? (see text)
YA1CW (via G5JP)
ZB2VF (to G3VCN)
ZC4TK (via RSGB)
ZD5J (to ZD5V)
ZD9BL (via WA6AHF)

CR6EW enjoys the DX sport and captures his share of goodies with an NCX-5 and dipole in Nova Lisboa. (Photo via W1YYM)

November 1968

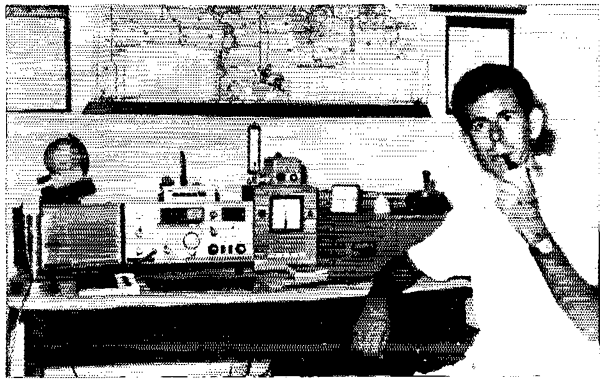
ZL1DS (to ZL1BGR)
ZP9AC (see text)
ZS3LU (via W2CTN)
3V8AB (see text)
4AØFCR (to WB6FCR)
4S7NE (see text)
5A1TY (to HB9ADP)
7Q7LA (to G3JCJ)
9M2US (via W3GRS)
9X5AA (via W1YRC)

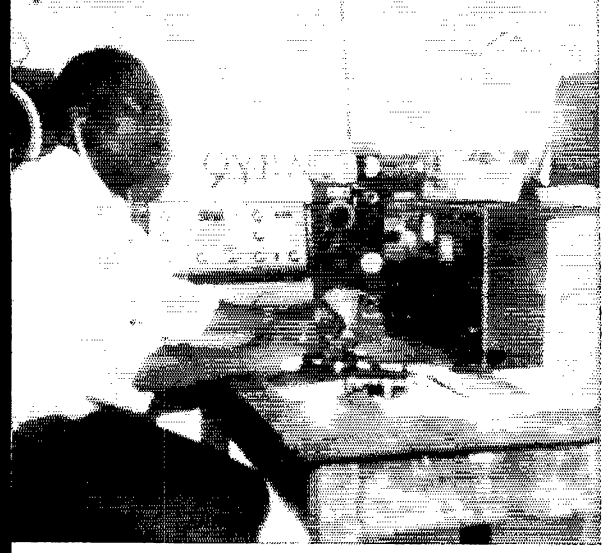
For the preceding we have great team play by contributing **Ws** 1APU 1CW 1DGJ 1IKE 1SWX 2DY 4YOK 8YGR, **K1s** LNJ/KL7 TKS, **WAs** 1FHU 1GGN 1IOB 2BPL 3HRV 5OFT 8TGX 9TFM, **WB2**BCI, **WNs** 3JRY 9TUM, **DL4**FS, Canadian DX Association *Long Skip* (VE3DLC), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor.72.T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX 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 *DXer* (Box 608, Menlo Park, Calif., 94025; attn. K6CQF), Southern California *DX Club Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB), VERON's *DXpress* (PAOs FX LOU TO VDV WWP) and West Coast *DX Bulletin* (WA6AUD). TU!

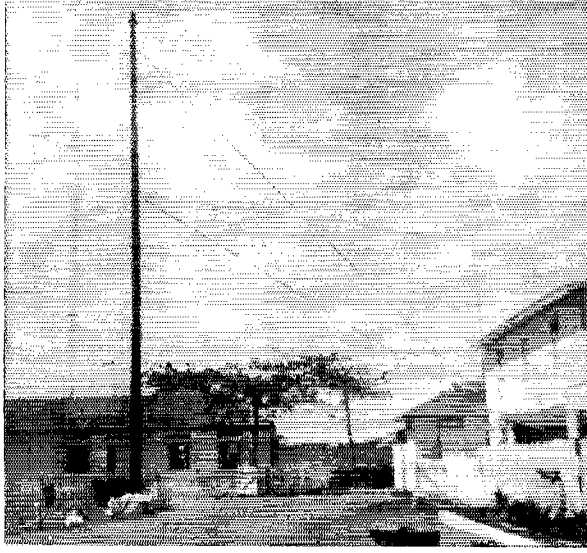
Whence:

OCEANIA—"I'll be operating from Lord Howe Island during my annual vacation, about November 19-28, 1968," reveals VK2BKM. Watch 3695, 7095, 14,195, 21,300 and 28,500 kHz. for Karl's 400, linear, dipoles and beam. "C.w. operation will be on frequencies as yet undecided." . . . . . "Our Federal Awards Manager is now VK3AMK, Geoff Wilson, 7 Norman Avenue, Frankston, Victoria, Australia, 3199," specifies Wireless Institute of Australia president VK3OR . . . . . "VS5MH is on vacation till December," informs W1DGJ. "He's also VS5TJ and will be active on c.w. and single-sideband for the next eighteen months. Slim supervises a multimillion dollar training school complex in Brunei Town." . . . . . ZLs 1DS 1TU and 3JO may reactivate the Chathams by December, and ZL2ANX could fire up from rare ZL regions at any time . . . . . Cocos-Keeling might be next stop for ZD8Z (W6BHY) . . . . . Roving VE6s AJT and APV may be in the Manihiki region this month, according to CDXA's *Long Skip*, calls as yet unspecified.

ASIA—On the 2nd and 3rd of this month, as detailed in October's column, Okinawa Amateur Radio Club throws its gala KR6 Contest. How many Okies can you track down? . . . . . BYIs CK and F tantalize the c.w. gang on 15 and 20. Anyone with a fresh BY QSL out there? . . . . . West Coast *DX Bulletin* learns that Princess Souvana Phouma occasionally signs







9Y4LA is a familiar call in DX tests. Some of Gordon's skywires may be discernable in the interesting Tobago landscape at right. (Photo via W1ARR)

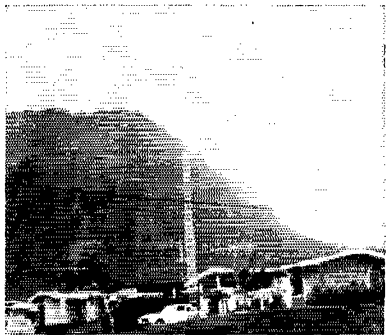
XW8CA .–.–.– 9M2LN, according to W1VAH, seeks Me., Vt. and Wyo. to sew up WAS, 14,060 kHz. around 1030 GMT, and W3GRS says 9M2US (K3JJG) is hungry for east coast QSOs on 21,010-kHz. c.w. at 1500-1700 GMT with a KWM-2 and dipole. Ed teaches English, etc., with the Peace Corps .–.–.– 9K2CC (9V1OI) tells K9CSM he's toying with Qatar, 9K3 and YB possibilities .–.–.– W3HNK finds that EP2KB, with a 30-S1 on 10, 15 and 20, luckily missed out on Iran's recent earthquake disaster .–.–.– K6PIH highly recommends JARL's WAJA certification as an interesting WAS-type challenge. Mas also pursues JCC, a sheepskin awarded for QSOing 100 or more Japanese cities .–.–.– Long Island DX Association's *DX Bulletin* finds AP2s AR and HB readying for sideband sport, the former recently married, and states that ex-CR9AH will settle in British Columbia.

AFRICA—Via the clubs press: ZD8GA is hot for 40 code and phone this season with his new 14-AVQ vertical .–.–.– ET3REL intends to pep up r.f. output from the Sudan if possible .–.–.– 5VZAT's NCX-3 replaces 5VZRQ in Togo, the latter repatriating to Canada .–.–.– YL CR4BH is awfully popular near 14,207 kHz. at 0500 GMT .–.–.– VQ9DH, 21,245 kHz. at 1800 GMT or so, may visit Des Roches if properly encouraged .–.–.– FR7ZR may spell FR7ZL/t at the Tromelin meteorological station this month .–.–.– 8R1S, bidding adieu to Guyana, may become a 5H3 ere long.

EUROPE—Statistical recap of last year's Scandinavian activity Contest, SRAL (Finland) sponsor: C.w. entries totaled 682, phone logs 276. Yank c.w. highs per reporting call area are WA1FHU, Ws 1BGD/2 3BYX 4ZX1 5KC 6TZD, K8HZU, W9LKJ, WAØEMS, KH6IJ, KL7MF. Phone leaders are WA2CCF, Ws 3BYX 4HOS, WAs 5ALB 7EVO, Ks 8HZU 9ECE, WAØEMS and KH6IJ. Up Canada way it went (c.w.) VEs 1AE 2NV 5DZ, (phone) 3C1ANT. In order of score our side finished (c.w.) Ws 1BGD/2 2MEL 4ZXI, WAØEMS, W3BYX, K4BAI, WØBMM, K8HZU, WAØKDI, K3NUM; (phone) W3BYX, K9ECE, WAØEMS, Ws 9KXK ØLBB 4HOS, K8HZU, WA9UGI, W8DWP and WA5ALB. The ten top Scandinavian single-oppers are (c.w.) OH5SE, SMs 7BKZ 5CEU, OH2KK, OZ1LO, SM4CMG, OHs 6VP 2XK, OZ4CF, OH1TN; (phone) SM7TE, OHs 2TH 7PI, SM7CRW, OH1VR, SM2CZT, OHØNI, LA7VE, SM5API and OH4OO, listed in order of scores. World single-op c.w. highs were turned in by CE2CR, DJ5BV, DM3BE, EA3KT, EL2D, EP2BQ, F9NF, G3IAR, GM5AHS, HA8UD, HB9AGH, HP1AC, HEVK, JA5AB, KH6IJ, KL7MF, LZ2EA, OE3AX, OK1WC, ON4XG, PAØVO, PY7APS, SP5ARN. UAs 1ZX 2DP 9WS, UB5HS, UC2SE, UF6LA, UH8BO, UI8CD, UJ8KAA, UL7CH, UO5WU, UP2NX, UQ2AS, UR2FU, VE2NV, VK3AXK, YO8AP, YU3EY, ZE2JD, ZL2CD, 4X4YY, 5H3KJ and 9H1AG. Phone country kingpins are CR6DX, CT1MW, DJ5BV, DM4JM, EAs 3QW 6BJ, EL8H, EP2BQ, F2JE, G3IAR, GM5AHS, GW3OCD, HA5CQ, HB9QA, HK4TA, HPHN, JA2CXF, KH6IJ, LX1BW, OA4BS, OE5ANL, OK1AKL, ON4XG, PAØSNG, PY7APS, SP8AJK, TG8IA, UAs 3BK 9BE, UB5DW, UC2BF, UG6AW, UH8BO, UP2NV, UQ2ANB, UR2IV, 3C1ANT, VK6XX, VU2BK, YA5RG and YU3LB. There are 42 U.S. c.w. logs, 14 phone, all single-operator entries. The U.S.S.R. outfiled us in this category 129 to 56 .–.–.– WA1FHU says DK1KJ's all-transistor 30-watt rig comes across nicely on 20 c.w., a ground-plane radiating.

HEREABOUTS—"DXCC-squared" No. 57, the first from Brazil, arrives from PY3AHJ, a photo of QSLs confirming QSOs with ARRL DX Century Club members in 100 or more countries (see p. 138, August '68 *QST*) .–.–.– "When a DX station calls 'CQ WN', as many kind ones do, please let WNs answer him," reasonably requests WN7JIG .–.–.– K4TWJ reports a plague of QRM on s.s.b. DX frequencies apparently caused by W/K lids running open mikes. Somebody sick or somethin'? .–.–.– WA9TFM, with a fresh Advanced ticket, is all ready for FCC's impending phone subbands adjustment. Are you? .–.–.– The International YL Sideband System net frequency remains at 14,332 kHz. where much choice voice DX checks in .–.–.– North Eastern DX Association *DX Bulletin* editor K1IMP drew a six-month call to duty from the military .–.–.– Top DX and contest talent from Connecticut Wireless Association and Potomac Valley Radio Club will man Curacao's PJØCC on November 23rd-24th, multiop and multimode from 10 through 160 meters. They'll display the first PJØ tag of record. QST

KH6BZF, ARRL's Hawaii Section Communications Manager, turned in an astronomical phone score in the 1968 ARRL DX classic. You may also occasionally catch Lee on operational visits to rarer Pacific points. (Photo via W1ARR)



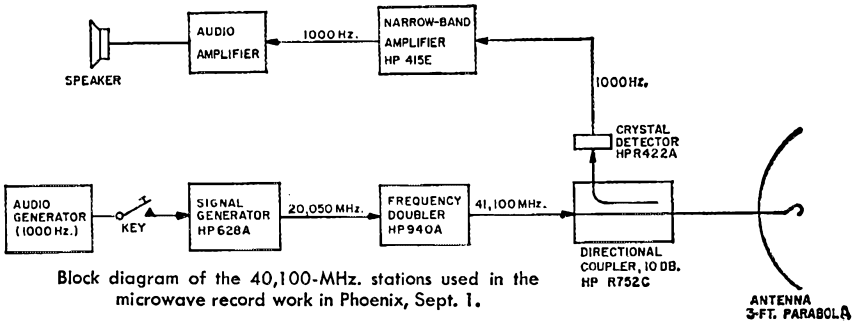
Strays

New 40,000-MHz. Record

A new distance record for the unassigned region above 40,000 MHz. was set by Arizona amateurs during the recent ARRL Southwestern Division Convention. Two-way communication on 40,100 MHz. over a distance of 3720 feet was carried out Sept. 1, by Lorraine Cripps, WA7EDI/7, operating atop the First Federal Savings Building, and Gary Hamman, W7CAF/7, set up on the sidewalk in front of the Townehouse Hotel in Phoenix.

Laboratory test equipment from the Motorola Aerospace Center was adapted by Ray Cripps, WA7EDH, and W7CAF. The transmitters were H-P 628A signal generators, driving 940A frequency doublers, with power output of about one milliwatt at 40,100 MHz. Receivers used H-P R422A crystal detectors, working into narrow-bandpass amplifiers and speakers. Each generator was externally modulated with a 1000-cycle tone and a hand key. Break-in A2 operation was possible, using a 10-db. directional coupler, as shown in the block diagram.

The antennas were 3-foot parabolas fed from WR-28 waveguide. Beamwidth was measured 0.7 degree at the half-power points, and gain was calculated to be 48 db. over isotropic. QST



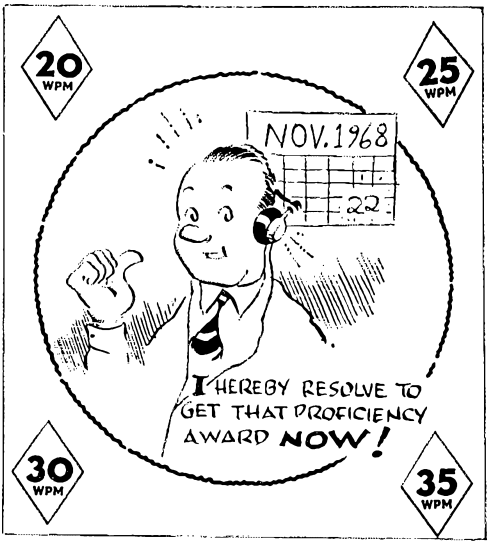
Block diagram of the 40,100-MHz. stations used in the microwave record work in Phoenix, Sept. 1.

Arizona SCM, Gary Hamman, W7CAF, operates in front of the Townehouse Hotel in Phoenix, site of the ARRL Southwestern Division Convention, Sept. 1. Looking on are John Huntoon, W1LVQ, ARRL General Manager, and John Griggs, W6KW, Southwestern Division Director. Signals were exchanged on 40,100 MHz. over a 3720-foot path with WA7EDI/7. At the right, Lorraine Cripps, WA7EDI, operates atop the First Federal Savings Building, as Ray Cripps, WA7EDH, codesigner of the installations, supervises the record attempt.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE
Contests: ROBERT HILL, W1ARR
DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD

It's About That Time. On Nov. 22, the first phase of the new band segments for extra and advanced class licensees go into effect, and many changes will have to be made in some of our operating habits. The exact limits of the segments have been covered previously and elsewhere, so we won't go into detail at this time. This, however, may serve as a reminder and help some avoid getting into hot water. If you are an Extra Class license, you have nothing to worry about; you can operate in any part of any amateur band. Otherwise, be sure to become familiar with which parts of which bands are "off limits" to you — that is, until you qualify for that "Extra," of course.



Milestones in Code Proficiency. A word of encouragement to those who despair of ever qualifying for Extra class: Honestly, fellows and gals, it's not all that hard. We happen to know from personal experience that anybody with only rudimentary knowledge of radio fundamentals and a little amateur experience can qualify. How? Well, to use a phrase once uttered by Robert Benchley, by applying the seat of one's pants to the seat of the chair. In other words, by intense study of the very excellent study material provided through many sources (not the least of which has run in *QST*) and by nightly practice of the code.

Regarding the latter, which is really the only part of the incentive program which is a CD function, W1AW transmits nightly code practice at speeds which include sessions at or near both the 13 and 20 w.p.m. required by the General and Extra Class tests respectively. The code proficiency program has recently been expanded to include a session at 0030 GMT, and to include sessions at 20 and 25 w.p.m. every night of the week.

If you can qualify for a code proficiency certificate at 15 w.p.m., you should certainly have little difficulty passing FCC's 13 w.p.m. General Class test. After all, W1AW is an amateur station operating in the QRMed amateur bands, and copying the signal, especially in the far

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club Operating Events

November	December	January
2–3 KR6 DX Contest (p. 103, last issue).	4 **Qualifying Run, W6OWP**	2 **Qualifying Run, W6OWP**
6–7 YL/AP, phone (p. 106, last issue).	13 **Qualifying Run, W1AW**	4–5 **VHF SS**
7 Qualifying Run, W6OWP	22 Tennessee QSO Party (p. 108, this issue).	11 **Qualifying Run, W1AW**
9 **Frequency Measuring Test,** 0Ø8 only.		11–13 **CD Party** (c.w.)*
9–11 **SS,** phone (p. 54, last issue).		18–20 **CD Party** (phone)*
10 International OK DX Contest (p. 103, last issue).		18–19 Louisiana QSO Party
14 **Qualifying Run, W1AW**		25–26 **Simulated Emergency Test**
16–18 **SS,** c.w. (p. 54, last issue).		*League Officials and Communications Dept. Appointees only.
23–25 Delaware QSO Party (p. 105, this issue).		

west, can be *tough*. As for the 20 w.p.m. test, qualifying for an ARRL certification at 20 w.p.m. is a good indication that you're close to, if not at, the goal line. To be on the safe side, however, many amateurs make sure they can get it at 25 w.p.m.

Code proficiency has to start somewhere. The ARRL program is not restricted to licensed amateurs or League members, and the 10 w.p.m. certificate has been issued to many SWLs working toward an amateur license, not to mention Novices and Technicians in hot pursuit of that General Class ticket. It is the first milestone in the progression from Novice or Technician to General. The second milestone is the 15 w.p.m. sticker, and then you can pass the General Class test. After that comes 20 w.p.m., the first milestone on the way to Extra class. Then 25 w.p.m., and you've *got* the Extra.

After that, what? What can you do with 30 and 35 w.p.m.? What does it buy you? Well, nothing, really, except a very satisfying sense of achievement. As often as not, once you have reached the 25 w.p.m. heights and have that Extra Class ticket tucked away, you start seeking new worlds to conquer. The 30 and 35 w.p.m. stickers are available, so why not have a crack at them? You'll be surprised to find that once you can copy 25 w.p.m., 30 and 35 require only a little more practice.

New W1AW Frequencies. Now that the new regs are about to go into effect seems a propitious time to move the W1AW bulletin and code practice frequencies into the restricted segments. The purpose of this move is twofold: first, to get W1AW out of what will probably be (for a while, anyway) the most crowded portion of the band; and secondly, to avoid W1AW's adding to the din at the same time the "big signal" helps the occupancy of the new segments. A corollary reason for the change is to standardize the W1AW frequencies, so they can be found readily by anyone looking for the headquarters station and so that the frequency in each band can be remembered as being just 20 kc. inside the low end.

That's right, 20 kc. inside the low end of *each* amateur band, from 160 through 2 meters is where you will find W1AW, starting at the changeover from "daylight saving" to "standard" time on Oct. 27. In other words, for most of you, this is probably where you'll find the bulletins and code practice right now — 1820, 3520, 3820, 7020, 7220, 14020, 14220, 21020, 21270, 50020, 50120 and 144020.

Please note that these changes apply only to bulletins and code practice (i.e., one-way transmissions) and those general contact periods which immediately follow these transmissions. Other general contact periods will remain on the former W1AW frequencies, so contact with all classes of amateur licensees can be maintained as before.

W1AW bulletin frequencies are crystal controlled, but no temperature-controlled ovens are in use and the exact frequencies will be subject to the normal amount of variation. Thus, do not try to use W1AW as though it were WWV. We expect that these new frequencies will be permanent, but we wouldn't want to guarantee this until we see how they work out.

The Net Directory. Those operators who have asked that they be sent one of the new net directories when they are ready are in for a surprise — a pleasant one, we hope. The new directory is cross-indexed by name of net, state and frequency, as before, contains a few minor items of information not included in previous directories, is just as readable (in fact, some think more so), and yet includes everything in slightly over half the number of pages as the previous net directory.

— *W1NJM.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for August Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPL	6276	1692	1453	239	9660
W3CUL	236	3517	3329	161	7243
K5TEY	5	2450	2327	7	4789
K0ONK	292	2030	1767	58	4147
WA9CNV	0	1203	1176	5	2384
K3N8N	612	730	700	30	2072
W7BA	40	883	795	84	1802
W3VR	97	790	765	21	1673
WA2UWA	15	740	720	2	1557
W6GYH	77	626	617	4	1324
K5BNH	11	644	570	35	1260
K3MYS	22	606	531	31	1190
W8UPH	17	551	468	80	1116
W0LCX	14	568	500	10	1092
W5OBD	29	486	486	0	1001
W1PEX	51	464	411	28	954
WA3EKP	97	427	417	10	951
W9JYO	712	100	50	50	912
W9EQO	0	444	444	0	888
WA2GPT	50	425	353	59	887
W6RSY	7	472	275	108	862
W4BAZ	266	275	244	7	792
WB6BBO	17	358	352	2	729
W3EML	38	397	288	4	727
WA4SCK	26	360	324	4	714
WA2BHN	30	339	315	19	703
W8GAI	9	352	309	21	691
WA9MHU	95	308	225	60	688
W8RYP	20	335	295	31	681
WA7DXI	21	334	311	13	679
WA5TYH	7	339	275	48	669
WB2FUW	44	310	298	7	659
VE7ZK	19	304	269	20	642
WA4DYL	196	243	140	44	623
W6YBV	6	302	276	31	615
WA0PNB	2	296	293	3	594
WA4WWT	18	286	279	1	584
W4NLO	243	156	164	9	572
W7DZX	8	293	252	7	560
W6BGF	48	246	195	47	536
WA9VZM	7	262	261	6	536
WB4AIN	6	266	236	27	535
WA0NRA	9	262	93	169	533
W2OE	94	238	170	28	530
WA2ABY	81	245	181	21	528
WA2VYS	208	182	116	9	515
WB2RKK	48	252	196	16	512
WA7DZL	8	251	239	12	510
W1EFW	58	260	188	3	509
W8INJ	29	161	154	159	503
W2FR	14	204	270	14	502
Late Reports:					
W5OBD (July)	34	671	670	1	1376
W0LXA (June)	1	274	258	16	549

More-Than-One-Operator-Stations

K0WBD	1279	40	30	10	1359

BPL for 100 or more *originations-plus deliveries*

W6MLF 275	W3TN 133	W4RHA 108	
W4IYT 234	WA6BYZ 131	W7KZ 107	
KH6GKL 220	WA9QNI 118	K1PNB 103	
W8AUZ 210	W1DKD 114	K7ITH 102	
WA1GGN 181	W2EW 114	K1TKS 101	
WB2UVB 179	WB6HVA 112	Late Reports:	
WB2PGH 151	K0NEB 112	WB2EWJ (July) 211	
W2AE 153	WB6UMT 111	WA9JYO (July) 196	
W8LV 150	W9HOT 111	KH6GHZ (July) 147	
K4UWH 143	W9ESJ 110		

More-Than-One-Operator-Stations

K4GOP 468	K3HKK 209	K6MCA 172	
		Late Report:	
		K1PGQ (July) 114	

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listing: WB2IYO.

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.

Top Brass at the National Convention in San Antonio last June 7–9 included (L-R) ARRL Communications Manager **W1NJM** and Northern Texas SCM **W5LR.**

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Nov. 14 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted Nov. 7 at 0500 Greenwich Mean Time on 3590 and 7129 kHz. *CAUTION!* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example*, In converting, 0230 GMT Nov. 14 becomes 2130 EST Nov. 13. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP for the coming 3-month period.

Any person can apply. Neither ARRL membership for 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 through 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.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At

DX CENTURY CLUB AWARDS

From August 1, through August 31, 1968, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs Listed below

New Members

K4GXO....241	ZC4GM....123	W4DUQ....111	WA8TNJ...106	UA1ZX....103	WA8OSL...101		
WA1CJR...218	LA1IE....121	DL8OH....111	G5AAJ....105	VE7WL....103	WØJAS....101		
DL4PV....176	W4SD....120	WA9UMH..110	WA5RTG...105	W9AICR...103	HB9XO....100		
DM2BTO...153	K4YBE....118	UW3TE....109	HB9AHS...104	K5RBU....102	K4CXO....100		
KR6AB....153	W9VBV....118	JA3ENQ...108	JA1HHM...104	W5NQQ....102	UT5KDP...100		
K6KQN....151	GM5AHS...116	K6QMW/1..107	JA7KE....104	WA5NQN...102	W1YK....100		
K6VOL....140	JA3DWT...116	K9MDK....107	K6RIP....104	OZ7Z....101	W5CJV....100		
W1QUG....139	W3WXW...116	SM7ASN...107	K7RLS....103	UA3MIX...101	W6ZOL....100		
VO1HI....135	HB9ACM...112	UA9MX....106	SM5ACQ...103	UB5EU....101	WA7GFT...100		
K4AE....124					WA8TWC...100		

Radiotelephone

W1QQO....235	DL1MM....136	WA4NIB....115	K3LGM....106	6W8DY....103	XE1NNY...101		
W9ENE....161	DM2ATD...135	DL8OH....109	WB2FFZ...106	WA2VEQ...102	GM5AIF...100		
DL4PV....148	K6KQN....131	WØACT....109	WA9UMH...106	W9MBQ....102	K4CG....100		
KR6AB....148	K6VOL....126	W0SOZ....109	JA7BHQ....104	KZ5EN....101	K4HP....100		
OZ3PZ....145	K8PYD....126	LX1BW....108	K7RLS....103	W3SEJ....101	WA4WWK...100		
W8KRS....137	ULG....119	ZC4GM....107	W4SD....103	W5NQQ....101	W6BDI....100		
		HOVL....106	WB4ASG...103	WA9TFM...101			

Endorsements

Endorsements issued for confirmations credited from August 1, 1968 through August 31, 1968, are listed below. Endorsement listing 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.

325	**305**	**280**	K4IEX	W4USQ	**180**	W6EJJ	PY1NEW	UA4LN	K4KMX
ON4NC	OH2BH	K2ISP	K4THA	WA4MUB	JA1GTF	WB6FYW	UA4KKC	W4IJX	K6JAH
	PY4OD	K4SHB	SM7BHF	W9TKR	K4ELK	WA8BDL	WA5BFB	W4LXA	LA7QI
	SM5BPJ	OK1FT	VE3CTX		K4LFC	WØAY	W8ZNO	W6JKR	OZ8JD
315	W6DQ	SM5RK	VE7EH	**200**	W1AJC		WA9TFM	WA8PAW	PAØMID
W2EQS	WØBN	W9DH	W2RSJ	HB9RX	W2HL	**160**		W9AEM	VK9KS
W9ILW			W9CL	JA3BG	WB2NXL	DM3SBM		WA9NSR	W2CKR
	300	**260**		K1EIN	WA3GTX	F9BB	**140**		W2DF
	W1BPW	W7RVM	**220**	K8PYD	WA4PFD	G3KAA	DL1NC		W2QIP
310	W1BPY		DJ4HR	LA8PF	W5TXN	K2DDK	HB9PQ	**120**	W3NNX
JA2JW	W2LA	**240**	G3GIQ	OE3SJW	WA5AUZ	K6BAG	I1FOS	G3TZU	WB4HFJ
KH6IJ	W9BZW	G2FYT	K1GUD	WA5JSI	W6EJJ	K9JLJ	LA1FH	HA5MB	W5HCJ
W5CP	WØSMV	G3JEC	K2LGJ	W9EXE	W5TXN	OZ3KE	PY1BQO	K3OTY	W6OL
W5EJT	XE1CE	JA4XW	SM6CKS	YU3OV	WA5AUZ	PY1FH	PY2BBO	K4CG	

Radiotelephone

325	**305**	W1BPY	VE3CTX	JA1BN	**200**	K3RPY	**160**	VE4BJ	W1BDG
ZP5CF	W2ODO	W2GBC	W4TUC	JV7MA	G3NLY	K4LFC	DJ4VE	W2BHK	W1DO
		W5CP	W6DQ	K3PDC	VE3UR	OE1MEW	K2KGS	WA7DRP	WB2FMK
	280	W5LZZ	W8LUZ	SM7BHF	W2AEB	PY6CN	LA4DJ	W8GHN	WA5REB
320	K5AWR		W9DH	VE3EVU	W2VBJ	WA1HN	W1VRK	W8ZNO	WA5REM
ZS5JM	SM5RK		YV4IQ	W1YCH	W5OLG	WB2NXL	WB6FYW	YU3OV	WA6YMG
	W7GBW	**240**		W4HOS	W8GGE	W5OLG	WA9IVL		W7MSI
	ZL3OY	JA1BK		WA4MUB	ZL3AAD	W8GKM			WA7DRP
310		JA2JW	**220**	WA6AHF		W9MWO		**120**	W9UX
K5JEA	**260**	K4GXO	CX2CN	W5EJT	**180**		**140**	K3OTY	WA9NFL
	LU9DAH	SM5BPJ	F9RM		DU1FH		CT1MW	VK9KS	

0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. *CAUTION:* 0230 GMT Tuesday corresponds to 9:30 P.M. (EST) and 6:30 P.M. (PST) *Monday* evening. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230–0320 GMT runs are omitted four times each 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 on the air!) and to allow checking strict accuracy of your copy on certain tapes note t GMT dates and texts to be sent in the 0230–0320 GM practice on those dates:

Date Subject of Practice Text from September *QST*
Nov. 11: *It seems to Us*, p. 9
Nov. 19: *A Transistor Phone Rig for 1.8 Mc.*,* p. 11
Nov. 22: *The C-Line Matcher*, p. 23

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Dec. 2: *Antennas and Feeders*, p. 95
Dec. 11: *Enter Time*, p. 96

*Speeds will be sent in reverse order, highest speed first.

W1AW FALL-WINTER SCHEDULE, EFFECTIVE OCTOBER 27, 1968

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your *original* operator's license with you. The station will be closed November 28, Thanksgiving Day.

NEW W1AW C.P. & BULLETIN FREQUENCIES

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	....	[illegible]	[illegible]	[illegible]	RTT[illegible] O[illegible]³	....	....
0030	← [illegible] PRACTI[illegible] LY [illegible]0-[illegible] w[illegible] →						
0100	....	← [illegible] C.W[illegible] OB[illegible] →					
0120-0200⁴	....	....	7.020	3.520	7.020⁶	3.520⁶	7.020
0200	....	← PHONE OBS² →					
0205-0230⁴	....	....	3.820	50.120	144.120	1.820	3.820
0230	← CODE PRACTICE DAILY¹ (15-35 w.p.m. TThSat), (5-25 w.p.m. MWFSn) →						
0330-0400⁴	....	....	3.520	....	1.820	....	3.520
0400	RTTY OBS³	....	← RTTY OBS³ →				
0410-0430⁴	[illegible]	[illegible]	3.625	[illegible]	[illegible]7.095	[illegible]	3.625
0430	[illegible]one OBS[illegible]	[illegible]	← [illegible]HON[illegible] OBS[illegible] →				
0435-0500⁴	[illegible]	[illegible]	[illegible]220	[illegible]	[illegible]	[illegible]	7.220
0500	C.W. OBS¹	....	← C.W. OBS¹ →				
0530-0600⁴	....	....	3.520⁶	7.020⁶	3.520	7.220	3.520
0600-0700	....	....	7.080	3.945	14.100	3.555	7.080
0700-0800	....	....	14.280	7.255	3.945	14.100	14.280
2000-2100	....	14.280	21/28⁵	14.095	21/28⁵	14.280	....
2100-2200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]100	....
2300-2345	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]/28⁵	[illegible]55	....

¹ C.W. OBS (bullet[illegible]s, 18 w.p.m.) and co[illegible]ractice on [illegible], [illegible], [illegible], [illegible], [illegible], [illegible], 50.02 and 144.12 MHz.
² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 144.12 MHz.
³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.
⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.
⁵ Operation will be on one of the following frequencies; 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
⁶ W1AW will listen in the Novice segments for Novices, on the band indicated (but will transmit on the frequency shown) before looking for other contacts.
⁷ Bulletins sent with 170-cycle shift, repeated with 850-cycle shift.
Maintenance Staff; W1s QIS WPR. *Times/days in GMT. Operating frequencies are approximate.

Strays

Feedback

Although C_{28}, a 0.005-μf. disk ceramic capacitor, is not shown in Fig. 1 of the "Connecticut Bond Box" (*QST*, August 1968, p. 11), it should be included as shown on the circuit-board template. The equipment will work without it, but it should be used to assure bypassing for the B-plus end of L_7.

—•••—

The coil table for the "General-Purpose V.F.O." (*QST*, September 1968, p. 40), lists the correct J. W. Miller coils for each band. However, the inductance range for the 42A225CBI should read 12.9 to 27.5 μh. The 42A155CBI has a range of 9.40 to 18.7 μh., and the 42A476CBI tunes from 2.4 to 5.8 μh.

—•••—

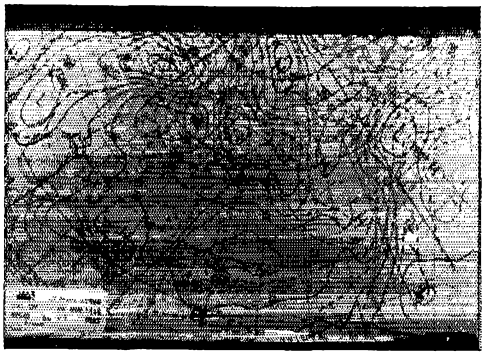
The dates in the footnotes to Simmons' "Digital Counter with Teletype Print-Out," August 1968, should have been: Grigg, July 1965; Skeen, January, 1965; Brassine, December 1966.

—•••—

WB2VIA says that his call was incorrectly listed as WB2JIA (NYC-LI) in the September 1968 *QST* report of the 1967 VE/W Contest.

This is WAØTLT—what makes him unusual is that he was an Associate Member of the League for over 30 years before he finally got a license. Then, immediately upon receiving his ham ticket, he applied for Life Membership in the League.

Strays



WEFAX

Latest development in satellite-relayed weather information is the broadcasting of maps compiled from the small-scale pictures received from ESSA satellites. The accompanying pictures were recorded by Aubrey Burton, **W4TNT,** with home-built equipment of the type described by Wendell Anderson, **K2RNF,** in November 1965 *QST,* during the experimental program. The transmissions originated at the NASA ATS ground station at Mojave, California, and were retransmitted by the ATS-3 satellite hovering 19,000 miles above the Equator over Brazil —not bad DX for picture transmission on approximately 2 meters! (The Mojave frequency was 149.22 MHz. and the ATS-3 retransmission was on 135.6 MHz.)

The picture at the right is a test pattern and the one at the left is a weather map of the type that will be sent out periodically as the information is accumulated from satellite pictures. The reproductions here don't really do justice to the 8 X 10 original photographs; the majority of the print can easily be read on the latter while it gets lost in the half-tone screen in these reproductions.

WAS

The ARRL Communications Department recently completed processing WAS #19,228—unique by any standards! **W5AQF** of Okay, Arkansas submitted proof of contact with the same station (**W5EGY**) on W5EGY's trek about these 50 states. That's W5AQF below with the ubiquitous Gene W5EGY on the left. Gene's trailer-touring started in summer of 1965 with a short jaunt to Idaho, Washington, Montana, Nebraska, Kansas and Oklahoma. The east coast swing this past summer wound it up with W5AQF's 50th state, Alabama.

Station Activities

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX. RM: W3EEB. Endorsements: K3KAJ, WA3DUM, W3EEB as ORSs; K3OBU and WA3HWC as OVSs; W3RDZ as OO. WA3FYS is Asst. EC for Sussex County. WA3GSM and WA3IID are off to college for the year. W3JYG is continuing in the Intruder Watch. WA3HWC has joined the ranks of retirees. W3DOG reports doing 2-meter work. W3EEB spent his vacation in Vermont. W3CZS and WA3FFU upgraded their licenses to Advanced Class. WN3KFF is now General. WN3KFF is the grandson of W3WR. WA3CDV is 6-meter mobile. WA3BAO has his 2-meter s.s.b. unit on the air. K3JLY has a new 80-ft. tower, including a beacon light on the top. All stations are urged to check over their emergency gear in preparation for the annual SET coming up in Jan.

DELAWARE QSO PARTY

November 23-25

The Delaware Amateur Radio Club of Wilmington (W3SL) announces its 13th Delaware QSO Party and invites all amateurs to participate. Delaware hams are urged to work as many out-of-state stations as possible, so that those interested can earn credit toward WAS and the W-DEL certificate. Here are the details:

(1) Time: 30-hour period from 2300 GMT Nov. 23 to 0500 GMT Nov. 25.

(2) No time limit and no power restrictions.

(3) Scoring: *Delaware stations:* 1 point per contact and multiply total by the number of states, Canadian provinces and foreign countries worked during the contest period. *Outside stations:* 5 points for each Delaware station worked and multiply total by the number of counties in Delaware worked during the contest period.

(4) Credit will be given for contacts with the same station on more than one band.

(5) A certificate will be awarded to the highest-scoring station in each state, Canadian Province and foreign country (with 3 or more contacts) and to the highest-scoring station in each Delaware county. In addition, a W-DEL certificate will be sent to any station working all 3 Delaware counties. Party logs showing required data will be accepted in lieu of QSLs.

(6) *Suggested freqs:* C.w. 3535 7035 14,035 21,035 28,035 kHz; S.s.b. 3975 7275 14,325 21,425 28,650 kHz; V.h.f. 50.15 50.4 144 MHz.

(7) General call: "CD DEL." Delaware c.w. stations should identify themselves by signing *de* (*call*) DEL K. Phones say, "Delaware calling."

(8) Contact information required: Delaware stations send number of QSO, RS(T) and county (New Castle, Kent or Sussex). All others send number of QSO, RS(T) report, and state, province, or county.

(9) Logs and scores must be postmarked not later than Dec. 23, 1968, and should be sent to the Delaware Amateur Radio Club, c/o Dick Reuling, K3ZKD, 25 McCord Drive, Newark, Delaware 19711. Applications for the W-DEL certificates should also be addressed there. No fees are asked, but s.a.s.e. would be appreciated.

Net reports: DEPN, QNI 61, QTC 9; DSMN, QNI 63, QTC 5; DTMN, QNI 28, QTC 17. Traffic: WA3GSM 44, W3EEB 35, K3NYG 28, W3DKX 26, WA3HWC 17, WA3DUM 5, W3DOG 4.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3AES. RMs: W3EML, K3-MVO, K3YVG, W3MPX. PAMs: K3MYS, K3WAJ. V.H.F. PAM: W3FGQ. OBS reports were received from K3WEU, K3RDM, WA3HGX, W3ID, WA3INC, WA3-AFI, WA3EEC; OVS from WA3EEC, K3WEU, WA3-HDI, WA3IAZ, W3FPC, W3ID, WA3BJQ, W3CL, W3-ZRR; OO from K3MYS, W3KEK, W3AES, K3WEU.

Net	*Freq.*	*Operates*		*QNI*	*QTC*	*RM/PAM*
EPA	3610	Daily	6:45 P.M.	240	224	K3YVG
PFN	3690	Mon.-Fri.	5:30 P.M.	442	678	K3MYS
PTTN	3610	Daily	6:00 P.M.		128	W3MPX
EPAEPTN	3917	Daily	6:00 P.M.	530	255	K3WAJ
VHF (6)	50.25	Mon.-Fri.	7:00 P.M.			W3FGQ
VHF (2)	145.6	Mon.-Fri.	8:00 P.M.			W3FGQ

W3CUL reports that the back-to-school rush is building up traffic. W3EML is having his problems with the new antenna reacting on his rig. WA3JCJ passed the Advanced Class exam. WA3HMU joined Navy MARS. K3WEU is getting ready for the fall season of the Book Review Net. WA3AFI has finished putting together an AR-15 hi fi. W3HNK's growing list of DX QSL service adds EP2KB. WA3JLF moved up to General Class. WA3GAT reports that the quad is really working. WA3BSV is performing major surgery on his rig but will be back on the nets soon. W3CL has been globe-trotting again. W3CPR is designing an all-transistor s.s.b. rig. WA3FPM is starting a SEPAN "slow EPA Net," primarily for Novices. K3DCB is W8GLC when he is in Pontiac, Mich. WA3EEC was active in the Bring 'em Back Alive Net. WA3FCP was a link between the 2-meter nets and the 75-Meter S.S.B. Net. W3AES still is looking for volunteers for EC posts. K3WEU expects to start another class at the Inglis House this fall. Area hams interested in helping, give him a buzz. W3PST is trying to put new life into Philadelphia Co. ARPSC. W3ICC is doing a fine job with ARPSC in Bucks Co. The first phase of incentive licensing is now in effect, get that Extra and you won't have to worry about the new limitations. Traffic: (Aug.) W3CUL 7243, K3NSN 2072, W3VR 1673, K3MYS 1190, W3EML 727, K3ONW 447, W3MPX 217, K3MVO 164, K3PIE 157, W3HK 133, WA3JCJ 112, W3CID 106, W3ERL 101, WA3AOJ 99, WA3ATQ 98, K3OIO 97, K3DCB 91, WA3HMU 89, K3VBA 87, K3-YVG 79, W3KJJ 64, W3NNL 59, WA3EEC 49, WA3IUV 48, WA3GAT 47, K3WEU 37, WA3AFI 34, WA3GLI 34, WA3INC 33, K3RUA 32, WA3EXB 27, K3KKO 27, W3FPC 26, W3HNK 26, WA3FCP 23, WA3JLF 22, K3FOB 20, W3VAP 20, WA3HGX 15, WA3JGS 14, WA3HMU 12, W3AKO 11, W3BUR 11, W3OML 11, WA3GAT 10, WA3HEU 9, WA3JKB 8, K3HKW 6, W3OV 4, WA3BSV 3, W3AES 2, WA3BJQ 2, W3CL 2, W3CPR 2, WA3IAZ 2, W3ADE 1, W3EU 1, W3FAF 1, WA3FPM 1, W3ID 1, W3KEK 1, W3YPF 1. (July) K3PIE 46. (June) K3PIE 43.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ—SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	0000Z	Daily	31	295	12.8	WA3HTQ, RM
MDDS	3643	0130Z	Daily	29	44	5.2	W3CGB, RM
MDCTN	3920	2300Z	S-T-T-S	18	60	13.9	K3GZK, PAM
MEPN	3920	2300Z 1800Z	M-W-F S-S				K3IAG
MTMTN	145.206	0200Z	M thru S	26	11	10.0	W3IFW

K3GZK is the new PAM for the MDC h.f. nets in lieu of W3SRC who will pursue a heavy study course in evening college. New appointee: K3GZK as PAM. Endorsed appointments: W3EOK as OO Class IV and ORS, W3LBC as ORS, W3JPT as OO Class III, W3-MVB as OO Class III, K3GZK as ORS and OPS. New AREC members: WA3EQY and WA3JDA. W3TN again earned BPL on originations and deliveries. WA3-

EKP earned BPL for a total of 951 points on phone. W3CDQ reports that the Washington RC has a new meeting place. WN3KQV has a new TD-3JR dipole in operation with some good results on the Novice band. WA3JBY is renewing his antenna system. W3ATQ is rebuilding frequency-measuring equipment and incorporating a homebrew counter using IC chips. WA4QLP/3 is picking up at the Naval Academy. W3FU received QSO confirmation from JT1AG and worked VU2OLK on 40. He also made 321 Intruder Watch reports in Aug. WA3GAU is busy working on v.h.f. equipment. WA3IRQ passed the 1st-class radiotelephone commercial exam. W3EOV reports an enjoyable 3000-mile vacation trip with many eye-ball QSOs. W3GEB is in the electronic service business but can't find time to repair his amateur gear. W3LBC is going v.h.f. and soon will be a regular on MTMTN. WA3IYS reports on the "back to school—off the air blues." WA3CCN is off to W6-Land and then to S.E. Asia for an 18-month "vacation." The Goddard ARC elected W3RQY, pres.; W3FA, vice-pres.; W3ZKI, treas.; W3BRV, act. mgr.; K3FFR, pub. mgr.; W. Opdyke, secy., and reports FD activity from old WWV antenna site. WA3EQM, ex-WN3BMA, has returned to chasing DX as General Class. WA3GVP, WA3GUI and WA3HQW, members of the High Point ARC, are building an amateur rocket with which to launch a relay station. WA3EOP has passed the Advanced Class exam. Your SCM was pleased to pass out Section Net certificates at the MDD, MDDS, MDCTN and MEPN picnics to those qualified station operators whose activities deserved same. WN3KCP reports working SM3CNN on his first try at operating on the 15-meter band. Traffic: (Aug.) WA3EKP 951, W3TN 246, W3CBG 237, WA3HTQ 127, WA3JBY 117, W3ATQ 109, K3GZK 86, WØUCE/3 66, K3FQF 54, W3LDD 54, WA3IRQ 53, WA3IYS 46, W3LBC 34, K3JYZ 22, WA3GAU 12, W3GEB 11, W3EOV 6, K3OAE 6, WA3EOP 3, WA3HUJ 2. (July) WA3JDA 23, WA3HUJ 12.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YPZ. SEC: W2LVW. RMs: WA2KIP, WA2BLV. PAMs: WA2UVB, W2ZI & NJPN Net Mgr. NJN reports QNI 417 stations, 397 traffic. NJPN reports QNI 540 stations, 251 traffic. The N.J. QSO Party was well attended, Mercer Co. being represented by W2ZI and several others. The SJRA made the highest score in its history on FD. W2BZ is proxy of the new RTTY Group: the Del. Valley Green Keys. The net meets Mon. at 7 P.M on 51.7 and 146.7 Mc. WB2CHO was elected proxy of Princeton U. station W2PU. WA2AJF is trustee of WJRA station W2UUG. W2HX copied the Armed Forces Day message on RTTY. WA2GAA is a new OVS. WB2FJE is the new NCS for Tue. on NJPN, replacing W2SJI who moved to Florida. K2PI is now K4PI, while W2FK is now K4IK. WA2HQE is Navy MARS NØHAC in Princeton. W2EZM is collecting old-time vacuum tubes. W2ZI received a unique QSL card from WFØITU, the CCIR Conference Station, Boulder, Colo., which operated from July 7 to Aug. 9. A nice article was received from W2LVW with his picture in *NAFC News*. WB2RVD has his new commercial radiotelephone ticket with radar endorsement. W2YPZ has been vacationing in the Maritime Provinces. W2VE recently returned from Germany. The DVRA Annual Corn Roast was held Aug. 13. W2QWC has returned from Kenya, Africa. WB2IYO is moving to Westchester Co. WN2CIF is now WA2CIF, while WN2CHY took the Tech. Class exam. WB2WXA is going to college. WA2HLF is working 440-Mc. ATV. W2ZEW built an HW-100 and now is on s.s.b. W2ZVW is Acting NCS on EAN. Traffic: (Aug.) WA2ABY 528, WB2UVB 248, WA2HLV 210, WA2KIP 119, W2ZI 87, W2IU 41, W2YPZ 23, WB2VEJ 20, K2JJC 14, WB2FJE 12, WA2KAP 6, W2ORS 5, WB2MNF 3, W2ZVW 2. (July) WA2ABY 347, WB2UVB 217.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—SEC: W2RUF. PAM: W2PVI. RMs: W2RUF, W2MTA, W2FR, K2KIR. Nets: NYSPTEN, 3925 kc. 2200Z; NYS, 3675 kc., 1900 local; ESS, 3590 kc., 1800 local. K2BKU and K1DIK/2 are new OOs. K2KQC is a new OPS and K2KNV is a new OVS. Please all appointees: If your appointment has expired and has not been renewed, and if you wish to keep it in effect, please send your certificate in for endorsement. The records show appointees who haven't been heard from in years. I have no way of knowing if you are active until I hear from you. It would be appreciated if section clubs would include me on their bulletin mailing lists. WB2HSR has been vacationing and DX-ing on 6. Congrats to WB2YQH on his new Advanced Class license. WA2AWK, Onodaga County EC, reports the appointment of K2ZSE as Asst. EC. WA2AQD is a new General. Several Glens Falls area AREC members received Public Service awards for activity with the Red Cross during two local fires. W2CFP is working on increasing 2-meter f.m. activity in the Ithaca area. W2EMW continues to work FB DX on 20 c.w. with QRP. The RDXA held its annual picnic Sept. 7. The Fulton Amateur Radio Club will have its birthday party-hamfest Nov. 16. Those interested should contact WA2SOO. Congratulations to WA2HAH on his new General Class license. WB2NUZ is active on v.h.f. between classes at Cornell. K2LCT is transmitting bulletins on 3900 kc. at 1900 local time as well as on the Erie County Net. K2KTK has his beam up at the new QTH. K2BKU and WA2AWK returned safely from European trips. WB2YNR, W2FUL and K2JQT attended the 21st Century ARC Picnic at Depew. W2MTA continues to keep in contact with NYS members with a fine bulletin. The Chemung County AREC, K2DNN EC, provided communications for the 35th National Soaring Competition in Elmira. WB2EWJ made the BPL in July, as did W2OE, W2FR and W2AE/2 in Aug. W2AE is the brand-new club station of RAGS and was operated portable at the New York State Fair in Syracuse. Please send me your activity reports by the 5th of the month. Traffic: (Aug.) W2OE 530, W2FR 502, WB2OYE 270, W2RUF 205, W2MTA 169, W2FEB 164, W2AE/2 153, W2HYM 56, W2RQF 38, WA2GIN 23, K2OFV 22, WB2RWR 22, K2KIR 17, K2DNN 16, K2KTK 15, W2PVI 14, W2PNW 13, WB2NZA 8, WA2AWK 7, W2CFP 5, W2EMW 2. (July) WB2EWJ 211, WB2VND 58, WA2AWK 10.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: W3KPJ. PAMs: W3WFR, K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3NEM, K3SOH. Traffic nets: WPA, 3585 kc. daily at 0000 GMT; KSSN, 3585 kc. Mon. through Fri. at 2330 GMT. This column regrets to record the passing of W3QZM. The section thanks W3NEM for a job well done as SCM during the past two years. K3OTY has a new SB-101. WA3BGE attends Case Western Reserve U. W3MRZ is now W3SG. W3RVX changed to W3RH. WA3FLB acquired his General Class license. W3TOC attended the South Hills Hamfest and now has a new NC-200 transceiver. WA9QKE is now WA3KSM at Ellwood City. WN3HUN graduated to Technician as WA3KYC. New officers of the Breeze Shooters Net are K3UEQ, pres.; K3IXB, treas.; K3CHD, checker; W3OVM, WA3CHC and W3TZW, wind gaugers. W3YLJ is testing a Tigaray atop a 36-ft. aluminum ladder. A new Novice in the Erna area is WN3LBP. K3LGM runs emergency traffic on 21 Mc. W3KPI is back home after several months in Spain. WA3HQM, WA3HOF and WA3HAE operated WA3IPS/Ø from the Explorer Scout Delegate Conference in Colorado. W3DM checks out a new quad. Radio club secretaries are requested to mail in their monthly club bulletins for information to be used in this column. W3NEM is now an Extra Class licensee. K3RZE has moved to Harrisburg. WA3GPK sports a new SB-301 and 401. K3CFA built a 432-Mc. 48-element antenna for his local radio club. W3KTW became a member of the A-1 Operators Club. K8BIT has moved into the Pittsburgh area. His XYL is K8MQB. WA3BLE attends Lehigh U. WA3GIV, W3DMK and W3GJY received Armed Forces Day certificates for 100 percent RTTY copy. K3HWR is back in Erie after a tour of duty in Vietnam. Interested in the AREC? If so, contact SEC W3KPJ for details. New appointments: W3WFR as PAM; W3NEM as RM; K3HCT, W3IDO and WA3HSI as ORSs. Endorsements: W3CA, K3KMO, W3KOD, W3LOD, W3LOS and W3YA as ORSs; K3ASI and K3EDO as OBSs; W3UGV as OO; K3ASI as OVS. Traffic: K3HKK 293, W3NEM 225, WA3IPU 214, W3KUN 211, K3SOH 94, W3LOS 53, WA3AKH 36, W3KPJ 34, W3SN 20, K3HCT 12, K3ASI 11, K3SMB 10, W3GJY 6, WA3HSI 6, K3SJN 6, WA3BGE 5, W3IDO 4, W3LOD 2, K3RZE 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9RLA (v.h.f.). Cook County EC: W9HPG.

Net	*Freq.*	*Time*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	No Report
ILN	3960 kc.	0000Z	Daily	225
NCPN	3915 kc.	1200Z	Mon.-Sat. }	619
NCPN	3915 kc.	1700Z	Mon.-Sat. }	
Ill. PON	3925 kc.	1700Z	Mon.-Fri.	1682
Ill. PON	145.5 Mc.	2000Z	M.W.F.	No Report
Ill. PON	50.25 Mc.	2000Z	Mon.-Thurs.	No Report
TNT	145.36 Mc.	2100	Sun.-Fri.	273

W9DID, W9MAL, W9IFA, WA9OZO, WA9OZN, K9RUG, K9SGD, WA9CHB, K9VWX, W9VWY, W9ZIH and W9KQX attended the Central States V.H.F.

Conference at Ozage Beach, Mo., where the featured speaker was Edward P. Tilton, W1HDQ, of the ARRL staff. WA9QXT passed the Extra Class exam. This column's sympathy is extended to the family and friends of Evelyn Spars, WA9OBQ, who passed away July 29. Evelyn was secretary of Hamfesters (Chicago). WA9BYF was named Illinois Amateur of the Year during the Hamfest Picnic at Santa Fe Park. He received his award for setting up a communications network for emergency purposes for the Little Company of Mary Hospital. W9QLW reports that the traffic count for the Ninth Regional Net was 1174 for the month of Aug. WN9VLP has a new TH6DX beam to help him bring in the rare ones on 75 watts. New Generals in Barrington are WA9WIX and WA9ZPR. The Barrington ARC started its meetings at the High School Sept. 5. The Sangamon Valley Radio Club, Inc., cooperated with the American National Red Cross with communications for emergency use during the Illinois State Fair while the Bell Telephone employees were on strike. K9IFE is on the road to recovery after a short hospital seige. New appointments include K9FRZ as ORS, K9YNG as OVS and WA9BRQ as OBS and OVS. WA9QZE has a new Drake and is starting to work DX again. W9JOV is on 2 meters after an absence of many years. K9DQU is enjoying a new (to him) HQ-180. W9SXL is experimenting with an eight-element yagi on 2 meters. WA9CNV, WA9-MHU and W9HOT are BPL certificate recipients this month. Traffic: (Aug.) WA9CNV 2384, WA9MHU 688, K9KZB 355, WA9OTD 257, W9HOT 236, K9AUD 207, W9IXV 171, W9NXG 146, WA9PFB 128, WA9TUM 112, W9EVJ 105, WA9AKR 101, WA9DOQ 95, WA9LDC 46, WA9WNH 45, W9LDU 44, WA9SPA 33, K9DRS 28, WA9HVQ 28, K9HSK 25, WA9QVU 23, WA9SFB 19, WA9QBM 14, W9PRN 8, WA9QXT 8, K3PYS/9 3, K9RAS 3, W9IDY 1.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Net	*Freq.*	*Time*	*Aug. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300Z M-F	276	K9IVG
ISN	3910	0000Z Daily 2300Z S-S	552	K9CRS
QIN	3656	0000Z Daily	266	W9HRY
Ind. PON	3910	1245Z Sun.	128	K9EFY
Ind. PON V.H.F.	50.7	0200Z Mon.-Thurs.	74	WA9NLE

W9PMT, mgr. of the Hoosier V.H.F. Nets, reports Aug. traffic as 183. We are happy to report that K9IVG is home from the hospital and back on the air. W9BUQ attended the Louisville Ham Konvention in Louisville, Ky. K9EAT won first prize in the homebrew contest there. WA9QEQ reports that the Kokomo AREC Net operates on 50.7 Mc. at 0200Z Wed.-Sun. W9QLW has a new 6&2-meter beam. WA9ITB will soon be in the Navy. W9HCQ, located in Hendrick County, will start code practice on 50.8 at 0300Z Tue. through Sat. WA9-GOP passed the Advanced Class exam. WA9VZM passed the Extra Class exam. WB4AFH moved to Indiana and is now WA9YXA. K9YFT is the EC for Martin, Davies and Greene Counties. Indiana needs ECs. Contact W9BUQ if interested in appointment as EC for your county if you do not have one. WA9VZM reports traffic as 184 for Mar., 366, for Apr., 296 for May, 151 for June. Endorsements due in Nov.: W9-HCQ, W9QUH, W9SVL, K9ULW as ECs; K9KDV, W9SVL as OPSs; W9HRY as ORS. QIN Honor Roll: W9BDP 30, K9VHY 27, W9QLW 24, K9HYV 17, WA9-KAG 16, WA9MXG 16, W9UQP 16. *Amateur radio exists because of the service it renders.* BPL certificates went to W9JYO, W9EQO and WA9VZM. Traffic: (Aug.) W9JYO 912, W9EQO 888, WA9VZM 536, W9-QLW 349, W9HRY 299, W9JBQ 249, K9FZX 244, K9IVG 198, WA9FDQ 172, K9HYV 156, K9QVT 109, K9CRS 63, K9KTB 57, W9BUQ 56, K9STN 54, WA9OLM 47, K9VHY 39, K9RWQ 38, WA9BHG 37, WA9PUM 33, K9EFY 31, K9ILK 29, W9CMT 28, WA9QOQ 23, K9-WGN 22, W9DOK 21, K9JQY 20, WA9AXF 19, K9GBR 18, WA9QEQ 18, W9PMT 17, W9YYX 17, W9ALM 15, K9FZU 15, W9DZC 14, W9FWH 14, K9BSL 13, K9OXA 12, WA9VBG 11, K9FUJ 10, WA9KYG 10, WA9MFY 10, W9SNQ 8, K9CRY 7, WA9BDP 6, W9CUC 6, K9-HZY 5, WA9IPS 5, WA9YXA 4, W9DGA 3, WA9AUM 2, WA9ABI 1. (July) W9JYO 224, W9QLW 184, W9JBQ 44, W9RTH 19, WA9QEQ 14, W9FUJ 10, WA9YXA 4.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. PAMs: WA8QNI, WA9QKP, W9NGT, K9DBR and WA9IZK. RMs: W9DND, W9CBE and K9KSA.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1245Z	Mon.-Sat.	376	242	W9NRP
BEN	3985 kc.	1800Z	Daily	767	75	W9NRP
WSBN	3985 kc.	2300Z	Daily	1228	321	WA9QNI
WIN	3662 kc.	0115Z	Daily	195	106	W9DND
WSSN	3780 kc.	0030Z	Daily	99	13	K9KSA
WRN	3620 kc.	0130Z	Sun.			W9CBE
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			K9DBR
SW2RN	145.35 Mc.	0230Z	Daily	350	49	WA9IZK

Net certificates went to WA9TXN for WIN; WA9SUY, WA9TMT and WA9QIS for WSBN. New appointees: WA9SAB as OBS. Renewed appointments: W9NGT as SEC, W9LQC and K9PKQ as ECs, K9GDF as ORS. K9ZMS is working in Los Angeles for a while. W9YT is getting its new antennas up. WA9TXN reports he passed the Advanced Class test. WA9RAK is handling TCC duties. WA9GJU received WAC phone. WA9QNI and W9ESJ made the BPL in Aug. Traffic: W9ESJ 248, WA9QNI 246, W9CXY 237, K9CPM 196, WA9RAK 185, WA9SSN/9 165, W9DYG 102, W9NRP 86, WA9UMT 67, K9FHI 57, WA9GJU 45, WA9NDV 45, W9AYK 43, WA9PKM 38, W9RTP 38, W9BCH 37, K9KSA 35, W9DM 32, K9JPS 25, W9GXU 24, WA9TXN 24, W9DXV 21, K9GSC 15, K9TBY 14, K9WRQ 14, WA9NBU 13, W9AOW 12, W9IRZ 8, WA9SAB 2, W9SQM 2.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØIEF. RMs: KØORK, WAØEPX. PAMs: WAØMMV, WAØHRM. MSN meets daily on 3685 kc. at 2330Z. MJN meets Tue.-Sun. on 3685 kc. at 0000Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1705Z. Sun. and holidays at 1400Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Note that when we go back to Standard Time, all nets will meet one hour later by GMT, staying at the same local time, *except* Evening MSPN which stays the same GMT time, and meets one hour earlier by local time. Appointments renewed: WAØIAW as OO and ORS; WAØDOT as ORS; WØHEN as OBS. The Annual St. Cloud ARC Picnic and Hamfest was enjoyed by 169 amateurs and their families. We were pleasantly surprised to meet former SCM WØOPX and OM WØRIQ from California, who planned their vacation so they could attend the picnic. WAØIAW attended the Central Division Convention this summer. WAØNAX is getting on the air with a new DX-100. WAØQMP will be operating portable while attending Brown Institute in Minneapolis. WØ-CSC, WAØSSN and WØTCK are getting RTTY units on the air. Traffic: (Aug.) KØZRD 151, WA2OEJ 135, KØORK 110, WAØMMV 104, KØSRK 60, WAØEPX 50, KØZBI 42, WØBUC 41, WØTCK 34, WØBE 31, WØKYG 30, WØATO 28, WAØKWO 26, WAØMJF 19, WAØDET 18, WØHEN 18, WØUMX 18, KØDEF 15, WAØRKF 14, WAØHRM 13, KØMVF 12, WAØDOT 11, KØFLT 11, WØKLG 10, WAØODB 10, KØCNC 9, WAØTQT 8, WAØJPR 7, WØKNR 7, WAØNQH 7, KØZXE 7, WØRUO 5, WAØSSN 3, WAØPXT 2. (July) WAØKWO 20, WAØGAZ 2.

NORTH DAKOTA—SCM, Harold L. Sheets, WØ-DM—SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØELO. WAØTBR took a train, auto and bus for an extended trip in Mexico and the States. KØSPH reports that his XYL is on the mend after some time in the hospital. WØGQD spent some time in Florida working portable from a trailer but only one North Dakota station. WØEFJ and WAØMND made use of their new trailer this summer, stopping off the last time to visit with WAØGRX and her OM at their Minnesota Lake home. KØPYZ had a big corn feed at his farm and despite some rain 33 OMS, XYLs and jr. operators showed up and were given a fine time. WØBIH is back in the hospital. Drop him a card, gang. WAØOAT has been working on construction and has a new Drake transceiver. WAØTYA has an NCX-5 and put up a new antenna to go with it. WØDM spent three week ends at home in July and Aug. WAØHUD has been holding up his end of the traffic handling. WAØUTS is a new call in Minot. Ex-WØHUM was back from Sun City, Calif. for a couple of weeks. NDRACES 21 sess. 350 check-ins 59 traffic KØSPH, WØHJU, WAØTBR, WØEFJ, KØ-PZK. Traffic: WAØHUD 112, KØSPH 11, WØDM 5, WAØJPT 5, WAØTBR 2.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW —SEC: WAØCPX. PAM: WAØCWW. RM: WØIPF. Congratulations go to KØHQD and Doug on the new YL harmonic. WAØRIQ, WAØQCC, WAØPBL, WAØNWM, KØZTV and all the others who are going to school will be missed. Their participation has been appreciated. All report a good time at the state picnic and thanks to the Prairie Dog ARC it was a success. Mitchell has promised a good one in 1969. All net managers are asking for your participation as NCS, if able, volunteer. Net reports: Morning Net, WØHOJ mgr., 450 QNI, 13 QTC; NJQ Net, WAØLLG mgr., 417 QNI, 223 QTC, 63 info. Early Session Net,

WAØRIQ mgr., 398 QNI, 42 QTC, 45 info. Late Session Net, WAØPNB mgr., 1176 QNI, 36 QTC, 141 info. *The report for the C.W. Net is incomplete but* RM WØIPF reports activity increasing. Traffic: WAØPNB 594, WAØMYS 53, WAØPBL 16, WAØFUZ 12, WAØRIQ 10, WØDJO 4, WAØFJZ 3.

DELTA DIVISION

ARKANSAS—Acting SCM, Robert D. Schaefer, WA5IIS—SEC: W5PBZ. PAM: WA5PPD. RM: W5NND. As your Acting SCM, I hope to follow the good example set by W5DTR. W5PBZ, our new SEC, is well qualified and will be a good leader for our AREC organization. The EC appointment of WA5TLS has been endorsed. WA5QMQ is a new OPS. WA5LKB reports good progress with AREC and licensing classes in Russellville. W5MYZ has been issued OZK certificate No. 54. Welcome to new Novices WN5VRQ in Monticello and WN5VSV in Little Rock. WN5VSV is WA5HNN's dad. WA5HNN has been working good DX on 20 with his new X-beam. I received a nice bulletin from the Southeast Arkansas Amateur Radio Club. We welcome W5KGJ back to Fort Smith. Net reports for Aug.:

Net	*Freq.*	*Time*	*Traffic*	*Stations*	*Mgr.*
OZK	3790	0000Z	15	219	W5NND
RN	3815	2330Z	52	608	WA5PPD
APN	3885	1100Z	14	506	K5ABE
Teenage	3815	2230Z	15	173	WA5QPI

Traffic: (Aug.) W5OBD 1001, W5NND 211, K5AJM 132, WA5PPD 74, WA5KEF 44, WA5QPI 36, W5MYZ 32, W5DTR 30, WA5QMQ 23, WA5IIS 19, K5VBF 14, WA5HNN 13, W5PBZ 7, WA5TLS 1. (July) W5OBD 1376.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—K5RSH is now Advanced and WA5NYY Extra Class. W5CEW is having rig trouble. W5FMO is spending much of his time as a nimrod. W5EA is looking forward to cooler weather. W1LVQ addressed the NOARC and the turnout was exceptional. W5CEZ has been gadding about with MARS. WN5VQP, WN5VQQ and WN5VQR are new to the game in Monroe. Incidentally, WA5MWH has moved to this town, where WA5QVN passed the Advanced Class exam. The OOTC National QSO Party is being sponsored in Jan. by the New Orleans Chapter. W5BUK is party chairman. Our own Louisiana QSO Party will be held Jan. 18 and 19, 1969. WA5EID has joined the Extra ranks. WN5UUM and WN5VDE are newcomers to the NO area. K5ANS/5, our RM, is looking for a net mgr. for LAN. W5MBC had to relinquish the job. WA5LGO is hot chasing DX on 20. W5JFB has built a long yagi for reception of TV Ch. 10 in order to watch the Saints, which are blacked out in the NO area. K5KRX has been away on vacation. It is with sincere regret we announce the passing of K5LNW. The Central Gulf Coast Hurricane Net had a total of 154 check-ins during Aug. W5CZ is new prexy for the CLARC with WA5GNM, vice-pres.; and W5JHF, secy. treas. The LARC group recently held a huge picnic with almost a complete turnout of its membership. W5NQQ and W5NQR spent part of their vacationing time in Florida. The Ozone ARC of Slidell increased its FD total contacts this year by over 487. Under the chairmanship of K5AGI the gang used two flat tops and two beams in their two-station set up. W5HUT is new prexy of GNOARC with WA5ORS, vice-pres.; WA5FBQ, secy.; and K5GKK, treas. K5JBC had tower trouble which burst his quad. Traffic: WA5GVB 183, W5CEZ 151, W5MXQ 146, W5KRX 102, WA5NYY 35, K5ANS/5 15, W5EA 8, WA5QVN 4.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—It is with mixed emotions that I write this, my last report of Mississippi station activity. A combination of circumstances has made it necessary for me to resign and ask for a replacement for the remainder of my term of office. I regret that I am not able to complete this term, but am proud of the splendid advancement of the Mississippi amateurs and their contribution to amateur radio. I very deeply appreciate the help and excellent cooperation that I have had during my terms of office. *Any success I have had I owe to fine amateurs such as* W5JHS, W5BW, W5WZ, K5SYG, K5PPI, WA5KEY, W5ODV, W5MUG, W5JDF, WA5PTE, W5WMQ, WA5TUD, W5LEA, WA5JWD, WA5OKI, WA5RBY, W5EHZ and WA5OHQ to mention a very few who come to my mind. As always it is a pleasure to welcome a new Novice, WN5VRS. I have just learned of the excellent job WA5SKI has been doing on the Intruder Watch Program. May I once again express my thanks and urge your especially good cooperation with my successor.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. RM: WA4YEM. PAMs: W4PFP, WA4YBT, WA4EWW, WA4CRU.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	Tue-Sun.	0030Z	27	1275	151	WA4YBT
TPN	3980	M-Sat. Sun.	1245 1300	31	1063	151	W4PFP
ETPN	3980	M-F	1140	22	511	87	WA4EWW
TCN	3980	Thurs.	0200	4	35	(Wed. CST)	W4TYV
TPO	3980	Mon.	0030	4	53	15	W4AST
Tn	3635	Daily	0100	31	222	243	WA4YEM
TTN	7290	Daily	2200	31	111	21	WA4CRU
ETVHF	50.4	Tue-Th-Sat.	0000				WA4TJJ
ETVHF	145.2	Wed. & F.	0000				K4FKO

Appointments: WA4YBT as PAM; K4EGC as EC; WB4FEC, WB4DGI as ORSs; WA4WVW, WB4ESE as OPSs; W4JVM as OBS; WA4YON as OVS. On Aug. 13 W1HDQ, V.H.F. Editor of *QST*, spoke to the Delta ARC (Whitehaven). The Knoxville ARC, W4BBB/4, operated portable at the Tn. Valley A&I Fair. The following attended the Central States V.H.F. Conference at Lake of the Ozarks, Mo.: W4HHK, W4UDQ, WN4JKZ, WA4HGN, W4LOJ, K4TAX. W4HHK has built a parametric amplifier and is building a crystal-controlled transmitter for 2300 Mc. EC WB4EHK reports the Johnson City ARC had a booth at the Appalachian District Fair. WB4ESE is attending Southwestern U., Memphis. The Kingsport ARC, W4ZJA/4, operated a message center in the "Take Five" program of the Amer. Red Cross and the Kingsport Safety Council over the Labor Day week end. K4UWH made the BPL. On Sept. 3 W1LVQ, Gen. Mgr. and Secy. of ARRL and editor of *QST*, spoke to the Mid-South ARA in Memphis. Other honored guests were W5LDH, W4RHO and Ed Moory. I regret to report that our Asst. SCM, WA4YDT, is now a Silent Key. Traffic: W4FX 414, K4UWH 329, WA4YEM 328, W4OGG 292, WA4UAZ 217, W4SQE 151, WA4ZBC 137, K4VT 123, W4WPK 74, WA4YSX 70, WA4NEC 63, K4RTA 62, WA4GLS 56, WB4FEC 33, K4MQI 31, WB4EHK 30, WA4WVW 30, WB4HYY 29, W4PFP 29, WB4ANX 27, W4PRY 25, WA4TWL 23, K4LTA 20, K4AMC 16, W4LU 10, W4ZJA 16, W4CYL 12, W4TYV 11, K4UMW 11, WA4CRU 10, WA4EWW 7, WB4ESE 4, WA4TJJ 3, WA4HGN 2.

TENNESSEE QSO PARTY

December 22 1968

All amateurs are invited to participate in the Fifth Annual Tennessee QSO Party, sponsored by the Radio Amateur Transmitting Society.

Rules: 1) Contacts may be made during the 24 hour period starting at 0000 GMT and ending 2400 GMT December 22. 2) No power or time limitations. 3) The same station may be worked on different bands and modes. 4) The general call is CQ Tenn. All modes to be combined as one entry. 5) Exchange QSO number, report and county (Tennessee stations) or state, province or country (non-Tennessee stations). 6) Tennessee stations count one point for each completed contact, multiplied by the number of states, provinces, countries and Tennessee counties worked for final score. Out of state stations multiply QSO points by the number of different Tennessee counties worked. 7) Certificate awards for the first three places per state, province or country and for the first five places within Tennessee. A suitable engraved loving cup will be awarded to the grand aggregate score outside of Tennessee and also to the winner in Tennessee. All amateurs contacting 10 separate Tennessee stations during the contest will be awarded a "Certificate of Achievement." 8) Suggested frequencies: 3530 3900 7030 7250 14070 14275 21050 21325 28300 28900. 9) Any station disrupting a working Tennessee traffic net for the purpose of contest contacts will be automatically disqualified from any award.

Logs showing date, time, stations contacted, band, modes, location and computed final scores must be received no later than January 23, 1969. Send logs to the club station, W4POP, c/o American Red Cross Building, 22nd and Patterson, Nashville, Tennessee 37203.

GREAT LAKES DIVISION

KENTUCKY—Acting SCM, George Wilson, W4OYI—Appointments: W4VYS as SEC, WA4MKH as OPS. Endorsements: WA4AGH as OBS, OPS, OO; W4BAZ

as OBS, ORS; W4CSN, K4HOE, WA4BZS, WA4GMA as ECs; W4JUI as OO; K4KZH as PAM; WA4ELG, W4NBZ, WA4AUR, K4UMN, WB4ACQ, W4RCE as OPSs; K4DZM, W4MWX, WA4UIH, K4VDO, WA4VUE as ORSs.

Net	*QNI*	*QTC*	*Mgr.*
KRN	341	32	K4KIS
MKPN	465	133	K4TRT
KTN	840	308	WA4AGH
KYN	387	1080	W4BAZ
FCATN	99	38	WB4BKG

The Kenvention was tops. Congrats to the entire committee. The LARO reports an outstanding FD score. A nice new exhaler boosts K4YZU's signal. K4AVX and his XYL have a new YL. We hate to lose WA4UAZ to Tenn. The Northern Ky. American ARC did a bang-up job at the Boone County Fair, and the Ky. State Fair traffic seemed to move more and faster than ever from Louisville. The Henderson hamfest was well attended. Thanks to everyone for helping me get adjusted as Acting SCM. Traffic: (Aug.) W4BAZ 792, WA4DYL 623, WA4WWT 584, W4NLO 572, WB4AIN 535, WA4UAZ 418, K4TRT 140, WA4AGH 130, W4NBZ 121, W4UK 81. WA4VUE 78, WA4VZZ 65, K4MAN 51, W4OYI 49, K4VDO 42, WB4EOR 41, K4HOE 40, WB4-BKG 38, WA4GHQ 32, K4UMN 28, W4SZB 25, WB4-EEH 24, K4IPT 23, K4OEK 20, WA4TFK/4 20, WA4-GMA/4 19, WA4UHR 16, WB4EQV 15, W4MWX 13, W4YOQ 9, K4AVX 8, W4KKG 8, W4YKA 7, W4KJP 6, WA4UIH 3. (July) WA4WWT 277, W4NLO 168, WB4AIN 59, K4UMN 20. (June) K4YZU 80, W4VYS 30, WB4IPE 13.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ. PAMs: K8GOU, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: WA8AXF and W8-NDM as ECs; W8AP, W8FWQ and WA8MCQ as ORS; K8CKD, WA8LAY, W8PEB and WA8QCW as OPSs; WA8SOP as OBS; K8HKM as OO; WA8VHG as OVS. Silent Keys: WA8ZGS and Carl Poosch, retired from Radio Specialties Co.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2200	Dy	464	507	31	W8FWQ
WSSB	3935	2300	Dy	799	157	29	K8WRJ
UPEN	3920	2230	Dy	444	42	30	WA8UCD
PON-DAY	3935	1600	M-Sat.	426	184	27	WA8OGR
B/R-MEN	3930	2130	M-Fri.	917	81	26	W8OWG

All clubs again are urged to appoint a representative to the Michigan Council of Clubs. W8AET is doing fine after a back operation. W8HJR had heart surgery in Muskegon, and WA8ARB had a heart attack in Seattle while on vacation. W8ZQW is recovering from a leg amputation in Allegan. W8DXU is now W4TGH in Georgia, WA8BLU is WA7KOT in Arizona and W8FAN is WA4RCW in Florida. WA8KRH's son is WN8AVG on 2. W8VWY/K8ZJU's daughter is WN8BSX. W8GAI has a 60-ft. tilt-over crank-up tower. BPLers: W8GAI, W8IXJ, W8IV. The Great Lakes repeater is now in operation: input 146.34, output 146.76, call K8NUI. *Keep an accurate log!* W8HID worked the Virgin Islands on 160. W8MPD is expecting. W8IV now has Navy MARS RTTY gear. K8CGM is now a proud papa. Sorry to hear of the death of WA8EMJ's mother. WA8SIQ put up a tower, used as a top-loaded 160-meter vertical. WN8AEX, WA8ERH, W8FWC, WA8NYK, WA8OLN, K8QDZ, WA8RQI, WA8SIQ and WA8ZOF all gave WA8EMJ a hand transporting his pre-cut house from Frazer. K8QDZ's XYL presented him with a Jr. operator. K8EVG has a 78-ft. vertical antenna. WA8SIQ's XYL won't tell her age—neither will mine. Traffic: (Aug.) W8GAI 691, W8IXJ 503, K8KMQ 350, K8ZJU 228, K8LNE 203, WA8SQC 171, W8IV 150, W8JTQ 144, W8QQK 118, W8MO 96, WA8OGR 95, W8DET 90, W8NOH 86, W8IWF 79, K8JED 64, W8RTN 36, W8FX 33, WA8ENW 32, WA8PZT 28, WA8WZF 28, W8BEZ 20, W8MPD 20, W8FWQ 19, K8MXC 19, WA8MGM 18, W8UFS 18, W8CUP 15, WA8LXY 11, W8TBP 11, W8-OWG 10, K8ETU 9, WA8KRH 9, WA8UYJ 8, WA8OCW 7, K8VDA 6, WA8VGQ 4, WA8VBL 3. (July) W8IV 78, K8HKM 53, W8DQL 10, WA8LXY 4.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU. RM: W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time*	*Mgr.*
OSSBN	1674	885	58	3972.5	1430 & 2245Z	K8UBK
BN	638	484	61	3580	2300 & 0200Z	W8IMI
06MtrN	188	82	31	50.6	2300Z	WA8ADU
OSN	152	80	28	3580	2225Z	WA8VNU

BPL in Aug. was made by W8UPH, W8RYP and W8AUZ. Your SCM attended the Findlay Hamfest and participated in the Ohio Traffic Nets session. A huge volume of traffic was handled at the ham radio display and traffic booths at the Henry Co., Mahoning Co. and Ohio State Fairs. The many traffic nets that took part did a superb job. We have a total of 80 traffic reports this month. This is a new record, gang, let's see if we can keep beating the records. K8DDG attended the Warren Hamfest and reported it to be the biggest and best ever. WA8RQQ tells us that he has WAS on 40-meter c.w. with a dipole and 15 watts. W8CHT and WA8COA report a Proclamation of Amateur Radio Week by the Mayor of Cincinnati. WA8TYF attended the Central States V.H.F. Conference. WA8ZYT observed a 6-meter opening at 0120Z Aug. 28, hearing many WOs. WA8MCR writes about the Kettering Holiday At Home Parade. Ten members of RACES furnished an elaborate communications facility for this function. DARA's *R. F. Carrier* already is touting the 1969 Hamvention (Apr. 25-26). The Columbus ARA held a very successful auction at its Sept. meeting. The CARA also announced the date of its Christmas Party as Dec. 8. The CARA has instituted a "Big Brother" program with names and phone numbers of experienced members willing to help beginners to get on the air published in the Bulletin. Congratulations to new Extras W8IUS, W8WCW and W8AQ, and to new Advanced W8DHJ. WA8CXY and W8LZE got net certificates in Aug. (Buckeye Net). Aug. appointments: WA8MCR and K8EHU as OOs, WA8BZR as ORS, K8HRR, W8KJM and WA8ZYT as OVSs. The Indian Hills Radio Club's new officers are K8RMK, pres.; K8AXG, vice-pres.; W8SZF, secy-treas. We have received invitations to visit with the Queen City Emergency Net, Miami Valley Amateur Radio Contest Society, Canton Radio Club, Brunnerdale RC, Indian Hills RC and Greater Cincinnati RC. Any more? It's not too early to start planning the 1969 Simulated Emergency Test. ECs should be putting their planning committees together and working with NTSs. We don't want to lose the nationwide lead position we've been enjoying. By the time you read this, I will have completed what I will call the "State of the Section Report." This paper, detailing and summarizing section communications status and progress, will be sent to all appointees in the section. Non-appointees desiring copies need only send me a card or radiogram. Traffic: W8UPH 1116, W8RYP 681, W8AUZ 443, W8QZK 376, W8SZU 236, WA8VNU 226, W8SUS 204, W8IMI 201, WA8ULF 158, K8WVZ 142, W8UDG 138, WA8TYF 134, W8ERD 115, W8CHT 112, WA8OCG 111, K8ONA 110, WA8TWC 105, W8GVX 100, WA8GZE 98, WA8UPI 96, K8LGA 93, WA8FSX 90, WA8MTS 89, WA8SZD 87, W8OE 82, W8UTX 82, K8WKS 82, W8LRE 81, WA8SED 81, W8PMJ 79, W8QCU 72, WA8PPK 69, K8UBK 67, W8DAE 60, W8QXQ 55, W8FGD 50, WA8LAM 47, WA8KPN 41, W8GOE 40, WA8RQQ 40, WA8MHO 37, WA8SXI 31, W8LAG 28, WA8BZR 25, WA8WJR 25, WA8QFK 23, WA8IEH 22, K8BYR 21, W8WDU 21, K8DDG 19, WA8ETV 19, WA8ZGC 19, W8DVM 18, WA8SHP 18, WA8NTA 17, W8FRV 16, W8IUS 16, K8NQA 16, WA8YLW 16, K8DMZ 15, W8ETU 15, WA8VVP 15, W8AJZ 14, WA8TRE 14, WB8AZH 13, K8CKY 13, WA8COA 13, W8OUU 13, WA8UXL 12, W8WEG 12, WA8JSW 10, WA8CXV 8, W8ELE 8, WA8-ZNC 6, WA8YHN 5, WA8CFJ 4, W8CHT/mobile 4, W8LZE 4, W8VND 4, W8EEQ 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN—Asst. SCM and RM: Ruth Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB. Section nets: NYS at 2400Z on 3675 kc. nightly; ESS at 2300Z, 3590 kc. nightly; NYSPT&EN at 2300Z on 3925 kc. nightly. Appointments and renewals: W2PKY, WA2HGB, W2EFU as ORSs, WA2MID, WA2UZK, K2MPK as OPSs, K2DNR, WA2ZPD, WB2OIM, W2WGE and K2-CBA as OVSs. We're looking for applicants for EC in each county. Get in touch with W2KGC and help reorganize the AREC for the ENY section. Congratulations to WB2CMC, WA2CWW and WB2UHZ on new Advanced Class tickets. W2URP, alternate radio officer for Schenectady County RACES, reports a leadership certificate awarded to the boss, K2ONF, and commendations to all net members racking up 75% or better drill participation. Albany County now has 20 stations active on the 6-meter RACES Net. Hudson Council Pres. K2IES and Vice-Director K2SJO are among the group running classes for the Explorer Scouts in Rye. New Rochelle Club station K2YCJ supplied communications for the local swim meet for the tenth year running, with K2JQB, WA2TEQ, WB2RLS among the operating group. WA2BUE is working on the f.s.k. unit for the RTTY setup. WB2FYP is attending Iowa Wesleyan studying for the ministry. WB2UEQ has gone to

John Hopkins for his Pol Sci Doctorate studies and expects to operate from WA3EPT on campus. NYSPT-&EN reports 31 sessions, 374 traffic count for Aug. WA2AUI is getting pre-Viet training after USMA graduation leave. WA2OMT, K2QDF, WA2VYK, WB2-VUK, WA2IPQ and WA2JZD are all back active after the summer recess period. WB2GXF is designing and building a 220-Mc. four-element quad stacked in square for the Dutchess County V.H.F. Club use in the Spring V.H.F. Contest. All club secretaries: Please mail advanced programs to the SCM for a column "plug" and ENY staff visit planning. Thanks. Traffic: (Aug.) WA2BHN 703, WA2VYS 515, W2EAF 229, WA2VYT 188, WB2UHZ 187, WA2HGB 48, W2PTV/2 41, K2SJN 38, WA2CRW 35, WB2VJB 32, W2ANV 22, WB2-VYS 4, WA2BRF 1, WA2BUC 1, WB2FOA 1. (July) K2-AVP 50.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915/2200 Nightly	WA2UWA RM
NLIVHF*	145.8 Mc.	1930 MTWTF	WB2RQF PAM
NLIPHONE*	3932 kc.	1600 Daily	WB2ZET PAM
NLS (Slo)*	3715 kc.	1845 Nightly	WB2UQC RM
Clear Hse	3925 kc.	1100 Daily	WA2GPT Mgr
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG Mgr
East U.S.	3683 kc.	0001 Nightly	K2UBG Mgr
All Svc	3925 kc.	1300 Sun.	K2AAS Mgr
NYSPTEN	3925 kc.	1800 Daily	K2AAS Mgr

** Section Nets. All times shown above are local.*

Congratulations to WN2DVS, who passed the General Classs exam on the first try. The FLIRC had another successful hamfest out at Point Lookout on Sept. 1. WA2GPT was awarded a cook book and bath powder at the hamfest and she is wondering if there is a priority message there somewhere. WA2ZHA, of the Rockaway Club, was given the TX-2, 621 v.f.o., Ameco Nuvista converter and a microphone at the hamfest. WB2DRW has taken off for R.P.I. in Troy and expects to work out some on W2SZ, the club station. Venerable W2EW says he's still looking for a couple of young agiles to shinny up the trees with the ends of his wire. K2UBG allows that his mobile trip on 75 taught him much about skip on that band, which will come in handy during NCS chores. Congratulations to WN2DDR, who also passed the General Class exam. WB2JJU came home this summer and made his professional debut with considerable success. The LIMARC had a terrific dinner meeting in Aug., according to good old WB2JJW. WB2WCS also concludes that the hamfest at Point Lookout was a good one and feels sorry for you guys who missed it. Hey, wanna have some fun? Make many wonderful new friends? Belong to an affable group of congenial folk who abound with fellowship, camaraderie and are even downright neighborly? Well, join one of our traffic nets; you will even enjoy traffic-handling. Did you know that W4VI/2, executive vice-pres. for RCA, spoke at the 21st Annual QCWA meeting?, asks W2PF. WB2EMJ skipped off to another year of college. WA2PVG, the Wagner College station, figures to be on 2 meters a lot this academic year. WA2GLP plans to start a 6-meter c.w. net. WN2-GEY is looking for all those interested in starting a Novice c.w. net on 15 meters. We regret to note that K2TEM has joined the Silent Keys. WN2FMX is another guy who gave it a bodacious try and passed the General Class the first time. Net managers of the Huntington RACES are WB2TDK, 2 meters; WA2-FAK, 6 meters; K2PHS, 10 meters. Huntington also boasts of having two OM/XYL teams, W2NBH/WA2-EXM and WB2YYW/WB2YXY. Listen, W2OCL should now be called W2VY! Traffic: WA2UWA 1557, WA2-GPT 887, WB2DRW 343, W2EW 292, K2UBG 235, WB2RQF 172, K2AAS 99, WB2AEK 61, WA2LJS 60, WB2JJW 24, WB2DXM 20, WB2WCS 15, W2EC 12, WB2QIL 12, WB2ACE 11, W2PF 8, WB2PJH 6, WB2-EMJ 3, WA2GLR 2, K2JFE 2, WA2QJU 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2ZZ—Asst. SCM: Edward F. Erickson, W2CVW. SEC: WA2ASM.

ARPSC Section Net Schedules

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695 kc.	7:00 P.M.	Dy	31	417	397	WA2KIP
NJSN	3740 kc.	8:00 P.M.	Dy	31	175	75	WB2RKK
NJEPTN	3928 kc.	6:00 P.M.	M-Sat.	31	540	251	W2ZI
NJPON	3928 kc.	6:00 P.M.	Sun.	—	—	—	WA2TEK
NJAN	50,300 kc.	8:00 P.M.	M-F	22	308	61	WA2KZF
PVETN	145,710 kc.	7:30 P.M.	Dy	31	327	199	K2KDQ
ECTN	146,700 kc.	9:00 P.M.	Dy	31	280	217	WA2TBS

RMs: W2BVE and WB2RKK. PAMs: W2PEV, K2-KDQ, WA2KZF, WA2TEK and WA2TBS. New appointment: WB2DRJ as OVS. Endorsement: WB2-ZGP as OVS. BPL certificates went to WB2FUW and WB2RKK. Please note the new call of the OM. The summer months kept the FCC Office in NYC QRL with the NNJ group checking in for up-grades. WN2DQE passed the General Class exam and received the CP-20 sticker. WN2BVN passed the General Class exam. WN2EUX passed both the General and Advanced Class exams and is now WA2. K2JTU, WA2-BAN and WA2DMF received their Advanced Class licenses. Congratulations to all. WB2HCO reports his gear includes the HQ-110 and T-150. WA2BUP is planning a 2-meter setup. WB2TFH and WB2ZSH received 25-w.p.m. endorsements. WA2CKU has a new T4XB and is on 40. New officers of the St. Peters Prep RC are WB2DGL, chairman; WN2EOM, treas.; WA2-BAN, secy. WB2DRJ reports working 55 countries his first week as a General. He used W2ZZ's new 50-ft. tower. K2OQJ received WAC and WAS. He is waiting for the QSLs for DXCC with 120 worked. K2GPK is building the HW-17. WB2IYO has a new job and is leaving the section. We wish him the best and say "thank you" for the FB job he did in planning and organizing the ECTN. WA2DNY reports his station includes the 2NT and 2B with dipoles. The ECTN now has a *Swap News*. Contact K2OEI for further information. Good luck to all in the SS and CU in the nets. Traffic: (Aug.) WB2FUW 659, WB2RKK 512, WB2DDQ 300, WA2TBS 200, WB2NSV 140, WA2ACJ 82, K2KDQ 73, WB2ZCI 50, WN2DQE 40, WA2ASM 37, WB2HXK 37, WB2YPQ 33, WA2KZF 30, WB2CGI 28, WB2BCS 26, W2CVW 26, WB2TUL 24, W2ZZ 24, WB2JWB 23, WB2ZSH 20, W2EWZ 18, WA2NJB 18, WA2CLO 15, WN2CWU 14, WA2BUP 13, K2DEL 10, K2ZFI 10, K2EQP 8, WA2GLI 8, WB2QMA 8, WB2-DRJ 7, K2JTU 7, W2JDH 6, W2TFM 6, WA2ACP 5, WN2FSF 5, WA2CCF 4, WA2KAS 3, WB2WNZ 3. (July) WB2AMV 61, WA2ASM 35, WB2BCS 33, WB2-TUL 30, WB2JWB 26, K2EQP 12, WA2BUP 11, W2ABL 2.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KØMIIX—SEC: KØLVB. PAM: WØPZO. RM: WØLGG. OBS: WAØ-MIT. KØLVB is eager to hear from all ECs to get their ideas on how to improve the Emergency Corps and asks them to bring their certificates up to date. Does your area have an active EC? WØPZO is the manager of the 75-meter Net. Joe has been around a long time and handles the Noon Net very well. He usually has some "home-brew" project going. WØ-LGG is devoted to traffic work and manages the Tenth Regional Net. She says that she is strictly c.w. now. WAØMIT is a lawyer in Marshalltown, an Iowa football fan and a golfer. His melodious voice will be heard on 3970 kc. from time to time. Yours truly, formerly W9IYN in Illinois, is a rural mail carrier, eleven years in Iowa, twenty years over-all and a ham nineteen years. Iowa made a good showing in the Post Office Net Communications Exercise, held three or four times a year. November is the month the new licensing comes into effect. Have you up-dated your license? WØSEJ advises the next FCC examination will be held early in Dec. in Des Moines.

Net	*Freq.*	*Day*	*GMT*	*QNI*	*QTC*	*Mgr.*
Iowa 75	3970	M-Sat.	1830	1410	156	WØPZO
Iowa S.S.B.	3970	M-Sat.	2359			WØYLS
Iowa 160	1815	Daily	0100			
TLCN	3560	Daily	0030	58	31	KØAZJ
PON	3915	W & F	0030	156	43	WAØDYV
PON	3697	T & Sat.	0030			

Traffic: (Aug.) WØLCX 1092, WØLGG 99, WAØDYV 50, KØTFT 50, KØAJN 22, WAØJUT 14, WAØSSB 14, WAØRBU 9, KØGHH 6, WAØSRM 6, KØEXN 4, WAØOTQ 4. (July) WAØDYV 136, WAØOTQ 2.

KANSAS—SCM, Robert M. Sommers, KØBXF—SEC: KØEMB. RMs: WAØMLE, WAØJFV. PAM: KØJMF. A new OBS is KØUVH; new OO is WØLYC. WAØMLE renewed as OO. The Kansas Novice Net, QKN, schedule is as follows: 2100Z Sun., NCS WNØ-UES, 7160 kc.; 2300Z Sun., NCS WAØJFV, 3735 kc.; 2300Z Wed., NCS WNØTAS, 7160 kc. WNØSHH recently was awarded his Eagle Scout rank. The ARRL Intruder watch program is now in its fifth year. It has a two-fold purpose, to report intruders in the amateur bands so the Government can take steps to have them removed and to establish a public record of vigilant protection of the amateur bands. Kansas has no one watching the bands under this plan. Do we have a volunteer or two? I will be glad to sked any desiring more information on this plan.

Kans WX Net	Aug '68	QNI 726	QTC 112
KPON	Aug '68	QNI 783	QTC 1021

(Continued on page 118)

EIMAC

3-500Z's used in Drake's linear amplifier for 2 kW PEP at 3.5-30 MHz

The R. L. Drake L-4B linear amplifier shown here uses two of EIMAC's new 3-500Z zero-bias triodes in grounded grid circuitry to achieve 2-kW PEP SSB input and 1-kW dc input on CW, AM, and RTTY. Drive power is 100 watts PEP and 75 watts CW, AM, and RTTY.

Drake chose EIMAC 3-500Z's because these rugged, compact, high-mu power triodes are ideal for grounded grid operation. They can provide up to 20 times power gain in a cathode driven circuit. And the two tubes have a total plate dissipation rating of 1000 watts.

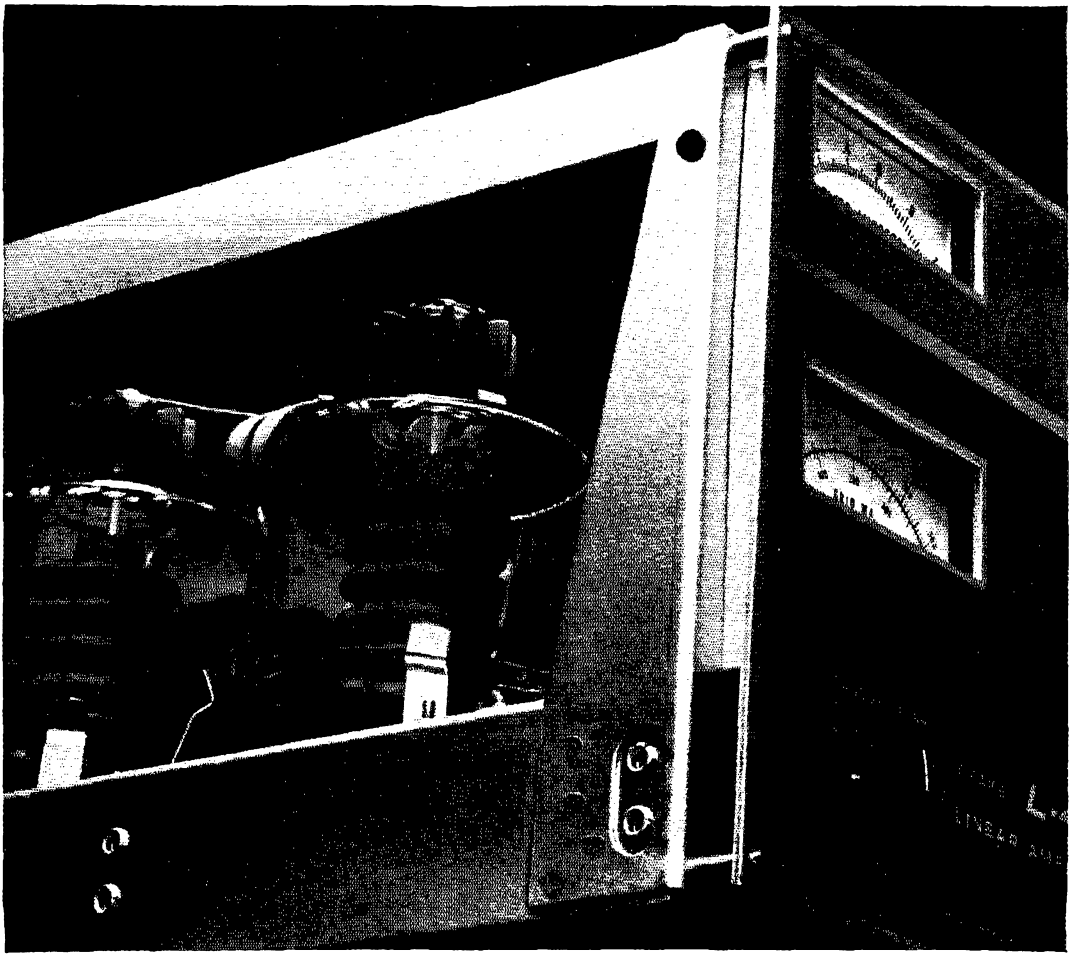
For more information on EIMAC's line of power tubes for advanced transmitters, write Amateur Services Department, or contact your nearest EIMAC distributor.

3-500Z TYPICAL OPERATION*

DC Plate Voltage	2500 V
Zero-Sig DC Plate Current**	130 mA
Single-Tone DC Plate Current	400 mA
Single-Tone DC Grid Current	120 mA
Two-Tone DC Plate Current	280 mA
Two-Tone DC Grid Current	70 mA
Peak Envelope Useful Output Power	500 W
Resonant Load Impedance	3450 ohms
Intermodulation Distortion Products	−33 dB

*Measured data from a single tube
**Approximate

EIMAC
Division of Varian
San Carlos, California 94070



EIMAC

3-400Z's used in prototype 6-meter linear amplifier for 2 kW PEP at 50 MHz

The prototype Swan linear amplifier shown here uses two EIMAC 3-400Z triodes in grounded grid circuitry to achieve two kilowatts PEP input at 50 MHz. Drive power is less than 100 watts PEP. The prototype amplifier features a tuned cathode circuit for low intermodulation distortion, and uses a pi-network plate tank circuit. The new linear may be driven with modern six-meter SSB transceivers, and offers real operational economy at 50 MHz.

Swan chose EIMAC 3-400Z's because these compact, high-mu power triodes are ideal for grounded grid operation. They can provide a power gain as high as 20 in a cathode-driven circuit.

For more information on EIMAC's line of power tubes for advanced transmitters, write Amateur Services Department, or contact your nearest EIMAC distributor.

3-400Z TYPICAL OPERATION (Minimum IM Distortion Products at 1 kW PEP Input)	
DC-DC Plate Voltage	2500 V
Zero-Sig DC Plate Current*	73 mA
Single Tone DC Plate Current	400 mA
Single Tone DC Grid Current	142 mA
Two Tone DC Plate Current	274 mA
Two Tone DC Grid Current	82 mA
Peak Envelope Useful Output Power	560 W
Resonant Load Impedance	3450 ohms
IM Distortion Products	−35 db**

* Approximate

** −35 db or more below one tone of a two tone test signal.

We have a new brochure entitled "Linear Amplifier and Single Sideband Service." Write for your copy.

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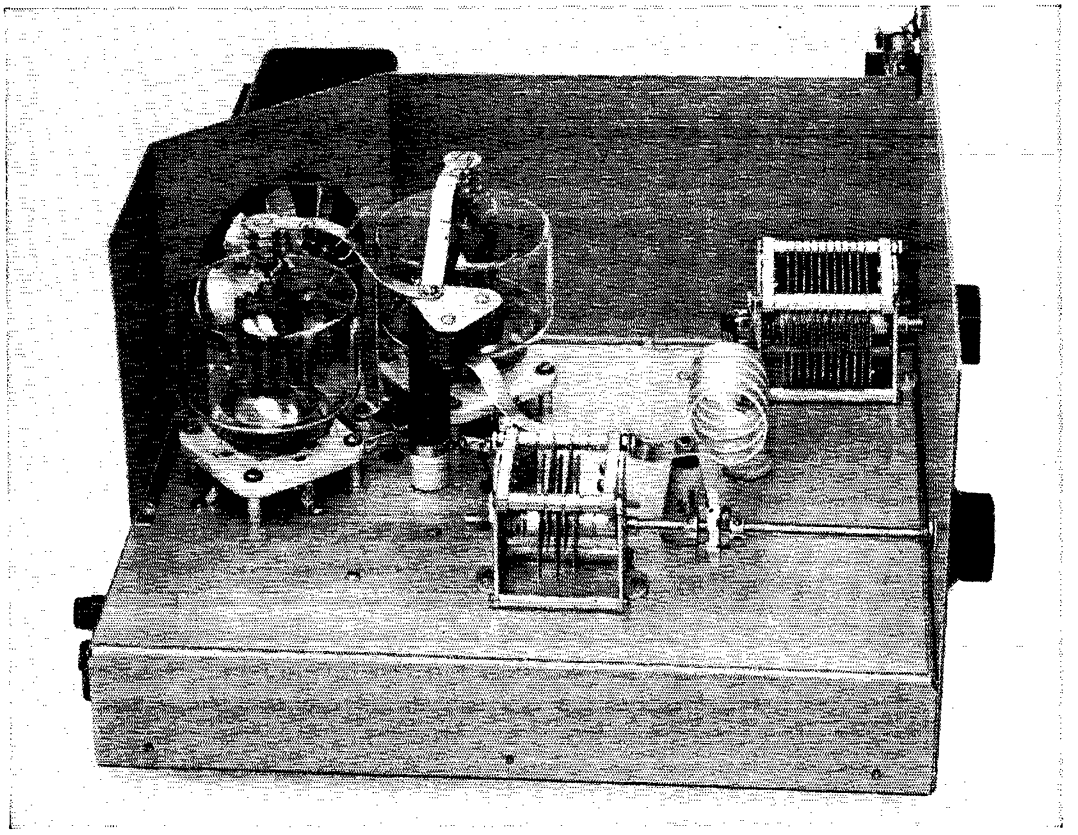
San Carlos, California 94070



KPN	Aug '68	QNI 189	QTC 21	16 Sess.
KSBN	Aug '68	QNI 662	QTC 256	22 Sess.
QKN	Aug '68	QNI 14	QTC 12	
QKS	July '68	QNI 139	QTC 35	
KANS PI Net	Aug '68	QNI 35	QTC 0	

Zones 7-9-11-15 and ACARA Coffeyville and North Central V.H.F. Nets report a combined total of QNI 89, QTC 9, most of the traffic handled in the Zone 11 Net. Zones 7-9-13-15 report low-band AREC nets in action, total QNI 130, QTC 5. Traffic: (Aug.) WØINH 278, WØLXA 139, WAØLLC 128, KØJMF 103, WØPSN 102, KØVLZ 83, KØBXF 79, KØDVN 78, WØZJY 76, WAØKPE 51, WØFII 49, KØEMB 47, WAØNFP 43, WOCGZ 40, WØBGX 34, WØSAF 33, WAØOWH 26, WAØJOG 25, KØLPE 21, KØGZP 20, WØICV 18, WAØJFV 17, WAØCCW 13, WØOAQ 10, WAØOZP 10, KØGII 8, KØUVH 7, WNØTAS 6, WAØKHN 4, WNØUES 3, WØHI 2, WNØTVH 2. (July) WØZJY 43, WAØTJU 31, WAØKPE 12. (June) WØLXA 549.

MISSOURI—SCM, Alfred E. Schwaneke, WØGS—SEC: WØBUL. WAØKUH received an OBS appointment. WØOUD renewed as RM. WØGBJ renewed as ORS. WØOUD has reactivated the Show-Me Net (SMN) on 3585 kc. at 2200 GMT (4:00 P.M. CST) Sun. WAØFKD is QRL at home and school and is unable to continue with QMO. WAØEMX is moving to Iowa with a new XYL to attend medical school. WAØRMW has joined the Air National Guard and will attend electronics school at Keesler AFB. WAØHTN, KØYBD and WA9HHH (now at Hq.) attended the Central Division Convention. WAØQXG passed the Adv. Cl. exam. WØGJ is ex-WØITX. WAØRFD has a new HW-32. K8CAN/Ø also has a new HW-32. WAØFLL received a Public Service Award for help in locating a tourist by radio. WAØITU passed the Adv. Cl. test. About 85 hams plus families attended the Annual SMARC Picnic at Springfield. KØAEM is TCC. E. and F. Wed. and Sat., and TEN NCS, Fri. KØONK demonstrated her Galaxy tuning system at a Fort Wood ARC meeting. The PHD ARC (WAØUGU) now has 52 members. OVS reports were received from WAØITU and WNØSBP. Don't forget that GMT listed for all nets will change when Daylight Saving Time goes off, but local times will remain the same. Net reports for Aug.:

Net	*Freq. Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885 2330Z	M-W-F	14	130	20	WØBUL
MON	3585 0100Z	Daily				KØVBD
MNN	7063 1900Z	M-Sat.	27	81	33	WØOUD
SMN	3585 2200Z	Sun.				WØOUD
MoSSB	3963 2400Z	M-Sat.	25	681	617	WØRTO
MoPON	3933 2200Z	M-F				WØHVJ
PHD	50.4 0130Z	Tue. (GMT)	4	94	10	WAØKUH

Traffic: (Aug.) KØONK 4147, KØWBD 1359. WAØNRA 533, WAØHTN 273, KØAEM 184, WØOUD 94, WØBV 76, WAØEMX 66, WAØKUH 61, WAØQXG 50, WAØFMD 44, KØJPS 31, WØBUL 27, WØRTO 27, KØVVH 21, WØGS 10, KØDEQ 5. (July) KØAEM 120, KØJPS 22. (June) KØVVH 58.

NEBRASKA—SCM, V. A. Cashon, KØOAL—SEC: KØODF. Monthly net reports for Aug.: Nebr. Emergency Phone Net, WAØGHZ, QNI 1340, QTC 727. West Nebr. Phone Net, WØNIK, QNI 629, QTC 30. Nebr. Morning Phone Net, WAØJUF, QNI 1025, QTC 44. Nebr. C.W. net, WAØQMZ, 0000Z and 0300Z sessions, total QNI 21. AREC C.W. Net, WAØEEI, QNI 12. Nebr. Storm Net, WAØLOY, 2330Z session, QNI 947, QTC 135; 0030Z session, QNI 940, QTC 104. AREC Phone Net, WØIRZ, QNI 147. Members of the Lincoln ARC operated KØNEB at the Nebr. State Fair and handled a large amount of traffic, earning BPL for the club on originations the first two days of operation. The Tri-State ARC Picnic at Bridgeport had an attendance of approximately 70 amateurs and their families. Amateurs are invited to submit their individual traffic counts. Reports must be received by the seventh of each month. Net comparisons: Aug. 1967, QNI 4703, QTC 515; 1968, QNI 5072, QTC 1061. Traffic: WAØIBB 335, WAØTID 270, WØLOD 190, KØJTW 128, KØNEB 112, WAØGHZ 109, KØIXY 44, WAØOMY 42, WAØHWR 41, WAØGVJ 33, KØJFN 29, WØBFV 26, KØHNT 24, WAØLOY 23, WAØSRN 17, WØPQP 16, WAØSRM 15, WØHTA 14, WAØOQT 14, KØODF 13, WAØPCC 13, KØMUF 12, WAØQLE 11, WAØEEI 10, WAØJUF 9, KØABT 8, WØNIK 7, WAØPIF 6, KØFRU 5, WAØIXD 5, KØUDW 5, KØOAL 4, WØPHA 4, KØSFA 4, WAØJKN 3, WAØEUM 2, WAØIKG 2, WAØRPB 2, KØVRL 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNassor, W1GVT—SEC: W1PRT. RM: WA1HSN. PAM: W1YBH. V.H.F. PAM: K1SXF. Activity report for the month of Aug.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	263	398
CPN	3880	M-S 1800 Sun.	1000	30	398	166
VHF 2	145.98	M-S	2200	22	134	73
VHF 6	50.6	M-S	2100	22	234	57

High QNI: CN—K1TKS and WA1GGN. CPN—W1GVT 28, K1LFW 25, WA1IEG 23, K1SXF 21, W1YBH 20, WA1IWN 19, W1LUH 18, WA1FXS and WA1GOI 17, K1EIC 15. SEC W1PRT would appreciate reports from all ECs covering their most recent EC drill. Try to complete one more EC drill before the year end. The ARRL Intruder Watch Program has been very successful since its start four years ago. Connecticut has only *six* active members supporting this great work. Your help is needed. Please request full information if interested. All are invited to join WA1CRS on 10 meters for nightly QSOs. Conditions are good. W1BDI enjoyed a vacation in Maine. W1WEE is getting fan mail on his OBS skeds! W1WHR was very successful with the Southington EC drill. The QCWA Net now operates Sun. at 0900 on 3917 kc. WA1GEK would like information on your v.h.f. activity for his fine Connecticut *V.H.F. Newsletter*. Congratulations to: W1BGD, W1DRA, WA1FGN, K1FNU, K1MBF and K1OXU on Intruder Watch support; W1EFW, WA1GGN and K1TKS on making the BPL in Aug.; WA1CRS and WA1JMR on Advanced Class licenses; WA1IQJ on General Class and W1OPZ on his retirement. Station appointments are renewable annually. Please check yours and send certificates for endorsement when due if still interested. Traffic: (Aug.) W1EFW 509, WA1GGN 330, K1TKS 278, K1SXF 145, W1WCG 124, W1AW 103, WA1FNJ 101, WA1HSN 84, WA1GIX 76, W1GVT 74, WA1FXS 64, WA1IEG 40, W1DZU 36, W1QV 27, K1ZND 24, WA9QVU 23, W1BDI 22, WA1GFW 20, W1YBH 15, W1CUH 12, WA1GEK 10, K1YGS 8, W1BNB 6, WA1CYT 4, WA1ICN 4, WA1JGF 2, WN1IQJ 1. (July) K1PGQ 114, K1UDD 38, WA1IUL 21, WA1FXS 10, WA1GEK 8.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from these ECs: K1s DZG, PNB, ERO, W1RPF, WA1DXI. W1BHV is a new ORS. Appointments endorsed: W1s AKN, QXX, QMN, K1ERO, WA1DXI as ECs; K1PNB as RM for the Novice 80 c.w. band, W1s BGW and TZ as OOs; W1TZ as OBS, W1PEX as OPS, WA1DGG as ORS, K9AQP/1 as OVS, K1ENS, W1TY and W1QD are Silent Keys. We need ECs for quite a few cities and towns. Write to W1AOG or me. W8GOC visited W1s VAH and WMH. WA1BFD, portable up in Grand Isle County, Vt., had good luck on the 80-20 CHC Nets. K1BUF and W1ZQM have new T-4XB and R-4B Drake equipment. W1BGW visited the Antique Museum in R.I. The T-9 RC met at W1IIB's QTH. K1KIX moved to Sharon. WN1JKJ is pres. of the Franklin HSRC and needs some help for newcomers. WA1FSH-FSI now is in Germany where he has been transferred on his job. W1BHV-K1CXP, ex-W6JRH, moved to Marlboro. W1SEA, mobile, worked VK7TR on 20 s.s.b. WN1JMR, age 15, has his Advanced Class license; also WA1FXU has his. WN1JXP is a new YL licensee in Plainville. K1CLM, WA1s DBM, HOD, W1s MO and NF are helping out in the Intruder Watch. If interested in this program write to W1IKE at ARRL. W1UID made Advanced Class. K1TVY is mobile in VE-Land. W1AIE is mobile on 40. How about checking in to our c.w. net, EMN, on 3660 daily at 7 and 10 P.M.?, asks W1DAL. W1SMO is in Navy MARS. W1JDP was out in WØ-Land in July. WA1AJN is in the CH Net on 3925. K1ERO is Radio Officer for Rowley. New officers of the Quannapowitt RA are K1ZQL, pres.; W1DFS, vice-pres.; K1UUQ, treas.; K1NFW, secy.; WA1HPS, news editor; W9GTC/1, W1s EED, FSN, AOG, WA1-FHU, K1NKA, directors. The 6-Meter Cross Band Net had 20 sessions, 87 QNI's, 2 traffic. K1QDR built an FET converter for 6. K9AQP/1 is building an eleven-element Yagi for 220 Mc. WA5IOD/1 built a 6146 rig s.s.b. for 6 from scratch. WA1DPX worked W4-Land on 6 during an opening; he now is on RTTY. New officers of the AROA are WA1FHU, pres.; WAØGSA, vice-pres.; K1PNB, secy.-treas. Those present at the club's recent gathering were W1s DFS, AOG, ALP, EAE, EMG, K1YUB, WA1s FHU, FCV, DWS, WAØ-GSA/1, K1ETT. The W1AEC Club had a nice write-up on its Field Day in the *Standard Times*. WA1FBH has a new vertical antenna for 40-80. W1ER added another 6146 to the rig and has 150 watts on 80. W1-AYA is instructor at Newton C.D. for Extra Class. WA1s AFO and AFU are studying for General Class. The Capeway RC met at K1LOE's. W1KVO showed the film The People of Pitcairn at the Massasoit ARA meeting. W1DXO is moving to Florida. W1RWC is active in Army MARS. The Yankee RC met at its

(Continued on page 120)

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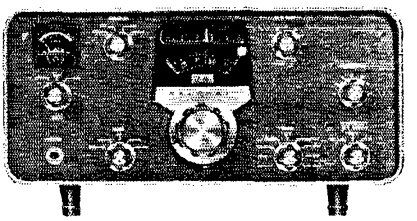
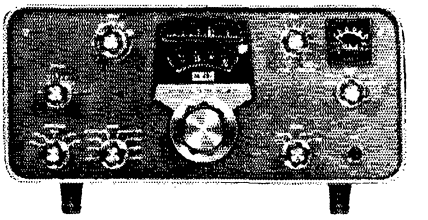
The World's Largest

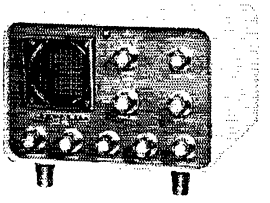
THE FAMOUS HEATHKIT® SB-SERIES . . .



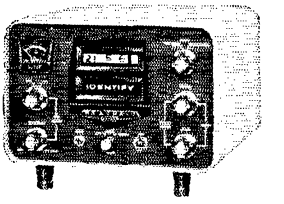
SB-301 Amateur Band Receiver . . . SSB, AM, CW, and RTTY reception on 80 through 10 meters plus 15 MHz WWV reception. Tunes 6 & 2 meters with SBA-300-3 and SBA-300-4 plug-in converters. (less speaker)
Kit SB-301, 25 lbs., no money dn., $24 mo. **$260.00**



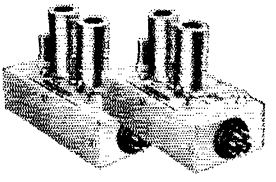
SB-401 Amateur Band SSB Transmitter . . . 180 watts PEP SSB, 170 watts CW on 80 through 10 meters. Operates "Transceive" with SB-301 — requires SBA-401-1 crystal pack for independent operation.
Kit SB-401, 36 lbs., no money dn., $27 mo. **$285.00**
SBA-401-1, crystal pack, 1 lb., no money dn., $5 mo. **$29.95**



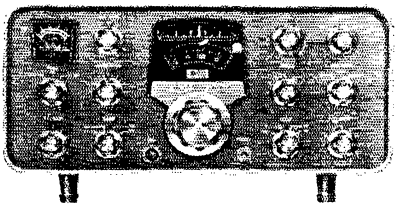
SB-610 Signal Monitor Scope . . . operates with transmitters on 160 through 6 meters at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 MHz. Spots signal distortion, overmodulation, etc.
Kit SB-610, 14 lbs., no money dn., $8 mo. **$74.95**



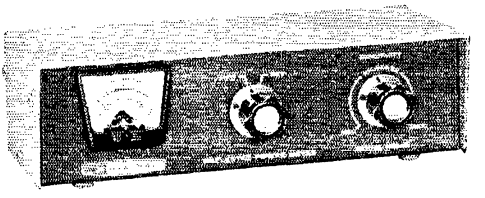
SB-630 Amateur Station Console . . . including 24-hour clock, SWR meter, 10 minute timer with audio-visual signaling, and more. Styled to match your SB-Series station.
Kit SB-630, 10 lbs., no money dn., $8 mo. **$74.95**



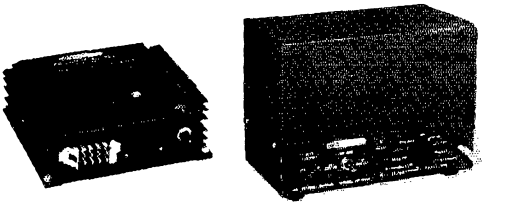
6 & 2 Meter Plug-In Converters For SB-301 . . . 10 meter output — operate from front panel switch on SB-301. Better than 0.2 uv sensitivity for 6 db signal-plus-noise to noise ratio.
SBA-300-3 (6 meter), 2 lbs. **$19.95**
SBA-300-4 (2 meter), 2 lbs. **$19.95**



SB-110 6-Meter SSB Transceiver . . . puts the famous Heath SB-Series on "6". 180 watts PEP input SSB . . . 150 watts CW — with single-knob linear tuning, 1 kHz dial calibration, and the ultimate in stability (less speaker).
SB-110, 23 lbs., no money dn., $28 mo. **$299.00**



HM-15 Relative Power SWR Meter . . . indicates forward and reflected power and SWR. Band coverage is 160 through 6 meters. Handles peak power well over 1 kw. Wiring options permit operation with either 50 or 75 ohm transmission lines.
Kit HM-15, 2 lbs. **$14.95**

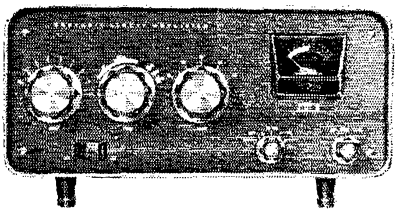


SBA-100-1 SB-Series Mobile Mounting Bracket . . . cantilever mounting for SB-110 and SB-101. Allows quick-change from *fixed* to *mobile* installation.
Kit SBA-100-1, 6 lbs. **$14.95**
HP-13 Mobile & HP-23A Fixed Power Supplies . . . for SB-110 and SB-101 and "Single-Banders." All necessary voltages.
Kit HP-13, 7 lbs., no money dn., $7 mo. **$64.95**
Kit HP-23A, 19 lbs., no money dn., $5 mo. **$49.95**

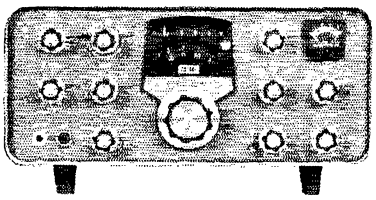
No-Money-Down Credit . . . Write for Application Blank

Selection of Amateur Radio Kits

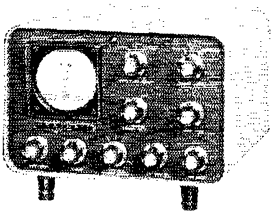
FINE EQUIPMENT AT LOWER COST



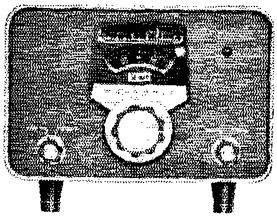
SB-200 KW SSB Linear Amplifier . . . 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 meters. Built-in antenna relay, SWR meter, and power supply. Drives with most popular SSB transmitters & transceivers.
Kit SB-200, 41 lbs., no money dn., $21 mo..... **$220.00**



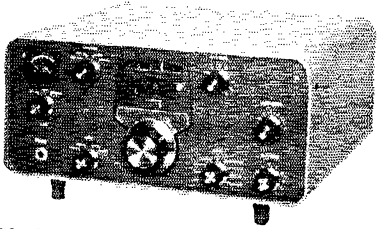
SB-101 80 Through 10 Meter SSB/CW Transceiver . . . 180 watts PEP input SSB, 170 watts CW. Front panel selection of SSB filter or optional CW filter makes the SB-101 an exceptional CW rig. Unmatched in engineering and performance.
Kit SB-101, 23 lbs., $37 dn., $35 mo..... **$370.00**



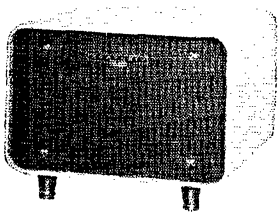
SB-620 Amateur Radio Spectrum Monitor . . . displays all received signals up to 250 kHz either side of receiver tuned frequency. New narrow sweep function shows 10 kHz for single signal analysis.
Kit SB-620, 15 lbs., no money dn., $11 mo..... **$119.95**



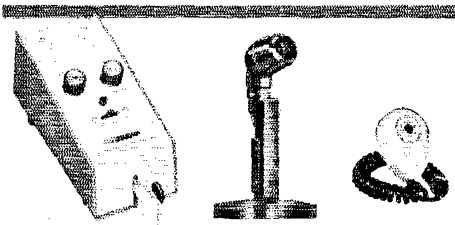
SB-640 External LMO . . . provides an additional LMO (Linear Master Oscillator) for independent control of SB-101 transmitter and receiver frequency.
Kit SB-640, 9 lbs., no money dn., $10 mo..... **$99.00**



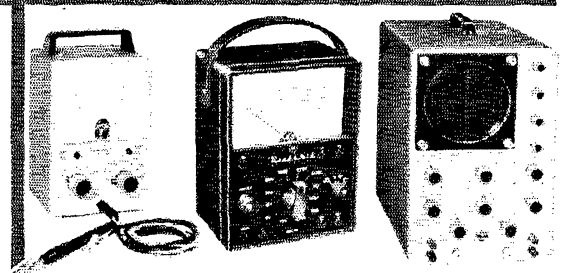
SB-310 Shortwave Listener/Amateur Band Receiver . . . covers 49, 41, 31, 25, 19 & 16 meter bands plus amateur bands 80, 40 & 20 and 11 meter CB. SB-Series performance and quality (less speaker).
Kit SB-310, 24 lbs., no money dn., $23 mo..... **$249.00**



SB-600 Communications Speaker . . . matches the Heathkit SB-Series line and includes space for HP-23 fixed-station power supply. Features an 8 ohm 6" x 9" speaker with 300 to 3000 Hz response.
Kit SB-600, 6 lbs..... **$18.95**



Communications Microphones & Solid-State Electronic Keyer . . . Heathkit recommended microphones for optimum voice communications. Electronic keyer features built-in sidetone to provide audio monitor . . . no relays to stick or chatter . . . speed ranges 10 to 20 wpm and 15 to 60 wpm. Grid block keying transmitters only.
HDP-21A Desk-top microphone, 4 lbs., no money dn., $5 mo..... **$29.40**
GH-12A, Hand Held PTT Mike, 2 lbs..... **$8.50**
HD-10 Electronic Keyer, 6 lbs., no money dn., $5 mo. **$39.95**



A Complete Line Of Test Instruments . . . to provide the ham with professional instrumentation at a price he can afford. Features **New Heathkit Instrumentation Series . . .** solid-state Volt-Ohm meters, power supplies, and more! See the "new look", new performance instruments in the 1969 Heathkit catalog.

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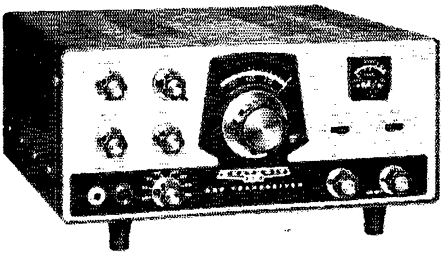
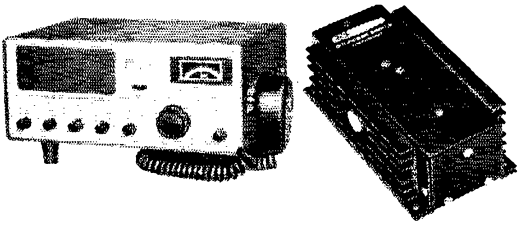
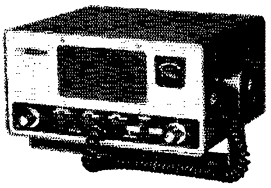


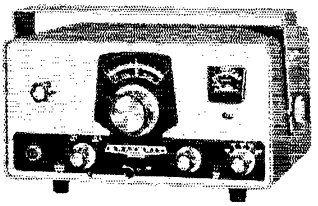
The New HW-100 5-Band SSB-CW Transceiver . . . 180 watts PEP SSB input, 170 watts input CW on 80 thru 10 meters. Switch select USB/LSB or CW. Solid-state (FET) VFO. Crystal filter. TALC, VOX, PTT, S-meter. Run fixed or mobile with the HP-23A or HP-13 power supplies.
Kit HW-100, 22 lbs., no money dn., $22 mo. **$240.00**



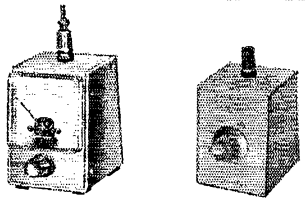
The New HW-17 Solid-State 2-Meter AM Transceiver . . . 25-30 watts input . . . covers 143.2 to 148.2 MHz. Switch select 4 crystal frequencies or external VFO (the HG-10B is perfect). PTT, ANL, Squelch, S-meter.
Kit HW-17, 17 lbs., no money dn., $12 mo. **$129.00**
Kit HWA-17-1, Solid-state DC Power Supply for HW-17 . . . 5 lbs., no money dn., $5 mo. **$24.95**



The HW-18 Series . . . CAP, MARS & 160 M Transceivers. 200 watts PEP SSB input. 25 watts input with carrier for AM station compatibility. Crystal filter, ALC, PTT, S-meter.
Kit HW-18-1, CAP xcvr, 16 lbs., no money dn., $11 mo. **$119.95**
Kit HW-18-2, MARS xcvr, 16 lbs., no money dn., $11 mo. **$109.95**
Kit HW-18-3, 160 M xcvr, 16 lbs., no money dn., $11 mo. **$109.95**

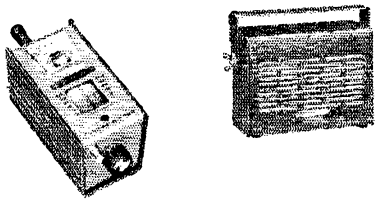


The Single-Bander Transceivers . . . provide 200 watts PEP SSB input on the band of your choice. Now with LSB or USB on 80, 40, or 20. New styling, plus AVC, ALC, S-meter, PTT, and VOX.
Kit HW-12A, 80-mtr., 15 lbs., no mon. dn., $10 mo. . **$99.95**
Kit HW-22A, 40-mtr., 15 lbs., no mon. dn., $11 mo. **$104.95**
Kit HW-32A, 20-mtr., 15 lbs., no mon. dn., $11 mo. **$104.95**

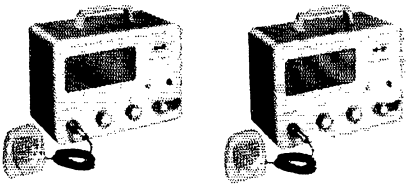


Amateur Station Accessories . . . PM-2 RF Power Meter indicates transmitter relative power. Covers 100 kHz to 250 MHz. No power connections or battery required. **HD-20 100 kHz Crystal Calibrator** provides accurate calibrating signals every 100 kHz up to and beyond 54 MHz. Uses 9 volt battery (not included.)
Kit PM-2, 2 lbs. **$12.95**
Kit HD-20, 1 lb. **$14.95**

Tools For The Amateur Station . . . HN-31 "Cantenna" Transmitter Dummy Load . . . provides a non reactive 50 ohm load to transmitters up to 1 kw . . . better than 1.5:1 SWR for frequencies 160 to 2 meters. Oil coolent not included. Soldering iron kits, needle nose pliers, nut drivers, and more are included in the new 1968 Heathkit catalog.
Kit HN-31, 3 lbs. **$9.95**



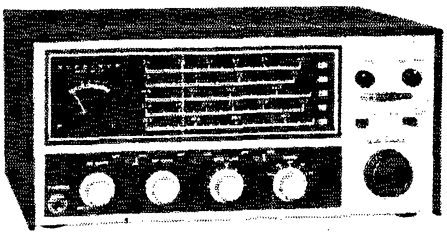
HM-10A Solid-State "Tunnel Dipper" . . . a solid-state version of the classic grid-dip meter. Features a tunnel diode oscillator. Covers 3 to 260 MHz. Uses an AA penlite cell (not included.)
Kit HM-10A, 3 lbs., no money dn., $5 mo. **$29.95**



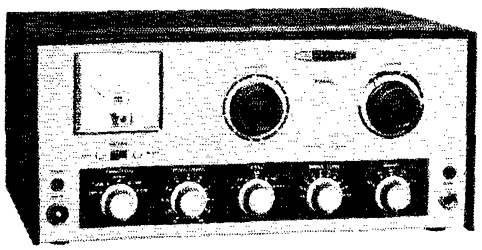
Benton Harbor Lunch Boxes — Complete Transceivers . . . for 6 and 2 meters. Feature crystal-controlled transmitters with 5-watt input and tunable super-regenerative receivers with RF stage. Built-in 115 VAC power supply and speaker. Mike included. Less crystal.
Kit HW-29A, 6-meter, 9 lbs., no money dn., $5 mo. **$44.95**
Kit HW-30, 2-meter, 9 lbs., no money dn., $5 mo. . **$44.95**
Kit GP-11, Mobile Vibrator Power Supply, 6 lbs. . . . **$17.95**

Selection of Amateur Radio Kits

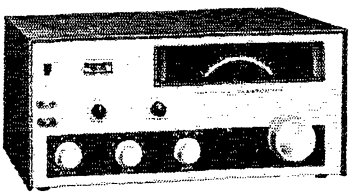
ON $25 TO $300 PURCHASES...WRITE FOR APPLICATION



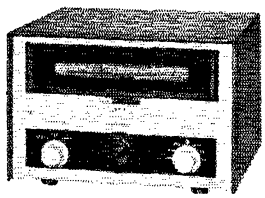
HR-10B Amateur Band Receiver . . . with new extra-durable two-tone wrinkle finish to match the new "Single-Banders" and novice transceiver. Tune AM, CW, and SSB with 80 through 10 meter coverage. Provisions for plug-in 100 kHz crystal calibrator.
Kit HR-10B, 20 lbs., no money dn., $8 mo. **$79.95**
Kit HRA-10-1, 100 kHz crystal calibrator, 1 lb. **$8.95**



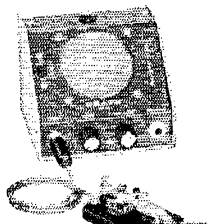
DX-60B Phone & CW Transmitter . . . with new wrinkle finish matching HR-10B and the new "Single-Banders". Here's 90 watts on 80 through 10 meters . . . operates at reduced power for novice class.
Kit DX-60B, 24 lbs., no money dn., $8 mo. **$79.95**



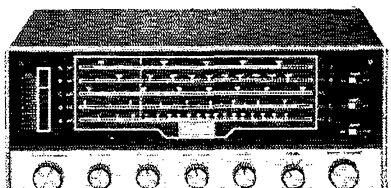
HW-16 Novice CW Transceiver . . . a high-performance 3-band CW transceiver . . . covers the lower 250 kHz of 80, 40, & 15 meters. 75 watts input for novice class — 90 watts for general class. Provisions for VFO transmitter control with Heathkit HG-10B.
Kit HW-16, 25 lbs., no money dn., $11 mo. **$109.95**



HG-10B VFO — Perfect For The DX-60B or HW-16 . . . provides 5 volts RMS signal — plenty of RF for Heathkit rigs and ample for most transmitters. Calibrated for 80 through 2 meters. Requires 108 volts DC @ 25 ma., 6.3 VAC @ 0.75 amperes.
Kit HG-10B, 12 lbs., no money dn., $5 mo. **$39.95**



New HD-16 Code Practice Oscillator . . . includes radio telegraph key . . . a complete code-practice outfit. Perfect for future hams. Controls let you adjust both tone and volume. Switch for blinker light or tone. Build-in speaker and jack for headphones. Requires two 9 volt batteries and one "C" cell (not included).
Kit HD-16, 3 lbs. **$9.95**
Heath Recommended Headphones GD-396 . . . excellent for shortwave listening or code practice.
GD-396, 1 lb. **$3.50**



GR-54 General Coverage Receiver . . . 5-bands covering 2 MHz to 30 MHz plus broadcast band & 180 kHz to 420 kHz navigation frequencies. A selective, stable receiver for AM, CW, & SSB. Excellent for the novice, beginner, or short wave listener.
Kit GR-54, 25 lbs., no money dn., $9 mo. **$89.95**

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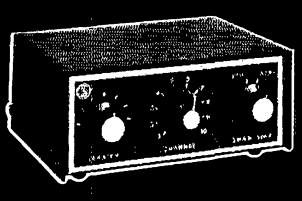
RELIABILITY QUALITY VALUE

SWAN 508 FULL COVERAGE EXTERNAL VFO

The Model 508 Frequency Control Unit is designed for full coverage of 80, 40, 20, 15, and 10 meters. It provides for transmitting and receiving on separate frequencies, and plugs directly into the back of the 500C. A separate Dual-VFO adaptor is no longer required, since the relay control circuitry is built into the 508. A panel control permits selection of VFO's so that operation may be transceive mode with the 500C VFO, transceive with the 508 VFO, or transmit on the 500C and receive on the 508. The Model 508 features eight ranges of 500 kc each, with 5 kc calibration. It may also be used with the 350C transceiver.

$125



MARS OSCILLATOR

Ten crystal controlled channels with vernier frequency control. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 510X (less crystals) . . $45

SWAN 500C SSB-AM-CW TRANSCEIVER

Five band, 520 watts for home station, mobile and portable operation.

The new model 500C is the latest evolutionary development of a basic well proven design philosophy. It offers greater power and additional features for even more operator enjoyment. Using a pair of the new heavy duty RCA 6LQ6 tetrodes, the final amplifier operates with increased efficiency and power output on all bands. PEP input rating of the 500C is conservatively 520 watts. Actually an average pair of 6LQ6's reach a peak input of over 570 watts before flattopping!

The 500C retains the same superior selectivity for which Swan transceivers are noted. The filter is made especially for us by C-F Networks, and with a shape factor of 1.7 and ultimate rejection of more than 100 db, it is the finest filter being offered in any transceiver today.

For the CW operator the 500C includes a built-in sidetone monitor, and by installing the Swan VOX Accessory (VX-2) you will have break in CW operation.

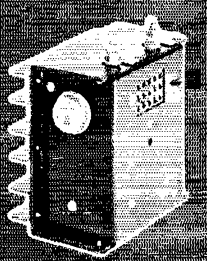
Voice quality, performance and reliability are in the Swan tradition of being second to none.

$520

SWAN 117XC MATCHING AC POWER SUPPLY

Complete A.C. supply for 117 volts, 50-60 cycles, in a matching cabinet with speaker, phone jack, and indicator light. Includes power cable with plug for transceiver, and A.C. line cord. Ready to plug in and operate.

$105



SWAN 14C DC CONVERTER

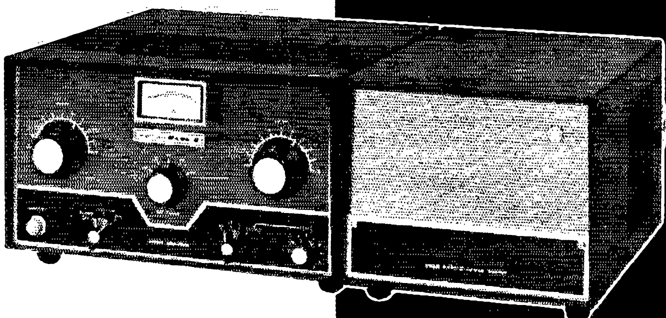
Converts the above 117XC A.C. power supply to 12 volt D.C. input for mobile, portable, or emergency operation.

$65

SWAN SPEAKS YOUR LANGUAGE . . . ASK THE HAM WHO OWNS ONE

POWER

VERSATILITY



SWAN MARK II LINEAR AMPLIFIER

Two Eimac 3-500Z Triodes provide the legal power input: 2000 Watts P.E.P. in SSB mode or 1000 Watts AM or CW input. Planetary vernier drives on both plate and loading controls provide precise and velvet smooth tuning of the amplifier. Greatly reduced blower noise is provided by a low RPM, high volume fan.

Provides full frequency coverage of the amateur bands from 10 through 80 meters and may be driven by any transceiver or exciter having between 100 and 300 watts output.

$395

PLUG-IN VOX UNIT

Plugs directly into Model 500C, and may also be used with Model 350C and other Swan transceivers.

MODEL VX-2 . . . . $35

SWAN 350C SSB-AM-CW TRANSCEIVER

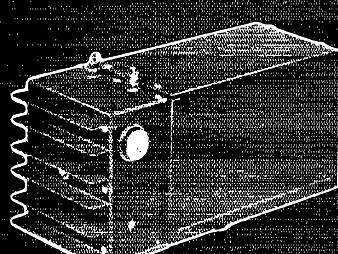
Our improved standard 5 band model, now in production and still only . . .

$420

MARK II POWER SUPPLY

May be placed beside the Mark II, or with its 4½ foot connecting cable, may be placed on the floor. Silicon rectifiers deliver 2500 volts D.C. in excess of 1 ampere. Computer grade electrolytic filters provide 40 mfd capacity for excellent dynamic regulation. A quiet cooling fan allows continuous operating with minimum temperature rise, thus extending the life and reliability of all components. Input voltage may be either 117 or 230 volts A.C.

$265



SWAN 14-117 12 VOLT DC SUPPLY

Complete D.C. supply for 12 volt mobile or portable operation. Includes cables, plugs, and fuses. Will also operate from 117 volt A.C. by detaching the D.C. module & plugging in 117 volt line cord. Negative ground standard. Positive ground available on special order.

$130

Illustrated on these pages is a complete Swan amateur radio station, one of the finest money can buy. Starting with the powerful 500C and an AC power supply, you are immediately on the air with a big, high quality signal. Thanks to the excellence of the high-frequency crystal lattice filter, made especially for Swan by CF networks, you will have one of the cleanest and most readable signals on the air, as well as outstanding receiver selectivity and sensitivity. The various accessories from the Swan line may be added at any time, providing greater operating pleasure and performance. The tremendous acceptance of Swan products by radio amateurs throughout the world is most gratifying to all of the people at Swan. It is our continuing policy to offer the finest communications equipment we know how to design and manufacture, with quality control, craftsmanship, and service that is second to none.

73

SWAN

ELECTRONICS
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new quarters. W1MX has a new 8-over-8 Yagi for 2. K1JIY, now in Malden, is back on the air after 4 years in the USN. K1RAW spoke on traffic-handling at the Framingham RC. The club's new officers are WA1EIN, pres.; W1SON, vice-pres.; W1LFM, secy.; WN1IFO, treas. 6-Meter RTTY stations: K1s JUN, KEC, MIM, NSN, QLA, UCT, WTZ, YCM, W1s DRH, LLY, MCG, WA1s AXU, BJM, CHW, DPX, FCI, HVG, HYX. Traffic: (Aug.) W1PEX 954, W1OJM 494, K1PNB 221, W1DKD 163, W1DQM 155, W1EMG 117, K1CLM 79, W1DAL 59, WA1EYY 46, WA1HEJ 33, W1CTR 32, WA1DPX 30, WA1DEC 29, WA1FHU 28, W1SMO 22, WA1DED 19, W1AOG 16, WA1DFL 13, W1JDP 13, WA1AJN 10, WA1HHK 9, W1LE 7, K1LCQ 5, K1OKE 2. (July) W1OJM/1 391.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1900. Pine Tree Net, daily on 3596 kc. c.w. at 1900. WA1FCM is NCS on the PTN and giving the fellows a hand down there. Traffic: W1BJG 303, WA1FCM 64, WA1FLG 43.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: K1QES. RM: K1BCS. PAM: K1APQ. Endorsements: K1QES as SEC and K1SHC as EC. W1YMJ is now Class I Official Observer. Welcome to new hams WA1JZB, Manchester, and WA1JXN, Holderness. Greetings were received from the State of Washington SCM during its Amateur Radio Week. K1PQV is modifying an ARC-5 for v.f.o. operation. WN1JFL is a new AREC member. WN1HGM and WN1IOO have started the Hudson Emergency Radio Service (HERS). The Central New England Net held its annual outing at Elkins, N.H. For you folks outside reading this column, the CNEN is one of the best and friendliest nets we have here in New England. It meets on 3945 kc. in the "early morn." Traffic: WA1IIH 166, K1PQV 57, W1SWX 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 31 sessions, 349 QNI, 79 traffic. The NCRC Club of Newport reports that the following were elected full members: WA1JLV, K8YXC, ZD8CQ and ex-VP1LL. Newport County ARC Awards for at least five confirmed contacts with club members were issued as follows: No. 77 to WA1HXK, No. 78 to WA1HXJ and No. 79 to K8YXC. W1JFF and WA1JJB, of the club, are operating 15-meter s.s.b. W1TXL has a Swan 500. W4KGR, formerly W1SQO, spent some time this summer with W1JFF. W4KGR, who recently celebrated his 80th birthday, was operator at WCC, RCA Radio Marine station, for many years. W1JHF will be off the air for a few weeks while he is in the Newport Hospital. The NCEN, which meets every Sun. A.M. on 29.53 Mc., lists the following new members: WA1HXJ, K1YGY and W1CUY. Air Force Capt. WA1JZB, formerly of Woonsocket, is being transferred to England. He will be working 20 meters after Jan. with an SB-101. The W1AQ Club of Rumford reports the following elected to membership: W1DK, WA1HUR and WA1CDX. The following members received their Tech. Class licenses: WA1KCP, ex-WN1ICR, and WA1JYF, ex-WN1IHXP. Traffic: W1BTV 113, WA1CFO 51, WA1EEJ 45, K1VYC 24, K1TPK 23.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*ONI*	*QTC*	*Net Mgr.*
Gr. Mt.	3855	2230Z	M-S	369	15	W1VMC
Vt. Fone	3855	1430Z	Sun.	26	0	WA1EDI
VTNH	3685	2330Z	M-F			K1UZG
VTCD	3990½	1500Z	Sun.	29	11	W1AD
Carrier	3885	1400Z	M	—	—	W1KKD
VTSB	3909	2230Z	M-S	816	90	KL7DVP/1
		1330Z	Sun.			

Note changes in frequency time and personnel in the above. The Carrier Net was activated Sept. 3. FD was a huge success. Congrats to BARC and the gang who did the work. W1MRW was appointed ORS. Greetings to new net mgrs. WA1EDI and KL7DVP/1, to WA1GKS as asst. net mgr. for the VTSB Net and to WA1DHK, who is the new VTSB net secy.-treas. Thanks to the outgoing officers for their help. Welcome to Novice WN1JWD (Poultney). Traffic: WA1GKS 18, W1MRW 5. K1MPN 3.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DVW reports 145 QTC for Aug. with 15 different stations calling in. This net meets daily at 7 P.M. local time on 3560 kc. and welcomes all stations. WA1JHZ recently called in from Westover and will be a regular. His ORS appointment is in the works. The WMN Picnic was hosted by K1WZY and family with real success. The scenery was enjoyed by W1DVW, W1MNG, K1AEC, W1BKG and Marge, W1BVR and Madeline, W1LLN and Dad, and yours truly. Section Net certificates were presented to W1DVW, W1BVR, K1AEC, K1IJV, W1MNG and W1ZPB. W1QWJ has a new 2-meter rig. W1EOB has moved up to his bedroom. Southwick has new calls WN1JBB and WN1JUV. The HCRAI will have another home-brew night come next May, so get started. Congratulations to K1IDS on obtaining his Advanced Class license. W1IDS will be in Florida from Sept. to join W4TBB (ex-W1BNO). During the summer WB2PGH/1 handled a lot of traffic for the boys at Camp Taconic in Hinsdale. The VARC will visit the Naval Submarine Base, New London, on Nov. 3. Check with K1ZQB for details. W1NPL is the new Editor of *The Oscillator* and doing a bang-up job of it. Endorsements: K1WZY and WA1ABW as ORSs. Appointment: K1YRV as OO. Brother Bernard Frey, WA1FKE, was elected a member of the Board of the International Mission Radio Association at its Annual Convention in Atchinson, Kans. Traffic: W1EOB 202, WB2PGH 194, W1DVW 119, W1BVR 76, K1WZY 63, W1ZPB 27, WA1ABW 22, W1STR 22, W1HRC 15.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—Via NARC we are informed that KL7GDT is deserting the north country for California. KL7GJR has been rock-hounding down in the Oregon country. It seems there is an attempt afoot around Anchorage to see who works ex-KL7FDG from his new QTH down San Antonio way. Up around Fairbanks way KL7s EVO, GBG, AZJ and AEQ spent five weeks nursing canoes down 500-plus miles of very inaccessible streams. Communications with home was on 3735 kc. running a half-watt to a dipole and not one sked was missed. They were met way down the Yukon River by KL7s ENL and FNM. KL7s AD and GFT provided the transportation back for the whole works via river boat. We still keep hoping to hear the CQ Fairbanks on 2. KL7FNL, at Tanana, is putting his 6-meter beams up 90 feet now, and by the time this sees the light of day should be old hat in the lower 48. Traffic: KL7CAH 120.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX. The FARM Net convenes week days on 3935 kc. at 0200 GMT. WA7BDD has qualified for a VLCC certificate. K7ORA is building a new linear. WA7FFZ/M won the Lewiston-Clarkston Ham Club transmitter hunt. WA7ETO has a new Apache transmitter. If you are interested in ORS, OBS, OO or OPS appointment, contact your SCM. There still are several counties that do not have Emergency Coordinators. If you are interested in an EC appointment, contact your SEC or SCM. W7OWA is installing a 75-meter s.s.b. mobile FARM Net report for Aug.: 18 sessions, 539 check-ins, 55 traffic handled. Traffic: WA7BDD 145, K7CSL 12, K7QCH 10, W7ZNN 5, W7IY 4.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. RM: WA7DMA.

Montana Section Net	3950 kc.	1700 GMT	Sun.
Montana Traffic Net	3910 kc.	0000 GMT	M-F
Montana PON	3950 kc.	1515 GMT	Sun.
Montana RACES	3996.5 kc.	1600 GMT	1-3 Sun.

Endorsements: W7RZY as SEC. The Billings group, in cooperation with the Gallatin Amateur Radio Club, ran a test in the 2-meter f.m. band to check out a repeater path between those two cities. Signals were FB on both ends. The Bozeman station also worked W7TYN in Anaconda. Thanks to W7OIQ for the test information. The Butte and Helena Amateur Radio Clubs sponsored a picnic and get-together at the Gates of the Mountains near Helena. K7PFQ has a new f.m. base station on 2 meters. W7ROE has a new linear. If anyone is interested in the ARRL Intruder Watch Program in the state, please write your SCM or SEC for full details on this activity. The Electric City Radio Club has the *Montana Call Book* available. If you do not have your copy as yet contact any Great Falls ham. We still need more ECs, ORSs, OPSs, OBSs and OOs in the state. Traffic: K7CGD 17, W7WYG 11.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—RM: W7ZFH. PAM: K7RQZ. Section net reports: W7ZFH reports for the OSN for Aug., sessions 23, check-ins 99, high 7, traffic 36, high 10. WA7AHW reports for the AREC Net, sessions 31, check-ins 903, traffic 29, maximum number of counties 20, contacts 120 and QSTs 1. New AREC certificates are being sent to WA7EXH, K7VJH, WA7IFS, W7FRO, K7WNX, WA7GBW, K7YAF and K7QPW. K7IFG reports for the BSN sessions 60, traffic 144, contacts 189, check-ins 1098. BSN certificates are going to WA7ICD,

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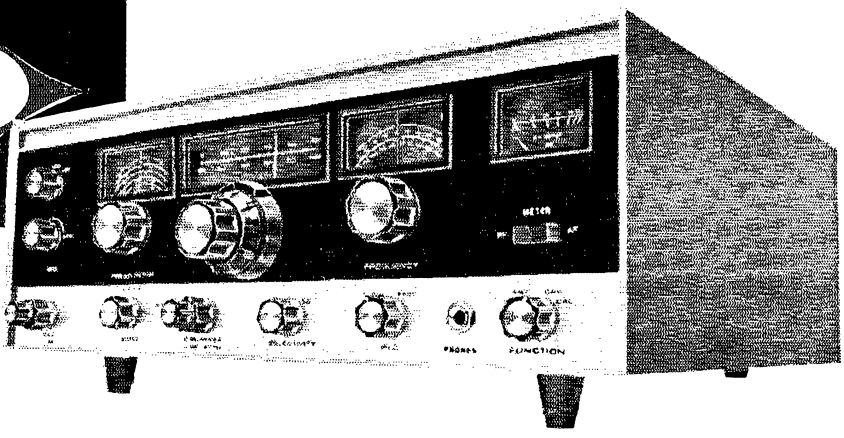

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Complete transistorization and ***modular construction*** provide ***maximum stability.*** Minimum heat generation and power requirements allow the R-530 to be used in field applications now impractical with vacuum tube equipment. The new Galaxy R-530 is compatible with existing systems. ***Beautifully styled***, compact, weighing only 25 pounds.

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WA7KIE, WA7IFS and WA7ECV. WA7GFP is working skip on 6 meters and nabbed Alaska. WA7FTN made 418 telephone relays to S.E. Asia during the month. WA7HKV was selected Asst. EC for Klamath County. W7AJN keeps his OBS skeds when possible. K7WWR is experimenting with one-element quads on 40 and 80 meters. Traffic: K7RQZ 402, WA7DPK 70, WA7HKV 70, W7ZFH 60, K7IFG 59, K7OUF 57, WA7AHW 24, K7WWR 22, W7BNS 19, WA7DOX 17, WA7ICD 14, K7ADR 11, W7DEM 11, W7MLJ 4.

WASHINGTON—SCM, William R. Watson, W7BQ —SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

WSN	3590 kc.	Daily 0145Z	QNI 344	QTC 484	Sess. 31
NTN	3970 kc.	Daily 1830Z	QNI 892	QTC 390	Sess. 30
WARTS	3970 kc.	Daily 0100Z	QNI 1229	QTC 200	Sess. 26
NSN	3700 kc.	Daily 0300Z	QNI 283	QTC 83	Sess. 31

During Washington Amateur Radio Weeek recently messages were originated from the Capitol to all Governors and sent via the NTS by Governor Daniel J. Evans, who signed the proclamation. Cooperating in the week's events were the Washington State QSO Party, sponsored by the BEARS; a Washington State Certificate, signed by the Governor and sponsored by the Puget Sound Council ARC; Tacoma Club's Logger's certificate, and BEARS club award. New appointments: K7MWC as OVS and W7KZ as ORS. K7EVO, K7NEX, K7ETY, WA7EDZ and K7MWC, with mobile 2-meter f.m., provided back-up emergency communications for the Kent Pacific Raceway during the National Sport Car Races. SEC W7UWT reports getting ready for the 1969 SET early. Spokane Radio Amateurs, Inc., reports the start of fall classes in all license categories. PAM W7BUN reports from a new QTH in Puyallup. W7IEU reports skeds on 14 Mc. with W7ETR/XP1AA at Thule. W7JEY is the new CC for Jefferson County C.D. W7BTB is holding special skeds with KL7-Land for traffic haison. W7GYF passed the Extra in New Jersey while on vacation. The Skagit Club camped at Red Bridge over Labor Day. W7ZSH is back to Kodiak again, mobile. K7JIO is in a new QTH in Ballard. WSN Manager W7ZIW sends in a good report of high activity on the net with more stations getting into e.w. W7KZ made the BPL on originations plus deliveries. W7OEB sends in another FB report from Richland. K7VNV is working on 2 meters with ¼ kw. W7OEB is on 6-meter f.m. and reports hearing W7NC through the repeater. WA7GVB is a new NCS on NTN Sun. K7PVO is out of the Army and heading for school in Utah. W7AOQ is recovering from an accident. WN7ITG worked his first DX, a VK. The QCWA reports the start of its nets the first week in Sept. The Seattle v.h.f. group is planning liaison with the State AREC. Other local v.h.f. nets active in Spokane and Wenatchee are tied in with the AREC. Traffic: (Aug.) W7BA 1802, WA7-DXI 679, W7DZX 560, WA7DZL 510, W7ZIW 489, W7PI 364, W7KZ 349, W7AXT 227, W7BQ 205. WA7-HKR 191, K7CTP 180, W7APS 146, W7IEU 123, W7-JEY 113, WA7EDQ 107, WA7JBM 106, W7AAO 104, WA7BZY 88, WA7HSJ 80, W7BTB 70, K7THG 39, K7KPA 30, WA7HPK 27, W7BUN 23, W7OEB 19, WA7GVB 16, K7LRD 15, W7UU 14, WA7BDB 11, WA7DYG 11, WA7GXF 11, W7AIB 10, WA7EYN 10, W7GYF 10, K7REK 8, K7YDZ 8, WA7FHN 6, K7EFB 5, WA7ILC 4, W7UWT 4, K7YFJ 3, K7MWC 2. (July) W7BUN 13.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: W4UAF/KH6. RM: KH6AD. V.H.F. PAM: KH6EEM. RACES nets (40, 10, 6 and 2-meters) coordinate with KH6AIN.

Net	*Freq.*	*Time (GMT)*	*Days*
League Appointees	7.290 Mc.	0700Z	Wed.
Friendly Net	7.290 Mc.	2030Z	M-F
Pacific Interisland Net	14.330 Mc.	0830Z	M-W-F

I'm sad to report that W6DTN/KH6 has joined the Silent Keys. Congratulations to KH6AD, who retired from the U.S. Navy to teach electronics and math in our "islands". KH600 recently retired from the First National Bank after many faithful years service. The following KH6s have QSL cards at the KH6 bureau: (Send a 4 x 9-inch business size envelope to KH6 Bureau, c/o KH6DQ, P.O. Box 101, Aiea, Hawaii 96701.) HAA IN JG KD KS NAA NB NES NFN OES PP QH UL WU YL ZA AC ABH ABN ABX AFD AFG AFS AH AHG AHQ AIK AK ALD APL AR ASQ AVU AWS AX AY BAS BBE BBM BCM BDV BF BFU BFV BHZ BI BIB BIF BIU BKE BKY BL BLK BOD BOK BR BQK BS BSK BT BTV BV BVM BWO BWV BXE BXP BXW BXY BY BYX

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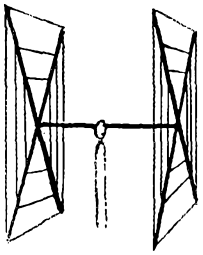
How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 15 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3---



CUB CAL QUAD ANTENNAS — these two element beam have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' × 1¼" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

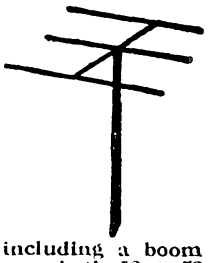
Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked VO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



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2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*	*20' boom	
5 El 15	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. . . . $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

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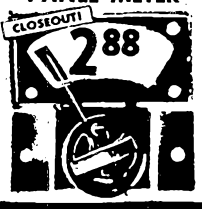
BZU BZZ CAB CCL CCV CD CDS CEA CED CEJ CFC CFT CHK CHU CIM CIZ CJD CK CL CLB CLG CLV CMM CNK CO COG COR CPH CPU CQ CQR CQT CQW CQY CRK CRR CRY CSF CSL CTA CTC CV CVH CVM CVW CXO CXY CY CYB CYF CYH CYK CYL CYO CYS DAK DBC DBF DDB DDD DDZ DE DED DEL DES DEU DEX DFO DFQ DFW DIA DIE DIG DJP DJR DRV DKD DKI DKS DMO DMU DNW DOA DOE DOX DOY DPT DPV DQA DQU DQX DRB DRG DRI DRK DRP DRW DUB DUC DUM DUZ DV DVA DVD DVE DVF DVG DVJ DWZ DZR DZS DZZ DEB EBM EC ECD ECR ECS ECU ECW ECZ EDJ EDX EDY EE EEZ EEM EFH EFI EFO EFW EGO EHR EJN EJR EJV EJY EJZ EKH EKO EKR ELA ELQ ELS ELW EMA EMV ENR ENS EPB ESM ESZ EU EV EVC EWA EXB EYP EYT EZB EZO EZT FAF FAH FAL FAM FAS FAW FB FCH FD FDK FEK FGA FGH FGN FGP FH FHA FHN FNO FHQ FHX FIE FIJ FIL FIQ FIZ FJE FJH FKG FKJ FKQ FKU FKW FLN FMD FMN FNF FNY FOF FOJ FON FOO FQC FQM FQR FQY FR FRB FRF FRI FRR FSQ FSR GAA GAH GBC GBJ GBS GBT GCE GCF GCJ GCL GCR GDA GDL GDQ GDW GEL GF GFD GFH GFI GFM GFR GFT GFX GFY GGI GGJ GHB GHI GIA GID GJJ GJT GS ALF BCB EVT HR JIV FRC FQU RRI RX SP TRV. Traffic: (Aug.) KH6-GKL 470, KH6NR/KH6GKV 34, W4UAF/KH6 4, KH6GLU 1. (July) KH6GHZ 320, W4UAF/KH6 8, KH6AD 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. The new QTH of K7AOA and K7-QGO is Tonopah. Hats off to the Reno group for a very nice hamfest. W7JLV needs more amateurs interested in a statewide RACES program. Nev. Emergency Net, 3996.5 kc., continues to be well represented at 1900 local time Mon. and Thurs. K7TDQ has a 450-Mc. repeater under construction. K7ZOK was in Washington, D.C., for TEN on business. W7TVF will schedule anyone needing Nevada DX or stateside. W7PBV is starting his fourth term as Nevada SCM. The W7-DDB t.m. repeater, 146.34 in and 146.94 out, continues to be active with visiting mobiles in this area. K7ICW has assumed the duties of R & D director. WA7KEL is active in Panaca. W7BIF has resigned as secretary of the SNARC. W7ZT has a new antenna tower and beam. W7EBL has gone s.s.b. as a result of the Sierra Hamfest. K7YVN and K7ZAU continue to provide outstanding public service in handling the WCARS-7255 bulletin. K7RKH has some v.h.f./u.h.f. solid state gear under construction. K7LBQ is home from summer college. Traffic: WA7BEU 14, WA7KEL 7, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, K6RHW, WB6RSY, W6-SMU, WA6TQJ. RMs: W6LNZ, WB6YTX. Your SCM attended the Sierra Hamfest at Bowers' Mansion near Carson City and was pleased to see many S.V. members were there. W6LNZ reports new check-ins into NCN: K6RPN (Grass Valley), WA6TNB (Corning) and K6YBV (Citrus Heights). W8VDA/6, stationed at McClellan AFB, reports he passed the Extra Class exam! Incidentally, fellow amateurs, that 20 w.p.m. at San Francisco is a lot easier to copy than you may think. For those who participated in the California QSO Party, get those logs in. RM WB6YTX reports that WN6ZJV is organizing a Novice net on 7192. WA6TVA and WA6IKE are back on SCEN after a long absence. K6ZFI is the only S.V. member in the ARRL Intruder Watch. If any of you are interested and feel qualified, let me know. Please note that Intruder Watch is not connected with the OO program or amateurs of another country. Any of you who have news of interest to this column, please send it to WA6JDT. Traffic: W6LNZ 127, W8VDA/6 78, WB6YTX 60, WB6-MAE 37, WB6QZZ 26, W6VUZ 3.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV. The Marin Club again handled the communications for the Dipsea Race this year with W6IFO, K6RAO, WB6UDS, W6QPG, W6CXU, K6OJO, W6FVK and K6BAQ providing point-to-point service for the race committee. WA6GVD has his General Class license after three months as a Novice. WA6BYZ, the big traffic man, has put up an inverted Vee and reports it goes well. WB6CIE has joined the Marin DXers with a new tri-band beam. WB6JQP has gone out to sea again after a stay on the beach and traffic work with the NCN. The Humboldt Radio Club has incorporated. W6BWV will furnish information for the most economical way to go that route to any interested club. W6CYO is home after a long visit to friends in 7-Land around the Puget Sound area. W6WLV had a small traffic get-together with WB6LFT, WB6JQP, WB6YBO and WB6HVA in attendance. K6CWS has stacked mono-banders, 20 over 15, in an effort to get



through to the DX stations. W6GPB has accumulated a fine collection of pre-1930 receivers which he has restored. The Humboldt Radio Club held its Annual Picnic at Trinidad State Park in Aug. WB6CDJ is Radio Officer for the Humboldt County C.D. setup. The Valley of the Moon Radio Club meets the 1st Fri. at the Sonoma Community Center. If you need information, contact K6SRM. W6DTV still is telling of his summer in the Lassen area. W6HST is up and active after successful heart surgery. W6KZF maintains a regular schedule with ZS6AR on 15-meter s.s.b. Traffic: WA6BYZ 476, WB6JQP 91, WA6AUD 39, W6FAX 16, W6BWV 7, W6CYO 1.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—Let us all give thanks at Thanksgiving, for all things good that we are blessed with. We amateurs have freedom, good equipment, lots of help from our amateur friends when we have problems with our gear, and good friends. WB6UHB has a Clegg 22 and is working out OK. K6OZL has a 54-ft. self-supporting tower with appropriate beams. K6URK has a new 4-1000 final. WB6VFU is on 75 with the Drake Line. K6-KOL is QRP with a transistorized rig on 80 c.w. The Bakersfield gang is working on its 2-meter f.m. repeater. The Delta Amateur Radio Club has a net on 146.00 Mc. Wed. at 2030 local time. All are invited to join. W6COB is net manager. WA6AFW has a Galaxy on 75-meter s.s.b. W6JPS is having some problems on s.s.b. W6BJI is building equipment to monitor weather satellites. The new officers of the Tulare County Amateur Radio Club are K6RGZ, pres.; W6NKJ, vice-pres.; WA6CUZ, secy.; and WB6TTP, net. chairman. K6AUA is in the USAF. WA6DDR is building a quad antenna. Let's keep those reports rolling in. We need them. Traffic: W6ADB 333, WB6HVA 315, K6KOL 90, WA6SCE 83.

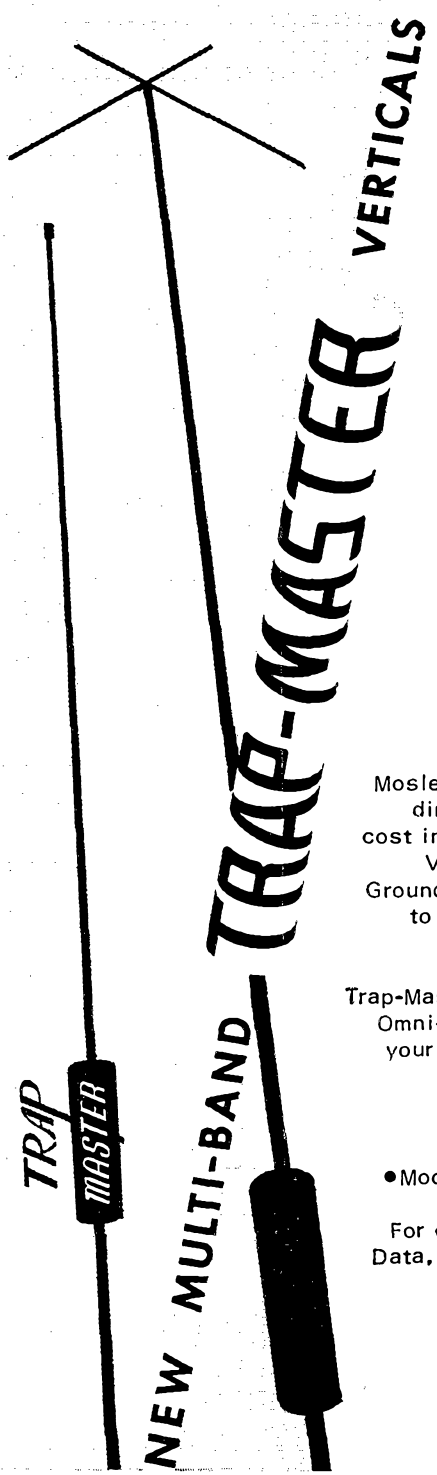
SANTA CLARA VALLEY—SCM, Edward T. Turner, W6NVO—SEC: W6VZE. RM: WA6LFA. Nets: Bay Area AREC Net, 3900 at 1830 GMT Sun., NCN/1 0200G; NCN/2 0330G, 3630 kc.; PAN, 3675 kc. 0330; WCARS, 7255 kc. all day every day any mode; WX Net, 3956 early A.M. The Palo Alto Radio Club has a lending library of test gear for members, also much ham gear being kept warmed up on loan to members. W6AUC gets quick action from the KPH coastal marine in clearing up a spur on 75 meters. The *NCN Newsletter* lists much activity of SCV members, including W6BPT, happy to be back on the C.W. Net, also W6DEF, with a new skywire and better signal on the net. K6DYX and W6SHK are active on slow-scan TV. Smittie is on a three-months vacation as of Oct. 1. WB6IZF still is on the go in Idaho. WA6LFA added a linear. W6OII is remodeling his shack. W6RSY has a big traffic total. W6YBV will find there are many who have agreed with him on ham politics. W6ZRJ visited the hamfest near Carson City. W6QIE can accept traffic now for the Navy MARS circuit to Viet Nam. Don needs local outlets to check into the local Navy MARS to accept traffic for the Greater Bay area. With Christmas coming soon more and more traffic will have to be handled. NØAEB/W6QIE is a direct circuit from South S.F. to Viet Nam many hours a day and needs your help. W6VK has to be retired to handle all the skeds he does. W6IKW is working away at OO problems. W6VZE checks with ECs and other League appointees on the AREC Sun. Net and into the traffic nets. Traffic: W6RSY 862, W6YBV 615, K6DYX 233, W6DEF 167, W6VZE 145, WA6LFA 124, W6EMS 63, W6AUC 38, W6VK 36, W6ZRJ 16, W6OII 8, W6BPT 5, WB6IZF 5.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodds, W4-BNU—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. WA4ZLC and WB4BGL are room-mates at North Carolina State University. K4EO now has an HW-100 and says he is looking forward to working some DX. WA4EIM, K4DFI and WB4CXH recently passed the amateur Advanced Class examination. WB4-IJH has up his 6- and 2-meter beams and plans to be on v.h.f. soon.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN (E)	3573 kc.	2330Z	Daily	151	W4IRE
THEN	3923 kc.	0030Z	Daily	109	W4ZZC
NCN (L) (July)	3573 kc.	0300Z	Daily	62	WA4CFN
SSBN	3938 kc.	0030Z	Daily	25	WA4LWZ

Traffic: (Aug.) W4EVN 356, W4IRE 172, WA4VNV 58, WB4IJH 48, K4EO 36, W4FDV 29, WA4GMC 29, WA4UQC 29, W4VTR 24, WA4KWC 23, K4VBG 22, WA4VTV 16, WB4DPT 12, WA4AKX 11, K4TTN 6, KØJFJ/4 2. (July) W4RWL 138, WB4BGL 1. (June) W4RWL 106, WB4BGL 1.



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SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ. RM: K4LND. PAM: WB4BZA.

SCPN	3930 kc.	0830 and 1530 EST Sun.,	1200 Noon Daily
SCN	3795 kc.	0000Z and 0300Z Daily	Aug. Tfc. 43
SCSSBN	3915 kc.	0000Z Daily	Aug. Tfc. 114

W4ZEQ is a new Class I OO in Spartanburg. W4FVV is a new OBS in Anderson. K4AYA and W4KNI report occupation of new ham shacks. WN4KPN and WN4KST are new Novices in Spartanburg helping to maintain S.C. ham population as K4EIB and WA4APD return to N.C. In Anderson WB4FAN has a new s.s.b. rig, WB4AQF and WB4EOC have new mobile rigs and WA4HFA a new RTTY outfit. WA4ICF's mobile rig escaped damage in a recent auto fire. WB4CIL is now K4AQ. In Aiken county, WA4NIG, WA4IKX, WA4ZRM and WA4NNC aided sheriffs and rescue squads in the search for a missing nursing home patient. K4GL reports lightning pickup on the power cable defeated his plans for permanent remote signal sources on 220 and 432. He's now using battery-powered ones which he must place and retrieve for each use. Traffic: (Aug.) W4PED 38, K4OCU 34, W4VFO 29, WA4EFP 22, W4NTO 21, W4FVV 19, WA4HFA 7, WB4BZA 5, W4JA 1. (July) WB4DFW 7.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: WA4EUL, K4MLC. A good time was had by all at the first VSBN Picnic held at the spacious home and grounds of W4OUK. WB4EAE finally received his ORS appointment. Loyal WB4FLT sustained a broken bone injury but made arrangements for his net obligations before allowing himself to be hospitalized. WB4CVY was named EC for Fairfax County. WA4BOQ received his Advanced Class license and WN4HRA his General. The Tidewater Club is sponsoring code and theory classes in conjunction with the Boy Scouts and also fosters a local calling frequency on 28.8 Mc. Section-wide nets meet nightly on 3680, 3835 and 3935. Traffic: (Aug.) WB4GTG 441, WB4EAE 364, K4KNP 295, W4NLC 257, W4UQ 200, W4RHA 188, WB4FDT 185, K4ISJ 165, WA4EUL 159, W4TE 115, WB4GTS 107, WB4DOY 77, WB4FLT 68, WB4CVY 64, K4MLC 58, WA3SJT 55, W4YZC 52, W4OKN 46, W4IA 39, WB4DRB 35, W4WO 33, WA4BOQ 30, K4LMB 30, W4GEQ 28, K4FSS 25, WN4HRA 21, WA4JJF 19, W4SHJ 19, W5THV 15, K4VCY 14, WB4FUJ 13, W4MK 8, WA4NJG 7, WA4PBG 7, W4JUJ 6, W4KX 5, WB4GYV 3, W4KFC 3, WA4YRH 3, (July) W4WO 29.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. RMs: K8MYU, K8TPF. PAMs: W8IYD, K8CHW. WVN Phone Net Mgr.: WA8YOF. West Va. C.W. and Phone Nets operate nightly on 3570 and 3890 at 0000 and 2330. Greenbrier ARC operated club station WB8AWR at the West Va. State Fair. West Va. C.W. Net in 26 sessions handled 92 messages and the Phone Net with 31 sessions and 708 stations reports 205 messages. The West Va. Tech Club station, W8AHZ, with trustee WA8POS, is active in c.w. and phone nets. WA8NDY and WA8WCK hold regular ARPSC-RACES drills in Upshur County. K8MYU accepted OBS appointment. WA8BAA and K8QYG report good DX with their quads. WA8LIC is editor of the Opequon Radio Society bulletin. WA8YHE is a new amateur at Martinsburg. Assisting in the QCWA Dinner Meeting, Charleston, were W8HZA, W8DJP, W8EV and W8CLX. W8CUL is the call of the W.V.U. ARC and W8GUL also is located in Morgantown. The MARA set up a Novice position during the V.H.F. Field Day. WA8FCZ and W8CLX made contact on 29.6 Mc. Traffic: W8SQO 220, WA8POS 161, WA8RQB 77, K8MYU 71, WA8NDY 70, WA8WCK 69, WA8YSB 52, K8TPF 51, W8GUL 26, W8DUV 17, W8JM 16, WA8WIX 14, W8WEJ 13, WA8YOF 9, WA8CKN 4, WA8LAL 4, WA8KMZ 3, WA8LPZ 2, WA8TWR 2, K8ZDY 2, K8ZPQ 2, W8AEN 1, WA8HGA 1, W8JGY 1, WA8LFW 1, W8QEC 1, WA8ZNH 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—New ECs include W5SBJ, WA5UWY, WA5FLG and W5ALR. We still need ECs badly in the northeast, southwest and southeast parts of the state. If three can be found to fill these areas the system will keep going. Interested? Write your SEC, Harry McGavran, W5PNY, 1931 40th St., Los Alamos 87544. WA5FPS reports few 50 Mc.-and-above band openings this month. K5MAT now is on 40 meters in Los Alamos. He did manage WAS on 80-, 40-, 20- and 15-meter c.w. before he moved from Santa Fe. Intruder Watchers are needed. Write Hq. for full details. W6SAI was W5WZK's guide for the Eimac Plants tour while he was in California recently. The Port Arthur ARC was

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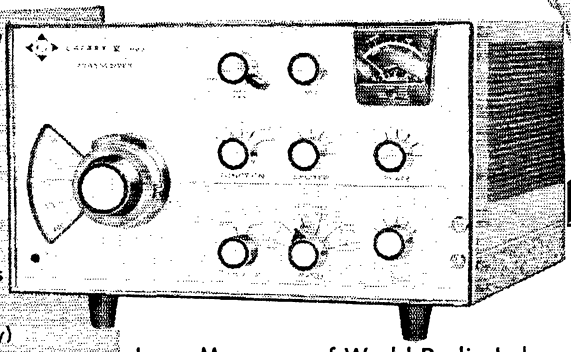

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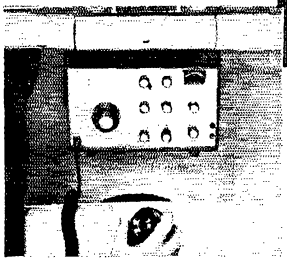

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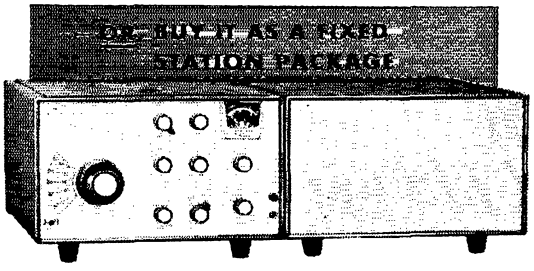

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met by the Albuquerque ARC and the Albuquerque Chamber of Commerce when they arrived the 17th. Albuquerque hams showed the Texans what the Albuquerque area has to offer. A great time was had by all. Traffic: W5DMG 14, WA5MIY 8, WA7FBV/5 6, WA5JNC 4, W5NON 4, W5NUI 4, K5MAT 3.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. K7RAJ has been awarded the Utah Section PICON Award by Director Smith. Jim is the pres. of the BYU Amateur Radio Club and vice-pres. of the Utah DX Association. Congratulations! K7HLR has been appointed ORS. All section appointments are being reviewed for inactivity. Activity and monthly reports to the SCM and/or SEC are the criterion for maintaining your appointment. WA7IAW copies WB6TFU/6, who was in Northern California, on 145.35 Mc. The Utah AREC-RACES Net now has 41 members with good state coverage. WA7DVT is NCS, with W7DIA and K7-LKH as ANCS. BUN now has 25 regular members. W7OCX, WA7GMJ and WA7GTU are NCSs and also alternating as ANCSs. Stations are needed for these positions as well as liaison to TWN. ORS should be filling the liaison slot. At present W7OCX is the only one. Traffic: W7OCX 99, K7SOT 18.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, 0630 Mon. through Sat. on 3920. New appointments: W7SDA and K7TAQ as OBSs, WA7EGK and W7VTB as OVSs. W7LVU is experimenting on 450 Mc. and may go with a repeater with K7KMT. We lost another ham in a tragic accident in Aug.—K7DLE of Cokeville died in a car accident. K7SDD was married in Aug. W7HTL has moved to Vancouver, Wash. K7QYG has moved to Rock Springs. W7CQP has moved to Ogden. WN7JJU has moved to Cedar City, Utah. K7WRS assisted by calling the Highway Patrol for an accident that K7NQX came upon on his way to Casper. The tenn-agers won the Field Day trophy for 1968. Traffic: K7ITH 144, WA7CLF 135, WA7GYQ 99, W7TZK 68, K7SLM 38, K7KSA 30, K7VWA 24, WA7-GOV 13, K7YPT 8, W7NKR 7, W7YWW 7, K7AHO 6, K7QJW 6, WA7BFV 4, W7AEC 2, K7LOH 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPL PAM. WA4EEC. RM: K4BSK. Another excellent North Alabama Hamfest is now history, but will long be remembered by many. The Huntsville ARC was host this year and everything seemed to progress almost like a dream. K4AAU was the proud recipient of the transceiver. WB4EKJ has been appointed net manager of AEND. W4FVY has Extra, DXCC and his rotator fixed, and a good traffic count for the month. W4GRG now has worked 101 Hungarian stations. We still lack stations from quite a few areas of the state. Many pieces of traffic have to be mailed for final delivery. Now that summer has passed and longer nights are with us, how about dropping in on at least one of the section nets and providing a new outlet for your section? The AENM S.S.B. Net meets daily on 3965 kc. at 1830 CST; AENT on 3970 at 1630 CST; c.w. nets, AEND at 1730 on 3725 kc. and AENB on 3575 kc. at 1900 and 2200 CST daily. Make your plans now for the SS Contest, phone Nov. 9-11 and c.w. Nov. 16-18. Traffic: K4BSK 195, W4FVY 192, WA4AVM 180, WB4EKJ 90, K4AOZ 56, WA4VEK 50, W4USM 48, WB4BLX 45, WA4EEC 41, WA4ROP 40, K4KJD 23, WA4GGD 22 ,K4WHW 22, WA4MTG 21, K4UUC 21, W4DGH 16, WA4JSM 16, K4WOP 16, WA4AZC 13, WB4FMQ 10, W4MKU 10, WB4KDN 8, K4UMD 8.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5-OB—A local civil defense project took place in the Canal Zone during Oct. WA4DHI and his XYL visited with KZ5MV and KZ5EF. Ted operated as KZ5TD during his visit. Most of the KZ5s arrived back from stateside vacations. KZ5BF, KZ5LM, KZ5OA and KZ5OB arrived on the same ship. KZ5OA and KZ5OB attended the annual convention of the IMRA (International Mission Radio Association) in Atchinson, Kans., and had a wonderful time. The IMRA does much good in helping missionaries abroad in telephone relaying, supplying equipment, etc. Anyone interested in securing more information about this worthwhile organization may call KZ5OA or KZ5OB. Traffic: KZ5-JC 45, KZ5PA 39, KZ5SA 32, KZ5CT 12.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4-MVB—Asst. SCM: Wm. G. Blasingame, WA4NFV. SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM 75M: W4OGX. PAM 40M: W4SDR. V.H.F. PAM: WA4BMC. August and the National Conventions (political) have come and

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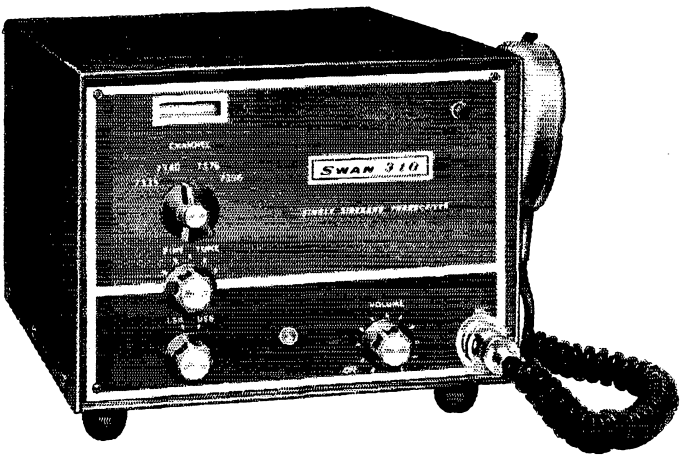

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gone. A group in Miami operated a station in Miami Beach near the convention site using the call K4GOP. This is the first time for such an operation and from the traffic reports was very successful. W4ILE reports that he has received his Extra Class ticket. Also daughter Regina is now WN4KTK. WB4FLW recently was appointed Asst. EC for Broward County. WA4OHO soon will be leaving for school. He will relinquish QFN net mgr. duties and turn them over to W4UQZ. I understand that W4BKC operated from AAA Headquarters in Orlando over Labor Day week end participating once again in BEBA, better known as Bring 'Em Back Alive. This is a joint project of AAA, the Jaycees and the amateur radio operators of Florida. Weather conditions, road conditions, traffic jams and other items of interest for motorists are gathered by the amateurs and reported to Orlando. There this information is turned over to AAA and they in turn have it broadcast over 150 radio stations throughout the state, in an attempt to reduce the holiday traffic fatalities. Traffic: (Aug.) WA4SCK 714, K4GOP 471, WA4NEV 329, WA4FGH 321, WB4AIW 266, WA4JJH 249, W4IYT 249, WB4FLW 187, WA4TWD 162, W4SDR 90, W4ILE 88, W4FP 75, W4OGX 72, WA4HED 70, WA4FJA 63, WA4OHO 57, WB4EPD 52, WA4CIQ 51, K4LEC 50, W4NGR 45, WB4DSP 44, WB4HJW 42, W4AKB 35, W4SMK 30, W4IAD 26, W4HFR 24, WA4NBE 23, K4LPS 21, W4BKC 15, WA4EYU 15, W4YPX 15, W4SME 10, W4VPQ 7, W4TJM 5, K4EBE 3. (July) WB4FLW 64, WB4DSP 53, W4GUJ 45, W4EHW 32, W4SOM 6.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4YDN. K4HQI reports 50-Mc. openings down from last month. Even so he logged all U.S. call areas as well as VP7, KP4, XE and VE4. He also found time to add a 20-w.p.m. sticker. WN4GTB swapped the "N" for a "B" with a Tech. Class ticket. W4GDY has moved to Athens from N.C. Work is under way on the Rome 146.94-Mc. f.m. repeater. WB4GTR has a new tower and v.h.f. antennas. W4ISS is now running 180 watts on 6 and 2 with a Johnson rig. He furnished complete details on 2-meter activity in the area. Frank is looking for 3/16 OD tubing for a 32-element colinear beam. The Augusta repeater operates 146.94 transmit and 147.3 receive. W4VHH is on vacation. WN4HLX is using an SB-301 and a homebrew four-element yagi for 15. W4LRR reports good 2-meter activity. The Atlanta Area Net is on 145.350 Mc. at 0105. W4DQD lost his S/Line when lightning struck his antenna. GSN, on 3595 kc. at 7 and 10 P.M. EDST, reports QNI 375, QTC 253, sessions 62. W4CZN bought a mike and has gone s.s.b. W4TYE is active on c.w. K4JFY has a new tri-band quad. WB4KTY is a new General. K4TXK is moving to Valdosta. W4HWY operated Ill., Md./D.C., Ind., N.J. and QRP QSO Parties. Traffic: (Aug.) W4CZN 251, WA4RAV 134, W4EDN 128, W4PIM 84, WA4UQQ 71, W4TYE 62, WA4WQU 56, K4JFY 37, W4DDY 36, WA4LLI 36, W4RZL 27, K4TXK 13, WB4EMF 11, WA4JES 4, W4HYW 3.

WEST INDIES—Acting SCM, Albert R. Crumley, Jr., KP4DV—*Puerto Rico*: KP4CB is on vacation from extensive hamming for a month. KP4BI is now "ex-KP4BI" because of total expiration without renewal. Better watch it, fellows! The exams are much harder these days. KP4DL, KP4DV and other AF MARS members assisted in moving the MARS station and equipment to its new location in the Photo Lab building at Ramey AFB. KP4JM and board members of the Radio Club de Puerto Rico are campaigning for frequencies outside the American bands for KP4s and KV4s, also for an active SCM with the time to fulfill all the duties. KP4WT, of Mayaguez, is the *only* KP4 to submit *regular monthly* reports of her activities. If all those fellows doing heavy "politics" would concentrate on (what I consider a necessity) more participation in action-items, and apply that energy to simple items of ARRL membership, monthly reports to the SCM, etc., *QST* would not have sufficient space for the reports. *Virgin Islands:* KV4AA has the latest s.s.b. rigs. Rare Novice calls are WV4FN and WV4FP, mostly on 15 meters. KV4EY has a new tri-band beam and tilt-over crank-down tower. KV4FL is the official Boy Scout station of the V.I. KV4AB, of "Radio Hill, South," has returned to W2KW "Radio Hill, North." (Clarence Seid, QCWA pres.). KV4BA teaches Boy Scouts amateur radio. Traffic: KP4WT (Jan. through July 1968) 1401.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAMs: H.F.—W7BNR/4. V.H.F.—W4UUF. RM: K4UBR. Nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	31	526	42
QFN	3651 kc.	2330/0300Z	"	62	—	—

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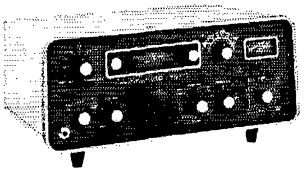
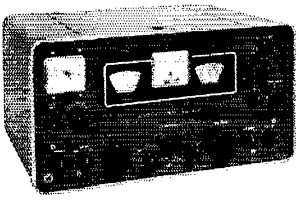


HQ-215

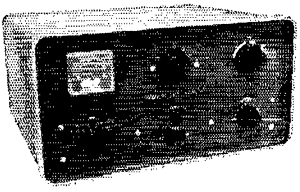
Newest member of the family, *solid state*, solid copy, in the best SUPER-PRO tradition.

Take 5 and prove it!



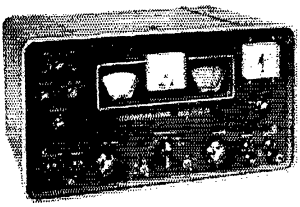
HQ-180-A

Versatile, general coverage receiver 0.5—30.0 MHZ full amateur bandspread has attained world recognition by creating new standards of performance.



HXL-1

The rugged one! 2KW PIP self-contained desk-top linear, 80 through 10 meters.



HQ-145A

This dual conversion general coverage receiver has *more* new features to provide even *better* operating efficiency.

HQ-110A-VHF

Improved mechanical and electrical stability plus expanded VHF dial in the *only* ham band receiver covering 160 through 2 meters.

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Pensacola: WA4WAR is the new EC for Escambia County. WA4AYX assists W7BNR as WFPN mgr. W4HJ, WA4ECY and WB4DVM were active in Operation BEBA. K1PKQ/4 is a new OPS. W7BNR/4 renewed as PAM and OPS. K4NMZ works 2-meter meteor scatter. WA4ISE, WB4DHL, WA4ZRN, WA4ZRF, W4UUF and WB4DVM are working on 2-meter f.m. gear. W4UUF and K4NMZ meet the Tri-State 2-meter S.S.B. Net on 144.1 Mc. each Sun. at 10 A.M. W4IMY, K4IVD and WA4ZRN are working on RTTY gear. New Novices are WN4JHQ and WN4KHO; WB4GQU is now General. Anyone interested in forming a DX Club, contact K4OSE. WA4JLI joined the Silent Keys. Milton: WN4IYV received his General Class license. Fort Walton Beach: WB4CFQ is OBS for local v.h.f. nets. The N.W. Florida FM Assn. was formed with K4QHR, W4MMW, WB4CFQ and WA4EVU as officers. K4BSK, Ala. RM, was a summer visitor. Panama City: The West Fla. Phone Net held its picnic at St. Andrews State Park, thanks to the efforts of WA4IMC and WA4JIM. Quincy: WB4DGW, club station has been moved to the c.d. office in the County Courthouse. Traffic: (Aug.) W4IKB 21, WB4DVM 18, K4BSK/4 2, K1PKQ/4 1. (July) K4BSK/4 23, WA4EPH 2.

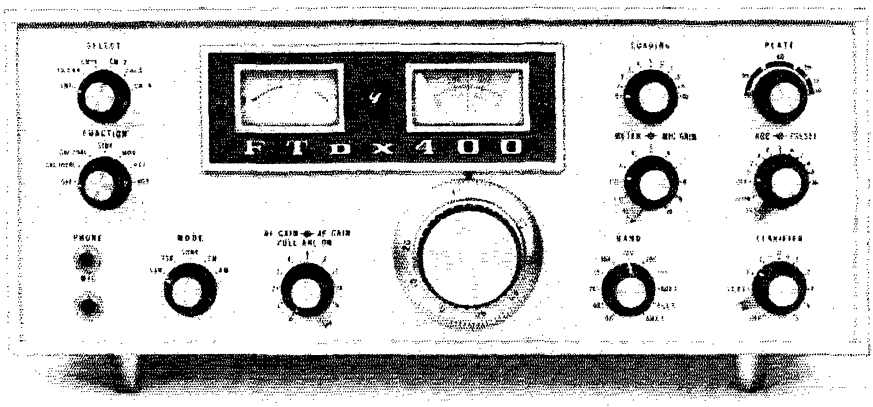
SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—PAM: W7UXZ. RM: K7NHL. OBS: WA7GOG on 444.1-Mc. ATV 24 hours a day. The new PAM and manager of the Copper State Net is W7UXZ. CSN meets Mon. through Fri. at 1900 MST on 3.878 Mc. The ARRL Convention in Phoenix was a big success because of the efforts of K7OED, chairman, and his committee. A new DX record for 40,000 Mc. and above was broken at the convention by WA7EDI and W7CAF. W7FEW won the TR-4 and RV-4. WA7DGY has his SB-100 in mobile operation now. K7SWX was married last Aug. and Tom and his XYL are attending medical school at the U. of A. WA7DUB worked 65 countries with a dipole and HW-100 during the summer and also earned the Advanced Class license and constructed an integrated circuit keyer. WA7IFD worked 110 countries last summer and received an ORS appointment. K7NII, running a kw. to 4 eight-element Yagis, continues to hold weekly skeds with New Mexico and California on 2 meters. He also has 500 watts and 32 elements on 432 Mc. The Arizona Automobile Association expressed its gratitude for the excellent job the hams did during their "Bring-em-Back Alive" campaign over the Fourth of July. K7HQF and K7UGA continue to telephone relay. Traffic: K7NHL 311, WA7IFD 23, WA7DUB 22, W7CAF 14.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—Asst. SCM; Harvey D.D. Hetland, WA6KZI. A Section Net certificate recently was earned by WB6WDS. W6KW and W6MLZ are competing for ARRL Director while W6PIF and W6UEI are competing for Vice-Director in the Southwestern Division. W6HPE and WB6TMC are new Extra Class holders, as well as W6DQX. WB6IMV now is sporting new 2-meter s.s.b. gear. W6VZA and WA6WPX have acquired some RTTY gear of late and are working with W6VHU on a possible SGVRC net of RTTYers. The W6JW group in Neltall reports holding an excellent annual picnic. K6CL is, or rather was, touring VE-Land and operating on the WCARS Net regularly, while K6EV got back to ARRL Headquarters for his vacation. WA6VIB has a new Drake line installed and WB6VZD has TVI-proofed his rig after much work. While W6USY of SCN went to KH6-Land, W6QAE was registering voters for the election this month. Recent auctions included the SGVRC, LERC, SFVRC and LBARC. An auction is set for K6BPC in November. V.h.f.ers attention. K6NA has a new final amplifier on the air. W6OEO reports hearing wedding bells! A v.h.f. traffic net recently was established on 49.76 Mc. for Army MARS members. A new So. Cal. V.H.F. RC member is WB6ZLP. WB6ZVC is now operating on the 3.5-Mc. band. Club bulletins are appreciated and solicited via address on page 6. Traffic: (Aug.) W6GYH 1324, WB6BBO 729, W6MLF 466, W6QAE 290, WB6TQS 267, K6CDW 257, WA6KZI 111, W6FD 85, WB6TMC 63, WB6WDS 57, WB6KGK 43, W6BHG 41, W6USY 30, WB6ZVC 28, K6CL 17, WB6SLG 15, W6DQX 12, WB6SXY 10, W6AM 8, K6ASK 3, W6HUJ 8, WB6OUD 8, K6UMV 7, WB6VZD 6, W6TN 3, WB6AEL 2, W6DGH 2. (July) WB6GGL 40, W6AM 4. (June) W6AM 2. (Apr.) W6AM 6.

ORANGE—SCM, Roy R. Maxson, W6DEY—WB6YPX, Autonetics Radio Club, has a new Hy-Gain DX Long John antenna which is performing nicely, handling 461 Vietnam telephone relays, per S. H. King, vice-pres. WA1JHZ now is at Westover AFB

NOT FOR THE NOVICE



THE FT DX 400 "FULL HOUSE"

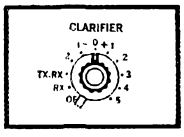
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

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 limited • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

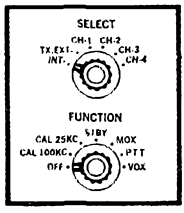
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural 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.

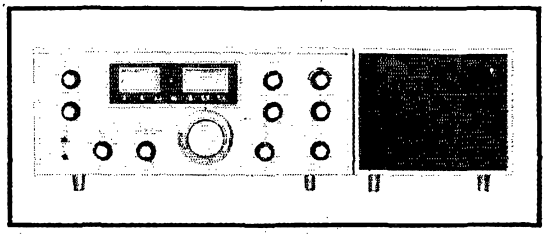


CLARIFIER CONTROL — Does the work of an external VFO — allows operator to vary receive frequency 10KHZ from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL — Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL—Selects crystal calibration marker frequency and desired transmit mode of operation.



FT DX 400 $599.95 — SP-400 $14.95

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— PROFESSIONAL EQUIPMENT FOR THE AMATEUR —

with a DX-35 and a 75-A2 on WMN. EC WB6RVM says the 2K is working FB. K6MCA handled 537 telephone relays in Aug. EC W6GQJ has an interesting report on emergency traffic under ARPSC. OO W6WRJ advises that the Mission Trail Net now is on 3930. W6BUK visited Mammoth Lakes and kept in touch via 40 and 80 s.s.b. He is getting a Drake R4B receiver. OO W6BAM has a new 10-meter beam. W6FB has a new QTH in the same area. With TI8GL his total is now 230/226. Fred has been an ARRL member continuously for 47 years and says his grandson, Steve, is interested and there may be another ham in the family yet. If you want to get your code speed up or practice check the net on 7152 at 2000 to 2300 GMT, 25 w.p.m. minimum speed. Traffic: (Aug.) W6BNX 419, WB6TYZ 281, K6MCA 239, WA6ROF 218, WA1JHZ 140, WB6UCK 132, W6WRJ 67, WB6RVM 53, K6IME 35, W6GB 7, W6PQA 6. (July) WA6GQJ 30.

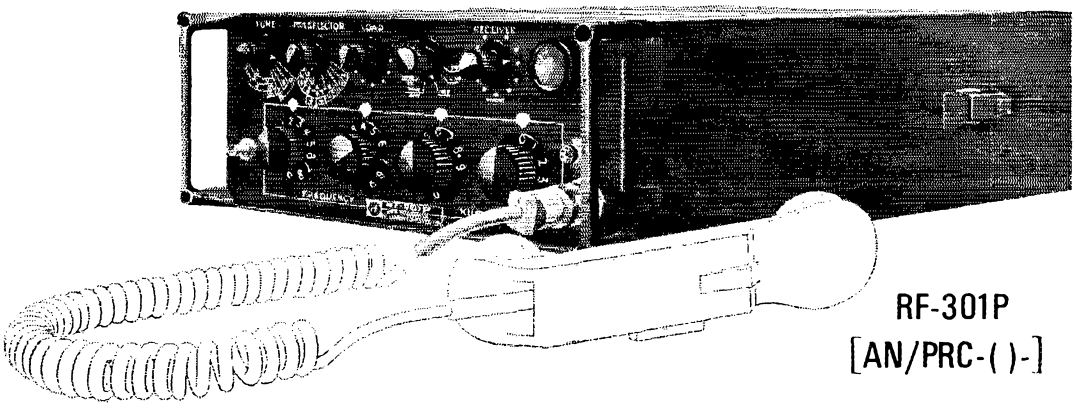
SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM—K6HAV, North County EC, has been appointed Asst. SEC to replace W6VNM, who recently moved to a new QTH. Ralph is a sparkplug up north and has started a 2-meter net besides his efforts with the 75-meter group. WA6DEI is putting the finishing touches to an i.s.k. circuit and expects to be on RTTY very soon. The ARC of El Cajon announces *WAMO!* is coming. Also members who recently passed the Advanced Class exam are WA6COE, WB6RSW and WB6WES. North Shores ARC has joined the ranks of clubs putting out a monthly paper. Many section members attended the Southwestern Division Convention in Phoenix Labor Day week end and had a grand time. Those who were there know that we were constantly reminded that next year's convention will be held here in San Diego. Our convention committee would like to know what you would like to see as a part of the general program or as a special extra curricular event? Are there any features you have seen in other conventions that you would like to see here? Please address your comments to WA6TAD, general chairman. W6GBI is now K6HN. County Civil Defense reports, via WB6KSA, that it is looking for about 20 operators to man 2-meter stations throughout the county Mon. nights and in emergencies. Are you doing anything for public service and amateur radio? Traffic: K6BPI 9660, W6BGF 536, W6VNQ 408, W6EOT 405, WB6UMT 147, W6SE 118, WA6DEI 81, K6HAV 59, WB6GMM 16, WA6KIN 13, WA6QAY 11, W6YKF 3.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV. RM: W6UJ. W6YK reported on his v.h.f. activities. Bill has an 80-element 2-meter beam and has heard VK3ATN on the E-M-E path. He will use the 12-ft. dish at K6KV soon for the 1296 Oscar activity. A new ham in Thousand Oaks is WA6WWC, WB6UHE, in Newbury Park, is building a 4-1000 linear. W6ORW is the newly-appointed EC for the Simi Valley and is putting together a solid emergency group for that area. K6TOE sends a nice report from the Morro Bay group. The Estero Radio Club is especially proud of WN6FHV who, with only three months on-the-air experience, has 23 states to his credit. W6ZRR devoted 33 hours of his station activity to the Powder Puff Derby. Members of the Estero ARC handled communications for the Labor Day Parade in Morro Bay as they have for the past 5 years. I ran into K6VBX at the convention in Phoenix and he reminded me that the Mike and Key ARC meets the 2nd Thurs. of each month at the Security Bank in Camarillo. Traffic: W6ORW 13, W6UJ 12.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. "Gene" Harrison, W5LR—May I remind you this report leaves my desk "come high water" the 7th of each month. Net managers are reminded that all reports should be in Dallas via some form of reliable communications by this date. Your SCM appeared before LTV Garland recently and a good crowd was on hand. This club has considerable equipment including a Swan 350, 250, HT-40 and associated equipment and is attempting to contact LTV people on 75 meters. W5RHI is group leader of this crowd, supported by C. A. Robinson and K5AON. The Dallas Amateur Radio Club enjoyed a conducted "tour" of LTV Continental Electronics, the "VLF" experts, with 60 amateurs attending. A review of existing ARRL records shows 155 appointments in our West Gulf Division. The Tarrant County Emergency Net is very active Sun. on 3970 at 1 P.M. local time. The Texas C.W. Net is very active at 7 P.M. and 10 P.M. local time on 3770 kc. W5EZY would like more participants. Incidentally, certificates are available upon request. Please let me know your needs. Tex Tfc Net reports 1475 check-ins, 401 messages, 31 sessions. All amateurs are reminded of the Texas Tfc Net meetings on 3961 kc. daily at 6:30 local time; also the 7290

SSB RF-301P PACK SET



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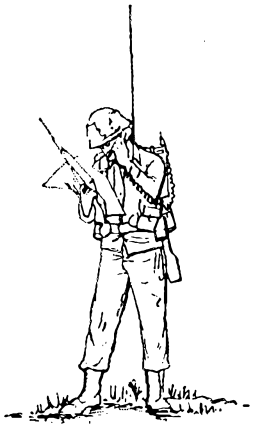

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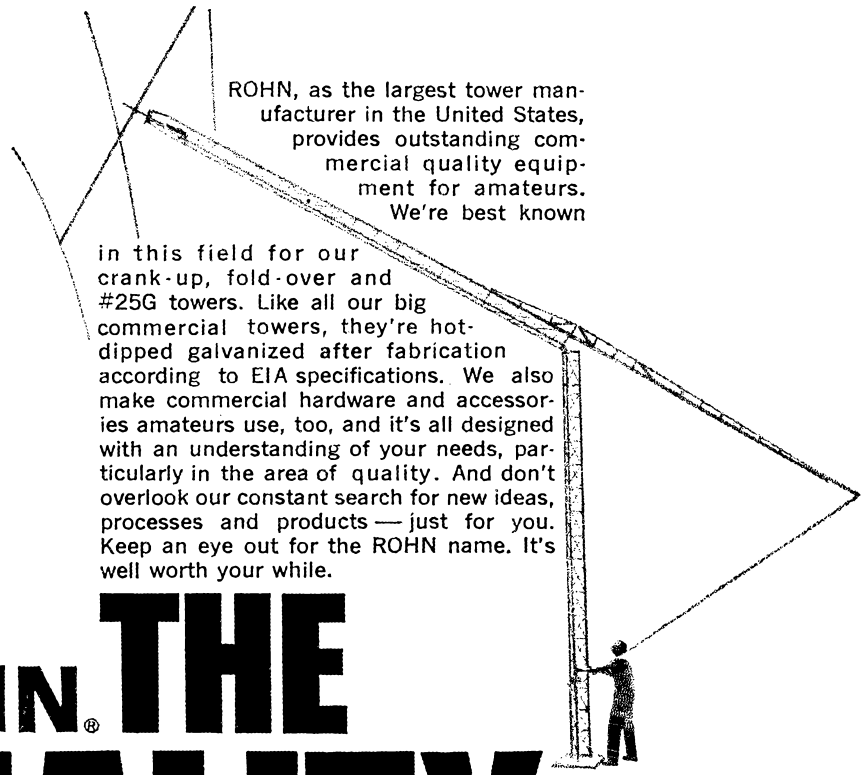
Network meets Mon. through Fri. from 9-12 and 1-4. North Texas amateurs are reminded of the upcoming Old Timers Night at the Dallas Amateur Radio Club scheduled for early Nov. 1968 at "Vicks." The 7290 Traffic Net held 44 sessions, QNI 1798 and QTC 1562. This represents a grand total. The Dallas Chapter of the QCWA is being organized. Those interested should call Paul Crossno, W5DMR, DA1-1727, Dallas, and he'll fill you in on scoop. Traffic: K5BNH 1260, WA5-TYH 669, K5LZA 44, WA5NSJ 33, WA5QQR 28, W5LR 25, W5PBN 16, WA5QQQ 13.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5AOB. RM: W5QMJ. PAMs: W5MFX-75, K5TEY-40, WA5JGU-6 and K5ZCJ-2. Ex-W5UYQ, West Gulf Division Director is sporting a new two-letter call, W5IQ. Ray and his lovely wife Mary, K5PBE, have sold their house in Oklahoma City, bought a retirement home and are in the process of moving to Kingston, Oklahoma. We hear WN5VCQ was in the attic (probably tapping the phone for extension into the shack) and fell right through the ceiling. Beware of UFOs—K5BKF got hit right in the bread basket by one. It was identified after hitting him as a radio-control model airplane. W5MFX was mobile with a 2-meter walkie-talkie on a recent trip to Nebraska. W5QMJ finally got his rig moved out of the dog house and in under the air conditioning. W5EHC is in Alabama, called there by illness in the family. K5TCG has a new tower with a new beam and rotor. The Enid 2-meter repeater is about ready to go and is now under test. K5VOZ, the Lawton-Ft. Sill Club station, has a new tri-band quad atop the 60-ft. tower and Ham-M, thanks to the club vice-pres., W5PWG. Congratulations to new Advanced Class K5HMI. Known new hams in the area are WA5s VPZ, VTH and VSC; also WN5s VQN, VSN and VRE. Traffic: K5TEY 4789, WA5JGU 80, WA5KFT 78, WA5-AOB 48, WA5IMO 37, W5PML 29, W5MFX 28, K5CAY 24, WA5DZP 20, W5QBF 18, WA5KZA 17, WA5SEC 14, K5SWL 10, K5WPP 10, W5FKL 8, K5MBK 5, K5OCX 4, W5EHC 1.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Congratulations to new appointees: W5ICL, Orange County EC; W5URW, Washington County EC; WA5-KIV, OO; W5KZT, OPS and ORS, STEN NCS K5JKV, ORS. We welcome to Southern Texas WA1FGN/5, ex-WØHYG, who has just passed the Extra First exam and is awaiting a 5th district call. EC K5HMF is all ready to go with RTTY and has his f.s.k. operative on 40 and 80 meters. PAM W5KLV still is working on the rig and now is operating mobile only. He advises that most South Texas Emergency Net Zones will be operating on 3955 kc. except the 40-meter c.w. section and the v.h.f. section. The s.s.b. section now is operating on 3915 kc. WA5GZX reports back on the air with a second-hand SB-101; he also has an SB-101 mobile. ORS WA5KIV passed the Amateur Extra First exam. Visited W5SC at the Hemisfair but found the station all locked up. It looked real nice through the glass windows. Orange ARC, with W5ICL as pres., has a real nice club station, W5ND, in the penthouse of the hospital with emergency power and the works. Enjoyed a visit there Sept. 6 after the Tri-City Club meeting. WA5VTO is the call of new Texas State RACES officer J. R. Messenger. All of us in Southern Texas are keeping our fingers crossed as the hurricane season advances. We will keep them crossed until around Thanksgiving, hoping we don't have to uncross them for emergency operations. Traffic: K5HZR 181, W5EZY 175, WA5INZ 143, W5QJA 132, W5AC 125, WA5MXY 124, W5BGE 110, K2EIU/5 102, W5TFW 56, WA5GZX 43, WA5QKE 39, W5KLV 36, W5AIR 5, WA1FGN/5 4, K5WYN 4, K5HMF 1.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM APSN: VE6ADS. ECs: VE6SS, VE6XC, VE6PL, VE6AFQ, VE6AFR. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6ATH, VE6AFQ. OOs: VE6HM, VE6TY. OBSs: VE6HM, VE6AIF. Our SEC reports that all AREC groups were very active this past summer, with the biggest turnouts for A.M.A. (bring them back alive). A.M.A. says congratulations and "thanks" for a job well done. Control station for these activities was VE6ADX with his station up on top of Turtle Mountain. VE6SB is busy touring around the country. VE6VF is doing a fine job on the net as well as touring the countryside. VE6BR is enjoying the week ends at Pine Lake. VE6AKV and his family are enjoying themselves here, there and everywhere. VE6AAI finally broke the ice and now is heard on phone. The International Waterton, Glacier Hamfest was another success. Because of the recent postal strike there was no report last month, therefore all traffic will show on



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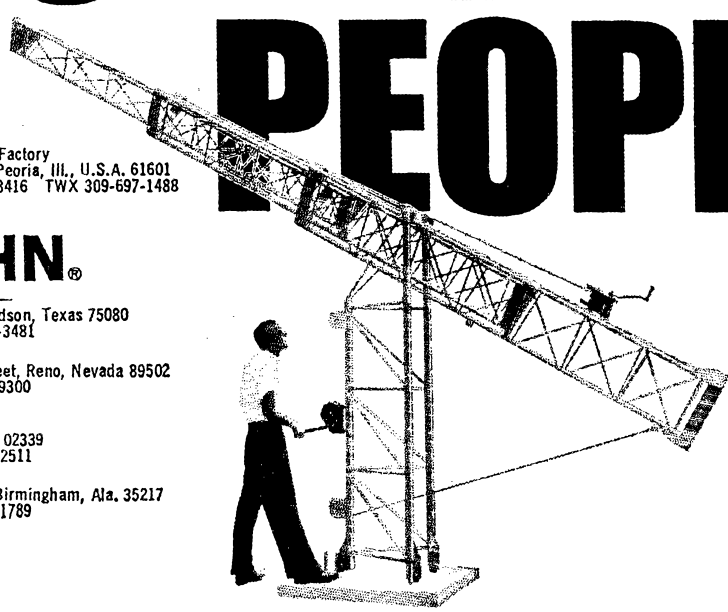

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this report. Your SCM will be retiring in Oct. so start looking for someone to take his place. Traffic: (Aug.) VE6HM 81, WA5OHH/VE6 48, VE6ATH 27, VE6FK 27, VE6UJ 22, VE6ATG 17, VE6AAI 7, VE6ALU 5, VE6AWF 5, VE6HN 4, VE6II 3, VE6BL 2, VE6YE 2, VE6FS 1, VE6NU 1. (July) WA5OHH/VE6 22, VE6FK 22, VE6ATG 17, VE6ATH 12, VE6SS 6, VE6XC 5, VE6AFW 4, VE6FS 4, VE6UJ 4, VE8RE/VE6 4, VE6FV 3, VE6AFQ 2, VE6NF 2, VE6SB 2, VE6WN 2, VE6XF 2, VE6YW 2, VE6AKZ 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—VE7BJT set a first for the B.C. Phone Net by calling the Eastern Section from 2800 feet above Kamloops. VE7AOF reports a new son. VE7AOQ is back after a silence of eight years. VE7AMW spent his holidays in England. WA6IQP has arrived home in San Francisco after a year signing VE7. VE7JF has moved to White Rock. VE7BTW is the proud dad of twins. VE7FB and VE7SH, plus Junior, had a three-weeks ball on the Oregon Coast in July. Beaver Valley ARC's FD was a big success with 389 contacts. VE7AFJ, formerly K6-YCX, is our needed Qualicum outlet for BCEN. VE7-VSF, Vancouver Sea Festival, reports good activity during the Festival. The North Vancouver ARC was very active during the summer in FD, the Park Royal Pageant Kinsman Carnival, the B.C. Aero Club Air Rally and the Sea Festival with volunteer operators for other activities. New ORS VE7GG, also VE7KZ, has the 20-meter beam up. Many thanks to him for checking the BCARPSC Net during our holidays. Traffic: (Aug.) VE7ZK 642, VE7GG 44, VE7BHH 26. (July) VE7ZK 354, VE7AC 67, VE7GG 37, VE7BHH 12, VE7FQ 5, VE7VSF 3. (June) VE7FQ 12.

MARITIME—SCM, William J. Gillis, VE1NR—Asst. SCM: R. P. Thorne, VO1EL. SEC: VE1HJ. Our condolences to the family of VE1GS, who passed away Aug. 31. VO2AB reports an interesting FD, sponsored by the ARCOWL, despite the flies and rain. 6D Messages were received by the SCM from practically all clubs and several groups in the section. The Aug. meeting of SONRA was held in the form of a picnic with some business conducted. The Annual Meeting of the NBARA was held at Fredericton Aug. 11. New executives are VE1XG, pres.; VE1FG, vice-pres.; VE1-KC, treas.; VE1NR, secy. The St. John's Nfld. gang reports good success with its 2-meter repeater. VE1LI is back in the shack after a seige in the wards. APN is looking for volunteers to act as NCS. Stations wishing to participate must be good c.w. operators and be prepared for liaison with ECN. APN reports 31 sessions, QNI 181, QTC 10. VE1AMB got real close to nature on her vacation with a chase by a moose and a bear! Traffic: VE1AMR 38, VE1AUD 1.

ONTARIO—SCM, Roy A. White, VE3BUX—AREC Asst. National Coordinator: VE3YC. SEC: VE3OE. PAMs: VE3AKQ and VE3BLZ. RMs: VE3BZB, VE3-DPO and VE3GI. It is with pleasure that I announce the appointment of VE3OE as our new SEC. He will be assisted by VE3EWD. A big welcome to VE3AKQ, who has taken over as PAM of the OPN. Congrats to VE3ART, who has just got her license and is busy pounding brass. A treat for sore, and envious, eyes is to visit the shack of VE3GK and his XYL VE3AYL of RTTY fame. They have enough equipment to start a store—c.w., a.m., s.s.b., RTTY! VE3GCE is going to have to give up as EC for Norfolk County to return to school. Any volunteers? VE3GBX, Wentworth County EC, also is reluctantly giving up to resume studies but has obtained VE3FWI as his replacement. We still need more ECs. If you can help, contact VE3OE. We can always use more good controllers on the Ontario Phone Net, too. Contact VE3AKQ if you can help. VE3FQQ is the latest addition to the controllers. His 100 watts puts a real potent signal down this way. The different message formats used by various organizations causes confusion, particularly when out-of-province traffic is involved. Nice to hear VE3AG on the air again after being hospitalized. VE3DBO is off to the Arctic on a painting and hamming session. VE3ATR is back in circulation but his doc has told him to go in low gear for a while. VE3CJ advises that Canadian amateurs soon will come under the jurisdiction of the Postmaster General instead of the Department of Transport. Eventual set-up will be under the new Ministry of Communications. We noticed VE3DJK back on 75 recently. Traffic: (Aug.) VE3GI 117, VE3GCE 107, VE3AWE 69, VE3ATI 62, VE3DBG 61, VE3EBC 56, VE3DV 43, VE3NO 36, VE3DMU 35, VE3DU 31, VE3FGV 30, VE3DPO 28, VE3AUU 24, VE3GMQ 21, VE3OE 21, VE3EHL 18, VE3APR 13, VE3BEB 12, VE3DVE 11, VE3EWD 7. (July) VE3DU 35.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAM (h.f.): VE2BWL. The next SET is a couple of months away but every EC should begin

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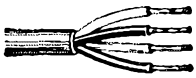
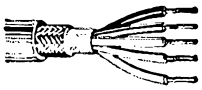


Antenna Rotor Cables
Sturdy, flexible, plastic insulated cable for rotor applications. Color coded. Chrome, vinyl plastic jacket resists sun and aging.



Power Supply Cables
Excellent mechanical and electrical characteristics for long service life. Special jacket offers maximum resistance to abrasion and ozone. Use as power supply cords and interconnecting cables. Ideal for remote control circuits, special press-to-talk microphone circuits, and other applications.

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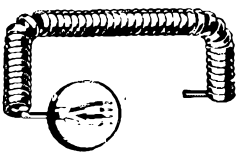
Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available from 24 AWG to 12 AWG.



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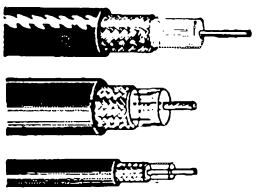

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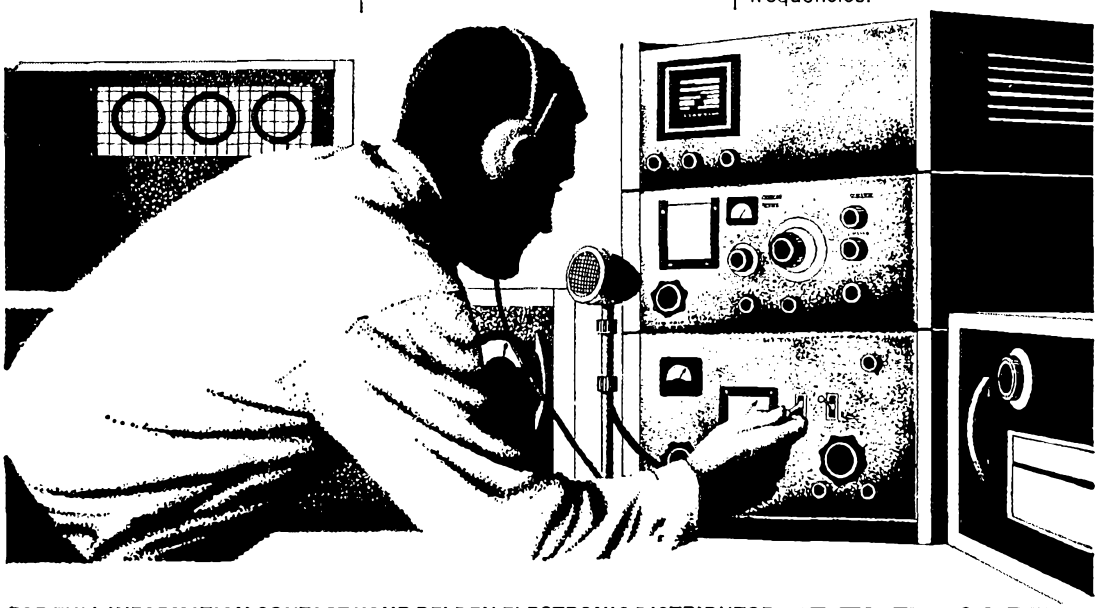

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immediately to set up some activity which will give a job, for a few hours, to each AREC member and especially the Asst. ECs. Why doesn't the SCM receive club activity reports? Each club has a secretary. Let's know what you are doing for amateur radio. VE2BKA held the AREC gang together on many occasions during the summer Sun. nets. VE2SS has a new harmonic. VE2DAX is a newcomer on the Three Rivers 2-meter repeater and in the same location is VE2DAE with a 24-element beam. VE2BMQ and VE2HW continue to do well on 1296 Mc. with good results on C.W. over a 22-mile path. VE2DFX now is VE2MQ and his XYL is VE2DFX! VE2WM reports great activities in the lower Saint Lawrence region. VE2DDO has a fine 80-meter s.s.b. signal from that region from the college in Matane. Le Radio Club de Québec a présenté un magnifique kiosque lors du congrès et tous les amateurs de la Province ont été à même de juger à quel point les membres du Radio Club sont des experts dans le domaine du v.h.f. traffic: VE2BVY 105, VE2DR 99, VE2OJ 62, VE2AJD 34, VE2CP 22, VE2ALE 20, VE2-EC 18, VE2PJ 17, VE2WM 8.

NEW BOOKS

How To Use Your VOM-VTVM & Oscilloscope, by Martin Clifford. Book No. 438. Published by Tab Books, Blue Ridge Summit, Penna. 17214. 192 pages, profusely illustrated with drawings, charts. 5½ by 8½ inches, paper cover. Price. $3.95.

This book is a useful reference guide to three widely used pieces of test equipment. Each test instrument is described with sections on how the instrument works, the uses of the instrument, and servicing techniques to be used in conjunction with the test equipment. No new or particularly enlightening testing techniques are presented, but the text does outline many standard techniques for three instruments under a single cover. Having such information available in one book should be especially helpful to a newcomer to electronic test equipment.

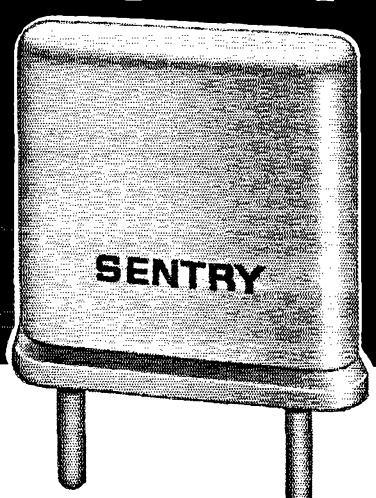
Working With the Oscilloscope, by Albert C. W. Saunders. Published by Tab Books, Blue Ridge Summit, Penna. 17214. No. 472. 10½ by 11 inches, 104 pages, profusely illustrated, paper cover. Price, $4.95.

Although a basic knowledge of electronics is helpful for this book to be fully appreciated, the beginner should have little difficulty understanding the majority of the text material because of the large number of sketches, photographs, and schematic diagrams which are included to complement the text. The book is set up as a completely self-taught course on the theory and operation of the oscilloscope. Five lessons, comprising 26 pages of text discuss such topics as the c.r.t., oscillographic patterns, time base oscillators and generators, and vertical deflection amplifiers. The majority of the text consists of 26 projects using the oscilloscope. These projects start with the rather simple procedures for setting the 'scope up, voltage and current measurements, calibrating the time base, and Lissajous diagrams, and proceed to more elaborate techniques such as used in color TV servicing. In addition, a handy section is provided describing the various techniques of waveform analysis. One important point made by the author bears mention: the oscilloscope can be used to diagnose its own ailments when they do occur.

Electronic Hobbyist's IC Project Handbook (No. 464), by Bob Brown and Tom Kneitel. Published by Tab Books, Blue Ridge Summit, Penna. 17214. 160 pages, 50 projects, 100 illus-

(Continued on page 144)

SO YOU WANT CRYSTALS FASTER!



24

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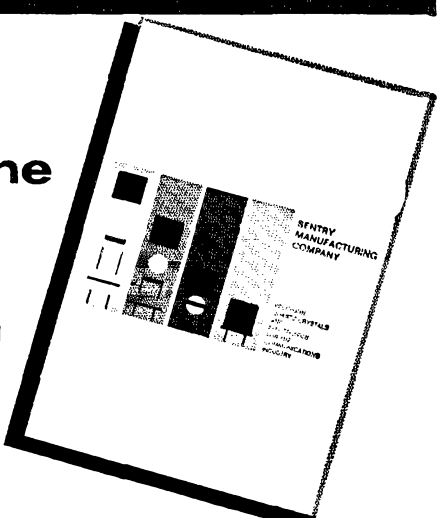

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(Continued from page 142)

trations. 6 by 8¾ inches. Cloth cover; price, $6.95. Paper cover; price $3.95.

This text is geared primarily for the experimenter who wants to learn about ICs by building projects. This book is a handy compilation of many typical IC applications. In a brief, general-type introduction, the authors discuss why ICs were developed and some of the possible uses of ICs without reverting to the discussion of any theory. Fifty rather simple projects are described, many using a single IC, and some using both ICs and bipolar transistors. Each project is described with a brief text, a schematic diagram, and a parts list. There are no pictorials or photographs of the actual projects. Some of the projects which might be of interest to amateurs include: a two IC receiver, a three IC 20-meter preamplifier, a 40-meter v.f.o. transmitter, three electronic keyers, several audio circuits, two crystal calibrators, two c.p.o.s, an IC tester, and three power supplies. Following the project's section of the text is an index of IC schematic diagrams showing just what's inside the 32 integrated circuits used in the projects that are described. QST

How I Learned To Love A Contest

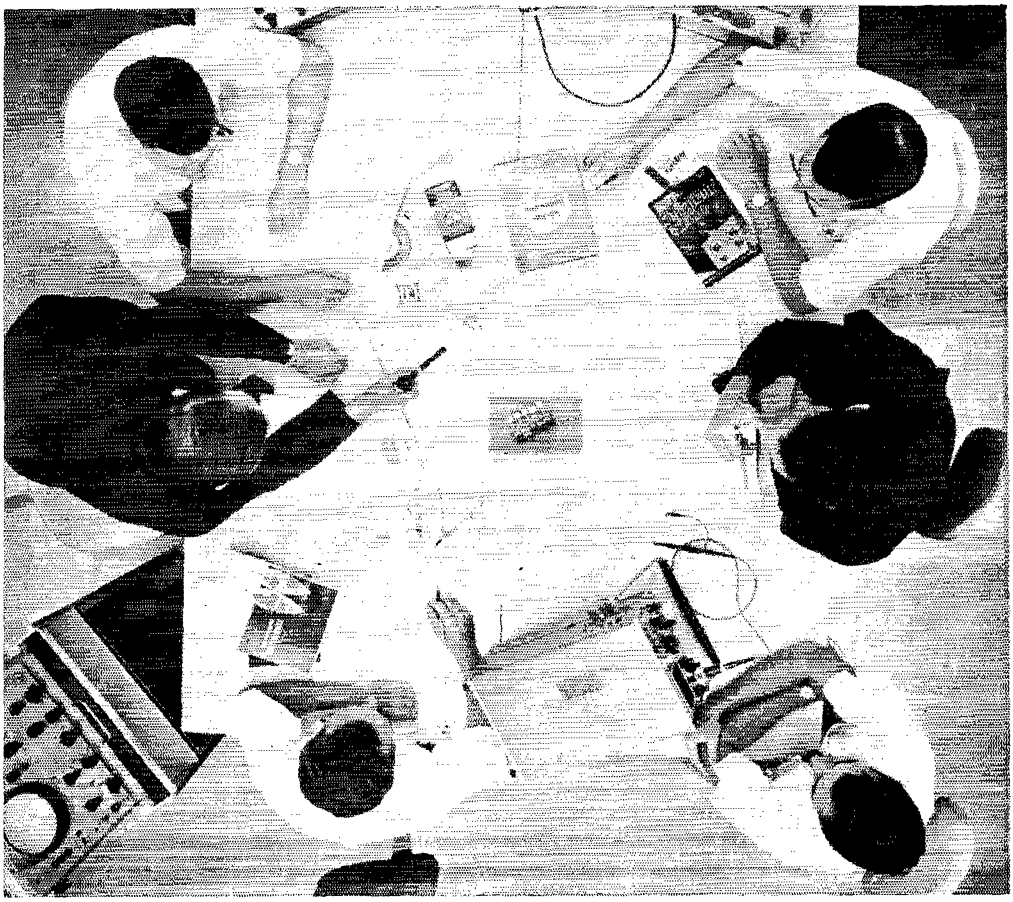
(Continued from page 71)

PVRC has them too and they also have a guy named Computer. He goes over the PVRC potential for each contest we decide to go in for as a club. He weighs all the variables, determines who should do this and who should do that and then sets up a point quota of minimum contribution per man. You'd better make your minimum and then some, otherwise, what you'll get makes the old Chinese water drop treatment seem like fun. It's scientific and I'd never seen anything like it. Imagine a radio club that is 100% concerned with amateur matters and not with the treasury and how much extra dividend could be declared that year.

Well, to get on with my story. Computer and a guy named Helper were going over the list of potential output. When they came to me, I could see they were puzzled, no doubt about it. After a short, whispered conversation, Computer asked me if I'd ever been in a contest. "Well, not seriously," I responded, "I've been in a couple. I worked W4KFC once." I could see right away that this wasn't getting me anywhere because Helper came out with "So what's new? So has everybody else." Well, anyway, Computer looked me over in his best, very superior manner with just the suggestion of a sneer on his face and told Helper to put me down for 25,000 points. Now, it wasn't the 25K (and me still operating with the Ranger and the 80-meter dipole), it was the way he had of saying it to show me where I stood. I'd make that 25K and then some or kill myself. I did it, too, and darned near did kill myself in the trying but in the process, I had found it — the magic ingredient that had been missing. Competition. Yes, that was it and what fun it was, pure, unadulterated pleasure. I've enjoyed contests ever since.

I live in the Virginia Section of the Roanoke ARRL Division. So does W4KFC and W4GF and

HAM CLUB?



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W4HM and K4MXF and W4JQ and W4NW and a lot more highly skilled contest types with antenna farms and youth. So what do I do to add zest to these contests? I have my own little private competitions with other club members who are about my speed. They don't know it, but it adds zing. Then, too, there is the desire to stand well up in the club competition and the section.

Yes, I have discovered that contests are FUN. Sometimes, as I look back over my 55 or so years in the game, I think of all the fun I've missed. The first 40 years are down the drain but I figure that, in addition to the 13 years I've put in so far, I ought to have 30 years or so left, figuring conservatively, of course.

Contests are fun. In my opinion, they separate the men from the boys. I hope the status remains "status quo." If it does't, so help me, I'll spearhead an organization called "Contests, Unlimited" and that's all we'll do. You don't think it would fly? Well, don't bet that it wouldn't. Have fun.

See you in the Sweepstakes. 73. QST

Happenings of The Month

(Continued from page 69)

For Vice Director:

Thomas G. Banks, W5HJ, and John H. Sampson, jr., W7OCX, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

SOUTHWESTERN DIVISION

For Director:

John R. Griggs, W6KW, and Ray E. Meyers, W6MLZ, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Thomas J. Cunningham, W6PIF, was found lawfully nominated and eligible; but the Committee was in receipt of a letter from Mr. Cunningham withdrawing his name as a candidate. Arnold Dahlman, W6UEI, and Gary A. Stilwell, W6NJU, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

WEST GULF DIVISION

For Director:

Lester L. Harbin, W5BNG, and George F. Munsch, W5VPQ, were found lawfully nominated; but the Committee was in receipt of letters from both nominees; each withdrawing his name as a candidate. Roy L. Albright, W5EYB, and Ray K. Bryan, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Favian M. Adair, W5FKE, Lester L. Harbin, W5BNG, and Eric B. Hjerpe, W5FCD, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

During the course of the above actions, Vice President P. Lanier Anderson, W4MWH, joined the meeting.

On motion of Mr. Dannals, unanimously VOTED that Noel B. Eaton, Gilbert L. Crossley and David

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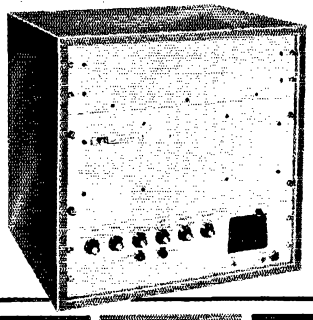

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H. Houghton, with F. E. Handy and George Hart as alternates, are appointed a Committee of Tellers to count the ballots in the current elections.

The Committee then examined the FCC proposal in Docket 18266, concerning expanded eligibility for the Novice Class license. After discussion, on motion of Mr. Dannals, unanimously VOTED to file comments in support of the proposal to make eligible for the Novice examination anyone who has not held an amateur license for at least 12 months; but to request the addition of present Technician Class licensees to the list of those eligible.

The matter of formation of Advisory Committees was discussed at length, after reports from the special working group of Messrs. Clark, Crossley and Dannals. On motion of Mr. Smith, unanimously VOTED to approve the petition of Director Griggs for the formation of an Advisory Committee on VHF Repeaters. On motion of Mr. Groves, unanimously VOTED to approve the petition of Mr. Dannals for the formation of an Advisory Committee on Contests.

During the course of its meeting the Committee discussed, without formal action, aircraft emergency communication, "homebrew" equipment, "phone patches," BPL, and the 1969 Board meeting location.

There being no further business, the Committee adjourned, at 6:20 P.M.

JOHN HUNTOON *Secretary*

CQ Contest, de Padre Tim

(Continued from page 77)

The reassignment had brought him to Santa Marguerita. A ZP ticket and a modern s.s.b. rig were soon acquired with the help of a local amateur. Contests and serious DXing had been out of the question, though, because of the little spare time he had.

Tim turned back to Eduardo. The boy hadn't understood that he didn't want to go, but only stared intently at Tim.

"Please, Padre, we go now?" he pleaded.

Picking up his medical kit and case of holy oils used in the last rites of the Church, Tim threw the main switch on the rig.

"OK, pal," he said. "Meet you at the Jeep as soon as I get the Eucharist from the chapel."

Bumping down the road toward San Phillipe, Tim smiled at his reluctance to give up the contest. Then he glanced up into the starry night and muttered half-aloud, "CQ, CQ, CQ Heaven. This is Father Tim. Please, God, let me work the next contest." QST

The Ruptured Rhombic

(Continued from page 78)

It is dead off the sides. Two Sundays ago on ten, I had a long and pleasant rag chew with Jack, ZL3KA, the only ZL I was hearing. Conversely, I was the only eight he was hearing — barefoot again — and this has occurred several times which verifies the 1936 article in *QST*. You hear them sooner and longer. On twenty, the rhombic competes with the twenty-meter medium-spaced beam, but you cannot rotate the rhombic — yet

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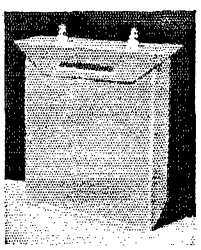

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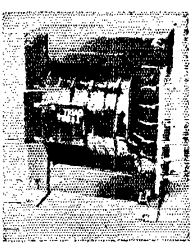

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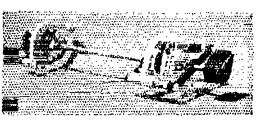

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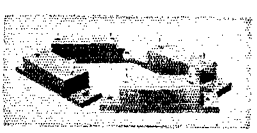

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anyway, although I recall reading an article where some guy rotated the hill along with it. On forty, the directional effects of the antenna begin to show and on the low end of this and the eighty-meter band, the exciter works well into Europe.

In conclusion, if you desire to work only short-haul contacts this is not the antenna for you. For an all-band array with fantastic gain and directivity in a predetermined bidirectional area, you can't beat it — if you've got five acres, four poles, friends, and are not above a little larceny. I have decided against terminating this antenna which would require very long feed lines and two double-pole-double-throw switches to change direction. It works well enough as it is, for my purposes. Oh yes, the title of the article? Well, during the transit work in the bitter cold, my glasses iced over and the pole on the Northwest corner ended up a little out of position. Thus, the Ruptured Rhombic! QST

The World Above 50 Mc.

(Continued from page 89)

RECORDS

Two-Way Work

50 Mc.: LU3EX — JA6FR
12,000 Miles — March 24, 1956
144 Mc.: W6NLZ-KH6UK
2540 Miles — July 8, 1957
220 Mc.: W6NLZ — KH6UK
2540 Miles — June 22, 1959
420 Mc.: W5LUU — WA1KFW
1150 Miles — April 13, 1965
1215 Mc.: W6DQJ/6 — K6AXN/6
400 Miles — June 14, 1959
2300 Mc.: W2BVU/1 — K1DRB/1
225 Miles — Aug. 30, 1968
3300 Mc.: W6IFE/6 — W6VIX/6
190 Miles — June 9, 1956
5650 Mc.: WA6KKK/6 — WB6JZY/6
179 Miles — October 15, 1966
10,000 Mc.: W7JIP/7 — W7LHL/7
265 Miles — July 31, 1960
21,000 Mc.: W2UKL/2 — WA2VWI/2
27 Miles — Oct. 24, 1964
Above 30,000 Mc.: W7CAF/7 — WA7EDI/7
3,750 Feet — Sept. 1, 1968

storm cell over the adjoining borders of Arkansas, Texas and Oklahoma. WØDRL reports some of W5RCI's bursts lasted 25 seconds, peaking 30 to 40 db. over the noise. Using meteor-scatter techniques, the contact was completed in 75 minutes.

W4FJ experienced lightning enhancement during an August 19th schedule with WA2EMB. One of the most violent electrical storms on record was in progress in the Washington, D.C. area. Tropo signals, normally S4, burst to well over S9 at both ends of the path.

W5RCI advises he wants schedules. He runs one kw. and a 128-element collinear 90 feet up. W5MCC in Louisiana readies a kw. and 40-element Yagi array for schedules. And in Michigan, WA8VHG offers 500 watts, s.s.b. and c.w.

No 1215-MHz. news was received during this reporting period. QST

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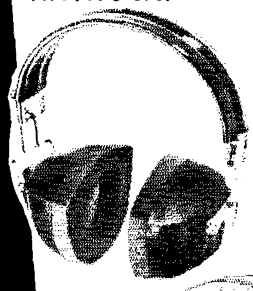

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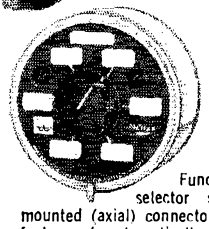

Waters Mod. 375 PROTAX ANTENNA SWITCH

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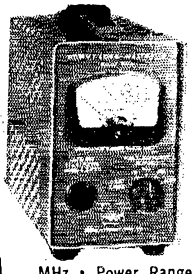

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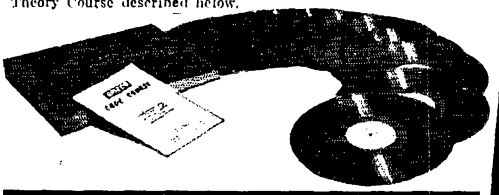

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No. 101-33 Senior Code Course—33⅓ rpm. Net Each 7.50
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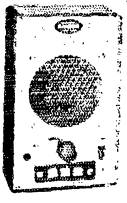

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FS-1 Secondary Frequency Standard

(Continued from page 38)

body has needed less than 5 pf.

If, on the other hand, you had to turn the trimmer counterclockwise, you had to remove capacitance, which means that the oscillator went lower with heat, and was not temperature-compensated enough. In this case, add, say, 5 pf. N750 and make the necessary adjustment in the fixed parallel value so the total again is the same as originally. So far, nobody has needed over 15 pf. N750, and only one person needed that much.

In Conclusion

The total cost of all components, including the chassis and printed circuit board but less power supply, is $83 when purchased separately (see footnote 5). Of the principal components, the Motorola ICs run $3.00 each and the Texas Instruments SN7490N decade dividers are $11.10 each. Thus the total cost of all the logic is around $45. The HA-1 crystal is $9.00.

Like many other good-quality items, once you have determined that the advantages outweigh the disadvantages (such as cost) you will soon wonder how you could have done without something of this nature for so long. You can set up schedules you can meet with ease. You can work closer to the edge of the band than any but the foolhardy, and you can rapidly spot net frequencies on any band. It is ideal for frequency-measuring work, contests, and similar activities.

The main thing that will happen, probably, is that you will become aware of just how much receivers and transmitters really do drift with use or temperature changes. You can tell whether it is your own equipment doing it or that of the other station. You may find that the receiver you always thought had superb stability isn't nearly as stable as you thought, even when allowed to run 24 hours a day.

The idea for this circuit was originally advanced by Vic Poor, K3NIO, when both of us gave up trying to get decent stability from a 100-kHz. crystal. Jon Schmidt, WA3DZK (ex-W8BZB), supplied many suggestions for the circuit. W4ZAG, W7AHW/4, W2QFR and K8JUG have all built prepublication units to assure uniform results. K8JUG has also been instrumental in setting up facilities to fabricate the printed-circuit board designed by the author, and also to procure the crystals and all other parts needed, for those interested in obtaining all parts at one time. QST

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- **CUSH-CRAFT — 2 Meter Ringo — $12.50.**
- **CUSH-CRAFT-CR-1 Ringo — $18.95.**
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A Tranceiving Converter for "160"

(*Continued from page 14*)

drive at J_1. Switch S_1 to read r.f. voltage, then tune C_2, C_4, and C_5 for maximum meter reading. Next, L_1 can be peaked for maximum oscillator output, while still observing the meter. After the foregoing adjustments are made monitor the plate current and tune for a dip the p.a. plate current by adjusting C_4. C_5 is the loading control, and it should be adjusted so that the dip in plate current is rather broad to assure tight coupling to the antenna — necessary if a good-quality signal is to be had. When the p.a. is properly adjusted the plate current should be approximately 100 ma.

If the 6146B stage is stable there will be no changes in plate current, other than the normal dip, as C_4 is tuned through its range. If additional peaks or dips occur, adjust the spacing between the neutralizing wire and the tube's anode until no instability is noted. With the drive disconnected from J_1, tune C_4 through its range and observe the plate current. Only the resting plate current should be registered if the amplifier is stable. By coupling a sensitive wavemeter to L_3 during the latter test,[1] self-oscillation will be apparent as r.f. output when C_4 is tuned. Fine adjustments to C_3 can then be made until no spurious output is noted.

When operating c.w., insert sufficient carrier to bring the p.a. plate current up to 100 ma. at dip. The key can be plugged into the exciter's key jack, or into J_4. Since K_1 is not designed for high-speed keying, it might be best to use J_4 as the keying terminal.

Final Comments

It should go without saying that the true measure of any ham station's performance can be taken from its antenna system. This is as true for 160-meter operation as it is for any other band. A random-length wire will usually give random results; a good antenna will give good results when used with good equipment. A quarter-wavelength vertical antenna, worked against a good ground system (even if the vertical element is physically short and uses lumped inductance to achieve resonance) will give good results. If space permits, a half-wave dipole, as high in the air as possible, will do an excellent job. Good results can sometimes be obtained by using an end-fed horizontal quarter-wavelength wire, as high in the air as possible. The latter should be worked against a good earth ground, and the more of the wire that is vertically oriented (current end) the better. Most end-fed quarter-wavelength wires for 1.8 MHz. are shaped like an inverted L, hence the previous statement.

This transceiving converter has sufficient power output for making plenty of DX contacts. If more power is desired, it can be used to excite a linear amplifier. (Thanks are given to Gus Wilson, W1NPG, ARRL lab technician, for his work in building and testing this equipment.) QST

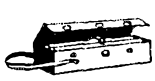
[1] "Are You Putting Out On The Correct Band?" *QST*, March 1967, p. 25.

No, we're not lazy! It's just that "Popular Electronics" (Dec. 1967) tells the DX-150 story so well.

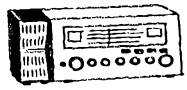
Reprinted Without Editing

"What may be the first really noteworthy advancement in communications receivers is wrapped up in the new Radio Shack imported DX-150. Featuring continuous coverage from the top of the AM broadcast band (535 kHz) to the bottom of the 10-meter band (30 MHz), the DX-150 is a single-conversion superhet with a tuned r.f. stage, two i.f. stages, full-wave product detector for SSB/CW reception — and it's 100% solid state. Selling at $119.95, the DX-150 has the flexibility of a communications receiver that a ham or SWL is used to buying for $175-plus. To rattle off a few more "features": there is a front panel antenna trimmer, fast or slow a.v.c. attack, a cleverly concealed built-in monitor speaker, plenty of calibrated bandspread, and noise limiting in both the i.f. and audio stages. Because of the solid state circuitry, the usual warm-up drift expected with a tube-type receiver is virtually absent here. And, although the DX-150 is primarily a base station receiver with a 117-volt a.c. power connection, it can be operated from an outboard d.c. power supply consisting of only 8 D-cells. Radio Shack claims that the receiver will operate for 100 hours — continuously — using only the d.c. supply. Ideal for Field Day and emergency work! The proof of the pudding so far as any communications receiver is concerned is how well it works "on the air" At POPULAR ELECTRONICS, the DX-150 was hooked up to a 125-foot long-wire antenna and tuned across the AM broadcast band. Needless to say, the S-meter was pinned on just about every single channel, and the audio quality with Radio Shack's voice-selective speaker (extra, $7.95) was crystal-clear. Tuning the band between 1.55 and 4.5 MHz, your reviewer got a chance to appreciate the comfortable handling on SSB reception. Going a little higher (4.5-13.0 MHz), the 25- and 31-meter bands were "alive" and signals appeared to leap out of the air — possibly due to the very quiet background of the DX-150. While quietness is usually regarded as a lack of sensitivity, that wasn't the case with the DX-150. On the top band (13-30 MHz), the sensitivity still seemed high; and on the CB frequencies, the DX-150 could hold its own against a dual-conversion receiver built just for CB work. **Summary:** Radio Shack has the Model DX-150 in most of its 160 retail outlets. Take a look at it, and get the "feel" of this unusual receiver."

CUSTOM ACCESSORIES



12 VDC Power Set



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Direct Conversion — A Neglected Technique

(*Continued from page 17*)

stations were logged with this receiver in the 1968 ARRL DX Test. The cross-modulation performance is at least equivalent to that of a medium-priced superhet and certainly much better than that of a regenerative receiver.

Additional Thoughts

The receiver is easily adapted to other bands by changing the input tuned circuit and the local-oscillator frequency. Oscillator coil data for 7-MHz. operation is included in Fig. 1. The more experienced experimenter may build the receiver for other bands by using the oscillator from the HBR-TR [5], with changes in the inductance values. Alternatively, it would be possible to make a stable master oscillator on 3.5 MHz. and construct a multiplier chain to derive local-oscillator injection for the higher bands. The product detector performs adequately with a local-oscillator injection level of 0.6 volt peak to peak. Measurements have shown the receiver's usable sensitivity to be constant at less than a microvolt over the range of 3.5 to 50 MHz., the limit of the test equipment used for the measurements. The manufacturer's data for the hot-carrier diodes suggests that the principles are easily adaptable to the 144-MHz. band, and perhaps even higher in frequency.

One disadvantage of the direct conversion approach is the ever-present audio image. While phasing techniques could be applied, the complexity of such a receiver would make a superhet more practical.

Since the local oscillator of a direct conversion receiver operates at essentially the same frequency as the received signal, the addition of an r.f. power amplifier would yield a very simple transceiver. Careful buffering of the v.f.o. is of course required. A unit in frequent use at W7WKR is such a transceiver. The rig operates on the 3.5-MHz. c.w. band, and is completely contained in a 3 × 4 × 5-inch box. With an output power of a tenth of a watt, hundreds of contacts have been made.

Clearly, the addition of switching at the input and output of the product detector would allow it to function as a balanced modulator for the generation of a double-sideband, suppressed-carrier signal. This could be the basis for a very simple phone transceiver for modern "hill topping."

While certainly not providing the ultimate in performance, the unit described represents perhaps the simplest approach to the construction of a truly usable receiver.

The authors gratefully acknowledge the ideas and comments of W7ZHA and W7DRA. Special thanks go to Chuck Wilcox, K6DMW, who contributed to many of the earlier experiments. QST

[5]Daughters, Hayward, and Alexander, "Solid State Receiver Design using the MOS Transistor, Part I," *QST*, April, 1967.

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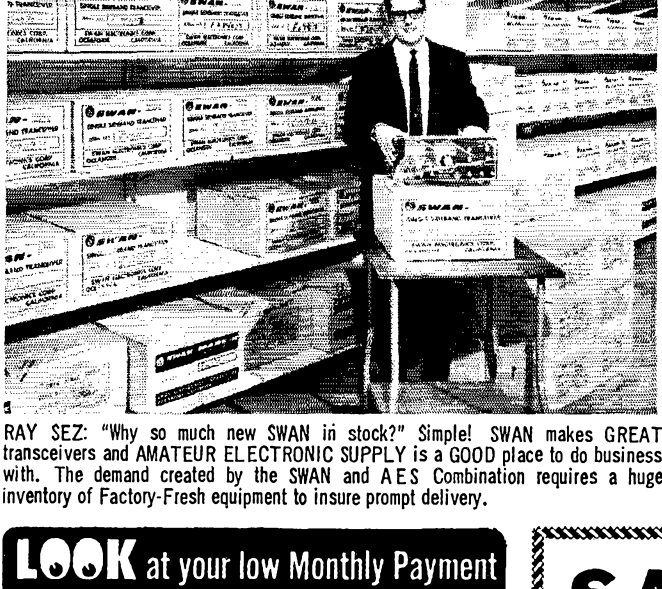

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410C Full-Coverage VFO.....		115.00
210 6 Meter VFO.....		120.00
VX-II Plug-in VOX.....		35.00
22B Dual VFO Adaptor.....		32.00
100kc Calibrator kit for 350C.....		19.50
500kc Calibrator kit for 250		19.50
RC-2 Mobile Remote Control kit		40.00
45 Swantenna – manual.....		65.00
55 Swantenna – remote control		95.00
Custom Contour Bumper Mount.....		24.95
Kwik-on Antenna Connector		3.25
14C 12v DC Module/cable		65.00
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117X Basic 117v AC supply ONLY.....		65.00
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AMATEUR ELECTRONIC SUPPLY

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Phone (414) 442-4200

STORE HOURS: Mon & Fri - 9 am to 9 pm; Tues, Wed & Thurs - 9 am to 5:30 pm; Sat - 9 am to 3 pm

SAVE $50

Purchase any new Swan transceiver or linear at the regular price with no trade-in and you may take a $50.00 Credit toward the purchase of any other merchandise.

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I am interested in the following new equipment:

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Ship me the following New Equipment.

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I enclose $_____, I will pay balance (if any)

☐ COD ☐ 1 year ☐ 2 years ☐ 3 years

Name _____

Address _____

City _____

State _____ Zip _____

☐ SEND 1968 AMATEUR CATALOG

Silent Keys

It is with deep regret that we record the passing of these amateurs:

WA1BGR, Fernand Gingras, Manchester, N. H.
W1CBY, Leslie Powell, Naples, Maine
W1QD, Arthur Stansfield, Needham, Mass.
W1TY, Donald E. Moss, Lynn, Mass.
K1WZZ, Charles Rohr, Niantic, Conn.
W2DYV, Alfred McClelland, Audubon, N. J.
K2JL, Irving Frankel, Rochester, N. Y.
K2VJW, Harry Weintraub, Jersey City, N. J.
W3OBC, Robert Hankey, Baltimore, Md.
W4APH, Thomas Uffelman, Nashville, Tenn.
ex-W4BYR, Frank Fassett, Lake Placid, Fla.
WA4HIQ, Charles Beattie, Somerset, Ken.
WA4HUR, William Pollard, Nashville, Tenn.
WA4JLY, Gary Dark, Pensacola, Fla.
W4MLA, George McCoy, Savannah, Ga.
K4RNR, James Campbell, Ormond Beach, Fla.
W4YR, Robert Flowers Sr., Atlanta, Ga.
W5AOH, Victor Pitts, Raton, New Mexico
WA5BEF, James J. Kennedy, Galveston, Texas
K5EQF, Othello Miller, Canadian, Texas
W5JAO, Arthur Heaney, Garland, Texas
K5LNW, Norman Akers, New Orleans, La.
WN5UGB, Herbert J. Kreger, Garland, Texas
W5QX, Carl G. Brinegar, San Angelo, Texas
W5SH, Edwin Shaw, Fort Worth, Texas
K6CKM, Edwin Conradi, E. Palmdale, Calif.
K6DYE, F. D. Leach, Long Beach, Calif.
KH6GBW/W6DTN, Robert Thornton, Honolulu, Hawaii
K6JTT, Edward Thomas, Anaheim, Calif.
WB6SEW, Clifford Phipps, Seaside, Calif.
W6YHP, Barton Warren, Los Angeles, Calif.
W6VMT, Rodney Clarke, Northridge, Calif.
K7DLE, Eugene Bagley, Cokeville, Wyoming
W7FBK, Raymond Smith, Tacoma, Washington
ex-W8DK, Art Grolz, Fresno, Calif.
W8FEZ, Raymond Yingling, Lorain, Ohio
K8JDO, Robert Dickun, Poland, Ohio
W8LCC, George Reazer Jr., Gates Mills, Ohio
WA8RSL, Carl Waldrep, Bloomfield Hills, Mich.
W8UC, Elmer Warn, Dayton, Ohio
W8ZND, Steve Laszlo, Detroit, Mich.
K9MNV, Delmar Kramer, Berwyn, Ill.
W9PEB, Donald Callahan, Park Ridge, Ill.
WØCOU, J. A. MacLean, Cozad, Nebraska
KØEGZ, Donald Bishop, Blue Rapids, Kansas
WØHQG, John McPhee, Telluride, Colo.
VE3ANS, Arthur Edwards, Chatham, Ontario, Canada
VE3CYJ, Alex Allen, Hamilton, Ontario, Canada
VE3SG, F. H. B. Saxon, Bolton, Ontario, Canada
VE7BWS, E. M. Chisholm, Saanich, Victoria, Canada

NATCH!

I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my $6.50 (in the U. S. and Canada, $7.00 elsewhere). Sign me up for a year's membership and twelve big issues of *QST!*

My name .....Call.....

Street .....

City .....State.....Zip.....

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 11-68

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 noncommercial 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 zipcode, which is essential you furnish. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**

(8) **No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.**

(9) Due to the tightness of production schedules, cancellation of a *Ham-Ad already accepted* cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

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, W2IE, 1417 Stonebrook Ave., Mamaroneck, N.Y. 10543.

A.W.A. Historical Radio Meet for old time amateur and commercial operators, historians and collector. Smithsonian, Washington, D.C. Oct. 5th. Write W2OY for details.

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.

RTTY Channel filters, octal mounted, 2125/2975, $5.95 pair. Special filters for TT/L-2. SASE for information. 88 Mh. toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, P.O. Box 845, Apple Valley, California 92307.

DAH-DITTER Keyer. Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in AC pwr. supply, reed relay output, with 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.

WELCOME To Maritime Mobile service net. 14313 Khz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry, RDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

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.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-Q567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill., 60606.

YOUR Call engraved White Plastic with Black letters or reverse. Choice lapel bar or tie-clasp, $1.45. Also 1½" x 6" wall signs, $2.95. E. W. Gorby, W2DF, Box 213, Farmingdale, N.Y. 11735.

MANUALS for surplus electronics. List 15¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HAM'S Spanish-English manual $3.00 Ppd., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

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 07032.

1916 QSTS needed for personal collection. Price secondary, Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

QSLS?? *Made-to-order!* ! Largest *variety. State-maps?* Rainbow mars? Cartoons? Religious? Samples 35¢; Deluxe, 50¢ (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLS—SMS. Samples 25¢. Malgo Press, Box 375, M. O., Toledo, Ohio 43601.

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.

100 QSLs, $1.25 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 558031.

QSLS. Neat, professional. 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

SUPERIOR QSLS. Glossy stock, best service, new owners. Samples 20¢. Ham Specialties Co., 402 E. Washington, Bloomington, Ill. 61701.

QUALITY QSLS: Samples 25¢ (refundable). R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSL, SWL, cards that are different. Quality Card stock, Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

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.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLS, finest YLRL's. OMs samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLS, XYL-OMS (Sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, sedate, fabulous, comic, DX-attractive, prototypal snazzy, unparagoned cards (Wow!). John Patterson carries on in the spirit of the late Warren Rogers, KØAAB, adding his own. Patterson Printing, 961 Arcade St., St. Paul, Minn. 55108

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLS. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Oregon 97402.

QSLS, SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLS, samples, 10¢. Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, Massachusetts 02151.

QSLS 300 for $4.35, samples 10¢. W9SKR, George Vesely, Rte #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08848.

QSLS-100 3-color glossy $3.50; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

SHARP QSLs, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

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. Tepabco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible K1FF QSLS, Box 33, Melrose Highlands, Mass. 02177.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, WA4HJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

QSLS, WA6QAY Press, 15008 Orchid Ave., Poway, Calif. 92064.

RAISED Lettering QSLs. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSL cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

BADGES. Engraved laminated plastic 1" x 3". Call and your first name, also for "XYL" and "Jr. Op" $1.25 each, prepaid. Club badges designed. K6PBE, Box 1307, Alhambra, Calif. 91802.

NAMEPLATES. Call Letters, wall pressure-sensitive, $2.00; desk type, $2.50. Kronenberg, 1492 High Ridge Road, Stamford, Conn. 06903.

ENVELOPES! Amateurized wid ur call, adr! $12.00 per 1000. K3ZWA Press, R. 1, Elizabethtown, Penna. 17022.

MANY Extras!! Free samples!! K.L.L. Press, Box 258, Martinsville, New Jersey 08836.

RUBBER Stamps, 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

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.

QSLS. When you're number 28 you try real hard, so try us. Samples 10¢. Alkanprint, Box 5494, Minneapolis, Minn. 55408.

LOW-PRICED QSLS! ! Free samples! ! K.L.L. Press, Box 258, Martinsville, N.J. 08836.

QSLS by Jansen. K2HVN, custom made, rainbows, pictures, maps, large variety backgrounds. Special offer. 300 glossy, $5.00. Samples 25¢. 860 Atlantic St., Lindenhurst, N.Y. 11757.

3 LINE engraved badges, any color, $1.25. Special rates to clubs. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

NAMEPLATES Call Letters. Stick-on. $2.00. Inquire of others. Check or m.o. Dave Forrest, 903 Prospect Ave., Spring Lake Heights, N.J. 07762.

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.

EXECUTIVE Stationery. Impressive, personalized "Ham Letterhead", Inexpensive. K3GWD Press, RR 2, Wampum, Penna. 16157.

NAME Pin—Eye-catching! Custom engraved with your call and name. $1.25 prepaid. K6PBE, P.O. Box 1307, Alhambra, Calif. 91802.

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).

PRIOR to 1930. Amateur equipment wanted. Please call or write Miss Chris Blake, VE3ART, 48 Megan Ave., W. Hill, Ont., Canada.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

JOYSTICK Variable frequency antenna systems, solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

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) WAlker 5-7003

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything, URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Editions, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $1.50 postpaid, Elliott Buchanan & Assoc., Inc. Buck, W6PVC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WE'RE Trying to complete our collection of 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.

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 07032.

WANTED: Model #28 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN. Box 34. Dixon, Calif.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

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.

ESTATE Liquidation. SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

3000 V @ 3 mff brand new GE Pyrano oil capacitors, $3.00 each. Can mail. 3-lbs. each shipping weight. FOB P. Wandelt, RD #1. Unadilla, New York 113849.

TELETYPE Gears, shifts, keytops, typebars, motors, forks, typeboxes, typewheels, punchlocks, nonoverliners, CR-LFs TRs, TDs, KSRs, ASRs, FSCs, toroids, fresh paper, testsets, SRT subchasses. Buy, too! Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

TOOOBES—Tranzcestors: New, unused, 6146B, $4.00; 6CW4, $1.60; 811-A, $4.25; 417-A, $4.50; 6146-A, $2.95. Free catalog. Vanbar Distributors, P.O. Box 91z, Paramus, N.J. 0765.

1000 PIV 1.5 amp. epoxy diodes, including by-pass capacitors and resistor. 10 for $3.75 ppd U.S.A. Fully guaranteed. East Coast Electronics, 123 St. Bonifce Road, Cheektowago, N.Y. 14225

MORE DX with a new QSO Phrase Book—Spanish, German, French, Russian, $3.00. M. Holubov, VE2BAG, 22 Vaudreuil, Baie Comeau, P.Q., Canada.

FREE Copy to hams (limited supply) National zipcode directory flyer. Send for your copy. E. McIvor, Box 8151, Rochester, N.Y. 14617.

OFFER $10 for May 1913 Elec. Experimenter, $3, Oct. 1914; $2 May 1919; $5 1919 issues Radio Amtr. News; $10 any 1908 Modern Electrics; $10 gov't. amtr. Callbooks 1922-26. Less for later dates, or poor condition. For historical library, none sold. Wayne Nelson, W4AA, Concord, North Carolina 28025.

YAESU FT-DX-400 transceiver for sale. W8AO, 2942 Riverview Blvd., Silver Lakes Village, Ohio 44224.

WANTED Lampkin mod. 105B frequency meter and modulation meter model 205-A, XE2Q, J. R. Agraz, P.O. Box 554, Hermosillo, Sonora, Mexico. Tel: 3-54-46.

SELL Or trade: QST, CQ, Electrical Experimenter, Radio, Modern Electronics Wireless Age and Callbooks, any quantity. Wanted; Old radio gear, books and magazines, Erv Rasmussen, 164 Lowell, Redwood City, Cal. 94062.

FOR Sale: Thunderbolt. Complete with spare tubes. Will ship, $225.00. K6HLO, 511 Oak St., Roseville, Calif. 95678.

WANTED: Comanche tuning scale. WA6QAY.

10000 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 USA, no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

PRE WORLD WAR I licenses who are entitled to an Amateur "Extra" license but unable to prove it, will be glad to know the Old Old Timers Club has all the early Callbooks plus lots of other information to help you prove your case. No cost to members. Write to W5VA Secretary, Old Old Timers Club, P.O. Box 840, Corpus Christi, Texas 78403.

BRAND New factory-sealed cartons. Hallicrafters SR-160, $250.00; P-150-AC, $80.00. P-150-DC, $90.00. CDR antenna rotors, TR-44, $50.00. All above F.o.b., H D H Sales Co., 170 Lockwood Avenue, Stamford, Conn. 0902.

FOR Sale: Like new condx, SB-200, $195.00. You pay shipping. Robert Dukes, 834 Butler, Bolivar, Tennessee 38008.

COUNTY Hunters maps, 23" x 35", listing the 48 states and all counties, $1.50 postpaid. Cameradio Company, 2801 Liberty Ave., Pittsburgh, Penna. 15222.

SELL: HT-32, $220.00; SX-101A, $160.00. Best offer. Knight SWR meter, $10.00. 18 AVQ, $35.00. Alliance rotor, $20.00. Michael Prust, 514 North Washington, St. Peter, Minnesota 56082.

HALLICRAFTERS SR-150—mobile rack—A.C. and D.C. pwr. supplies, $400.00 plus shipping. In A-1 condx. R. Drobish, 1316 S. Fernandez, Arlington Hts., Ill. 60005.

COLLINS 75S-3B for sale. $400.00. New condition. Sam Davis, WA5DRS. 5766 St. Katherine Ave. Baton Rouge, La. 70805.

FOR Sale: HT-37, $225.00; SX-101 Mark III, $140.00, both are in exclnt condx. W8KYH, G. Reazer, 8354 Luster Dr., West Chester, Ohio 45069. Tel: 513-777-3756.

SELL: 75A4 Ser. #2036, 2 filters, in mint condx. $400. Seneca, VHF-1, trans. $90; 12V G-E TPC, FE43JA6, 10w. w/acc., $175.00; Geiger counter, precision Model 1074, $20.00; new 813 tubes, $10.00; Hallicrafters SR-150 with a.c. and d.c. supplies, $350.00. RA-42, adjustable power supply, 0-300 v.d.c. $15.00. M. H. Klapp, W2EQV, 25 Gladwish Rd., Delmar, N.Y.

MECHANICAL Filters from R-390A receiver, center frequency 455 Kc., bandwidths: 8 kc, 6 kc, 4 kc, 2 kc, $30 each. R. L. Cramer, 208 E. Lloyd St., Edensburg, Penna. 15931.

SALE: KWM2-A and 516F-2. P.s. Both two years old. Absolutely no scratches. Perfect mechanical and electrical condx. No modifications. Contact M. L. Williams, 1408 Quill Dr., Plano, Texas. 75074. Tel: 214-945-7309, K5UFL.

NOTICE To all amateurs! Novice to Extra Class! We will make you as good a deal, cash or trade, on your needs of new or reconditioned used gear. We also have demos at reduced prices. We have all leading lines of new amateur gear. Good reconditioned, used gear Fully guaranteed. Factory reconditioned KWM2 with 516F-2 A.C./P.S., like new, $800.00. 30L-1, $350.00; Galaxy V Mk II, $365.00; Johnson Invader 2000, $350.00. Write or call for new listings of used gear at bargain prices. Bob's Amateur Electronics, 927 N.W. 1st, Oklahoma City, Oklahoma 73106. Tel: 405-CE5-6387.

WANTED: ARRL Antenna Book, second edition; will pay any reasonable price or will swap edition 3, 5, 8, 9, or 10. Chappell, 22206 Del Valle St., Woodland Hills, California 91364.

NATIONAL NC-300, vy clean: $145.00; DX-40, VFO, HR-10, all exclnt condx: $110.00; HA-230 gen. coverage rx exclnt. $65.00. Wollensak 1980 perfect, like new, $210. Steve WA2BUF, 116 Hudson Ave., Haverstraw, N.Y. 10927.

WANTED: Electronic test equipment (military and commercial) made by companies such as Tektronix, Hewlett-Packard, General Radio, Measurements, Stoddart and others. Also technical manuals, airborne and ground communications equipment, tubes, accessories. Highest cash prices paid. Write for our offer. Tucker Electronics, P.O. Box 1050, Garland, Texas 75040.

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, R. McMahon) 1055 So. Oak Knoll, Pasadena, Calif. 91106.

HEATH SB-101. $3.70: HP-23, $49.95. Works perfectly. Swan 240, with matching a.c. supply, speaker built-in. $250.00. You pay shipping. W1ERX, Rowayton, Conn. 06853.

EICO 753 w/751 a/c p.s. In EB condx. $160.00. WA5RVD, 241 Stuart, Shreveport, La. 71105.

WRL's used gear has trial-terms-guarantee! HW-12, $89.95; Galaxy III, $189.95; Galaxy V, $289.95; Galaxy 300, $159.95; Galaxy V Mk 2, $329.95; SR-46, $94.50; HX-500, $289.95; HA-14, $94.95; NC-155, $119.95; SB-300, $249.95; RME6900 $149.95, hundreds more: Free "Blue Book" list. Write WRL, Box 919, Council Bluffs, Iowa 51501.

WANTED: IRE Proceedings, prior 1926. IRE Transactions, PGCT prior 1959; PGMTT prior 1960; BSTJ prior 1930. Trade or buy. LCP, Box 152, La Canada, Calif. 91011.

DRAKE 2-A, 2-AQ, $175.00; HA-1 to keyer with Vibro-Keyer, $65.00; Knight VFO, $15.00. Want: R-4A, SB-200. Geoff Howard, WA3ILB, 245 Lincoln Ave., Apt. 505, Bellevue, Penna. 15202.

BEAUTIFUL NCX-3, NCX-A, $235.00; SCR-522, 2-mtr., $35.00. AR-22R, 7-ele. 2 mtr. beam, $30.00. WA1GZH, 244 Morgan Lane, West Haven, Conn. 06516.

CLEGG Thor 6 a.c. supply, manuals, gud condx, $145.00. Money order. Ship your expense. WA2ZWB, Zig Porada, 40 So. Glenwood Drive, Bergenfield, N.J. 07621. Tel: 201-385-4194.

CHRISTIAN Ham Fellowship now organized for Christian fellowship and gospel tract efforts among Christian licensed amateurs. Christian Ham Callbook, $1.00 donation. For details and sample copy of ham gospel tract, write to Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

HY-GAIN Hy-Tower, all band vertical. In exclnt condx. 50 ft. high. Self-supporting, no radials necessary. Manual. $85.00. F. Bergmann, 3935 Sunset Ave., Seaford, New York 11783. Tel: 516-SU-5-3275.

SELL: Apache, SB-300, Vibroplex Original. Ameco code-oscillator, Heath VTVM Model 1 M-11. All manuals. Like new condx. $250. Will take 6 mtr. mobile rig as part payment. Thomas Dalton, K2EOP, Box 95, Hackettstown, N.J. 07840. Tel: 852-5264.

HAMMARLUND HQ-145C with calibrator. $110.00 collect. Clegg Apollo 700 watt six-meter linear, $175.00. McCormack, 5008 Carlyn Spring, Arlington, Virginia 22203.

FOR Sale: Collins KWM-2 with 516F2 a.c. power supply and speaker. Like new condition. $650.00 certified check or money order. W4IQB, John Lambright, 8 Talo Circle, Daytona Beach, Fla. 32018.

FOR Sale: 5 band SSB package. Heathkit HR-20 receiver, HX-20 transmitter, HP-23 a.c. power supply. Factory aligned, excellent condx: $250.00. FT-100 5-element Triband beam, $50.00. K1ETU, Charles King, 36 Linsley Avenue, Meriden, Conn. 06450.

NOVICES: HQ-110 with matching speaker; DX-60 transmitter w/relay. All in excellent condition. WN2DGD, Larry Greidinger, 89-15 Shore Parkway, Howard Beach, NYC, 11414. Tel: 848-5443.

EXPERTLY and artfully wired. Factory-checked and aligned. 10 hours old, in mint condition: SB-620, postpaid in Continental USA, $120.00. D. Burns, 4925 Rock Spring Road, Arlington, Va. 22207.

APARTMENT Dweller needs room. Spotless 2B, original owner, factory realigned 1968, calibrator, WWV, 10-meter xtals, factory-installed scope outlet, 2BQ-speaker. Area deal only: $175.00. Blosser, W8IDBK, 18975 Van Aken, Shaker Heights, Ohio 44122.

SIX Meter transceiver wanted. Also, DX-100B for sale or trade. K8GNZ, Box 683, Fairmont, West Virginia 26554.

CV-89, Book, cord; exlnt condx, $125.00; Dumont 208B, $45.00; BC-348 w/supply, $60.00; German HA-15 WW II TX/RX w/universal supply, mike, schematics. AM, CW, MCW. Hellschreiber, 3-6 MhZ. Full set of spare tubes, $99.00, or will trade. C. Fuhrman, WA3CTZ 4613 Haverford Place, Apt. 12, Wilmington, Del. 19808.

COLLINS 75A4, three filters, in mint condx: $395.00; 10 ft. tower section (top), $10.00; base plate, $8.00; TH-4 beam, $45.00; balun, $3.00; TR-44 rotor and cable, $35.00; tubes: 3B28 (2), $3.00 each. 811A (5), $2.50 each. JT-30 microphone (Astatic), $8.00. Headset, $2.00. A. Karger, 33 Elliott St., Beverly, Mass. 01915. Tel: (617)-922-8029.

PROBLEMS? Let the Communications Specialist handle it for you. Complete amateur servicing. Kits wired. J-J Electronics, Canterbury, Conn. 06331.

L.A. Amateur Radio Supply, 2302B Artesia Boulevard, Redondo Beach, California, is open! Discounts up to 15%. Special: Galaxy V Mk III, and AC-400. $420.00 f.o.b. "Caslon 601" 24H calendar clock, $39.00. F.o.b.

COLLINS: Sell complete station. KWM-2, 516F-2, 312B-5, 30L-1, 10D, 14AVQ, $1000.00. George L. Tull, Box 4544, Clearwater, Florida 33518.

SCOTT All-wave Superhet rcvr, 1933 vintage, all chrome plated, in gud condx. Manual. Best offer. WA2MZQ, 648-4511, Chenango Bridge, N.Y. 13745.

NCL-2000, perfect condx, no problems: $325.00. F.o.b. Also SBE-33 with 12-volt supply, $190.00. R. P. Ache, 707 Barclay Lane, Broomall, Penna. 19008. Phone 215-353-0226.

SELL: Vibroplex Semi-automatic bug, Blue Racer, used only one hour. Learning to use a keyer. Will deliver within 20 miles. Sry, no shipping. $18.00. Also have Hy-Gain vertical antenna 12 AVQ, not bad. $15.00. F. M. Rodio, K2TBZ, 243 Senator St., Brooklyn, N.Y. 11220.

SELL DX-60A xmtr in gud condx, with manual for $49.00. You pay shipping. WA3DVH, Dayton Jones, 224 W. Willow Grove Ave., Philadelphia, Penna 19118. Tel: (215)-CH2-1435.

HEATH HA-10 Warrior KW amp., in exclnt condx, $140.00. Pick up deal only in N.Y. area. Tel: 516-HU2-4488. WB2KJL.

SELL: Rotors, Ham-M, $90.00; TR-44, $50.00, both factory rebuilt in sealed cartons. E. Frekko, W3EGM, 555 Thayer Ave., Silver Spring, Md. 20910.

TRIBAND HW-12 for sale, OK on 80. Needs work on 40 and 20 transmit. $60.00 prepaid USA. WA6PGA, 805-736-3762 between 0200 and 0400 GMT.

JOHNSON Viking Invader 2000, 2Kw PEP SSB, 1 Kw, c.w, 800 w. AM, in exclnt condx, 2 spare 4-400As, shipped prepaid, $495.00 cash. W6ME, RT1, Box 666B, Arroyo Grande, Calif. 93420.

2 KW Linear, uses two 3-400Zs. Gregory Wetzel, RD 2, Coopersburg, Penna. 18036.

QUALITY Accessory sale: Electro-Voice 664 mike and stand, $35.00; Koss PRO-4A headphones, 20-20,000 hz, $55.00. You pay shipping. K8VYY. Tel: 419-782-0891.

SELL: Simpson VOM Model 260, $15.00; B&W dip meter model 600, $40.00; RCA Voltohmyst VTVM, $20.00, all in excellent condx. Thad Stevens, WA5ROY, 1991-A 41 Street, Los Alamos, New Mexico 87544.

WANT Good receiver, H.F. will pay $300. Send pix and specs. Will make offer. (Homebrew on approval). Sgt Jamerson AF 18975111, WA6GOW, Box 18, 432 RTS (861), APO San Francisco 96307.

FOR Sale: Johnson Viking Ranger transmitter, $60; Hammarlund HQ-170 rcvr, $150; Hallicrafters Model HA-1 T-O keyer, $20; Central Electronics RF Analyzer, $25.00. All equipment in exclnt working condx. L. Mumm, W9FYX, 7267 W. Cody Circle, Milwaukee, Wisconsin 53223.

WANTED: Mint 75S-3B, 32S-3B, 516-F2, KWN-2. Quote best price. Jim Shively, Box 3061, Midway, Washington 99031.

SWAN 350, $275.00; 117XC, A.C. supply w/spkr in cabinet, $75.00; 14-117, 12VDC supply, $85.00; Mark 1 linear, $105.00. WA3HMQ, 301 Blacksmith Road, Camphill, Penna. 17011.

SALE: Heath SB-110 6M xcvr, $195.00; SB-200 1K linear, $161.00; HG-10 VFO, $19.00; Viking II, $68.00; Viking 122 VFO, $17.00. King Preselector DB-68, $19.00. WA5PBX, 5011 F St., Little Rock, Ark. 72205.

WRITE, phone, or visit us for new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, 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. Henry Radio, Butler, Missouri 64730.

PERFECT HT-32, Drake 2B and 2BQ, $175.00 each. WAØOAT, 716-28th St., Bismarck, N.D. 58501.

FOR Sale: Valiant I, $100; HT-40, $50; HT-37, $190. Will ship. Kenneth Lucas, WA4WIN/9, 665 East 66th St., Indianapolis, Ind ana 46220. Tel: 317-2550-547.

32S-1 Mint without A.C., $3.95. Collins KWM-2, $695 without a.c. Trades considered. Want: Collins 312B4, SB-34. Reasonable. F. E. Coble, 251 Collier Ave., Nashville, Tenn. 37211.

COLLEGE sale: DeWald six-meter transceiver, $40.00; Knight T-50, V-44 VFO, Johnson modulator, $45.00, S-40B, $45.00. All nice, postpaid, U.S.A. John Cupp, 2747 Memorial Blvd., Connellsville, Penna. 15425.

HEATH SB-300 with AM, SSB, CW xtal filters, $200 or swap for T-bolt. Eico VTVM $10.00. Make offers on HP 400D and Ballantine 300 AC VTVMs. A. Bartlett, 6 Murray Rd., Essex Jct., Vt. 05452.

FOR Sale: Heath Six meter equipment; Seneca transmitter (factory aligned), $100; Shawnee transmitter, $135.00; GR-64 receiver, $20, and Lafayette HA-650 transceiver, $50. All in gud condx, with manuals. Send certified check. Will ship collect. WA2EQK, 3 Bayberry Dr., Plainview, N.Y. 11803.

FOR Sale: Bendix ATD transmitter Type CQW input 100W new. G.E. Rosenberger, RD #7, Box 212, Raleigh, N.C. 27609.

AMECO CN-50 six-meter Nuvistor converter, 7MC IF, and PS-1 power supply, both for $30.00.. Jack Elias, WA3EVG, 2416 So. 7th St., Philadelphia, Penna. 19148.

SELL: 75A4 #1056 2100 kc. filter, $330.00; Valiant I, $125.00; both for $435.00. Take Lampkin PPM and 205A on trade. No shipping, sry. Deliver in 150 mile radius. William Pettee, K9WYX, Box 1, Princeton, Illinois 61356.

COMPLETE Ham Station: Hallicrafters HT-40 xmtr, SX-140 rcvr, Heath VF-1 VFO, and cabling. Must sell due to college. Will sell all or part. WA8LQD, Chuck Cribley, 6034 Hall St., S. E., Grand Rapids, Michigan 49506.

SWAN 140 transceiver with 8236 final, $90.00; Drake 1A receiver, $95.00; Drake converter console with 6 & 2 meter converters, calibrator, and power supply, $120.00; Collins ARR-15 receiver, as is, $25.00; BC221T frequency meter, $60.00; Heath SB-600 speaker, $12.00; HQ-180 speaker, $12.00. Philip Schwebler, W9GCG, 4536 N 50 St., Milwaukee, Wisconsin 53218.

FOR Sale: Collins 353C-31 mechanical filter adapter (for 75A1, etc), $25.00; P & H "Spitfire" KW linear, new, $85; HW-22A, $100; Eldico SSB-100-F crystal-filter exciter, fabulous, $225.00; Eico 320 Signal Generator, $25; 75A-3 with 75A-4 vernier knob, $250; 75A-4 #3481, no modifications, immaculate, $395; HT-33A, $265; 75S-B, #17032 (new in May 1968), $550; 351D-2, $75. PM-2, $100; CC-2, $50; 75S3, #12054, $375; 32S2, #10026, 516F-2, $450.00; 32S-1 #10100 75S-1 #11472, 516F-2, 312B-4, $750, 312B-5, $265; G-50 (6 meters), $175; SBE-34, $250; Heath IP-32 regulated supply, $25. Simpson 303 VTVM, reconditioned, $50; P & H AFC-2 compressor, $25. 516F-2 transformer, $25. James Craig, 29 Sherburne Ave., Portsmouth, N.H. 03801.

TUBES. Have types BH, 41, 42, 56, 75, 76, 78, 80, 01A, E1R, 6A7. Best offer for any or all. WA6ZMR, Dave Fisher, 243 Cimmeron, Glendora, Calif. 91740.

NEED Some low frequency coils and type 6D6, 6C6, 76, 37 tubes for SW-3. All letters will be answered. K4BNI, Richard McIntyre, 243 Norfolk Drive, Warrenton, Virginia 22186.

FOR Sale: Heathkit Sixer HW-29A, Utica 650, code machine, 32 ft. tower, 7-element Mosley yagi antenna, Hallicrafters receiver 3-38E. W. G. Temple, K8RKY, 180 Nicholas Dr., Circleville, Ohio 43113.

SELL: SX146 Rcvr w/calib., $195.00; CE-20A with factory VFO 160-10, $115.00; 300 watt P.E.P. linear for 20A, $50; complete; all equipment in mint condx. Will consider offer on any or all. K3BDU, Dave Hofreiter, 98 Blue Ridge Dr., Levittown, Penna. 19055. Tel: 215-943-5465.

FOR Sale: Mint condx S/Line station gear: 32S-1, 516F-2, 30L-1, 75S-3, 312B-4, package deal: $1150 cash. Buying a boat. K6UCP, 11685 Mora Drive, Los Altos, California 94022. Phone 415-948-7682.

HEATH DX-60B transmitter, in exclnt condx, $60.00; HR-10B receiver with calibrator, in perfect shape, $50.00. WA9WIX, 336 Sutton Road, Barrington, Illinois 60010.

SX-101A Hallicrafters receiver. Has product detector, in mint condx. $150.00. Jack Cramer, WA2BSP, 240 Mt. Vernon Place, Newark, N.J. 07106. Tel: 201-399-2944.

WANTED: Secondhand TA-33 beam and Ham-M rotator. State price. Bruce Burhans, King George Road, Millington, N.J. 07946.

SWAN 500, 117-XC supply, speaker. In mint condition. First certified check for $400 takes it. Local deal only. No shipping, sry. WB2OQR, Joe Green, Jr., 25 Burnett Terr., West Orange, N.J. 07052. Tel: 201-731-5033.

STUDENT Must sell: HT-32, R4A, and 2-meter FM. FM gear includes Sensecon "A" rec. 30 watt xmttr, and 60 watt p/s. Also separate 4 freq. xmit and recv. All in Motorola comp. station cabinet. Will sell all for $625.00, or separate for best offer. Must sell and will ship. WA9PII/NØFOF, Dan Dickinson, Culver-Stockton College, Box 255, Canton, Mo. 63435.

COLLINS Mechanical filters 360 kc—80 kc. at 300 cycle, 114 kc., $10.00 each. Eico FM multiplex, $20.00; AR-3st tweeter, $18.00; walnut chess clock $18.00 (trade?); hot RC-455, $10.00; early 20's QSTs $2 to $5 each; early tubes, variometers, variables, etc. Make offer. SASE pls. B. M. Susman, 30 Wiltshire Lane, West Hartford, Conn. 06117.

WANTED: 32S3, Philadelphia and N.J. areas only. Julio, 835 Kendrick, Philadelphia, Penna. 19111.

HEATHKIT HW-22A transceiver, like new condx: $85.00 firm. Larry Friend, 5228 N. 70 Place, Scottsdale, Ariz. 85251.

WANTED: Hallicrafters HT-33B amplifier in excint condx. W7LEP, 2831 140th NE, Bellevue, Washington 98004.

WANTED: McElroy XTR-442, C tape keyer and tape perforator. John R. Hinegardner, WØBFB, Mitchellville, Iowa 50169.

SELL: HW-12A *with* homebrew AC supply, $95; Heath HP-13 mobile supply, $45.00. Both for $130.00. J. Vick, RD #1, Freehold, N.J. 07728.

NCX-3 with homebrew AC supply, built-in speaker mobile mount. Real mint, $180.00. Stanley Ciaburri, W1LOF, 72 Hillside Ave., West Haven, Conn. 06516.

DRAKE T4-X, AC-4, Turner mike, used eight months: $375. Dow-Key 5-position coax switch, $8.00; Lymmeter GMT clock, $10; Hy-Gain 14-AVQ vertical (you pick up), $15.00. WB2UFV, 45 Early St., Morristown, N.J. 07960.

600L Central Electronics linear, 600 watt SSB amplifier, serial #56447, $195; SASE GETS, Brochure, will not ship, sry. Very gud condx. Drake R4 receiver, ser. #0629, $285. R. F. Sanford, 42 Penn Lyle Rd., Princeton Jct., N.J. 08550. K2MQM.

WANTED: Junk or very cheap Q-meter, signal generator and decade capacitor. Please write specifications, conditions, and price. Local pick-up deal preferred. Takarada, 1423 Vassar Road, Rockford, Ill. 61103.

TRADE R-390A, in excellent condition, for HRO-500 in the same condx. Jack Schock, WA7IHU, 3150 E. Behan St., Tucson, Ariz. 85706.

FOR SALE: SBE-34 with mike, $300, or your best offer. Collins mechanical filters: F455-FA-21, $20.00 each; F455-Y21, $30 each. Dean Gearhart, 48 East Jefferson, Naperville, Illinois 60540.

COLLEGE Expenses force sale: Swan 500 matching PS. Nine months ago $615.00 new. Light home use. Spotless. Asking $490.00 or best. WA1FEO/Ø, Dave Siddall, Lindenwood College, St. Charles, Mo. 63301.

SELL: HQ-145 Receiver, $150.00; Apache TX1-Transmitter, $90.00. In gud condx. R. Taub, 300 East 208th St., Euclid, Ohio 44123.

COLLINS 75A3, excellent condition, with 3 kc. mechanical filter, $250.00. Warren Middleton, W4DYF, 1223 Fenwick Drive, Lynchburg, Virginia 24502. Tel: (703)-239-0444.

COLLINS 32S-3 transmitter and 516F-2 power supply. Like new condx. $600.00 F.o.b. Gary L. Grothen, WØOMH/WSOPI, 90 Florissant Park, Florissant, Missouri 63031.

BARGAINS: Hammarlund Superpro SP-400X, free 100 kc. crystal calibrator, $50.00; new UTC CVM3 125-watt modulation transformer, $16.00. W8HET, D. R. Gardner, 3800 N. River Road, Port Huron, Michigan 48060.

DISCOUNT Prices: All equipment listed is new. Factory-sealed cartons, full manufacturers' warranty. Our policy—New equipment at low prices. Swan SW-500C, $468.00; SW-350C, $378.00; Swan 14-117 AC/DC P/S, $115.00; Hy-Gain TH6-DXX (reg. $159.00), $135.00; TH3MK3 (Reg. $125), $112.00; CDR Ham-M rotator with indicator, $99.95; Tri-Ex W-51 self-supporting crank-up tower (reg. $362), $299.95 prepaid. Mosley TA-36 (reg. $153.00) TA-33 (Reg. $121.00), $109.00; Hammarlund HQ-180A (reg $480.00), $432.00. Many factories prohibit discount advertising. Write or call for discount price. Catalogue on brands not listed in this ad. Time payments available. Bryan Edwards Electronics, 1316-19th St., Lubbock, Texas 79403. Tel. (806)-762-8759.

SELL: 75A2A with slicer 4; CE20A and 5bd. VFO. Eldon Reeves, 2808 W. 108th St., Minneapolis, Minn. 55431.

SELL: Hall'crafters Skyrider DD-1 EDX condx. 1935. WA8-YST, D. K. Johnson, 1590 Walton Road, Rochester, Mich. 48063.

HALLICRAFTERS HT-32A, in A-1 condx: $200. W1SEG, 115 Wood Dr., Atkinson, N.H. 03811. Tel: 362-4923.

HQ-100, good, $110.00; DX-40 and V44, $50.00. N. Dowling, 733 Mohawk, Lynchburg, Va. 24502.

2 METERS not for me. New Heath HW-17 tcvr, yours for $125.00. P.P. Dan Redman, K8IKB, 221 Edinborough, Findlay, Ohio. Tel: 419-423-5890.

SELL: Apache TX-1 xmtr, clean, $90.00. Also Lafayette HA-225 recvr and spkr in excient condx, $90.00. You pay shipping. Eugene Gascho, Pigeon, Michigan 48755.

TOWER, Tri-Ex, 3-10 foot sections, used FD only. In mint condx. Sri, no shipping. $39.50. W6WPN, 1661 Sierra Alta Drive, Santa Ana, Calif. 92705. Tel: (714)-544-3233.

DX-60, $60.00; Knight R-60A, $70.00; HG-10-VFO, $25.00; w/manuals, SWR meter, $5.00; Monitor, $5.00. Vibroplex $15.00. All six for $170.00. Stan Fisher, WA9GYD, 1105 Chicago, Downers Grove, Ill. 60515.

FOR Sale: Clegg Thor-6, 6-meter transceiver, 60-watts, in excint condx, with 3-element beam and low-pass filter, $160.00. Sidney Purvis, WA4VBC, 1934 Roxie Ave., Fayetteville, North Carolina 28304.

SELL: Valiant I, factory-wired, $150.00; Polycomm 62B, $200.00. Both in excint condx. Richard Stannard, 18 Circle Drive, RD 1, Voorheesville, N.Y. 12186.

WANTED: Gonset #3269, 100 kc. calibrator, or diagram. For G-76. J. Gysan, W1VYB 53 Lothrop St., Beverly, Mass. 01915.

DX-40, $35.00; Ameco 6M converter, $15.00; Lafayette KT-310 receiver, $40.00; LN or excellent. WB2GRB, Earl Bridge, 14 Duryea Place, Lynbrook, N.Y. 11563.

SELL: 75A4 and KWS-1 extras $850.00; R4A and speaker, $295.00. Want: 32S-1, 516F2, 312B-4, F455Q5. T. E. Conley, K2HWP, 28 Bayberry Circle W., Liverpool, N.Y. 13088.

VIKING Valiant I f/w, excint Gonset G-63 rcvr, and both manuals. Must sell, so come steal them. Rick Philips, WB2-JLZ, 30 Hudson Ave., Mt. Vernon, New York 10553.

WANTED: Matching A.C. supply for G-76. W2EQG.

SELL: Hammarlund HQ-140X receiver, Globe Chief deluxe xmitter, Glove VFO, Heath Q-meter, Dow-Key relay, Johnson filter, SWR meter. All in gud condx. Only will sell all. $160.00. WB2YUG, Harry Schwartz, 86-08 231 St., Jamaica, N.Y. 11427.

75S3B S.N. 17737, 500 cy filter, 312B3, year old; Heath SB-100, HP-23, SB-600. All like new condx. As package, $915.00. K8IKB, 221 Edinborough, Findlay, Ohio. Tel: (419)-423-5890.

WANTED: NC-300 VHF converters. W6BCZ, 10691 Ranney, Garden Grove, Calif. 92640.

COLLINS 75A4, exc. coax, vernier knob, 2 filters, orig. carton. All modif., mint, hi sensit lo noise level. Best offer. W2ASI, 15 Kensington Oval, New Rochelle, N.Y. 10805.

FOR Sale: Henry Radio 4K, perfect condition. Never used, $950.00. The Parkview Electric Co., 1390 W. 85th St., Cleveland, Ohio 44102. Days only. Tel: (216)-281-5550.

SELL Heathkit HX-20 s.s.b. transmitter, matching HR-20 receiver, 12-volt power supply, a.c. power supply, manuals. $225.00 f.o.b. Hartford. W1IKE, 26 Ridge Road, Simsbury, Conn. 06070. Phone (203)-658-7307.

VHFers: Following either new, or factory perfect: Parks 432-3, 29 MhZ, i.f., $40.00; two 16-element 432 MHz, J-Beam collinears with matching harness, $35.00; H4A varactor 432 tripler, $25.00; Ameco TX-62, p.t.t. mike, $120.00; CN-144W with a.c. 14 MHz i.f., $25.00 Alliance U-100 rotor, thrust bracket, $20.00. Cush Craft 144-7, $8.00. Bill Smith, WB4HIP, 68 N.E. 87th St., Miami, Fla. 33138. Tel: 3050-754-7510.

SELL: Eldico SSB-100 exciter, all-bands SSB, AM, CW, built-in 'scope, $175.00. P&H LA-400C linear, 800 watt P.E.P. factory-built, $120.00. Both perfect, clean, spare final tubes, others, factory manuals, connecting cables. Vibroplex Lightning Bug, almost new, $15.00. Heathkit Max Weiman, 888 8th Ave., New York, N.Y. Tel: (212)-582-7079.

SELL: BC-610 xfrmr, $25.00; 2-100TH tubes (new); 1-4-65A, (used); 1-4-125A (used); hi-voltage choke and condenser; 3 inch monitor 'scope Millen rack mounted, $15.00. W1MTL, 71 Crater La., Kensington, Conn. 06037.

WANTED: Trap assemblies (less coils). W3DZZ antenna. WA8TNJ, 143 Longford, Elyria, Ohio 44035.

SELL: HW-12, $50.00 or you make offer. Jesse Jones, 931 National, Vicksburg, Miss. 39180.

WANTED: Low frequency coils HRO 5TA1. WØA1B, 425 West 49 Terrace, Kansas City, Mo. 64112.

HW-30, Heath 2-meter transceiver with GP-11 mobile power supply. In mint condx, $50.00. Tom Benewicz, WA2OBT, 11 Montrose, Allendale, N.J. 07401.

CLEANING House: BC-221, ARC-5, transformers, tubes, more! Send SASE for list. W1JZX/2. Richard Stanley, 26 Brookside Terrace, Atlantic Highlands, N.J. 07716.

WANTED: Collins 32S-1, 30L-1, 75A-4. Must be mint and with manuals. Will consider complete station if price is right. WA6JWK/4, 2304 N. Florida St., Arlington, Virginia 22207.

SELL: Converted APX-6, AM/CW 1215 Mc. transceiver in excint condx w/self contained P.S. and field strength meter, $60.00. D. Hubecky, Losee Rd., Wappingers Falls, N.Y. 12590.

DRAKE T4X transmitter, AC-3 power supply, 160 and 10 meter xtals included. One year old, perfect condition: $325.00. Heath SB-600 speaker, $12.00. WA9AUM, 2415 West Main, Richmond, Ind. 47374.

HRO-50T1, 8 coils, AC, AD, A-F, NFM-83, xtal cal., Select-O-Ject, speaker, $175.00; Hammarlund HC-10, $65.00; Johnson 6N2 and VFO, $75.00. Heath Twoer, $35.00. Walter Bernadyn, W2FPM, 524 Hopper Ave., Wyckoff, N.J. 07481.

6N2 Meter station, Viking 6N2 transmitter with VFO, power supply, and modulator; HQ-145X with Ameco converters; Telrex beam, etc. Sell only as a unit: $345.00. K8BKU, 4240 Philadelphia Drive, Dayton, Ohio 45405. Tel: (513)-275-1122.

BOUND Volumes Radio 1937-1946, Audio Engineering 1947-1951, RCA Review 1956-1962, Radio & Television News 1950-1958, Bell System Technical Journal 1949-1956. Unbound QSTs 1932-1940. Make offer. Wanted: Late model Vibroplex. W4BKN, 603 Bunkers Cove Road, Panama City, Fla. 32401.

SELL: Heath HA-14 Kilowatt P.E.P. amplifier and HP-24 AC power supply, perfect. $140.00. WA1BUN's Reginair 321 Triband boomless quad, never used, $70.00. Johnson kilowatt low-pass filter, $8.00. Astatic D-104 mike, new, $12.00. Will ship. Steve Mann, W1EGT, 18 Chipmunk Lane, Darien, Conn. 06820.

WIJJ retired: changing QTH. SASE list, 50 years accumulation. Slotted line with meter, $25.00; two hi-fi 40-watt amplifiers, $20.00 each. Inverter, 110DC to 110AC, $10.00. ARC receivers and transmitters. 2½" voltmeters, new, twenty each 15V. AC, 3V, D.C. $1.50 each. K. A. Trites, 165 Parkway, Melrose, Mass. 02176.

TOROID Cores, Arnold set, for transceiver, QST 4-68, $3.75. Weisenourger, 927 East Ellet, Philadelphia, Penna. 19150.

CRYSTALS Airmailed: MARS, Marine, SSB, Nets, CD, etc. Novice .05% crystals $1.50. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction 3500 to 8600 $1.90. (Five or more this range $1.75 each), (nets ten or more same frequency $1.45). 1700 to 3499 and 8601 to 20.000 $2.95, with overtones supplied above 10,000. 10,001 to 13,500 fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. QST, Handbook, SSB Manuals, and other ARRL builders crystal groups and singles. Be specific. Write for order-bulletin. Crystals since 1933. Airmailing 10¢/crystal, surface 6¢. C-W Crystals, Marshfield, Missouri 65706.

SELL: Swan 240 with CesCo SWR Bridge and a.c. power supply and speaker, exclnt condx, $180.00; Heath VTVM, $15.00; Eico electronic keyer and paddle, perf, condx, $70.00; Knight T-150 xmtr, $30.00; Heath RF signal generator, $14.00. All with manuals. Jay Tyrec, W5LZU, P.O. Box 258, Lake Hamilton, Ark. 71951.

GR-64 Receiver and GO-125 Q-multiplier, both Heath's, in fine condx: $30. You pay shipping. Jon Fortune, WA9ITO, 225 S. Hickory, Arthur, Illinois 61911.

TR-4, $495.00; AC-4, $84.00; DC-3, $115.00; R4-B, $370.00. T4-XB, $380.00; MS-4, $18.00; TV-4, $84.00; L-4B, $630.00; W-4, $44.00. G. Melvin Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404.

MILWAUKEE Hams! Amateur equipment repaired, kits wired and tested. All professionally done. R. F.. Communications, Butler, Wisconsin, 53007. Tel: 781-3865.

DRAKE T4X and R4B w/warranty, $750.00. F. Smith, 20122 Ingrum, Torrance, California 90503.

HAMMARLUND HG-215, used 3 months, $400. Tecraft Model 50 converter 7-11 IF, $35.00. Never used. Both are in original cartons, with instruction books. WA3CZI, George W. MacCool, 4151 A. Ridge Ave., Philly, Penna. 19129.

SR-400 transceiver, HA-20 remote VFO, a.c. power supply, $800. WA9HHH, c/o ARRL Hq.

HA350 with speaker, $95.00; Drake 2NT, $85.00. Together, $175.00. WA1JAD, 64 Tunxis Avenue, Bloomfield, Conn. 06002. Tel: 203-242-4175.

MOSLEY V-3 antenna, practically new, plus base, radials. $15.00. WA2AKY, 2 Vernon, Rockville Centre, N.Y. 11570.

JOHNSON Invader 200, in mint condx, $275.00. Viking Valiant, $125.00. Nick Minko, WØVYE, 4302 W 18th, Wichita, Kansas 67212.

CASH For SB-34 or WRL DB-84 and DC-384 power supply. W5FTW, 2319 New York Street, New Orleans, Louisiana 70122.

WANT: Spare plug in units for SRR-12 and SRR-13 receivers. N. K. Thompson, 5 Palmer, Gorham, New Hampshire 03581.

PREPARE For new FCC exams! You need Posi-Check. Multiple choice questions, diagrams, explained answers, 18M sheets for self-testing. Same form as FCC exams. General Class, $3.25; Avdanced Class, $3.50; Extra Class, $3.75. 295 to 300 questions or diagrams in each. Each complete for a specific exam. Basic questions duplicated if they apply. Third class postage prepaid. Add 26¢ per copy, for first class mail; 54¢ for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

NOVICES: Knight T-60, well soldered, Lafayette HA-500, perfect condx, 3 months old, $150.00. WN2FKE, Steve, 12 Sanderson, West Caldwell, New Jersey 07006.

LINEAR Amplifier 811s, solid state, $75.00. W2VFW, 201-376-6492.

2-Meter GC-105 communicator with p.t.t. mike, crystal, in excellent condx, $100, C.o.d. Jon Fortune, WA9ITO, 225 S. Hickory, Arthur, Illinois 61911.

FILTERS: Collins 75A4, 500 cycle/$35.00. 1500 cycle/$32.00; 600 cycle/$25. WB2HXD, Offenberg, Box 157, Westbury, N.Y. 11591.

DRAKE R-4 receiver in excellent condx, $275.00; Novice xtals. Sorry, pick-up deal only. C. Hobron, 14723 Ibex Ave., Norwalk, California 90650. Tel: (213)-864-1114.

COLLINS 75S-1 receiver. Used very seldom due to illness. Excellent condx. Asking market value, $320.00. Matching speaker available. Please call W1FA at (617)-631-0755, 33 Lee St., Marblehead, Mass. 01945.

NEW Galaxy V Mk II with VOX 100kc. calibrator. Sound-off mike. Ready to go. No time to operate. Sacrifice: $280.00. Cliff Myers, W1HEN, 425 Samuel Gorton Ave., Warwick, R.I. 02889.

COLLINS KWM-2, $685; 75S3, $395; 75S1 with blanker, $315.00; 32S-1, $335.00; Heath SB-300, $215.00; SB-400, $235.00; National NCX5-II, VX501, in warranty with PS, $545; RME VHF-126, $75.00. Tom Nash, M.D., W5NWA, 1100 Canterbury, Dallas, Texas 75208.

COMPLETE SSB Station: Swan 350 with selectable Sidebands, c.w. Sidetone, crystal calibrator, Swan 405Z and 117XC, SWR meter, coax switch, etc., All for $450.00. Harry F. Palmer, WA4YDO, 4209 Aldebaran Way, Mobile, Alabama 36609. Tel: a.c. (205)-661-4194.

USED Astatic 888 dynamic, less stand, $30.00. Roache, Canterbury, Conn. 06331.

REBUILT SX-71; RME Preselctor; Mon-Key keyer, Eico VOM, SWR Bridge, Lafayette electronic flash; Garrard AT-60 changer, other goodies. Sell Swap for Heath SB-600, SB-610, SB-620; SB-630. W7DZW, Karl T. Thurber, 8556 Elm, Fairchild AFB Washington 99011.

CLEANINGOut Shack: Hammarlund 105 Trs, xmtr converted to 10 meters with xtal, $90; Viking II with VFO, $80 or make offer. All F.o.b. Saginaw, Other xmtrs. revrs, including VHF-SASE for list. W8FH, 4328 State Road, Saginaw, Mich. 48603.

EICO 720 transmitter, new, $75.00; BC-639A, 98-160 Mc., receiver: mint, $65.00. Nelson Lawhorn, 1841 Rosser Ave., Waynesboro, Va. 22980.

KILOWATT Mobile, SBE-34, all cables, mike, mobile mt, crystal cal, and manual: $285.00: SB2LA linear and SB3DCP inverter, all cables and manuals: $250.00. Will not separate linear and inverter. First certified check for $525.00 takes all. All shipping charges collect. All in excellent condition. WAØICG, Gene, 12106 Tesson Ferry Rd., St. Louis, Mo. 63128. Tel: 314-VI-30005.

S-B-E Owners. Attention!! Must sell SB-2 codapter. New. $35.00. WA4EPH, 1219 E. Cervantes St., Apt. 3, Pensacola, Fla. 32501.

STAINLESS Steel. Brass. Highly corrosion resistant threaded, washer, hardware. Quote needs. Lis for SASE. Straessser, W8BLR, 29716. Briarbank, Southfield, Mich. 48075. Ham Hardware Headquarters.

SELL: BC-610E, complete with speech ampl., coils and manuals: $95.00. Also spare tranps. AM-494, 152-174 mcs., final ampl. with 2-4X150As, power supply, $75.00. R. V. Buggy, W3KZ, 441 W. Stafford St., Philly, Penna. 19144.

SELL Variable voltage auto xfmr. "Powerstat", 0-120V., 1.6 KVA $20.00. Seyffert 1700 Church, Scotland Neck, N.C. 27874.

DON'T Miss Ham Radio Magazine. Your technical and home construction guide. $5.00 per year; $10 for three years. Free sample copy. Write Ham Radio, Greenville, New Hampshire 03048.

JOHNSON Valiant with SB-10 SSB. On air at present time. First $200.00 takes it. Reason: Going Navy and must travel light. WB2SXX, Larry Kwant, c/o Box 342, Hyde Park, N.Y. 12538.

FOR Sale: T-60 crystals $35, SX-28, $50. WB2AMV, 156 Farrell, Somerset, N.J. 08873.

COLLINS 51-S1 Serial 1775 to settle W4VS estate. $950; condition exclnt. W4NH, 10109 Bluecoat Drive, Fairfax, Va. 22030.

SELL: Swan SW-120 and Heath HP-13 D.C. supply. $150.00. Both exclnt. John Storie, 2086 Cunningham Drive, Hampton, Virginia 23366.

WANTED: MR-200 mounting rack for Hallicrafters FPM-200, and a P-200 AC power supply. Write Jack Eckert, WA9OKU, 225 Kedzie St., Evanston, Ill. 60202.

WANTED: A.C. supply for Eico 753 transceiver. Must be in gud condx. Charles Derapelian, W5IW, 2418 Dinah Dr., Port Neches, Texas 77651.

SB-300 and SB-400 $550.00; DX-20, $20.00; MT-1 Cheyenne with a.c. supply, $35.00. G-102 signal generator, $25.00. TA-33, Jr. beam, $30.00. All with manuals. Pappy, W5HNF, Box N, Hamlin, Texas 79520.

WANTED: Audio power amplifiers, schematics for audio power amplifiers, audio speakers and audio power horns. W8GUJ, 222 S. Dale Dr., Lima, Ohio 45805.

ESTATE Of W1JPM for sale: Collins 75S-3B, 32S-3, 2-516F2, 312-B3, Henry 2K. Other items too numerous to mention. Send bids to Mrs. Robert Seed, 86 Glendale St., Worcester, Mass. 01602.

CLEGG 22, brand new in sealed carton with warranty included: 5 xtals and commercial ground plane antenna, $185.00. Will deliver within 150 miles radius. Bill Dolan, W2HUA, 39 Doherty Dr., Clifton, N.J. 07013, Tel: (201)-472-5189.

TRANSCEIVER, S.S.B., A.M., C.W., Eico 753 (solid state V.F.O.), 752 a.c. supply/speaker console, 751 mobile supply. Going into service. Must sell. Sacrifice. S. Allen, 1007 South Trenton Avenue, Apt. 23, Pittsburgh, Penna. 15221.

SELL: TH-4 Hy-Gain Thunderbird beam. $50.00. Sry, will not ship. Swap: TH-3 Hy-Gain beam in original carton for gud rcvr. No junk, pls! S. Cokas, 16 Edgehill Rd., Swampscott, Mass. 01907.

SALE: Viking II, matching 122 VFO, Johnson KW low-pass filter. Rig has not been used for 2 years. Best offer over $55.00. Will consider selling units separately. Used Command transmitter 4-5.3, $4.00. You pay postage. Pike, K3BYJ, 111 Elm Avenue, Morrisville, Penna. 19067.

CLEANING House! All are in mint condx: Collins 302-1, $380: Heath 100 kc. calibrator HD-20, $10.00: Heath deluxe service bench VTVM-IMW13 with h.v. probe, $45.00; Garrard automatic record changer "Lab 80" with Pickering stereo cartridge, $40.00; Heath VTVM-IM11 and R.F. probe, $20.00; also SB-610 Heath signal monitor, $75.00; Communicator IV 2 meters. $230.00: Communicator IV, 6 meters, $200; Communicator VFO $65.00. Ed O'Brien, W2IW, 86-10 34 Ave., Jackson Hts., L.I., N.Y. 11372.

WARRANTY Repair station for Collins in South Texas, plus repair on other major lines. New specials: Hy-Gain 204BA, $109.95; 103BA, $37.95; Mosley A203C, $109.95; MP-33 $79.95; Turner 254C $14.95; Waters Codax keyer, $79.95; Reflectometer, $109.95. Used gear: KWM-2, $700.00; supply, $95.00. Eico 753, $150.00; new, guaranteed surplus Telex HMY-2000 Monoset $3.95; Jennings UCS-500 10Kv vacuum variable, $30.00; 220V- 2KVA Variac, $25.00; Tower package W-51 tower, Ham-M rotor, TH6DXX beam, $599.95; freight paid on tower. We carry a complete stock of old and current radio schematics. 50¢ each. Write for list. Don. K5AAD, Madison Electronics Supply, 1508 McKinney, Houston, Texas 77002. Tel: 713-CA42668.

TOROIDS, 44 & 88 mhy. center-tapped, unused, 5/$1.50 ppd. 11/16" report tape, $3/box. Page printer paper, $5.50/case. Ameco CN144W factory-wired two-meter converter with Ameco p/s, $25.00; Hammarlund HQ-100AC receiver, $90.00: Globe Chief 90A Novice transmitter, $25.00: Hallicrafters HT-37 SSB, $175.00: Dow-Key coax relay, $10.00: Johnson lo-pass, $9.00. Wanted: Drake 2B and 2BQ, RTTY and FM gear, rotator and tower. Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980. Tel: (201)-647-3325 after 10 PM E.T.

SELL: Hammarlund HQ-170, $165.00, like new; Eico grid dip meter, $20.00; HT-40 xmtr, with 9 crystals, $45.00. All have manuals. Joe Danielson, WA8RLP, 25 Lincoln Ave., Niles, Ohio 44446.

POLICE—FIRE Radio Station Directories. All areas. Call signs! Frequencies! Communications. Box 56-T, Commack, N.Y. 11725.

NEED Xmas money! Clegg Zeus, $275.00; HRO-60 A,B,C,D $149.00; Millen 100 W. 6N2 transmitter w/modulator and power, $50.00; frequency meter, TS-323 20-480 MHz, $85.00; TS-186 100-10,000 MHz, $125.00; Bird ME-11 (611) Termaline Wattmeter, $69.00; few elements, panel meters for Bird, #43 System, $15.00; two Eldico transmitters SSB-100 ML, 2.2-30 MHz, SSB-AM-CW, built-in power and scope, one $125.00, the other $150.00. Sprague 500 Interference Locator, 550 kc.-220 MHz, $75.00; Precision E-200C signal generator, $35.00; Measurements 59 megacycle meter, $95.00; few 4CX25?B sockets and 6939 tubes, $1.75 each; Heath Lab transistor tester, $45.00. Condenser Bridge, $19.00; exotic list, stamp. First money-order takes. W4API, Box 4095, Arlington, Virginia 22204.

QRT For law school: 75S-1, 32S-1, 516F-2, cables, manuals, excint. $695.00. Ralph, WB6PCZ, 7335 Santa Monica Blvd., Los Angeles, Calif. 90046.

NEW 4CX250B tubes, guaranteed, $21.00 pr. ppd. C. M. Pruett, Star Rte C, Flamingo Bay, Ft. Myers, Fla. 33901.

KWM-2 and PM-2 power supply. Recent complete factory check-out! Like-new condx. $725.00. Dan Hingtgen, WØWIG, 272 Crandall Dr., N.E., Cedar Rapids, Iowa 52402.

SELL: KWS-1 Ser #1409, mint condx, plus mint 75A4, Ser. #4751, VCZ mod., both $1000. Call Henry 201-327-9090 after 5 PM my time. H. Blakeley, WB2CNA, Deerhaven Rd., Mahwah, N.J. 07430.

BIG Signal for sale! Owner moving. Skylane 4-element fiberglass quad in mint condx; CDR TR-44 rotor (used 3 hours), 27; 3 section Rohn tower, all necessary cables for all of above, including 160 ft. of the finest guy wire available. All for $200. You pick up. WA2WDA, Jack Nelson, 6606 18th Avenue, Brooklyn, N.Y. 11204. Tel: (212)-232-6904.

EICO #720, 90-watt radio transmitter, brand new, never used. Cost $129.95. First $89.50 takes it. John A. Alexander, #7 Fifth St., Bayville, L.I., N.Y. 11709.

HY-GAIN DB-62 duo-band beam for 6 and 2 meters for sale. Jack Elias, WA3EVG, 2416 So. 7th St., Philadelphia, Penna. 19148. Tel: (215)-DE6-1061.

PERFECT Vibroplex Bug, $10. Excellent Lafayette SWR Bridge, $10.00. Dow-Key coax relay, $8.00. Turner 454X mike, $7.00. WB2RTJ, 54 Richards Road, Port Washington, N.Y. 11050.

SS-1R receiver, with all crystals, noise-blanker, speaker, antenna matcher, and more. $475.00. Jack Dynarski, WA2-VQO, 133 William, Carteret, N.J. Tel: (201)-969-0930.

KNIGHT T-60 xmitter, $40.00; R55-A rcvr, $35, both for $70. Gilbert Kunster, Jr., WB2DKZ, 225 W. 232 St. Bronx, N.Y. 10463.

FOR Sale: Complete Novice station, DX50A, 8 crystals, key, dipole, HR-10, speaker, calibrator, $125.00. Richard A. Dinges, 16 S. Main, Cape May Courthouse, N.J. 08210.

SELL: Clegg Zeus $300.00; SR-150 and PS-150AC, $300.00; CN-50, $30.00; PV-144, $10.00. All units like-new condx. Charles Secrest, WA8ASV/9, 5608-B Rue Royale, Indianapolis, Ind. 46227.

SALE: Comdel Speech Processor (CSP-11). Excellent condx, $75.00. ppd. WB6YW, 1755 N. Wilcox, Hollywood, Calif. 90028.

SELL: Heathkits: SB-300, SB-400 with crystals, SB-600, SB-610, SB-620, microphone, SBA-300-4, preamp, cables, guaranteed perfect $595.00. Offers on pieces considered. Michael Exner, 2900 Aurora, Boulder, Colorado 80302.

HUNTER Station control, matches S/Line, (wattmeter, speaker, digital clock, 10 minute minder) like new $65.00; Hy-Gain DB-10/15 3-element Duobander, $30.00; Mosley A-203C 3-element 20M beam, 24 ft. boom, $35.00. No shipping of beams, sry. Kosgrup, W9HOG, 703 Huntington, Schaumburg Ill, 60172. Tel: (312)-894-1328.

"HOSS TRADER Ed says if you don't buy your ham gear from him you might pay too much. Write or telephone "Hoss" for best cash quotes or trades anywhere in the U.S.A. New equipment with factory warranty: SB-34, $349.00; new Swan 500, $359.00; new Hammarlund HQ-215 receiver, $409.00; new Drake L-4 Linear, $459.00; New National VX-501 VFO, $249.95; cash price $129.00; New Drake T4-X, $339.00; new R4-A, $329.00; new FTDX-400 transceiver, $479.00; new Hy-Gain TH6-DX beam, $149.50. Cash price $119.00. New Rohn 50 ft. fold-over tower prepaid, $195.00; new Mosley TA-33 and Demo Ham-M, $179.00. Used equipment: B TI LK-2000 linear, $599.00; Drake 2-As, $139.00; HW-12As, $89.00; TR-4, $419.00; T4-XB, $349.00; R4-B, $339.00. Ed Moory Wholesale Radio Co., P.O. Box 506, DeWitt, Arkansas 72042. Tel: 946-2820.

HEATH AT-1 $10.00; Hy-Gain 6-meter halo with cable and connector, never used, $7.00. Lafayette Explorer, $8.00. Lee, WA2ACF, 722 Carlisle Road, Jericho, L.I., N.Y.11753.

SX-99, in excint working condx, 540 kc. thru 30 mc. with instruction book. $65.00. Ben Pollack, K4SDZ, 95 Edgewater Drive, Coral Gables, Fla. 33133.

SELL: Swan 350, AC supply, crystal calibrator, SWR bridge, microphone, $385.00, Hy-Gain 80-40 meter trap dipole, plus 70 ft. R68/U, $25.00. WA-VFH, 44 Seminole Circle, West Hartford, Conn. 06117.

HUNTER Watt meter, unopened cartons. Reads direct watts, 200 and 2000. About half-price, $35.00. Richard E. Mann, 1415 North 14th St., Ft. Dodge, Iowa 50501.

FOR Sale: Heath HX-20, SSB xmtr, HP-23 power supply. Hallicrafters SX-111 receiver. All for $225.00 or your best offer. Must sell as I need the money for college. Write: Norman Weinstein, 420 Memorial Drive, Cambridge, Mass. 02139.

SELLING My old radio books, magazines, catalogs and parts send stamped addressed envelope for price list. Elmer A. Piercy, W6CID, Box 666, Victorville, California 92392.

FOR Sale: Hallicrafters 101A receiver, in mint condx, $175.00. K2ANT, Robert C. Dunham, 1711 Exten Ave., Trenton, N.J. 08610. Tel: 888-2647.

USED Motorola FM/UHF transmitter/Receiver, 20 watts output with a.c. power supply. Easily converted to 432 MHz. Instrux manual included. Also 4 new 2C39A tubes. Best offer. Stan Rogala, W3GFT, 6519th 76th St., Cabin John, Md. 20731.

HQ-170 with clock for sale, $200. Condition perfect, demonstration possible. Also Heathkit Marauder, $200, in topnotch shape. Electro-Voice 664, $20 or tree with transmitter. Judd Goodman, 101 Hillwood Lane, Plainview, N.Y. 11803. Tel: (516)-WE5-5726 after 7 PM Sundays, my time.

PROP Pitch rotor, WW2, small excellent, $45.00. Link, 1081, Aron St., Cocoa, Fla. 32922.

CHICAGO Area: Over 300 copies of QST and CQ, 1948 through 1968. $20.00. W9QQG, KE9-0793.

HEATH DX-60A, $40.00; Heath HR-10, $45.00. Heath HG-10, $20.00. Sy Balsenbaum, 9424 Avenue A, Brooklyn, N.Y. 11236.

FOR Sale: YAESU FTDX 400, $325.00; Heath HR-20, $70.00; SB-175, $50.00, with all manuals. WB4APZ, 1900 8th Ave., Immokalee, Fla. 33934. Tel: 813-OL7-3288.

BUY Of a lifetime: Collins 32S-1, 75S-3, 516F-2, SM-1 MIKE, 5" 304AR Dumont 'scope, superb engineer built KW linear with spare brand new Eimac 4-1000A. 14AVQ and Telrex 20M beam; other valuable extras. Everything is in mint condition. $700 takes all. Dr. Milton Penner, 196 Pomona Mall West, Pomona, Calif. 91766. Tel: (714)-629-9242.

WANTED: NCX-A ac and NCX-D dc power supply; also good ham receiver. State lowest price delivered by QTH. C. J. Pattillo, 3408 North 21st St., Birmingham, Alabama 35207.

LINEAR 6 or 10 meters for sale. Brand new Knight T-175 120 watts AM plate input—300 watts PEP/SSB. Kit cost $108.00 delivered. $70 F.o.b. Mount Vernon, New Hampshire 03057. F. P. Pursell, Pond Road.

COLLINS "J" mechanical filters 2.5 and 5 Khz. Sold my A-4 to VOA listener. Make offer. W8YBS.

FOR Sale: KWM-2 and 516F a.c. power supply. Both like new. F. MacDonald, 1079 Woodside Blvd., Bayville, N.J. Tel: 201-269-0202.

FOR Sale: Davco DR-30 communications receiver, 80-6 mtrs in 10 positions, plus separate positions for WWV. Cost new $389.50. Will sell for $250 or your best offer. K1QQX, 400 Willard Ave., Newington, Conn. 06111.

HONDA #300 Generator, 110 volt, 12 volt, and 6 volt, used aboard cruiser with excellent efficiency. Used only 6 hours, and is very quiet in its operation. New, $180. Will sell for $140.000 or your best offer. Dr. R. H. Nordstrom, 1865 Broad, Edgewood, R.I. 02905.

TH3JR beam, with balun. In excint condx. $50.00. Chris Kimball, WA8UNS, 810 W. Jefferson, Ann Arbor, Mich. 48103.

LAFAYETTE HE-50A: 15W/AM 10-mtr. transceiver, 12v/-117v w/xtals, less mic. Also, HE-62 matching VFO. Both: $55.00. W2WLJ, 17 Coleman, Berlin, N.J. 08009.

FOR Sale: Heath HA-14 SSB linear with HP-14 mobile supply and HP-24 a.c. supply. All factory wired D.C. supply. Never used. All for $235.00. Harvey Kline, W8DOS, 6478 Noranda Drive, Dayton, Ohio 45415.

FOR Sale: Drake 2-NT xmttr, 3 months old, used 4 hours total. New condx, $100 firm. Will ship. R. S. Crowell, 640 Stonehenge Dr., Marty Esther, Florida 32569.

HT-37, Drake 2-B, 2-BQ, 2-AC. Separate items or package deal. Your best offer. Charles Gleason, WB2BXF, Box 390, Lake Forest College, Lake Forst, Ill. 60045 or 16 Middle Drive, Plandome, N.Y. 11030 during month of December.

SELL: Excint condx: NC-190 rcvr, $100. Travis Cox, 7557 Sharbeth Dr. S., Jacksonville, Fla. 32210. Tel: 904-771-0732. William T. Cox.

BACK Issues of QST. Also old copies of other radio mags and rare copy of 1921 List of Stations, Commercial and Govt. Also 2 Music Master speakers; 3 antique WD12 tubes, 1 variometer, 1 tuning coil, 1 "B" eliminator, 1/4 k.w. spark transformer, old battery receiver and more items not listed. Mrs. J. Kovelli, 313 Hunter, Niles, Ohio 44446.

SELLING: Polycomm PCZ 2-m, xcvr, 117 v.a.c. 12 v.d.c. All original equipment included. In xcint condx: $150.00. John Hoglund, 253-15 139 Ave., Rosedale, N.Y. 11422.

SELL: Novice Station, in xcint condx: Eico 723 c.w. transmitter, 6 Novice xtals. $35.00. HA-350 rcvr, xtal calibr, matching speaker. Both for $120.00. Joe Rotunno, WA2CKM, 1816 Parkview Ave., Bronx, N.Y. 10461.

HEATH HW-22A, HP-13, Hustler Antenna, complete with bumper mount, small mobile speaker, all cables and connectors, w/manuals. Six hours actual log time. In excellent condition: $175.00. Donald F. Miller, RD #1, Cresco, Penna. 18326. Tel: 1-717-595-7744.

FOR SALE: Thunderbolt linear, new PL-175As. Will ship. $250.00. W9MRX, 1001 Meadowcrest, Lagrange Park, Illinois 60525.

SELL: 75A-2 with vernier dial and 2.6 Collins filter and CE model B sideband slicer, $200. Consider 2 meter gear in trade. Also sell Gonset SSB exciter, GSB-100, $140.00. W5LC1, P.O. Box 592, Wynne, Arkansas.

WANTED: Heath Twoer and/or DC supply. No modifications. State price, condition, in first letter. Need fast, all offers considered. WA3IID, 2405 Greendale Rd., Wilmington, Delaware 19803.

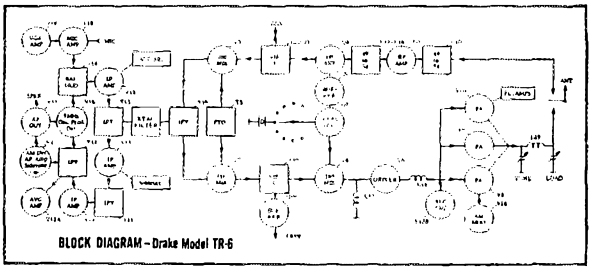
Index of Advertisers

NEW DRAKE MODEL TR-6 6-M SIDEBAND TRANSCEIVER

Model TR-6 **$599.95** Amateur Net

COMPARE THESE FEATURES

- **Full coverage of 6 meter band plus MARS.**
- **Four IF band widths:** 2.4 kHz upper sideband (supplied), 2.4 kHz lower sideband, 6.0 kHz AM, 0.3 kHz CW, all selectable with front panel switch.
- **Function switch selects product or envelope detector as well as built-in AM screen modulator.** Compatible with linear amplifiers.
- **No carrier balance or carrier insertion adjustment for AM or CW**
- **Shift carrier CW system for compatibility and versatility.**
- **Ultra-stable linear VFO.** 600 kHz in one range. 1 kc readability.
- **Built-in PTT, VOX, ANTI-VOX, 100 kHz calibrator.**
- **ALC prevents flat-topping.**
- **Ample metering provisions with two meters.** For ALC, S-Meter, Transmitter Plate Current, Relative RF Output.
- **RV6 External VFO allows split-frequency operation.** (RV3, RV4 usable).
- **Fast or slow AGC for receiving.** For meteor scatter work, selectable from front panel.
- **Ultimate receiver front end performance using FET's.** Less than 1/10μV required for 10 dB S/N ratio on SSB.
- **Input and outputs provided for Drake TC-2 or other 2-meter transverters.** All switching done internally with band switch.
- **300 watts CW and PEP input.**
- **6JB6 final tubes eliminate replacement problems.**
- **Extra input and output jacks for converters and/or outboard receivers.** Permits monitoring of more than one frequency simultaneously.



BLOCK DIAGRAM – Drake Model TR-6

Plug-in noise blanker accessory: $79.00
FREE with TR-6 order in 1968.

See your distributor or write for free brochure:

R. L. DRAKE COMPANY

Dept. 1118, 540 Richard St., Miamisburg, Ohio 45342

- ***Exclusive Features***
- ***Greatest Value***
- ***Unmatched Performance***

GENERAL SPECIFICATIONS

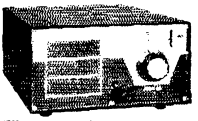
SIZE: 5¾" high, 10¾" wide, 16¼" deep (plus feet and knobs). **WEIGHT:** 15¾ lbs.
FREQUENCY COVERAGE: 49.4 to 54.0 MHz (crystals supplied for 49.9 to 51.1 only).
VFO DIAL CALIBRATION: 1 kHz divisions; dial accuracy is within ±1 kHz.
CALIBRATOR: 100 kHz calibrator built in.
FREQUENCY STABILITY: Less than 100 Hz overall drift per hour after 15 minutes warm-up; less than 100 Hz for 10% supply voltage change.
SPLIT FREQUENCY OPERATION: Xmt and Rcv frequencies may be separated by up to 600 kHz by use of the RV-6 or FF-1 accessories.
MODES: SSB, AM, and CW.
POWER SUPPLIES: Drake AC-3, AC-4, DC-3, DC-4 or DC-24.
TUBES AND SEMICONDUCTORS: 19 tubes, 7 bipolar and 3 field effect transistors, 12 diodes.

RECEIVER SPECIFICATIONS

SENSITIVITY: Less than 1/10 microvolt for 10 db S+N/N ratio at 2.4 kHz band width.
SELECTIVITY: 6 dB bandwidth 2.4 kHz with USB filter provided. Accessory filters available for LSB, AM (6 kHz) and CW (.3 kHz).
AUDIO RESPONSE: 400 to 2800 Hz at 6 dB.
INPUT: 50 ohms unbalanced.
OUTPUT: 4 ohms to speaker or headphones.
AUDIO OUTPUT POWER: 2 watts at 10% HD.
AVC: Output variation less than 3 dB for 60 dB input change. Fast attack. Release time selectable.
MANUAL GAIN CONTROLS: RF gain control sets threshold for AVC, AF gain control.
DETECTORS: Switch on front panel. Product detector for SSB and CW Envelope detector for AM.
NOISE BLANKER: On-off switch for accessory noise blanker on front panel.
INPUT: 13.9 to 14.5 MHz receiving input/output jack for converters and/or outboard IF receivers.

TRANSMITTER SPECIFICATIONS

POWER INPUT: 300 W PEP on SSB, 300 W PEP on AM. 300 W CW (50% maximum duty cycle).
OUTPUT IMPEDANCE: 50 ohms nom. unbalanced, 2:1 max. SWR. Adjustable loading.
MODES: SSB (USB provided, LSB with accessory filter), AM (controlled carrier system), CW (semi-break in, Sidetone).
AMPLIFIED AGC: Prevents flat-topping.
CARRIER INSERTION AND SHIFT: Automatic on AM and CW, shifted carrier CW system.
VOX AND PTT: VOX and Anti-VOX built-in.
AUDIO RESPONSE: 400 to 2800 Hz at 6 dB.
40 dB SIDEBAND SUPPRESSION above 1 KHz. 50 dB carrier suppression.
DISTORTION PRODUCTS: Down 30 dB minimum from PEP level.
MONITORING AND METERING: Final plate current, AGC action, and relative output can be read on meters. Sidetone for keyed CW.
14 MHz OUTPUT: 13.9 to 14.5 MHz output for Drake TC-2 and other transverters.



TR-6 ACCESSORIES

RV6 Remote VFO. Separates receive and transmit frequencies within the same range **$99.95**
FF1 Fixed frequency adaptor **$24.50**
MMK-3 Mobile mounting kit **$6.95**
Power supplies
AC-4 120 V 50/60 Hz **$99.95**
DC-4 12 VDC **$125.00**
DC-24 24 VDC **$210.00**
MS-4 Matching speaker **$19.95**

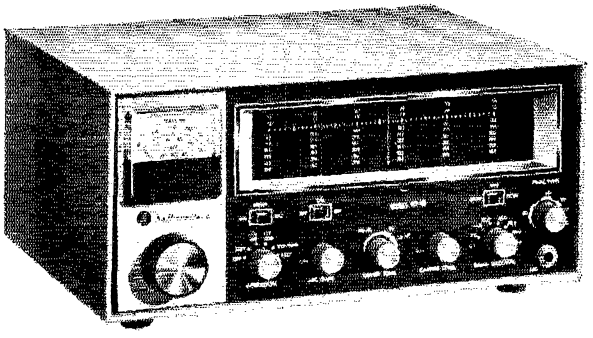
WANT *MORE* FOR YOUR MONEY?

Then latch on to one of these FB Hallicrafters HT-46 transmitters before they're all sold!

At our special price slash you're getting top performance and unbeatable value — a bargain you can't afford to pass up. Rush your order in, now.

73 *Bil Harrison* W2AVA

SAVE $145.



ON BRAND NEW *hallicrafters* famous HT-46 5 band transmitters

•

Plenty sold at $395.00 Amateur Net

SPECIAL!

While our supply lasts

ONLY $250.

Complete, with full factory warranty

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- 140 Watts CW
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- Internal AC Supply
- Plug-in VOX ($44.95 extra)
- "Transceive" input

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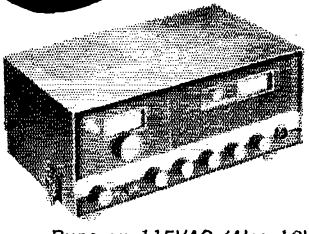
and JOIN THE FUN ON 6, WITH A BRAND NEW SR-46A 6 METER TRANSCEIVER



REGULAR HAM NET $199.95

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(LIMITED QUANTITY)

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SPECIAL: HA-26 Plug-in VFO, only $39.95

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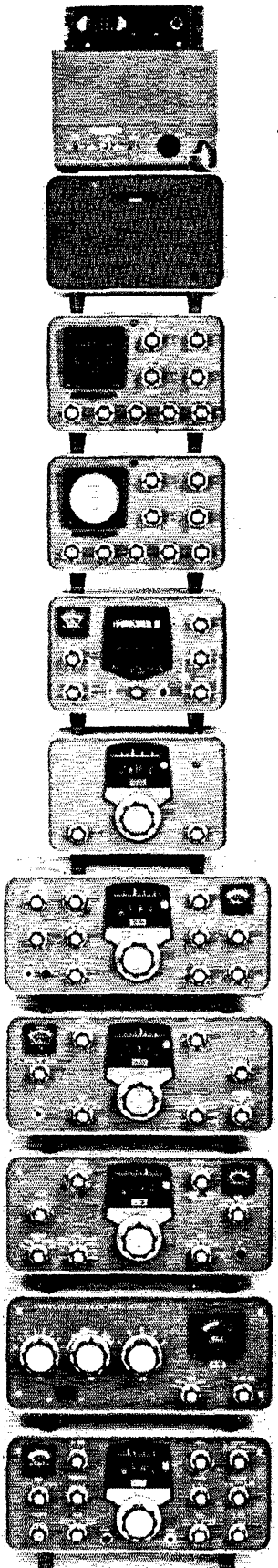

STACK THESE UP AGAINST THE OTHERS...

This Complete Heathkit SB-Series 80 thru 6M Mobile And Fixed Rig Costs Only $1936.70

A bit impractical to install in one place perhaps, but so is spending nearly $2000 on new equipment and not getting the maximum amount of operating versatility and performance. For the price of a few pieces of gear from most others, you can buy every piece of SB-Series gear Heath makes, plus both mobile and fixed power supplies. Many hams don't have $2000 handy though, and that's why Heathkit sells each of these pieces separately. We believe that you should still be able to get a stack of gear without spending a pile of money. For performance, versatility and top dollar value, the others just don't stack up.

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The SB-600 — 8 ohm fixed station speaker to match all SB and HW-Series gear. 6 lbs. **$18.95**

The SB-610 — Signal Monitor for transmitted & received AM, CW, SSB & RTTY signals, 160-6M. 14 lbs. **$74.95**

The SB-620 — "Scanalyzer" for monitoring band activity up to 500 kHz each side and bench testing transmitters. 15 lbs. **$119.95**

The SB-630 — Station Console with 24 hr. digital clock, SWR meter, resettable timer, etc. 10 lbs. **$74.95**

The SB-640 — External LMO for the SB-101. The 640/101 combination will operate in five different modes. 9 lbs. **$99.00**

The SB-101 — world's finest 80-10 M transceiver. 180 watts PEP SSB input, 170 watts CW. 23 lbs. **$370.00**

The SB-301 — world's finest AM, CW,SSB & RTTY receiver. 80-10 M +15 MHz WWV coverage. 0.3 uV sensitivity. 25 lbs. **$260.00**

The SB-401 — world's finest 80-10 M transmitter. 180 watts PEP SSB input, 170 watts CW. 36 lbs. **$285.00**

The SB-200 — world's greatest 80-10 M linear value. 1200 watts PEP SSB input, 1 kw on CW. 41 lbs. **$220.00**

The SB-110A — the best 6 M rig anywhere. 180 watts PEP SSB input, 150 watts CW. 23 lbs. **$299.00**

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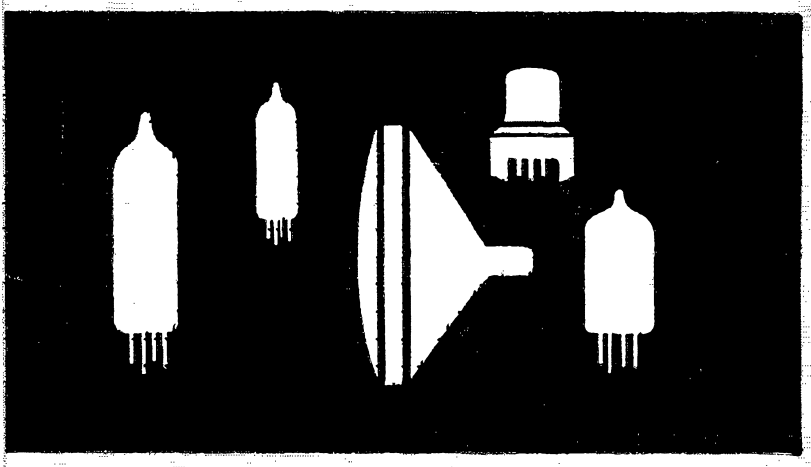
Suggested Price

RCA Receiving Tube Manual



RCA

The RC-26 is the biggest and best receiving tube manual in the industry! Newly revised and updated, it now has 656 pages of vital data for your shack ...information on the complete RCA line of receiving tubes, voltage-regulator tubes and voltage-reference tubes... expanded Circuits Section... extremely handy Applications Guide... Technical Data section with comprehensive data and curves for all active RCA receiving tubes.

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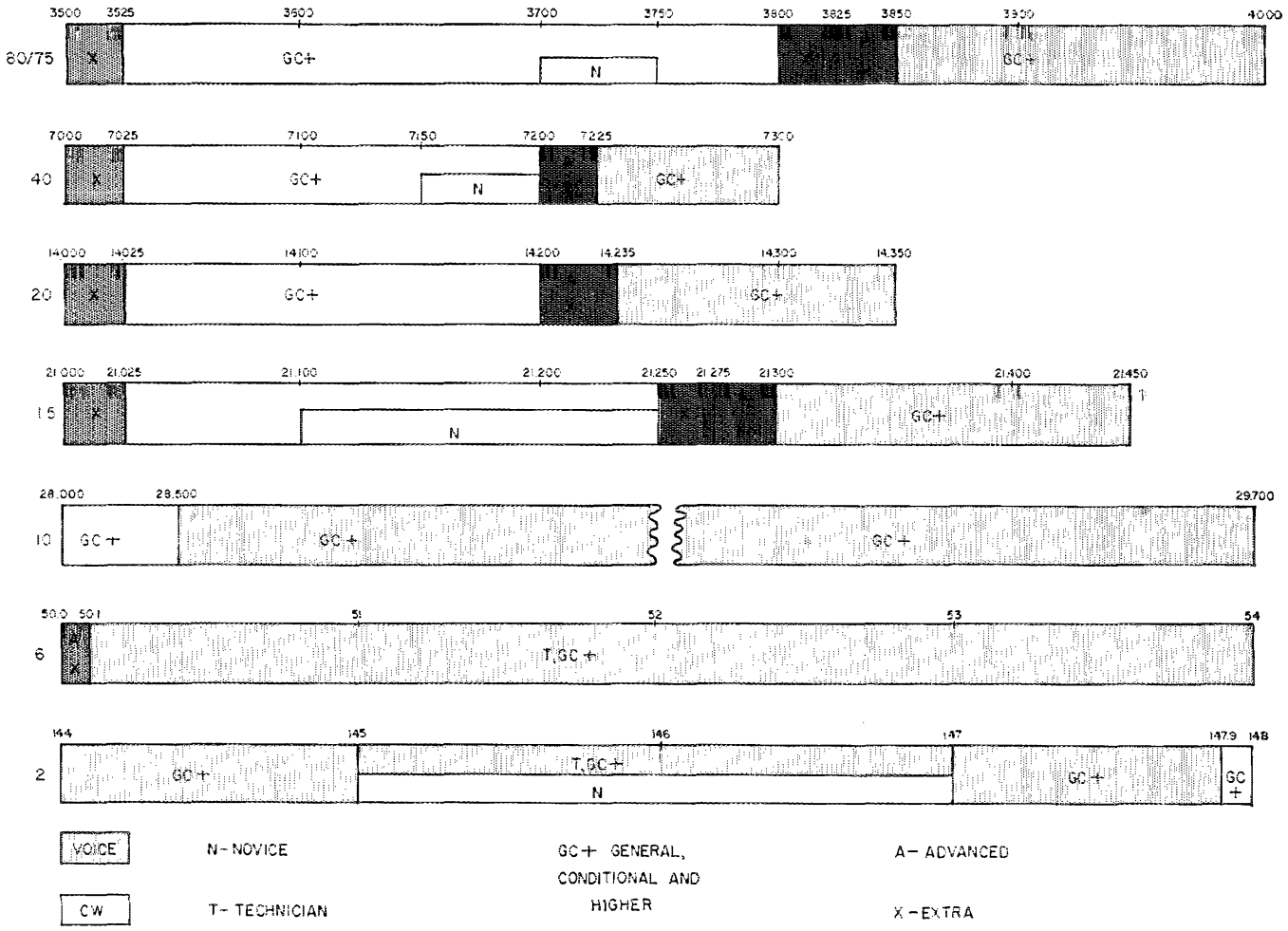
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145
146
147
147.9
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GC+
T, GC+
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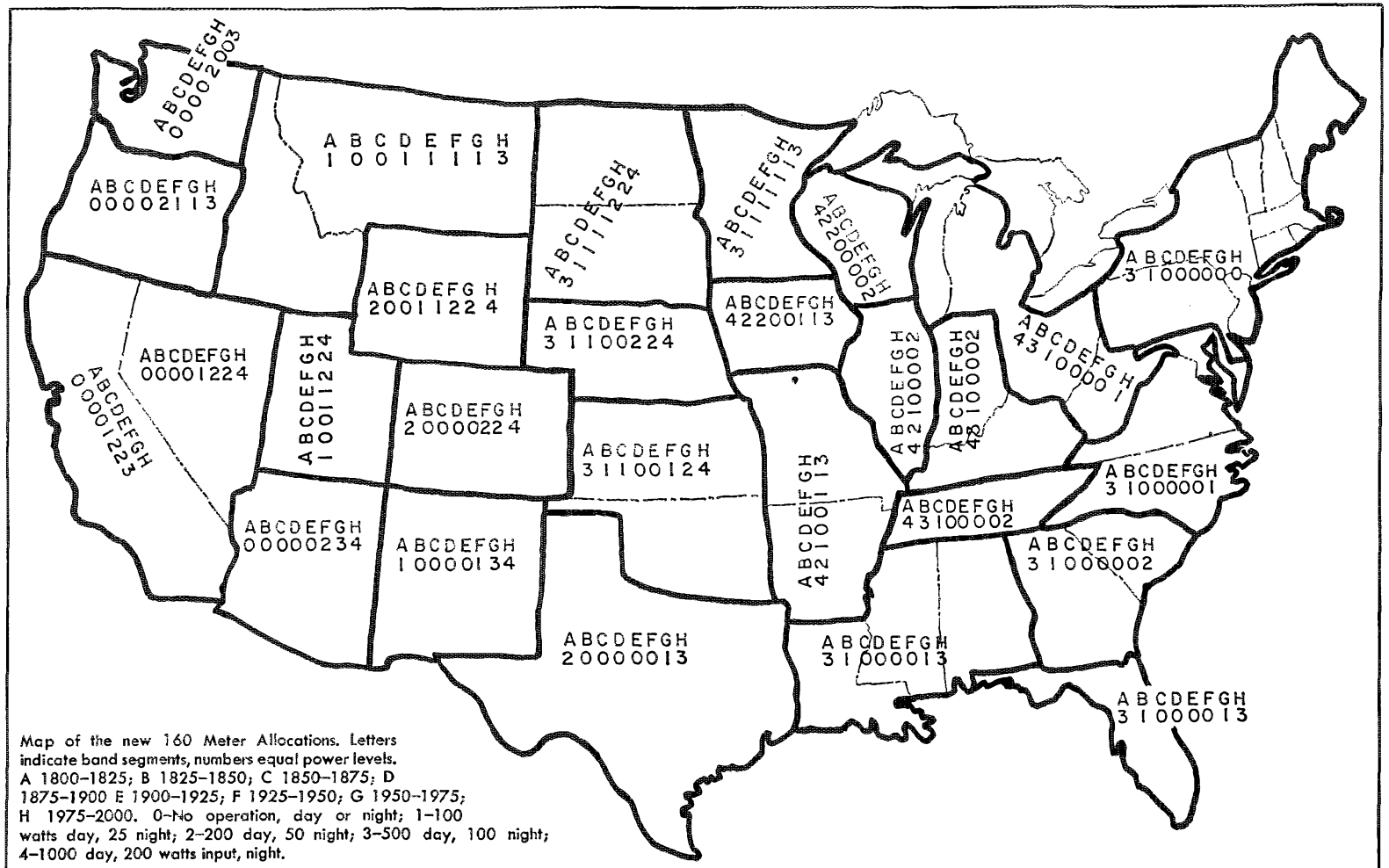
GC+
GC+
VOICE
CW
N- NOVICE
T- TECHNICIAN
GC+ GENERAL, CONDITIONAL AND HIGHER
A- ADVANCED
X - EXTRA



Map of the new 160 Meter Allocations. Letters indicate band segments, numbers equal power levels. A 1800–1825; B 1825–1850; C 1850–1875; D 1875–1900 E 1900–1925; F 1925–1950; G 1950–1975; H 1975–2000. 0–No operation, day or night; 1–100 watts day, 25 night; 2–200 day, 50 night; 3–500 day, 100 night; 4–1000 day, 200 watts input, night.