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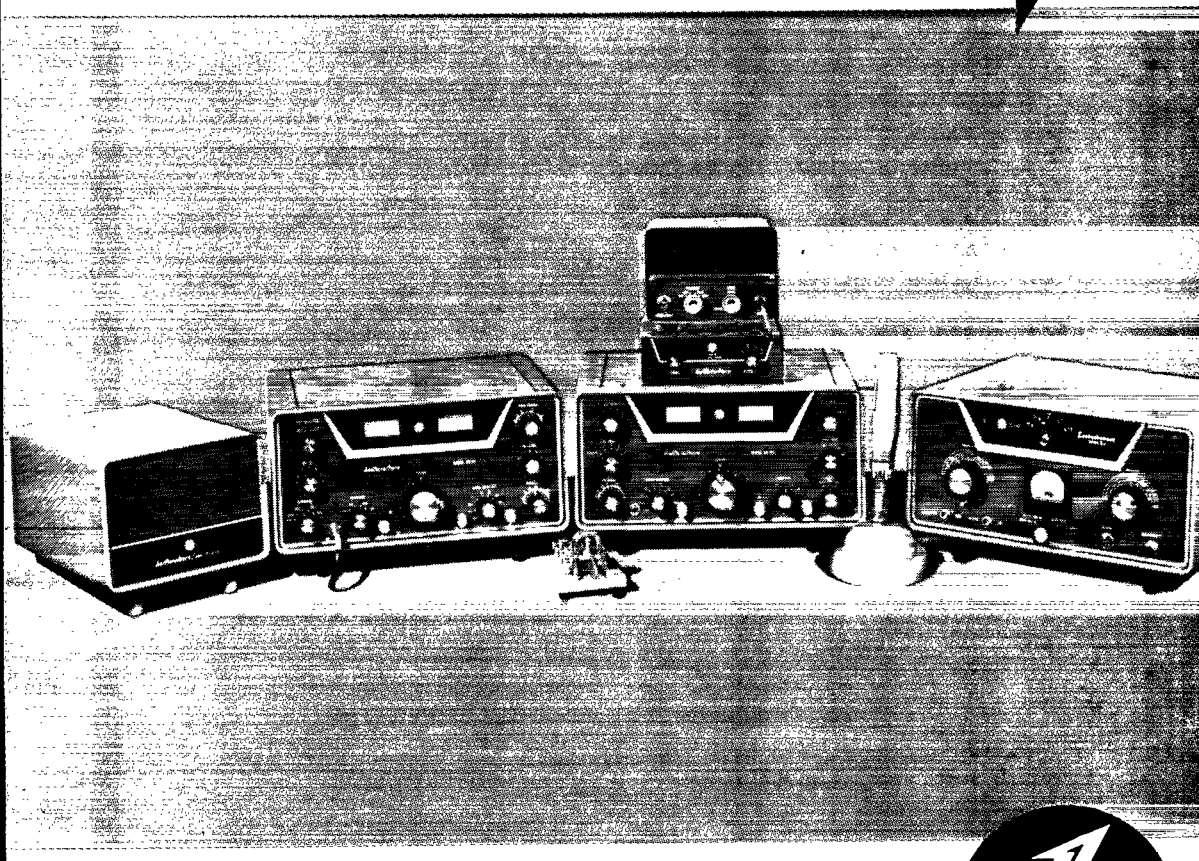
50th Anniversary

THE AMERICAN RADIO RELAY LEAGUE

In amateur equipment, the only thing that counts is the fine print. So we've made the fine print big enough to read



hallicrafters

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Export: International Div., Hallicrafters

SX-117 TRIPLE-CONVERSION RECEIVER. Exceptionally versatile and compact triple-conversion, super-heterodyne communication-type receiver. Selectivity: Variable in 3 steps, 0.5—2.5—5.0 kc. Crystal-controlled 1st and 3rd oscillators. Selectable sidebands, constant tuning rate. Sensitivity: less than 1 μv on AM, less than ½ μv on SSB/CW. T-notch for up to 50 db. attenuation to unwanted heterodyne in I.F. pass band. I.F. type noise limiter. Audio inverse feedback. **Crystals** provide for 3.5—4.0, 7.0—7.5, 14.0—14.5, 21.0—21.5, 28.5—29 mc. Four addt'l. crystal pos. for 500 kc. segments between 85 kc. and 30 mc. 100 kc. crystal calibrator included. **Size:** 15″ x 7⅛″ x 13″. Net wt. 18 lbs. Amateur net price: **$379.95.**

HA-10 Low freq. tuner adapts SX-117 for 85 kc.—3 mc. **$24.95**

HT-44 TRANSMITTER. Versatile compact amateur band transmitter *for independent operation or **transceiving** with SX-117 receiver. SSB, AM, on CW on 80 through 10 meters. Features Hallicrafters **stabilized phasing system** for sideband generation with —40 db. of sideband suppression @ 1 kc. and carrier suppression of —50 db. Distortion products, —30 db. **VOX/CW break-in and PTT operation.** Panel-adjusted VOX/CW delay for maximum Phone-CW flexibility. **Exclusive AALC** gives greater talk power with speech compression up to 12 db. Power input 200 watts DC on CW and SSB, 50 watts AM. **Same size and style as SX-117.** Furnished with crystals for 3.5—4.0, 7.0—7.5, 14.0—14.5, 21.0—21.5, and 28.6—29.0 mc. Less transceiver cables, **$395.00.** P-150AC power supply, **$99.50.**

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Complete metering—plate voltage, plate current, grid current, relative RF output. Uses a 3-400Z in a Zero bias grounded-grid circuit. Runs full legal input when used with adequate plate supply. Requires 2700-3000 VDC at 380 Ma. P-45 Power Supply recommended. Cabinet size 15″W x 7⅛″H x 13″D. Weight 28 lbs. **$299.50**

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P-150AC POWER SUPPLY. For use with HT-44 Amplifier. 5 silicon diode rectifiers, built-in speaker. **$99.50**

Note: We thought this phrase should be a LOT bigger

*for independent operation or transceiving with SX-117

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1959
10

KWM-2
75S-3B
32S-3
30L-1
62S-1
312B-4

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COLLINS

QST

AUGUST 1964

VOLUME XLVIII • NUMBER 8

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—CONTENTS—

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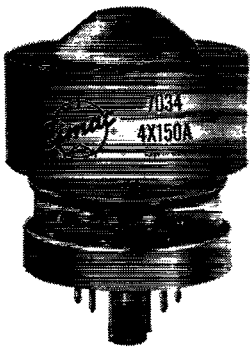
original-design family of tetrodes meets every need

What's your pleasure? Sideband? CW? RTTY? AM? VHF? FM? Or something exotic like slow-scan TV? Eimac has an original-design family of tetrodes ideally suited for your use in these and other modes. Rated for continuous, commercial (key-down), 24-hour-a-day operation, these compact reliable tetrodes are noted for quality and reliability—no intermittent, "one-minute-on-five-minute-off" ratings! Eimac tetrodes are designed for power, dependability, long life. Include them in the design of your next transmitter! For more information on Eimac original-design tetrodes to meet your needs write: Amateur Service Department, Eitel-McCullough, Inc., San Carlos, California.



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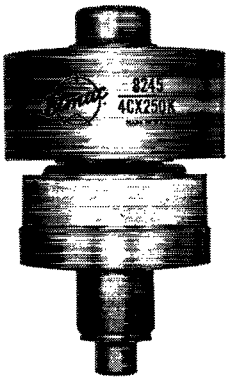

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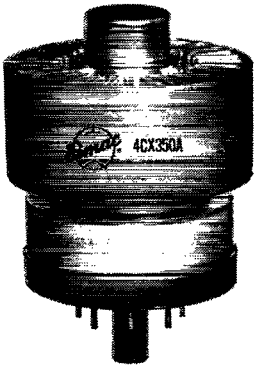
4CX250B



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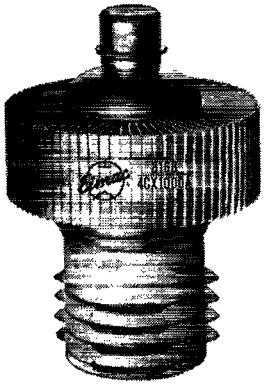

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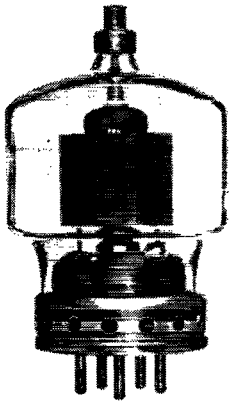

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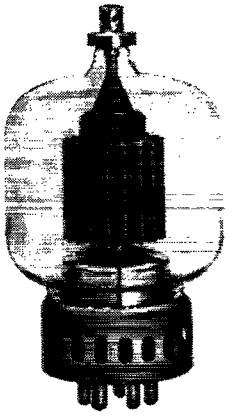

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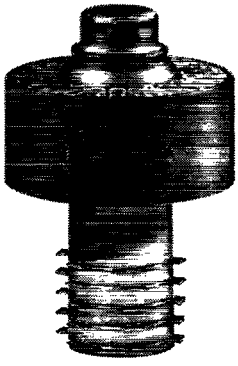

4CX300A

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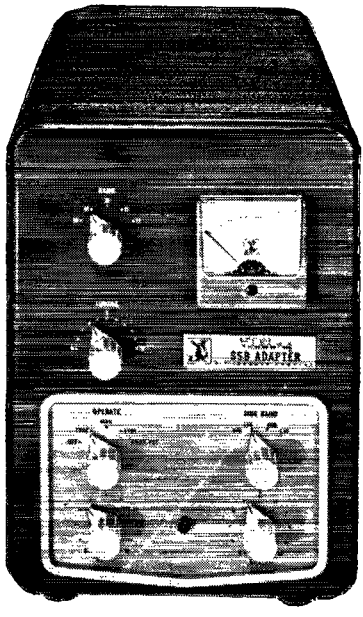

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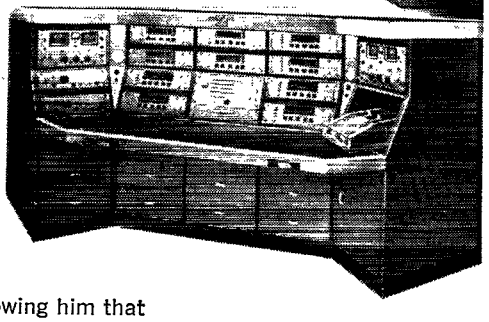

THE TECHNIMATIC* TUNING SYSTEM permits an operator to tune both transmitters and receivers remotely to frequencies and various modes of operation on an automatic and pre-programmed basis by means of pre-cut tapes, cards, memory systems or manual selection and provides a readback of information to the operator showing him that the selected tuning functions have, in fact, been performed.

The system is unique in that manual override is provided at the receive site; however, any change in the positioning of the controls at the receive site would automatically be indicated on the remote controller's console. Tuning functions of transmitters and receivers, including the selection of frequency, audio and RF levels, sideband selection are controlled at this console. Readback indication of the frequency to which the remote units have been tuned to is presented by 1" illuminated digital display at the operator's console. Other tuning functions are displayed on illuminated indicators.

*TM APPLIED FOR

Illustrated above is a "run" of DDR-5 receivers assembled from our production line for photographing. A wide selection of receiver combinations and capabilities are discussed in our DDR Brochure available on request. Insetted at the lower right is a typical TECHNIMATIC control console. We invite your inquiry.

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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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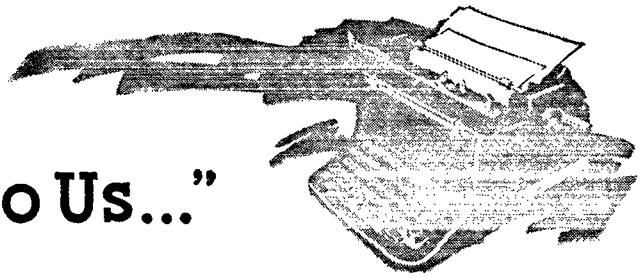


"It Seems to Us..."

The Importance of C.W.

In the earliest days of wireless development, with the crude and primitive equipment constituting the state of the art at that time, it was only natural that the first communication was by means of a signaling code. The receiving apparatus could distinguish only between the two conditions of signal presence or signal absence, and so an "off-on" system of dots and dashes was evolved from the pattern of the wire telegraph code.

Code transmission thus became the basic method of radio communication, and remained in the forefront for many years in commercial and military as well as amateur radio. It was the backbone of solid, two-way communication; except for broadcasting, other modes of emission were largely frills or novelties. High-speed machine code transmissions came into prominence; but even then when conditions became poor, the operator grabbed for his manual key. When it was necessary to "get the message through," manual c.w. always performed the job.

As the state of the art developed, gradually additional modes of emission became more reliable. Particularly since World War II, and the impetus it provided for electronic progress, c.w. appeared to become less important, to be relegated to the background. The advanced concept became automation . . . high-speed . . . electro-mechanical devices . . . push buttons . . . digital systems. The idea was to put almost full reliance on electronic technology and very little on the ability of the individual.

It was thus no surprise to find a gradual change of view, even within amateur circles, to the general effect: c.w. is a dying art; the day of the manual c.w. operator is past; commercial and military activities no longer have a place for him; code will soon be outmoded as an ancient means of communication, and it is therefore only logical to drop c.w. as a requirement for an amateur license. A number of amateurs — and many more aspirants for whom code is the stumbling block — felt that ARRL was reactionary in its general policy of advocating code proficiency as a continuing part of any amateur examination.

A recent staff study by the Department of the Army has indicated a marked change of emphasis by the military, at least by that branch, concerning manual radiotelegraphy.

After extensive evaluation, the Army has concluded that "a sound and undiminishing c.w. capability continues to be required by all tactical forces to assure effective communications. . . ." The Army finds that c.w. is still used extensively in many of its operations "where a high degree of reliability under all conditions is required." Manual radiotelegraphy is used additionally — and regularly — as backup for RTTY and voice circuits in instances of interference or other conditions hampering "automatic" communications.

The Army is accordingly re-examining its training procedures to ensure that a sufficient number of its communications people are adequately skilled in c.w. capability. The effect is to recognize once more that manual radiotelegraphy is still a basic method in today's complex communications systems.

Let us not for a moment underrate the capabilities of sophisticated means of communication. Each of the various advanced modes has an essential function to perform. But at the same time let us not be misled into thinking that the individual and his personally-developed skills no longer count, or that electronic technology alone can handle all our communications needs on a push-button basis.

C.w. telegraphy, then, is still considered a basic mode of radio communications. Amateur radio has been in the past a training ground, a reservoir of communicators as well as technicians. It is essential to the long-term preservation of amateur radio that we continue to serve the public interest, and this is one way we can do so. Enjoy the naturalness, the ease, of communicating by voice or RTTY as you will during your operating time, but occasionally polish the rust off your fist, and strive for greater copying and sending speed, accuracy and proficiency. Nightly practice sessions from W1AW exist as another ARRL service to amateurs for precisely this purpose.

QST

COMING A.R.R.L. CONVENTIONS

August 21–23 — ARRL National, New York City
September 5–6 — Maritime Province, Charlottetown, P. E. I.
September 11–13 — Southwestern Division, Palm Springs, Calif.
September 25–27 — Pacific Division, Sacramento, Calif.
October 2–3 — Ontario Province, London
October 17 — Michigan State, Grand Rapids
October 31 and November 1 — Oklahoma State, Lake Texoma
January 23–24, 1965 — Florida State, Miami

MARITIME PROVINCE CONVENTION

Charlottetown, P.E.I.

September 5–6

The Maritime Province ARRL Convention will be held Sept. 5–6, at the local branch of the Royal Canadian Legion, Charlottetown, Prince Edward Island. Registration begins at 9:00 A.M. Saturday. Convention activities will include meetings of the NBARA, NSARA and net meetings, s.s.b. breakfast, a swap shop, ARRL forum, hidden transmitter hunt and a homebrew mobile judging contest. A Saturday afternoon tea is planned for the ladies, and a Sunday afternoon motorcade scenic tour should be of interest to all. Speakers will include Lew McCoy, W1ICP, of ARRL Hq.; ARRL Vice-President Alex Reid, VE2BE; and Canadian Division Director Noel Eaton, VE3CJ; several trophies and awards are to be presented to deserving amateurs. Banquets are scheduled for Saturday and Sunday nights, followed by entertainment.

Total registration, including both banquets, is $4.00; $3.50 for YLs, XYLs and children. For full convention details or reservations, write Fulton Blair Proude, VE1KZ, 11 Green Street, Charlottetown.

SOUTHWESTERN DIVISION CONVENTION

Palm Springs, California

September 11–13

The 1964 Southwestern Division ARRL Convention will be held at the new Riviera Hotel Convention Center, Palm Springs, California Sept. 11–13. Convention activities will include a hidden transmitter hunt; mobile, DX QSL and homebrew contests; FCC examinations for General and Extra Class license; and numerous displays and exhibits. Speakers include League President Herbert Hoover, Jr., W6ZH, and ARRL General Manager John Huntoon, W1LVQ. The "Hoover Cup" will be awarded to the division club showing the greatest gain in League membership, and the annual DeForest Award will be presented to the division amateur who has done the most for amateur radio. Of interest to YLs and XYLs attending will be rides on the new aerial tramway and other events planned specifically for them. Director Meyers, W6MLZ, will be the chairman for the ARRL open forum Saturday afternoon.

The main banquet Saturday night will begin at 7:00; an initiation ceremony for the Royal Order of the Wouff Hong will take place at midnight. Sunday breakfast meetings for Old Timers, v.h.f., RTTY, MARS, YLs and other specific groups have been scheduled.

Pre-registrations must be postmarked no later than August 20, and should be addressed to the Convention, P.O. Box 2773, Palm Springs, California 92263. Requests for hotel reservations may be included but be sure to give full details, including price range desired. Full registration (including registration, banquet and breakfast) is $10.00; registration and banquet only, $9.00; with breakfast but not the banquet, $7.50; registration only, $5.00. For more information, contact Col. Fred J. Elser, W6FB, Convention Chairman, % the address shown above.

Commemorative Stamp Approved!

The Post Office Department has announced its approval of a commemorative postage stamp honoring amateur radio operators, as requested by the American Radio Relay League, and will issue it during the 50th anniversary year of the League. Actual date of issuance will be announced later, and is expected to be some time in October.

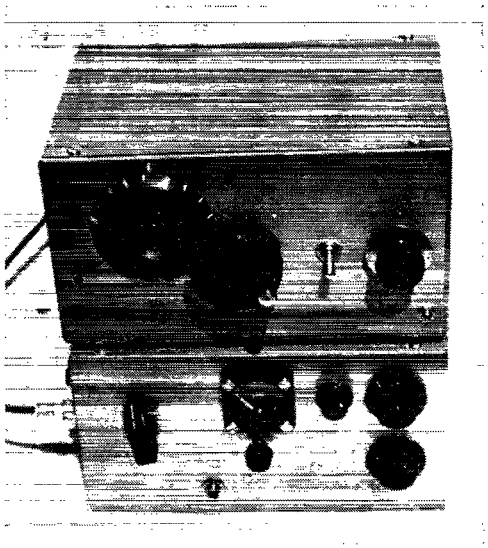
This is a significant action on the part of our Government in recognition of the value of the amateur radio service.

The design chosen by the Post Office, from several proposals submitted, is simple and symbolic with dials and waveforms. An official ARRL "first-day cover" envelope is being prepared, with a replica of the May *QST* cover. In addition to later purchase of commemorative stamps at local post offices for use in personal correspondence, many amateurs will want one or more of these first-day covers as mementoes of the occasion. More complete details will appear in September *QST* on the procedure to follow in obtaining such covers.

A Transistor C.W. Station for 7 Mc.

Complete Equipment for Home or Portable Use

BY WES HAYWARD,* WA6UVR



The 40-meter transistor receiver (above) and transmitter. The receiver tuning dial and capacitor were salvaged from a Command receiver.

In the receiver and transmitter described here, the author has aimed at circuits that can reasonably be expected to be duplicated with success by the average amateur not too familiar with transistor circuitry. Particular attention has been devoted to the selection of transistors near the bottom of the price totem pole that will give satisfactory performance.

SINCE the advent of practical semiconductor devices, the electronics industry has gone through an almost universal transition. In many labs, the use of transistors is so predominant that tubes are used only as a last resort. While transistors are becoming more popular with the radio amateur, semiconductor ham gear is still a novelty. Certainly the full potential of semiconductors in ham equipment has not been realized. It is the opinion of the author that this situation is in part because of the nature of the articles which have been published on the subject. Many articles have described interesting but very simple gear which can be expected to give only limited performance. At the other extreme are a number of papers describing equipment of uncompromising performance and versatility. This group is typified by the work of Priebe,[1] Harris,[2] and Vester.[3] Unfortunately, little has been published which describes equipment which would bridge the gap in complexity. It is thus the aim of this article to encourage the use of semiconductors by the serious experimenter who does not want to undertake a major engineering project.

It should be emphasized that this is not a construction article. Many of the parts used are from the author's junk box, or from local surplus outlets, and might be rather difficult to obtain. However, a prospective builder of similar gear should have no trouble finding suitable substitutes for his particular situation. An effort has been made to point out those parts of the design which are critical.

The basic transmitter and receiver described in this article are shown in the photographs. The gear was originally built as a prototype of a rig which could be used on mountain-climbing trips. Rather than striving for the ultimate in performance, the equipment was designed to be reasonably simple, yet provide usable performance. The 40-meter c.w. band was chosen because many inexpensive transistors work well at this frequency. However, most of the circuits shown could be adapted to any of the amateur bands up to 28 Mc. The main reference used in the design work was the excellent article by North.[4]

The Receiver

A schematic of the receiver is shown in Fig. 1. The circuit is a conventional single-conversion superhet with a crystal-lattice filter for selectivity. The RCA 2N1177 series of transistors is used throughout the receiver for the high-frequency applications. These transistors have appealing price tags of less than a buck.

* 1947 San Luis Avenue No. 6, Mountain View, Calif.

[1] Priebe, "All-Transistor Communications Receiver," *QST*, Feb. 1959.

[2] Harris, "A Tunable I.F. Amplifier Using Transistors," *QST*, Dec. 1962; "Selective Transistor I.F. Strip and Dual Detector System," *QST*, Jan., 1963; "A Transistor Audio System with Squelch Control," *QST*, Feb., 1963; "Transistor High-Frequency Converters," *QST*, Mar., 1963.

[3] Vester, "A Solid-State S.S.B. Transceiver," *QST*, June, 1963.

[4] North, "Practical Ham-Shack Transistor Application," *QST*, Dec. 1961.

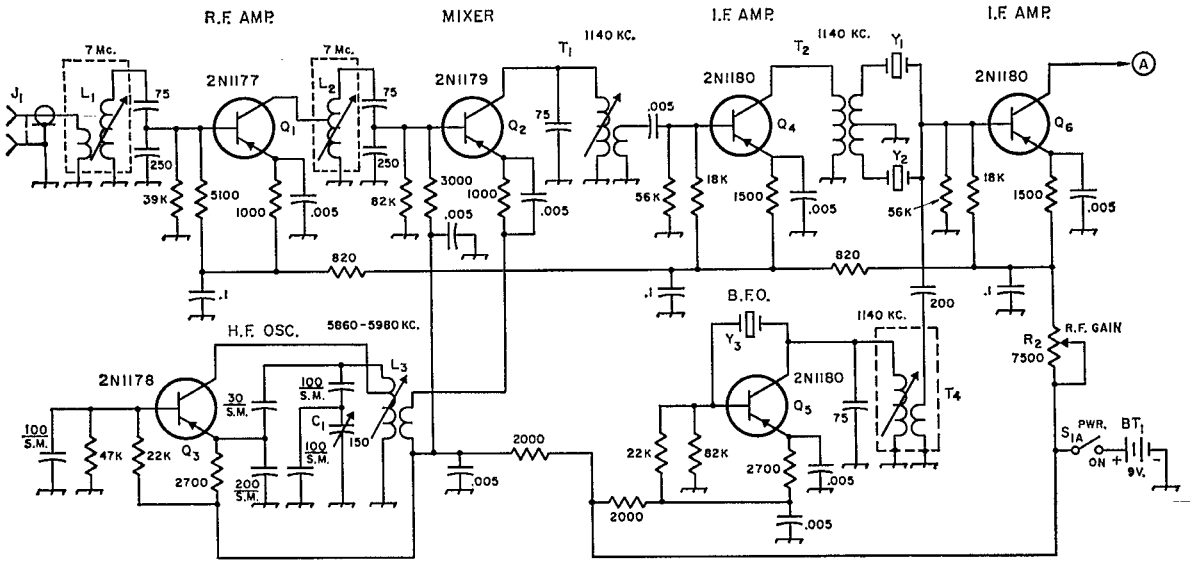


Fig. 1—Circuit of the 7-Mc. receiver. Fixed capacitors: SM indicates silver mica, polarity indicates electrolytic; otherwise decimal values in r.f. circuits are disk ceramic. Ceramic, Mylar or paper are used in audio circuits. Nondecimal values are mica or NP0 ceramic. Fixed resistors are ½-watt composition.

BT_1—9-volt battery (Burgess 2U6, or similar).
BT_2—1½-volt battery (penlight).
C_1—Tuning capacitor from BC-454 Command receiver, only one section used.
J_1—Chassis-mounting coaxial receptacle (BNC).
J_2—Open-circuit jack.
L_1—Approx. 9 μh., 25 turns No. 28 enameled wire close-wound on ⅜-inch iron-slug form. Link: 5 turns over ground end.
L_2—Same as L_1, tapped 18 turns from ground end.
L_3—Approx. 4 μh., 15 turns No. 28 enameled wire close-wound on ½-inch iron-slug form, tapped at 11 turns from ground end. Link: 2½ turns over ground end.
Q_7, Q_8, Q_9—See text.
R_1—See text.
R_2—Linear control.
S_1—D.p.s.t. toggle switch.
T_1, T_3, T_4—185–305-μh. slug-tuned coil (North Hills 1000K) with 10-turn link at ground end. (Miller type 41A224CBI may also be used, but may require a slightly higher external capacitance.)
T_2—Primary: 25 turns No. 28 enameled; secondary: 40 turns No. 28 enameled, bifilar-wound (20 double-strand turns). Inner end of one strand connected to outer end of other strand forms the center tap; the two remaining ends connect to Y_1 and Y_2. The core is a ½ × ¼-inch toroid with a 5/16-inch hole. Similar cores are possibly obtainable from Indiana General Corp., Keasbey, N. J. See text.
Y_1, Y_2—Nominal 1140-kc. crystals with separation to provide desired passband.
Y_3—1140-kc. crystal etched to give desired beat note.

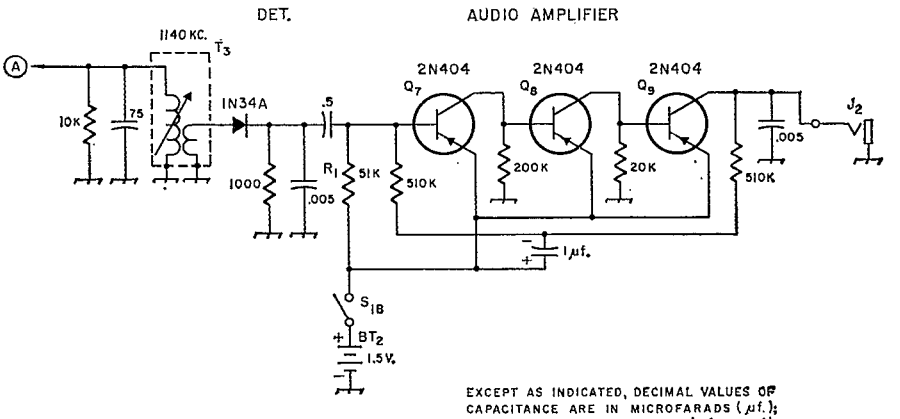
The front end is straightforward in design. The antenna and mixer coils are not tuned with the oscillator, since only the bottom 100 kc. of the band is covered. The slugs in the two coils are adjusted for a fairly flat response over the tuning range.

The oscillator used is described in detail by North.[4] As he reported, the circuit is amazingly stable. The coil is wound on a ½-inch diameter ceramic slug-tuned form. The capacitor used for tuning is from a BC-454 Command receiver and only one section is used. With the values shown, the oscillator tunes from 5.86 to 5.98 Mc. Since the Command capacitor has a gear reduction and dial mechanism built in, construction is quite simple. The dial was sprayed with black paint and recalibrated.

The frequency of the i.f. amplifier is 1140 kc., that being the frequency of junk-box crystals on hand. Two of these crystals were chosen for the filter, and a third is used for the b.f.o. In the author's receiver, the bandwidth obtained is about 1 kc. The b.f.o. crystal was etched to give a 1-kc. audio beat. Note that the bifilar winding used at the crystal-filter input is untuned. This adds to the simplicity of the filter and does not seem to degrade the performance. The toroid coil form used in the construction of T_2 was a junk-box item. However, several forms were tried and the results seem to indicate that the quality of the form is much less critical than might be expected. The author would suggest that prospective builders experiment with standard slug-tuned forms if toroids cannot be obtained.

The coils used in the mixer-output, second-i.f. and b.f.o. circuits (T_1, T_3 and T_4) are standard slug-tuned coils to which fixed capacitors and coupling coils have been added. Those wishing to duplicate the receiver might consider loopsticks as a good substitute. For simplicity, taps are not used for the collectors on these coils. As a result, the second i.f. stage was somewhat unstable. This was cured by shunting the primary of T_3 with a 10K resistor.

A diode was used for the detector. It worked well, so plans for a product detector were put



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

aside. These interested in a more sophisticated detector should consult the work of Harris.[2]

The audio amplifier (Q_7, Q_8, Q_9) is a direct-coupled affair with d.c. feedback for bias stabilization. This circuit is simple and provides a large part of the over-all receiver gain. The audio amplifier is powered from a single penlight cell. R_1 should be adjusted so that one half the supply voltage appears across the 2000-ohm headphones. As a bonus, this amplifier saturates with input signals above a few millivolts. As a result, a self-limiting action is obtained which is very nice for c.w. work. The limiting will be symmetrical if R_1 is adjusted as described above. Almost any transistor could be used in this circuit. The 2N404 works well, and is quite inexpensive.

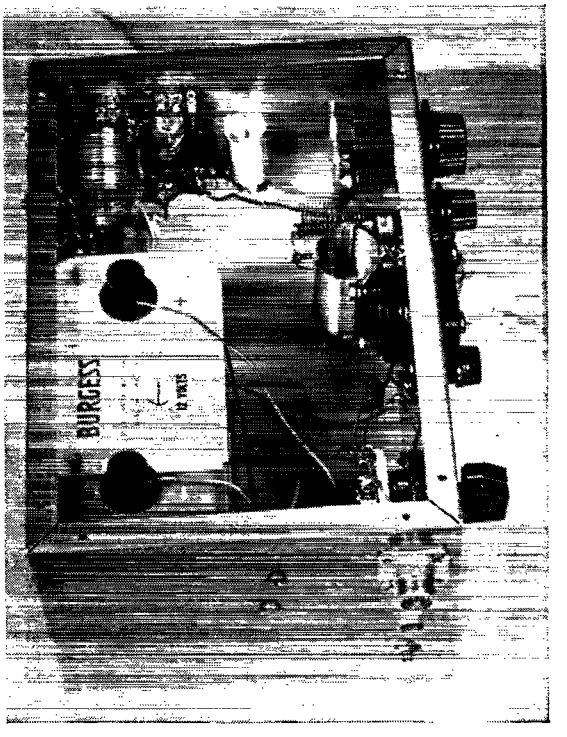
With the exception of the audio amplifier, the entire receiver is powered by a small 9-volt battery. Battery life is several months under normal operating conditions.

The only gain control in the receiver is an r.f. gain control which varies the voltage on the r.f. and i.f. stages. Although simple, this technique works well.

The receiver is built in a 5 × 6 × 9-inch box with a 5 × 8-inch piece of aluminum as a chassis. Most of the wiring was done by soldering the components to small mica-filled bakelite stand-off insulators. The antenna and r.f. coils are mounted in old i.f. cans; no other shielding is used. The r.f. stage, mixer, first i.f. stage, filter, second i.f. stage, and detector are built in a line along the back of the chassis. The audio is built in a small subchassis and mounted above the main chassis. The oscillator is near the tuning capacitor. Since the chassis is bolted firmly to the tuning capacitor, sufficient mechanical stability is obtained.

The type C battery mounted on the back panel of the receiver is used to power an auxiliary audio amplifier which drives a small speaker. The circuit for this optional amplifier is shown in Fig. 2. This amplifier may be built into the receiver, or constructed as a separate external amplifier-and-speaker unit which plugs into the receiver headphone jack, as indicated in Fig. 2.

The receiver has been used for several months now, and the results are quite gratifying. As previously mentioned, over-all selectivity and stability are quite good. The total gain is sufficient



Interior view of the transmitter. The coil in the upper left-hand corner is L_2. To the right of L_2 are the output transistors and L_3. In the upper right-hand corner is C_4 (a small variable augmented by a fixed capacitor in this instance). The coil mounted on the front panel is L_4. The oscillator and buffer stages are hidden behind the battery.

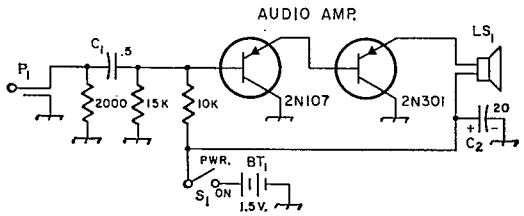


Fig. 2—Circuit of the auxiliary audio amplifier for the 7-Mc. transistor receiver. Capacitances are in μf.; resistances in ohms. Resistors are ½-watt composition.

BT_1—Single flashlight cell.
C_1—Paper, Mylar, or ceramic.
C_2—Electrolytic.
LS_1—Speaker with 4-ohm voice coil.
P_1—Headphone plug.
S_1—S.p.s.t. toggle switch.

to hear some noise when the antenna is disconnected. However, the noise increases markedly when the antenna is connected, indicating that the signal-to-noise ratio is indeed determined by ambient noise, as it should be at 7 Mc. The performance of the receiver is every bit as good as similar tube-type receivers the author has built. However, the receiver does suffer from cross-modulation problems with strong signals from local stations.

The Transmitter

A circuit of the transmitter is shown in Fig. 3. As with the receiver, simplicity was the major consideration in the transmitter design. RCA 2N696s are used throughout the unit. While better transistors do exist, the price of $1.57 each makes the 2N696 quite appealing. Those contemplating operation at higher frequencies might consider the 2N706 or 2N708.

With the exception of the output tank circuit, the transmitter is quite conventional in design. Here a double-pi network is used. While the components are chosen to provide a good match to a 50-ohm resistive load, "random" wires have also been used successfully. An uncalibrated r.f. voltmeter is built in for tuning purposes. In the author's unit, the 600-pf. output capacitor is the combination of a small variable capacitor and a switch to add fixed capacitance to the circuits.

Both sections of a standard broadcast-receiver capacitor in parallel could be used equally well. The only thing critical about the layout of the circuit is in the pi network. Here the only problem is to avoid inductive coupling between L_3 and L_4.

The transmitter is powered by a 12-volt lantern battery. Since the over-all efficiency is fairly good, battery life is several months under normal operating conditions. Total supply current is 150 to 200 ma.

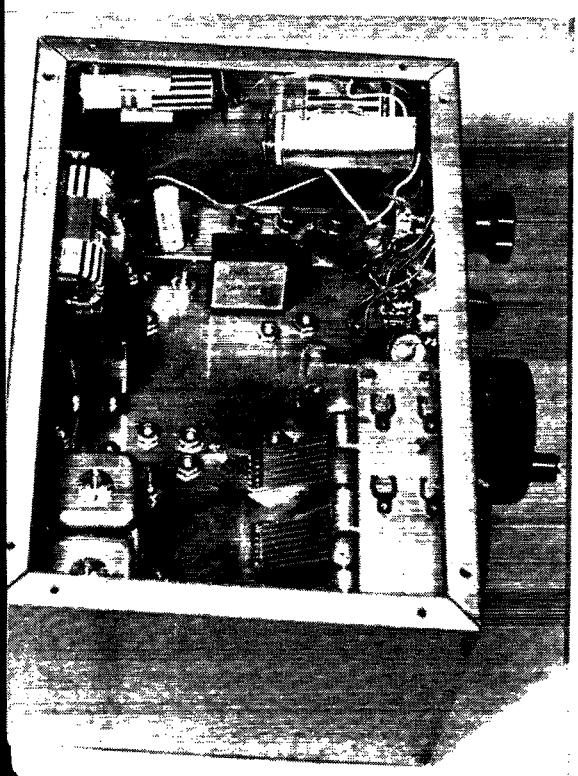
The transmitter is built in a 5 × 6 × 9-inch box to match the receiver. No chassis is used, as all of the parts are mounted on the walls of the box. The battery is internal for convenience. Although not shown in the circuit diagram, a wafer switch is included as a t.r. switch.

An external v.f.o. may be used by opening the circuit at the points marked with "X", and injecting the signal at the v.f.o. jack. About 50 milliwatts from the v.f.o. should drive the transmitter to full output.

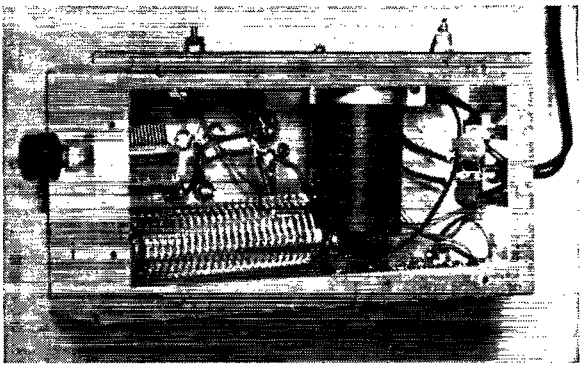
There are several adjustments in the transmitter. These include L_1, the coupling capacitor from the oscillator to the buffer, the capacitor tuning L_2, and the tap on L_2, as well as the pi-network capacitors. Adjustment procedure is quite simple. Place a 51-ohm 1-watt resistor across the output of the transmitter. Tune L_1 for stable oscillation and good keying characteristics as monitored in a communications receiver. The rest of the above-mentioned variables are adjusted for maximum power output as indicated by the r.f. output voltmeter. In changing antennas, only the two pi-network capacitors must be retuned.

The power output has been measured to be about one watt to a 50-ohm load. No heat sinks are used on the transistors. If they were used, the transistors could probably be driven to higher output.

The transmitter has been used at a number of locations with various antennas and pleasing results were obtained in each case. Twenty-three stations were contacted in a three-hour period during the last Field Day test. Using the home-station vertical, the best DX obtained was about 2000 miles (Kansas). The use of flea power has certainly been an enjoyable diversion for the author.



Interior view of the 40-meter transistor receiver. The antenna and r.f. coils and the crystals in the filter are along the rear wall of the box. The single crystal just below the audio transistor strip controls the b.f.o.



Interior view of the power r.f. amplifier with self-contained a.c. power supply.

The Power Amplifier

When the above transmitter was originally built, it was the author's belief that significant increases in power were impossible with inexpensive transistors. While this may be true at 50 Mc., it is certainly not the case at 7 Mc. as a search through an Allied catalog later revealed. Among a group of industrial transistors offered by Texas Instruments is the TI-486. For five bucks, this silicon transistor has the following ratings: V_{cbo} = 80 volts, P_c = 15 watts, F_{ab} = 25 Mc. Although this transistor is typically used as a servo amplifier, it performs quite well as an r.f. power amplifier at 7 Mc.

The amplifier circuit used is shown in Fig. 4. Following the "rut" established in the original transmitter, the common-base configuration is used. Since the amplifier was to be used at the home station with a flat 50-ohm line, a tapped coil is used in the output, rather than a pi network. The collector tap was chosen to give a usable tank Q and the output tap was found experimentally by measuring the peak r.f. voltage developed across a 50-ohm dummy load. A heat sink is a must, as the TI-486 is in a case which is smaller than some of the transistors in the receiver! A small commercial heat sink made by P.S.I. is used. A small piece of Mylar is used to electrically insulate the sink from the chassis. After buying the TI-486, it was realized that the TI-487 is the same transistor with a stud mount. A homemade heat sink should thus work well with the TI-487. While a power output of 10 watts has been obtained, the amplifier is normally operated with slightly reduced drive resulting in about 5 watts to the antenna.

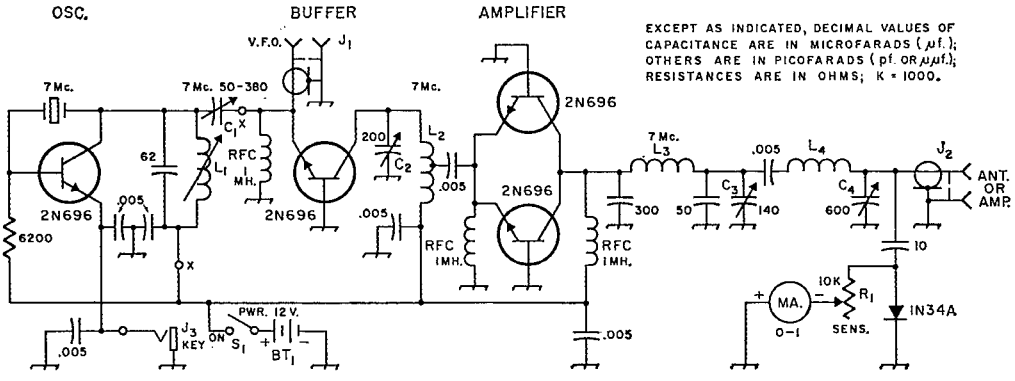


Fig. 3—Circuit of the 7-Mc. transistor transmitter. Fixed capacitors of decimal value are disk ceramic; others are mica. Fixed resistors are ½-watt composition. × indicates points where the circuit should be opened if a v.f.o. is fed into J_1.

BT_1—12-volt lantern battery (Burgess TW-2, or similar).
C_1—Compression trimmer.
C_2—Air variable (Hammarlund MC-200M, or broadcast-replacement type).
C_3—Air variable (Hammarlund HFA-140A).
C_4—Dual-section broadcast-replacement, sections in parallel, or see text.
J_1, J_2—Chassis-mounting coaxial receptacle.
J_3—Open-circuit jack.
L_1—Approx. 8 μh., 25 turns No. 28 enameled close-wound on ⅜-inch iron-slug form.
L_2—16 turns No. 20, 16 turns per inch, 1-inch diam. (Airdux 816 or Miniductor 3015). Adjust tap for max. power output.
L_3—40 turns No. 24, 32 turns per inch, ⅝-inch diam. (Airdux 532 or Miniductor 3008).
L_4—28 turns No. 20, 16 turns per inch, 1-inch diam. (Airdux 816 or Miniductor 3015).
R_1—Linear control.
S_1—S.p.s.t. toggle switch.

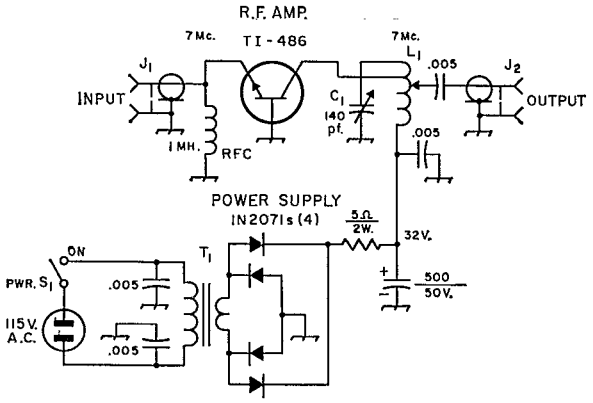


Fig. 4—Circuit of the power r.f. amplifier and power supply. Fixed capacitances are in μf. Fixed capacitors are disk ceramic, except where polarity indicates electrolytic.

C_1—Air variable (Hammarlund HFA-140A).
J_1, J_2—Chassis-mounting coaxial receptacle.
L_1—24 turns No. 18, 1-inch diameter, 8 turns per inch, collector tap at 5 turns from low-potential end.
S_1—S.p.s.t. toggle switch.
T_1—26.8 volt 1-amp. filament transformer (Triad F-40X).

The power supply used for the amplifier, whose circuit is included in Fig. 4, is self-explanatory. The amplifier draws 200 to 350 ma. from the power supply, depending upon the drive level. Using the components shown, additional power can be borrowed from the supply to run other equipment. With a 340-ma. load from the supply, the output voltage is about 32 volts.

The layout of the power amplifier is shown in one of the photographs. The two screws holding down the heat sink and the transistor are provided with insulating washers. The coax output connector is hidden under the variable capacitor. The power transformer is above the chassis.

Needless to say, the increase in power has resulted in better signal reports as well as better DX. For anyone contemplating building a similar amplifier for higher frequencies, it should be mentioned that the TI-486 does not work well at frequencies above 7 Mc. For operation through 21 Mc., the Fairchild type 2N2893 is suggested. The Motorola type MM800 should be satisfactory for still higher frequencies up through 50 Mc.

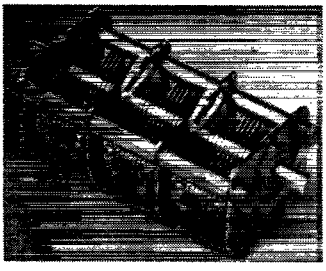
Acknowledgments

The author would like to thank Tony Medalen, W6CIE, for his help in testing the rig on the air. Special thanks go to Chuck Wilcox, K6DMW, for his suggestions and criticisms of the design, and for his continual encouragement. QST

• *New Apparatus*

Polar Precision Tuning Capacitors

If you're interested in a three-gang capacitor for general receiver applications (or one for the popular HBR series of receivers), the capacitor shown in the photograph is one of the best we have seen. This precision capacitor is manufactured by Wingrove and Roberts under the trade name of Polar and is available in this country through British Radio Electronics, Ltd., 1742 Wisconsin Avenue, N.W., Washington 7, D. C.



Although it may not be plain in the photograph, the capacitor shaft extends from both ends of the frame and is ball-bearing supported at both ends. This is the first instance we know of where a ball bearing capacitor is available to amateurs, at least through ordinary amateur parts sources. Because of the low torque requirements (6 oz. maximum), a light dial drive can be used with the capacitor and it won't be necessary to work out any stiffness in the mechanism.

Silver-plated rotor-contact brushes are provided on each gang to insure good electrical connection. As a matter of fact, the entire capacitor is silver plated. The stator insulation is ceramic. Rotor rotation is 360 degrees with no end stop.

Although the capacitor is manufactured in several capacitance ranges, only one model is presently stocked in this country. It is the model C28-143, straight-line capacitance, three gangs, each with a minimum of 5.5 pf. and a maximum of 28.8 pf.—quite satisfactory for most receiver applications.

One feature of this capacitor is that all sections are matched to close tolerances so sections all show the same capacitance at various angular positions.

Maximum dimensions for the capacitor are 1.532 inches wide and 3.028 inches long. The shaft extends ½ inch over this measurement at both ends.

—*E. L. C.*

Feedback

In the history section of *QST* for July, pages 67 and 68, it was correctly reported that W8DPY had been presented the first Paley Award, but the wrong emergency was cited as the reason. Mr. Stiles had performed outstanding service in the 1936 flooding of the Allegheny River at Renova, Pennsylvania. The fascinating story of his work is found beginning on page 8 of *QST* for July, 1937.

Using the

OSCAR III V.H.F.

Communication

Satellite

BY WILLIAM I. ORR,* W6SAI

OSCAR III, the third in a series of space communication satellites designed and built by radio amateurs, is being tested in a preflight prototype package in preparation for a launch during the winter months of 1964. The Oscar III satellite is a battery-powered high-frequency *translator*[1] operating in the internationally assigned 2-meter band (144-146 Mc.) in accord with the new amateur space allocation granted at the recent ITU Space Communications Conference held in Geneva.[2]

In brief, the Oscar III satellite permits two-way v.h.f. communication to be achieved by radio amateurs separated by the curvature of the earth (Fig. 1). The main portion of the transistorized equipment in the satellite listens to a 50-kc. segment of the 2-meter band centered about 144.1 Mc. and instantaneously translates this portion of the spectrum to a 50-kc. segment centered about 145.9 Mc., retransmitting the latter band segment to the ground observer. The

* Project Oscar Association, Box 183, Sunnyvale, California.

[1] Orr, "The Oscar III V.H.F. Translator Satellite," *QST*, February, 1963.

[2] Jacobs, "Amateur Radio and the ITU Space Communications Conference," *CQ*, January, 1964; "The Geneva Space Conference," *QST*, January, 1964.

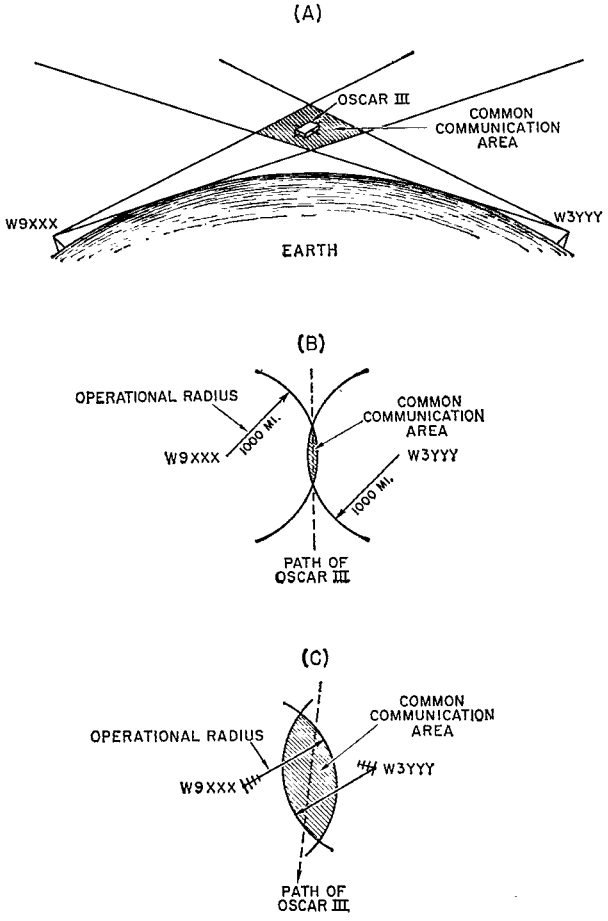


Fig. 1—(A) A common communication area exists between two v.h.f. stations communicating via Oscar III. The area depends upon the distance between the two stations and the operational range of each station.

(B) Two v.h.f. stations within 2000 miles of each other are theoretically able to communicate via Oscar III if the satellite orbit is about 120 miles above the surface of the earth. At such extreme range, however, the satellite traverses the common communication area in a matter of a few seconds.

(C) As Oscar III will probably have a north-south (polar) orbit, stations located on an east-west line will generally have a longer communication time than stations on a north-south line. The length of time Oscar III remains in the common communication area depends upon the distance between the stations and the angle the satellite cuts across the area.

satellite runs continuously, and an operational life of about one month is expected before the batteries expire. It is an aim of the Oscar Association eventually to launch a repeater of a similar nature with a higher orbit and longer operating life.

In addition to the wide-band translator, Oscar III will incorporate two beacon transmitters. The first beacon will transmit on 145.85 Mc., and the signal will be the well-known Oscar "HI" sent in Morse Code, followed by a burst of telemetering. Three separate measurements will be made within the satellite package and a simple system of pulse-width modulation will telemeter this information in sequence. The ground observer will be able to interpret the telemetered information with the aid of a 2-meter receiver and an inexpensive oscilloscope.

The second Oscar III beacon will transmit a continuous unmodulated signal on 145.95 Mc. and will be useful for those experimenters wishing to make experiments requiring a phase-coherent signal. The two beacon signals will bracket the 50-kc. spectrum which contains the output from the translator (Fig. 2).

Operational Range of Oscar III

The operational range of Oscar III depends, among other factors, upon the height of orbit above the earth. As this is unknown at the present time, it will be assumed to be about that of the earlier Oscar satellites (approximately 120 miles) until proven otherwise. Based on this figure and upon experience gained with Oscars I and II, a radius of ground reception of the satellite turns out to be *about* 1000 miles. Thus, two stations within 2000 miles of each other are theoretically just within communication range via Oscar III (Fig. 1B). At this distance, however, contact would be problematical, as the common communication area for both stations is extremely small. Stations 800 miles apart or less, however, stand a much better chance of communication as the satellite remains within the common communication area for a greater length of time. Stations located along an east-west line, moreover, will generally have longer common communication time, as the Oscar III satellite will probably have a north-south (polar) orbit. The length of time the satellite remains within a common communications area between two stations depends upon the distance between the stations and the angle at which the satellite cuts across the area. For short-distance contacts (stations separated by 500 miles or less, Fig. 1C) the satellite traverse time across the common communication area may be as much as six to eight minutes, whereas for extreme distances the traverse time may be a matter of only a few seconds.

Using Oscar III

Various types of experiments may be conducted by radio amateurs during the forthcoming flight of Oscar III. Passive, "listening experiments" are useful, as well as attempts to achieve two-way v.h.f. communication via satellite. In all cases, however, it is well to plan the operation in advance so that valuable time will not be lost during the period that the satellite is within radio range, estimated to be about eight minutes or less.

Telemetering Measurements: A more sophisticated form of telemetering is incorporated in Oscar III than was used in the first two amateur space satellites. The original Oscar beacon telemetered internal package temperature to earth by means of a temperature-sensitive element that varied the "HI" rate in such a way that a simple count of the rate by the ground observer could be translated into package temperature. The "HI" rate of Oscar III will be nearly constant and used only as an identifier, broken regularly by bursts of telemetering. The telemetering will consist of a series of pulses whose width will be a measure of the transmitted intelligence. Observing the ratio of pulse width to repetition rate on an inexpensive oscilloscope will provide temperature data. Several thermal points will be monitored within Oscar III and the measurements will be transmitted in sequence, as will be described in a future article. The Oscar Association requests temperature measurement reports by interested amateurs during the forthcoming flight.

Doppler Measurements: The 145.95-Mc. beacon may be used for Doppler data[3] by ground observers. The beacon emits a continuous, unmodulated signal, suitable for long-term measurements. It is hoped that some observers will maintain a 24-hour watch on this beacon, as various observations made on Oscar II point to unusual modes of propagation that permit extremely long distance reception of the satellite, well beyond the usual line of sight. A continuously-running receiver coupled to a tape recorder may very well turn up a permanent record of long-distance reception by as-yet-unexplained modes of v.h.f. propagation. In addition, Doppler measurements may be made on this beacon to determine orbital parameters and predictions of future passes.[4]

[3] Norgaard, "Eyeball and Eardrum Doppler Tracking," *QST*, April, 1962 and June, 1962.

[4] Burhans and Rankins, "Keeping Track of Oscar," *QST*, May, 1962. Hilton, "Making Your Own Orbital Predictions from Doppler Measurements," *QST*, March, 1962.

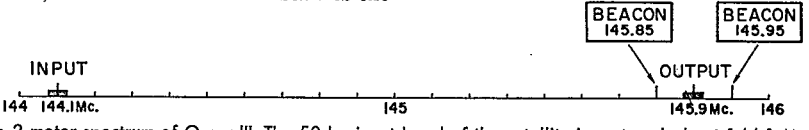


Fig. 2—The 2-meter spectrum of Oscar III. The 50 kc. input band of the satellite is centered about 144.1 Mc. The corresponding output band is centered about 145.9 Mc. (inverted). Beacon transmitters are on 145.85 Mc. and 145.95 Mc., bracketing the output band.

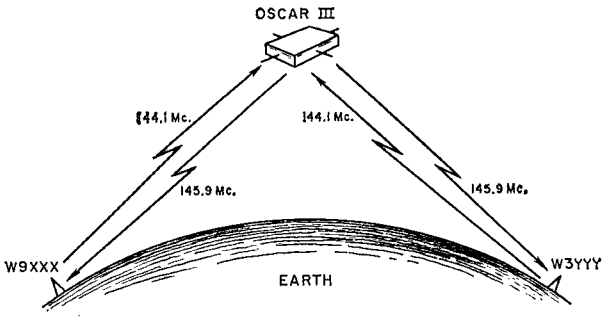


Fig. 3—Oscar III translates a v.h.f. signal from 144.1 Mc. to 145.9 Mc. Signals may pass both ways simultaneously through the repeater, which operates continuously during the life of the battery. Oscar III inverts the received signal so that the transmitted sidebands are reversed within the satellite, thus reducing the combined Doppler shift to a value never greater than that observed by a simple one-way satellite-to-earth transmission.

Passband Monitoring

The translation equipment in Oscar III will run continuously. When the satellite is in a quiescent state (no signals being received) the output of the translator consists of circuit and received noise, and may be readily identified by the ground observer as a hiss or "white noise" which covers the 50-kc. output frequency spectrum. The satellite may, in fact, be readily identified by this unique noise. When a v.h.f. signal of sufficient strength to activate the a.g.c. system of the satellite falls within its input passband, the output noise drops and the translated signal may be heard by a ground observer monitoring the output range of 145.875–145.925 Mc. As the satellite passes by, ground observers may tune back and forth across this range, logging signals within the passband that are repeated by Oscar III. Even though the observer possesses no transmitting equipment he will be capable of making a valuable contribution to the Oscar program by monitoring the passband and logging all signals heard within the band. Copies of such logs should be sent to Project Oscar, Inc., Box 183, Sunnyvale, California, U.S.A.

It should be noted that signals passing through the translator portion of Oscar III and received on earth will be subject to a Doppler shift occuring over two different paths. That is, the received signal will be a victim of Doppler shift as a result of the two-way transmission inherent in this system (Fig. 3). The translation circuitry of Oscar III inverts the received signal so that the transmitted *upper* sideband of a ground transmitter will be repeated back as the *lower* sideband to a ground observer. This is done to reduce the combined Doppler shift to a value never greater than that observed by a simple one-way satellite-to-earth transmission.

It is possible, of course, that nearby ground-based signals occupying the satellite output frequency range may cause interference with the repeated satellite signals. It is hoped that radio amateurs will stay clear of the Oscar III output frequencies during the pass time in a given location. Nontranslated earth signals in the output passband may be hard to identify although they will have no Doppler shift. Satellite-repeated signals generally will exhibit some degree of Doppler shift, but this may be less than the frequency drift commonly seen with many v.h.f. rigs using overworked surplus crystals!

Two-Way Satellite Communication

The primary purpose of Oscar III is to permit two-way radio amateur translator satellite communication beyond the normal v.h.f. range. Maximum communication distance is limited by the orbital height of the satellite, which will be unknown until after launch, but it is hoped that transcontinental or transoceanic contacts may be had by well-prepared radio amateurs. Experiments conducted by amateurs living in the San Francisco area with a preliminary Oscar III model, mounted atop a tower at the home of W6VMH, proved that the satellite permitted satisfactory two-way communication *provided* the users knew what they were doing and coordinated their efforts. Many of the users of the earth-bound Oscar repeater during this preliminary test were Oscar Association members, well versed in the working of the equipment, yet the thrill of the moment and the excitement of using a spectrum repeater led to chaos, confusion and unwanted interference until some form of discipline was planned in advance and a method of use established. It must be remembered that the output power of Oscar III, approximately one watt, will be shared by all the signals passing through the repeater. As more signals pass through Oscar III at one time, a point will be reached where each signal commands such a small part of the available output power that none of the signals is usable by the ground observer. The output spectrum of the satellite then becomes a confused, mumbling mass of "garbage." This may be expected to occur within range of areas of heavy v.h.f. population during week ends when many stations may try to use the repeater. At other times, only a few signals will pass through the repeater as it orbits over other areas of the world.

One suggested means of making optimum use of the Oscar III repeater is to take advantage of the "buddy" system. This requires two amateurs to act as a team, with a predetermined operation sequence, or "script." A joint effort will help to ensure that when Oscar III appears over the radio horizon an attempt at two-way communication may be made under circumstances that will encourage success.

For illustration, let us assume a hypothetical pass of Oscar III between two v.h.f. stations that desire to achieve two-way satellite communication. The problem is defined in this manner:

1. When does the satellite approach the proper position between the two stations, and how long will it remain within radio range of both stations?
2. What will be the line of position of the satellite between the stations as it moves along its orbital path?
3. What should be the transmitting frequency of each station, and to what frequency should each station receiver be tuned in order to hear the satellite-repeated signal of the other station?
4. At what critical times will each station listen and transmit?

It would be reasonable to assume, until proven otherwise, that calling CQ at random and "looking across the satellite band" for a contact would be asking too much; at least until the would-be satellite DXer has experience gained in a prearranged schedule with a reliable, not-too-distant v.h.f. companion. The greatest chance of success would seem to stem from a predetermined sequence of operation enacted between two coordinated "buddy stations" who have practiced their *modus operandi* aided, perhaps, by pre-launch low-frequency coordination schedules or by mail.

The Oscar Association emphasizes that Oscar III experiments in two-way communication differ in one important respect from other v.h.f. communication experiments conducted in the past by radio amateurs. Previous long-distance communication efforts based on propagation anamolies depended heavily on chance or luck for success. If the atmospheric diffraction was right; if the microwave duct was established; if the signal scattering was effective; if the unknown mode of propagation worked — the fleeting two-way contact was established on a hit-or-miss basis. Hours (or years) of work, largely with unknown, random factors, contributed to success.

This heuristic (cut-and-try) philosophy is absent in Oscar III. If launch is successful and the satellite equipment functions properly, alert radio amateurs using the proper operating techniques and equipment at the proper time and frequency can achieve two-way repeater communication. Propagation anamolies have little to do with it; Oscar III is a "go, no-go" bird and affords predictable success to those amateurs using it in a knowledgeable fashion. Communication via Oscar III is not something you *try*, it is something you *do*!

The Oscar Association will do its utmost to provide accurate and up-to-date tracking information. In addition, v.h.f. amateurs and clubs who tracked the earlier Oscar satellites are urged to generate and disseminate their own tracking information for local consumption.

A QSO Via Oscar III

By way of example, let's eavesdrop on a hypothetical 2-meter QSO via Oscar III. Remember, one of these stations may be *you!* Our two heroes are W9XXX in central Illinois, and W3YYY in western Pennsylvania, situated about 500 miles apart, on an east-west path. Each station is equipped with a stable, low-noise 2-meter receiver, accurately calibrated in kilocycles across both the input and output ranges of the Oscar III satellite. In addition, each station is equipped with an auxiliary "early-warning" receiver, tuned to 145.95 Mc., the c.w. beacon frequency, or to 145.85 Mc., the telemetry beacon frequency.[5] The receivers may consist of two v.h.f. crystal-controlled converters feeding a stable low-frequency communications receiver.

Each station is equipped with a 100-watt output crystal-controlled 2-meter transmitter, the frequency of which is known to a kilocycle. In addition, each station has a medium-gain Yagi antenna (5 elements, approximating 10 decibels) rotatable in azimuth only, controlled by a second operator whose job is to keep the beam antenna aimed on the satellite by virtue of the early-warning receiver tuned to a satellite beacon signal.

Information from the Oscar Communication Center has notified our two DX-perts that the satellite will pass approximately between them, on a north-south path during the time period of 1400-1407 GMT. The tactical situation is shown in Fig. 1C. W9XXX aims his antenna to the east of north, and W3YYY aims his antennas to the west of north.

Both stations have agreed beforehand to transmit on 144,110 kc. plus or minus one kilocycle. They know that the Oscar III translator will invert their signals and retransmit them back to earth on 145,890 kc., ten kilocycles lower than the center frequency of the output range. Initially, it is decided that W9XXX will start transmitting when he first hears the beacon signal, while W3YYY will listen for W9XXX at the proper satellite repeated frequency of 145,890 kc. As a starter, therefore, the early-warning receiver of each station is tuned to the satellite beacon frequency of 145.85 Mc. and the communication receiver is tuned to 145,890 kc. As the fateful hour approaches when Oscar III comes within range, the two stations quickly run through their individual "scripts":

1. Clock properly set to GMT? Yes.
2. Communication receiver tuned to 145,890 kc.? Yes.
3. Early-warning receiver properly tuned to 145.85 Mc.? Yes.[6]
4. Antennas positioned in the proper direction? Yes.
5. It is known that Oscar III will approach the common communication area at 1400 GMT on each station's clock, and it is agreed that W9XXX will start transmitting as soon as he hears the beacon. Since he knows that W3YYY will hear the beacon at almost the same instant, he has decided to transmit for 30 sec-

[5] In this article, satellite frequencies are given in megacycles, and ground station frequencies are given in kilocycles.

[6] In this type of short-distance pass, with the satellite between the stations, the over-all Doppler shift through the translator will be very small.

onds, then he will listen for one minute at 145,890 kc.

Each station is ready. The growing tension is broken by the second operator at W9XXX announcing he has heard and identified the c.w. beacon of the satellite! The tape recorder is started, and a few seconds later, reception of the beacon is verified at W3YYY. The time for the record-making QSO is at hand! According to the prearranged plan, W9XXX starts to transmit, calling W3YYY on 144,110 kc. with slow, steady c.w., one eye on the GMT clock. Five-hundred miles to the east, the second operator of W3YYY tracks the satellite beacon while the first operator tunes a few kilocycles above and below the repeater frequency of 145,890 kc. He hears the "white noise" of Oscar III, and carefully listens for the c.w. signal of W9XXX retransmitted back to earth via the space craft! Success is almost at hand when he finally hears a portion of W9XXX's transmission, clearly audible above the "white noise"!

When the 30 seconds are up, W9XXX signs over and starts to listen near 145,890 kc. for W3YYY, while the second operator at W9XXX faithfully continues to track the satellite beacon with the early-warning receiver, making any necessary adjustments to the beam antenna to hold the beacon signal at maximum strength. W3YYY is calling W9XXX on c.w., and shortly, the operators of the latter station are thrilled to hear the translator-repeated signal of W3YYY calling them close to 145,890 kc.! W3YYY passes a signal report to W9XXX and the QSO starts to resemble a normal low-frequency contact. Finally, during W9XXX's reply, both second operators note that the satellite beacon signal is going out of range, and sure enough: contact between the two stations is abruptly lost as Oscar III dips below the radio horizon. The first QSO via Oscar III satellite has been successfully completed! The record-making QSO, moreover, has been recorded on tape at both stations and has become a permanent record of the unique accomplishment.

This, then, is one way the first contact via Oscar III may be expected to be made. No doubt, sooner or later, some amateur will call CQ and receive an answer at random via the satellite. It is hoped, moreover, that trans-oceanic and trans-continental QSOs will be achieved by this unique repeater satellite. As this is the first time such an experiment has been undertaken, all prophesies and predictions are, of course, based upon intelligent guesswork and may prove to be invalid. The possibility exists that the satellite may be badly overloaded near areas of intense v.h.f. activity and remain silent but receptive over areas of the world where little v.h.f. activity is present.

Remote-area "Beacons"

It is hoped that amateurs in areas of the world having little v.h.f. activity will supply beacon signals that will activate the satellite to alert other, distant observers. A v.h.f. beacon transmitter in the Azores, for example, may activate Oscar III over the North Atlantic area so that such passes may be heard on both sides of the Atlantic. A similar beacon near the Fiji Islands and one near India will activate the satellite over Pacific and Asian areas.

It is readily apparent that this new adventure of amateur radio is a voyage into the unknown, and no member of the Oscar crew really knows all the answers, or has a complete picture of the capability of Oscar III. Surprises for all will be in store when Oscar III goes into orbit, and radio amateurs worldwide join Project Oscar in looking forward to a successful launch and an exciting and useful life for this 30-pound package of surprises.

Acknowledgement

Thanks to Don Nargaard, W6VMH for advice and assistance in the preparation of this article. QST

25 Years Ago *this month*

August 1939

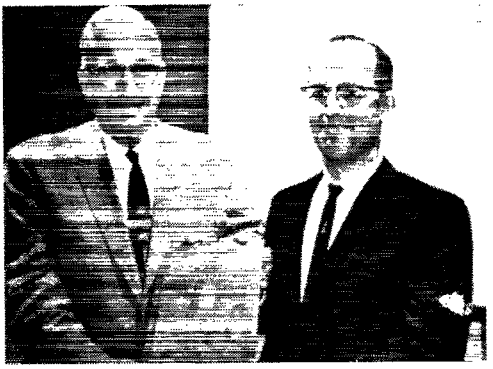
Five variations in compact portable-emergency transmitter design were described, among them a "QRR Rig — 1939 Model," designed by W9TMY (now W6TMY), who informs us that this rig is still in operating condition!

. . . W1DSK wrote on the electrical and mechanical characteristics of polystrene and how it could be used in amateur equipment.

. . . Hints & Kinks included a code-practice machine made from an old phonograph spring motor, some cheap relays for keying, link neutralizing for low-capacity tubes, and some suggestions for operating portable transmitters.

. . . Other technical articles included frequency modulation fundamentals, a low-pass filter for time-delay circuits, a two-band, five-element rotary, and a rig for 5 and 10 meters, suitable for home or car. QST

Strays



Atlantic Division Director W3YA (left) presents the Cover Plaque award for April to K3CFA for his article on a low-noise 2-meter converter.

• QST Article Contest Winner

Help a Ham

BY CARMEN J. DIODATI,* K3PXT

THE interest in amateur radio operating is growing by leaps and bounds. This is evidenced by the increase in the number of licenses issued in the past few years and the number of schools which offer amateur radio courses as an adult education curriculum. For example, in a suburban community of Philadelphia three schools are located within a five-mile radius, with an average class of 40 pupils. Simultaneously local radio clubs have developed courses for those whose goal is to become an amateur operator. Add to this the many individuals who are striving on their own to earn a license.

As these people become licensed they introduce others to the hobby and these in turn still others, and so on it goes, pyramiding the number of amateur radio operators as never before. This, of course, can be considered an asset, for in greater numbers there is greater strength; above all it contributes to the economy of the country and the moral well-being of the community.

On the deficit side of the ledger, the majority of these new amateurs enter a very complex field, with very limited knowledge. Most are aware of their limitations and strive to learn more about this new, fascinating field. They subscribe to periodicals, buy books, purchase tools and test equipments and in most instances endeavor to put this mass of confusion into something they can understand and do — only to become more confused, bewildered and uncertain.

The very important and comforting aspect of the situation is this desire to learn. The disturbing aspect is the discouraging results obtained for the efforts expended. The new amateur would like to see and feel the results of his new-found knowledge; very few can do it alone.

In the early days of amateur radio the only door to an operator's license was through another amateur. The aspiring ham was helped with the code and the necessary theory, and above all he was helped with his station. He learned by doing, with the constant guidance of the ham. The aspirant learned how to use the *Handbook*, read schematics, how to lay out his parts and why, and in debugging his station he learned how to trouble-shoot.

By the time the amateur was licensed a year he was self-sufficient — the more he applied himself the more proficient he became, and as he progressed, the greater asset he became to amateur radio, his community and his nation. Many amateurs are anxious to learn more than to operate. They want to learn how to build, how to trouble-shoot and how to apply the theory they have learned. They must, however, have guidance and help from the more competent and capable ham.

This help can be a result of club projects in building, where the uninitiated in the art of homebrew learn from the experienced artist on simple, but useful items, which when completed result in a personal pride of accomplishment and the desire to build something else.

This help can also be achieved as a result of increasing the contents of periodical articles to more than a circuit diagram and a description of the unit, but a complete layout of the chassis with parts placement, and a means of operational checking as each stage is wired and completed. When a unit with several stages is completely wired, locating errors in wiring and other difficulties becomes a problem for the expert, let alone the inexperienced ham. Above all, once the amateur meets with some degree of success on a construction project, the confidence he gains in himself and his ability will spur him on to greater efforts and greater achievements.

The best way of course to develop a better ham is by personal contact; if he has built something which doesn't work, help him in whatever way *you* can, keep him interested, whether it be advice, information or actually working on the unit. If he has never built anything, suggest that he does and help him — teach him to wire, solder, read schematics and how to use the *Handbook*. Encourage him in every way . . .

Help a fellow ham to improve his capabilities and his knowledge, and he in turn will help others; the result, a pyramiding of more competent, more versatile, more useful and happier hams.

QST

QST ARTICLE CONTEST

As a feature of the ARRL's 50th Anniversary Year, readers are invited to become writers, and submit entries for the monthly Article Contest.

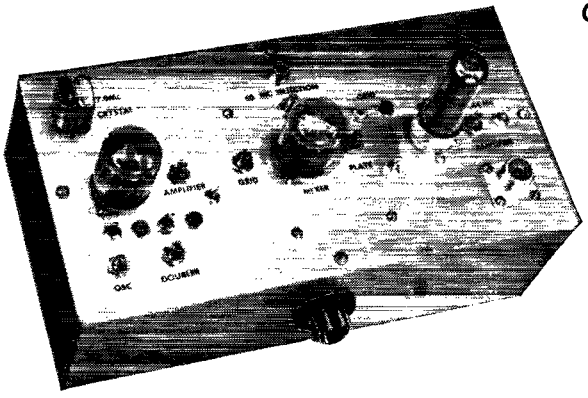
The author of the article selected by *QST*'s staff as the best each month for the remainder of 1964 will receive a $25 U. S. Savings Bond. This month's winning entry is by K3PXT.

Complete rules and some subject ideas appeared on page 49 of *QST* for February.

* 93 N. Hilltop Drive, Churchville, Pa.

Heterodyne Exciter for 144 Mc.

Generating a 2-Meter Signal with a 6-Meter Source



BY EDWARD P. TILTON,* W1HDQ

Fig. 1—Conversion unit for duplicating a 50-Mc. signal on 144 Mc. Two tubes at the left and center comprise the oscillator, multiplier, amplifier and mixer stages. At the right is the 144-Mc. output amplifier. Provision is made for metering all stages by means of tip jacks and test points. Note crystals taped together to prevent loss of the one not in use.

THIS three-tube r.f. unit was built primarily to develop s.s.b. drive on 144 Mc. with 50-Mc. excitation from a Heathkit HX-30 sideband rig,[1] but it can be used advantageously in several other ways. It will reproduce a 50-Mc. signal of any type of emission on 144 Mc. Its performance emphasizes the worth of heterodyning as a means of operating on more than one band with a single frequency-control source.

The oscillator-multiplier-amplifier approach normally employed in v.h.f. transmitters multiplies any oscillator instability. As a result, even quite good v.f.o. control on 8 Mc. may sound very fuzzy after it is multiplied 18 times to 144 Mc. If the usual v.f.o. is to be used for both 50 and 144 Mc. it must have a wide tuning range, with separate segments for each band, or incorporate band switching. In heterodyning from 50 to 144 Mc. a single tuning range for the v.f.o. suffices for both bands. If the 50-Mc. source also employs heterodyning, as in the author's case, the stability and calibration accuracy on both 50 and 144-Mc. are as good as the oscillator design in the 50-Mc. exciter permits. The result is sideband, c.w. or a.m. operation on two v.h.f. bands with stability and handling ease as good as usually found in gear for 20 or 75.

How It's Done

The conversion process is similar to that used in all superheterodyne receivers, and identical to that needed for a 144-Mc. converter intended for use with a tunable 50-Mc. receiver. In fact, the first stages of our unit could be used for converter injection in this way, as was done by W7LHL in a similar conversion job described recently.[2] Our heterodyning signal is on 94 Mc. This is fed to the grids of a mixer, the cathodes of which are driven on 50 Mc. The two frequencies add, providing 144-Mc. output in the mixer plate circuit. (The mixer would also provide 94 *minus* 50, or 44 Mc., but this product is rejected by the tuned circuits.) The output signal can be c.w., a.m. or sideband — or whatever else you care to generate on 50 Mc.

That's all there has to be to it. The mixer will drive a substantial following amplifier, and substitution of a larger mixer tube would make it possible to drive a kilowatt amplifier directly. We preferred a more conservative approach on several counts. The utmost in stability and linearity is important in sideband work, so we set up all our stages to run very lightly. Protection against radiation of energy on unwanted frequencies is improved by the additional tuned circuits. Finally, we wanted a band-pass type of response in the conversion unit, so as to operate over at least 144 to 146 Mc. with a minimum of retuning. The extra stages insure this; we can change crystals in the conversion unit and run the 50-Mc. excitation over a 1-megacycle range without more than a touch-up of the tuning.

Choice of Tubes

Stage functions are simple and operation is at a low power level, so many different tubes could have been used. If you have a stock of 6J6s or 6AK5s, for example, you could do the whole job with them. Many single and dual tubes would serve for the oscillator and multiplier stages, and

* V.h.f. Editor, *QST*.

[1] Recent Equipment, "The Heathkit HX-30," May 1963, *QST*, p. 51.

[2] Manly, "Two-Meter Transverter," September 1963, *QST*, p. 28

there are several other possibilities for the mixer and output amplifier. The Compactrons finally selected for the conversion portion combine five basic stage functions in two tube envelopes. The 6M11, V_1, is essentially a 12AT7 dual triode and a 6EW6 pentode in one assembly. The 6AR11, V_2, is the equivalent of two 6GM6 pentodes. With a plate dissipation capability of 7 watts it makes a good transmitting mixer.

With the above information and a table of tube characteristics you can draw up a formidable list of tube combinations that would do the job we've done here. In fact, we spent the better part of a day in this kind of speculation after the approximate circuit had been roughed out. An incidental dividend from the Compactron selection: the two tubes cost less at current catalog prices than any combination of older and simpler types. Surplus sources or stock on hand could change this picture, obviously.

For the output amplifier any larger dual

Fig. 2—Schematic diagram and parts information for the heterodyne unit. Decimal values of capacitance are in microfarads (μf.); others in picofarads (pf.). Unless otherwise indicated, fixed capacitors are ceramic. Resistors are composition, ½-watt, unless specified.

B_1—22½-volt miniature battery (Eveready No. 412).
C_1—15-pf. miniature trimmer (Hammarlund MAC-15).
C_2, C_3—10-pf. miniature trimmer (Hammarlund MAC-10).
C_4—3-30-pf. mica trimmer.
C_5, C_7—8-pf. per section miniature butterfly (Hammarlund MACBF-8).
C_8—30-pf. miniature trimmer (Hammarlund MAC-30).
C_9, C_{10}, C_{11}, C_{12}, C_{13}—500-pf. feedthrough bypass (Centralab FT-500). Cover exposed ends with ⅜-inch lengths of spaghetti when not in use for metering.
C_{14}—500-pf. button-mica.
C_{15}—20-pf. miniature trimmer (Hammarlund MAC-20).
J_1, J_2, J_3, J_4 — Insulated tip jack.
J_5—Coaxial receptacle, SO-239.
J_6—Phono jack or coaxial receptacle.
L_1—6¼ turns No. 24, ½-inch diam., 32 t.p.i. (B & W 3004).
L_2, L_3—3¾ turns, like L_1.
L_4—6 turns No. 20, ¼-inch diam., one inch long.
L_5—3 turns, like L_1.
L_6—2 turns each side, No. 20, ½-inch diam., 16 t.p.i., center-tapped. Make from single piece of B & W 3003, cutting all but one plastic strip. Leave ⅜-inch space at center.
L_7—4¼ turns No. 20, ½-inch diam., 16 t.p.i., center-tapped (B & W 3003).
L_8—Like L_6, except ½-inch space at center.
L_9—Like L_6, except ⅜-inch space at center.
L_{10}—One turn insulated hookup wire inserted halfway into center of L_9. Leads are 1½ and 2 inches long.
L_{11}—5 turns No. 24, ½-inch diam., 32 t.p.i., tapped 2 turns from ground end (B & W 3004).
L_{12}—2 turns made from same piece as L_{11}, spaced 4 turns away; cold ends adjacent.
RFC_1—No. 28 enam. close-wound full length of ½-watt 1-meg. resistor. (Any ready-made 144-Mc. r.f. choke is suitable).
RFC_2, RFC_3—Ferrite-bead r.f. choke, 1.3 μh. (National R-45-251) No. 24 enamel wound full length of 1-watt resistor also usable.
Y_1—Third-overtone crystals, 47.0 and 47.5 Mc. (International Crystal Mfg. Co. FA-5 or FA-9). Tape together, opposite ends up, to prevent loss of one not in use.

tetrode could be substituted for the 6360. We tried an 8458, a new dual tube by Amperex, much like the 6360 but with about twice the ratings. Anything up to at least a 5894 should work well to make the conversion unit a complete medium-power transmitter in itself.

Circuit and Layout

The schematic diagram, Fig. 2, and the bottom view, Fig. 3, may be "read" from left to right. First we have a simple triode crystal oscillator, V_{1A}, on 47.0 or 47.5 Mc., depending on the crystal, Y_1. The 47-Mc. plate coil, L_1, and its tuning capacitor, C_1, are in the upper left corner of the picture. The second triode of V_1 is a doubler to 94 or 95 Mc. Its tuned circuit, L_2C_2, is seen adjacent to the oscillator, but with its axis perpendicular to L_1. Inductively coupled loosely to L_2 is L_3, the grid circuit of a 94-Mc. amplifier, V_{1C}. On the right side of the first tube is the amplifier plate circuit, L_5C_3, straddled by L_6, the split grid coil of the mixer, V_2. Below the mixer tube is the 50-Mc. input circuit connected to the mixer cathodes.

From here on the layout and circuit look like any other low-powered 144-Mc. transmitter. The amplifier grid coil, L_8, is purposely made too small to resonate in the 144 to 146-Mc. region with the input capacitance of the 6360, V_3. Being on the high-frequency side of resonance, it offers little feedback coupling to the output circuit, even though there is no shielding between the two. The amplifier plate circuit, L_9C_7, is at the far right. Output is taken off through a series-tuned link, $L_{10}C_8$.

Positioning of the various coils is important. Note that coils are placed so that unwanted coupling between circuits is kept down, even with a fairly compact layout. It is suggested this principle be followed unless the builder is willing to cope with a new set of neutralization problems.

The oscillator and doubler circuits are standard practice. When we got to the grid circuit of the 94-Mc. amplifier, we found that the input capacitance of the 6M11 pentode was too high to permit resonating L_3 at 94 Mc. in the usual way. Some checks with a variable series capacitor showed that a coil the same size as in the previous plate circuit could be resonated at 94 Mc. with about 10 pf. in series, so the fixed capacitor shown in Fig. 2 was used. Only a small amount of energy is needed for the mixer grids, so neither the tuning nor the coupling between circuits is at all critical.

Getting the 94-Mc. amplifier to operate in a stable manner was mainly a matter of achieving ground potential for r.f. at the screen. This was done with the series circuit, L_4C_4, the setting of which is not particularly fussy. Coupling between L_5 and L_6 should be adjusted to the minimum that will provide satisfactory output from the mixer. Make sure that both circuits actually tune, as it is possible to get enough output with one or the other not actually peaking. Best rejection of unwanted frequencies will not be assured unless the circuits are tuned to the desired frequencies.

Coupling between L_7 and L_8 should also be as loose as it can be and still provide adequate drive for the 6360. Drive requirements depend on the class of operation of the output amplifier. For anything but Class-C conditions adequate

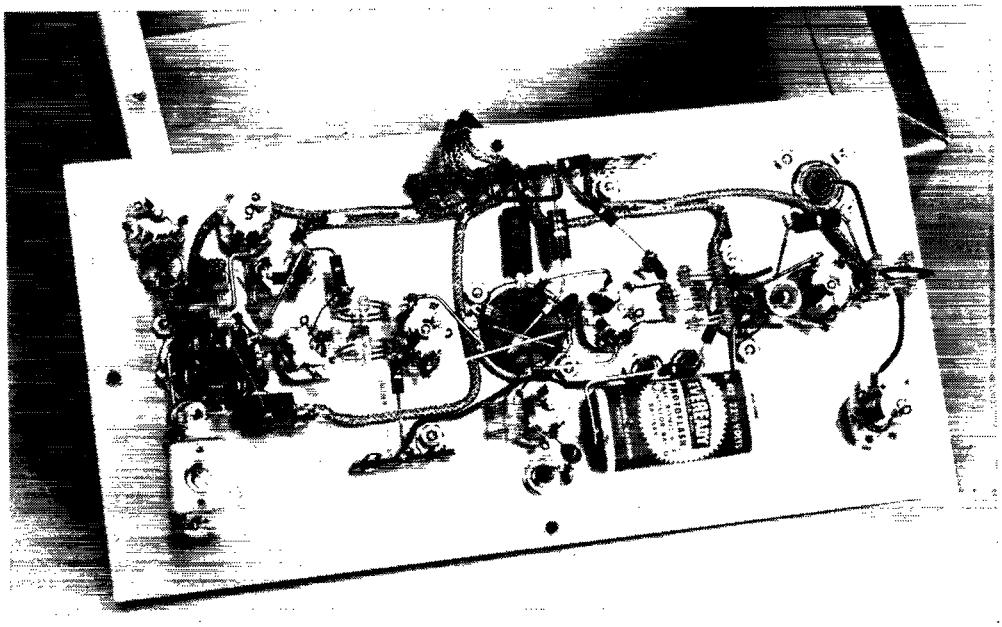


Fig. 3—Interior of the 144-Mc. heterodyne exciter. 47 and 94-Mc. circuits are at the left, the mixer in the center, and 144-Mc. amplifier at the right.

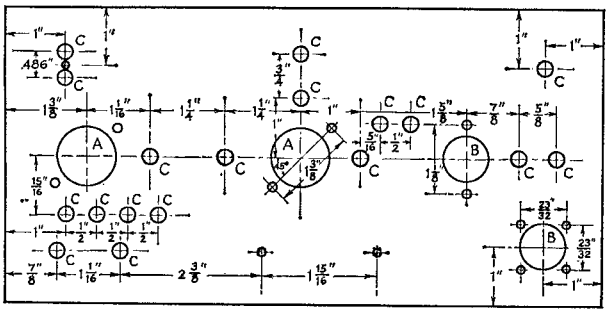


Fig. 4—Layout drawing showing principal hole locations and sizes, for those wishing to make a duplicate unit. Hole sizes: A—1 inch, B—¾ inch, C—¼ inch; others ⅛ inch. Chassis and plate are 5 by 10 inches.

drive is very easily achieved. Here again, be sure that L_7 actually tunes *through* the desired frequency, in order that rejection of unwanted frequencies will be at a maximum.

Construction is on a standard 5 by 10-inch aluminum plate and 3-inch chassis. A layout drawing, Fig. 4, is given for those who wish to make an exact duplicate. We wanted to be able to check every circuit during the adjustment phase of the project, so an unusual combination of feedthrough bypasses and tip jacks was used. Oscillator plate current is measured by plugging a meter into J_1 and clipping to the exposed terminal of C_9. All other plate currents may be read by plugging one side of the meter into J_2 and connecting to C_{10}, for doubler plate current, C_{11}, for 94-Mc. amplifier plate current, C_{12}, mixer plate and screen current, or C_{13}, amplifier plate and screen current. Amplifier grid current, if any, is checked at J_3 and J_4. A table of operating conditions is given later.

Bias for the mixer and output amplifier is obtained from a small 22½-volt battery. Builders may prefer some other bias source, but the battery does the trick simply and inexpensively. There is no current drain, and it may even be charged a bit when the amplifier runs into Class-C conditions, so life should be long and voltage constant. Just be careful not to short out the battery when working on the unit. It is too small to stand such treatment for long.

The 6360 amplifier operated satisfactorily without external neutralization, but a small amount was added when a slight reaction on amplifier grid current was noted as the plate circuit was tuned through resonance with voltage off. The grid and plate leads are crossed over inside the 6360, providing inherent neutralization in the v.h.f. range, so only a tiny amount of additional capacitance is needed. A half-inch wire is soldered to each grid terminal, and bent over toward the adjacent plate terminal. The position is adjusted until reaction on amplifier grid current is eliminated. For circuit simplicity, this neutralization is not shown in Fig. 2.

Options, Good and Bad

Our first version used only the two Compactrons. Output from the mixer was sufficient to drive our February *QST* linear[3] to about 250 watts output on 144 Mc. Since the mixer was then running only 5 watts input, it could have been pushed further. We liked using an amplifier stage instead, as this gave us output on 144 Mc. at about the same level as the HX-30 gives on 50 Mc. We thus have a nice two-band setup for sideband, a.m. or c.w. adequate for Field Day and the warm-weather v.h.f. parties, when we like to take to the hills with v.h.f. gear that will run effectively on a small portable generator.

It should not be taken for granted that the heterodyning approach is for the sideband operator alone. Given any of the popular small 50-Mc. transmitters, homebuilt or commercial, this heterodyne unit will duplicate its signal on the 144-Mc. band at a comparable power level. You'll need no big batch of crystals or two separate v.f.o. units to give coverage of both bands. If you're a Technician or Novice at present, use only the 47.5-Mc. crystal in the oscillator-multiplier. Heterodyning from 50-Mc. frequencies will start your coverage at 145 Mc. A crystal that gives operation on 50.2 Mc. will put you on 145.2 Mc., and so on. A v.f.o. that covers 50 to 51 Mc. (not for Novice use, of course) will give you coverage of 145 to 146 Mc., which can be extended to 144 Mc. with the insertion of the 47-Mc. crystal at a suitable time.

The output stage of the conversion unit can be run as a linear amplifier for sideband, c.w. or a.m., or it can be driven into Class-C conditions for higher efficiency on c.w. Plate modulation may be applied in the usual way for high-efficiency a.m. service. The linear way will probably be the more attractive to most users, however, as it eliminates the heavy and power-consuming audio equipment. If your 50-Mc. rig is plate modulated, you can make provision for switching the audio power over from its final stage to that of the conversion unit.

Initially we ran the 50-Mc. energy into the mixer grids and applied the 94-Mc. injection to the cathodes. This worked and we had it on the air for an evening, but it was easy to saturate the grids with the swinging drive from the 50-Mc. sideband rig. With the circuits swapped around as shown, the mixer takes the full output of the HX-30 (about 2 watts a.m. or 6 watts s.s.b.) without flat-topping. Output is several times what it was with the other arrangement, and linearity is extremely good. Every circuit tunes uncritically, and it is possible to set up the

[3] Tilton, "Kilowatt Amplifiers for 50 and 144 Mc.," February 1964, *QST*, p. 11.

works almost on-the-button merely by peaking the circuits to approximate frequencies with a grid-dip meter.

Adjustment and Use

The various operating voltages are brought to a terminal strip visible in the upper center portion of Fig. 3. In firing up the unit we applied plate power to one stage at a time, beginning with the oscillator. This stage works simply, showing the usual sudden downward kick in plate current from about 12 to 5 ma. when the crystal starts oscillating. Set C_1 so that oscillation starts every time voltage is applied.

If you have a grid-dip meter you can set all following circuits close enough without applying power to the unit. The dip meter can also be used to indicate power output relatively from the various stages, and to determine that output is on the desired frequencies.

The pentode amplifier should be checked for stability by removing power from the preceding stages briefly and watching the doubler plate current while tuning C_3. Should any fluctuation appear, adjust C_4 to stop it.

We are now ready to "mix" and to obtain output on 144 Mc. Feed 50-Mc. power into J_6. With power on the two Compactrons, check for output on 144 Mc. at L_7. A pilot lamp connected to a loop of insulated wire wrapped around L_7 may be used temporarily as an output indicator. When output has been obtained, connect a one-ma. meter to J_3 and J_4, and look for amplifier grid current. Leave plate and screen voltage off the 6360 for the moment.

The lead from J_3 can be removed from the negative terminal of the bias battery and connected to the chassis, to make it easier to obtain grid current for purposes of adjustment, if necessary. Peak all adjustments for maximum grid current, making sure that this drive is on the desired frequency. You'll need something larger than a one-ma. meter if everything is working correctly, or you can reconnect the bias battery once you have obtained a reasonable current reading. Operation of the amplifier from here on is exactly like it would be in a conventional transmitter.

When the conversion unit is used for sideband or a.m. the 6360 operates as a Class AB_1 linear amplifier. Thus the drive must be kept below the level at which grid current starts to flow. In driving an amplifier like the 144-Mc. 4CX250 job described in February *QST*, it is not necessary to drive the 6360 into grid current for any class of service. On c.w., for example, we have found it possible to develop 600 watts output from the 4CX250s with the 6360 stage running Class AB_1 (no grid current). If a harder-to-drive final stage is used it may be necessary to push the 6360 into Class-C conditions for full-power c.w. work. This will also be necessary if the 6360 is to be plate modulated.

In practice, it is convenient to use the output control on the 50-Mc. exciter as the sole means of controlling the operation of the conversion unit, whether the mode of operation be sideband, c.w. or a.m. Keying for c.w. is done in the 50-Mc. exciter, and modulation of the signal is also done there. We have encountered no linearity problems in the mixer or its following amplifier at any level of operation needed with the 4CX250 push-pull amplifier running at power output levels from 50 to 600 watts.

We operate the conversion unit by plugging it into a power supply designed for the v.h.f. station described by the writer in 1961.[4] Power is left on the setup during all operating time, as the current drain without 50-Mc. drive is well below the rated dissipation of all tube elements. Any power supply capable of delivering 250 to 300 volts at 100 ma. and 150 volts, regulated, should be satisfactory. Some typical operating conditions are:

Oscillator plate current: 12 ma. without crystal oscillating; 5 ma. with.
Doubler plate current: 8 ma.
Amplifier plate current: 10 ma.
Mixer plate and screen current: 15 ma. with no 50-Mc. drive; up to 20 ma. with maximum drive.
6360 Amplifier plate and screen current: 25 ma. with no 50-Mc. drive; 48 ma. for operation as linear amplifier; 70 ma. max. for Class-C c.w.
Amplifier grid current: None, except for Class-C operation; about 1.5 ma. max.
Output: 6 watts c.w., sideband or plate-modulated a.m.; 2 watts a.m. linear. QST

[4] Tilton, "Two-Band V.h.f. Station," Part III, September 1961, *QST*, p. 32.

Strays

Through the courtesy of the Panama Canal and the KZ5 amateur radio club, a special golden anniversary QSL card will confirm QSOs with KZ5 stations during the period August 8 through 16 in celebration of the 50th anniversary of the Panama Canal on August 15. Also a special commemorative certificate will be presented by the Governor of the Canal Zone to stations applying on the basis of five or more KZ5 contacts during that period. — *KZ5PR, Pres., Canal Zone A.R.A.*

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At the Rotary International Convention in Toronto, Canada, on June 10, 1964, a meeting of Rotarians of Amateur Radio (ROAR) was also held with 27 present. The group voted to thank Byron Sharpe, W9JKC and the Glencoe, Illinois, Rotary Club for their interest in promoting ROAR. The group adopted calling frequencies for Rotary ragchews: 14,140 kc., Canadian; 14,290 and 3810 kc. U.S. Twenty-meter schedules are for Sunday at noon CST and the 80-meter schedule is for 6 A.M. CST, also on Sunday. ROAR members will get together again at the ARRL National Convention.

ROAR, incidentally, was commended by the ARRL Board of Directors at its 1964 meeting for the ROAR project which will equip amateur stations in the new and developing countries.

Sideband Scope Patterns

How the Basic Ones Are Formed

Fundamentally, the oscilloscope will show only amplitude variations in a modulated wave versus time, when using ordinary sweep methods. In modulation systems having the carrier partially or wholly suppressed, the modulation envelope is not so simply related to the modulating audio frequency as it is in straight amplitude modulation.

BY GEORGE GRAMMER,* W1DF

To review briefly, when the pattern formed by an amplitude-modulated r.f. wave is viewed on the scope, using a linear horizontal sweep, the top and bottom edges of the pattern outline the modulation envelope, the pattern of the modulating signal being traced by either edge. The individual r.f. cycles cannot be distinguished, in the ordinary case, because the radio frequency is so great compared with the modulating frequency.[1]

Amplitude modulation, although important, is only one of several kinds. With frequency modulation, for instance, there are no amplitude variations in the modulated pattern. The trace of such a signal is a simple rectangle that looks just like an unmodulated carrier. In using the scope with f.m., then, the object is to obtain a pattern that has perfectly straight lines at top and bottom. Only negative information can be obtained about an f.m. signal from the scope pattern — if any amplitude variations *do* show on the envelope the signal is not a true f.m. signal, but is a combination of f.m. and a.m. The conventional scope presentation tells nothing more, and is of no value for monitoring frequency deviation or distortion.

Sideband techniques introduce another variation into the modulated pattern. A good starting point for considering these is the balanced modulator.

The Balanced Modulator

While the balanced modulator appears in many circuit guises, the principle is always the same: the carrier is made to disappear from the output, leaving only the two sidebands that are generated by amplitude modulation. The circuit of Fig. 1 is representative. Although perhaps more complicated-looking than some, it is easy to follow. R.f. drive is applied to the grids of the two tetrodes in push-pull, so the r.f. voltages at the grids are out of phase. That is, one grid is positive with respect to cathode when the other is negative, and vice versa. The amplified r.f. voltages at the plates also are out of phase, and if the amplification is the same in both tubes the two r.f. voltages have equal amplitudes. Since the plates are connected in parallel, the two voltages buck each other out, and there is no output.

In this circuit the amplification in each tube depends on its screen-grid voltage. If the two tubes are well matched and the r.f. grid circuit is carefully balanced, the amplification will be the same in both tubes when both have the same d.c. screen voltage. The audio modulating signal is superimposed on the d.c. screen voltage to drive the screens in push-pull, so if the bottom end of the audio transformer secondary is instantaneously positive with respect to the center tap, the upper end is simultaneously negative. Thus the instantaneous voltage will be increased on tube 2's screen while the voltage on tube 1's screen will be decreased. (In a later part of the audio cycle this will be reversed.) The unequal screen voltages mean that one tube amplifies more while the other amplifies less, resulting in an output from the modulator that is proportional to the difference in amplification. Thus there is output only when audio voltage is applied to the screens, and if the operating conditions are properly chosen the r.f. output voltage is proportional to the modulating voltage.

The effect is similar if different d.c. voltages are applied to the screens of the two tubes. If the voltage on tube 1's screen is fixed while that on

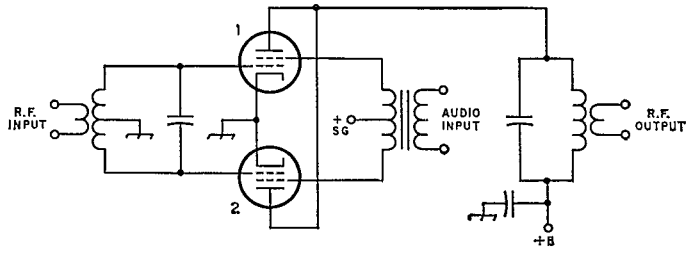


Fig. 1—A representative balanced-modulator circuit.

* Technical Editor, *QST*.

[1] "The Flying Spot — III," *QST*, June 1964.

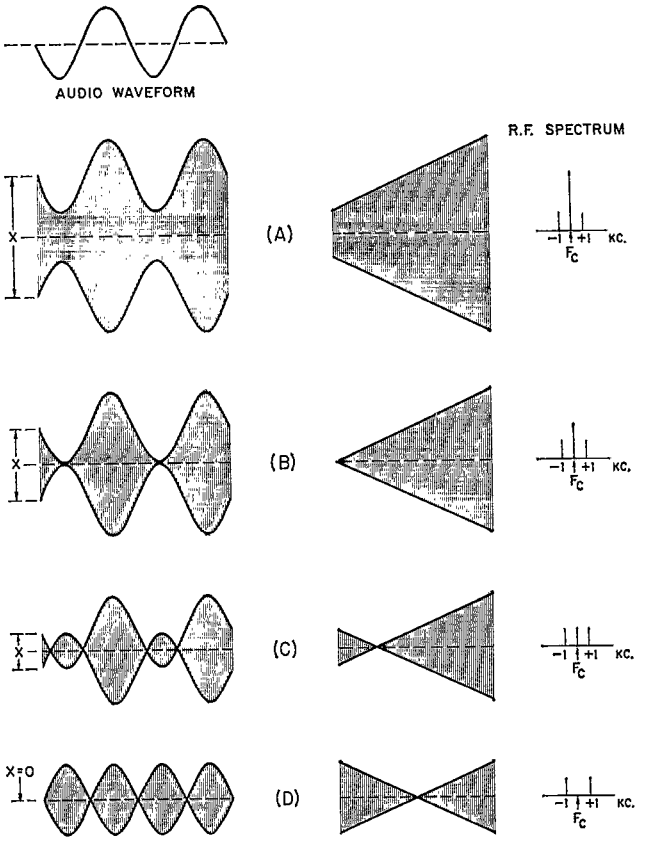


Fig. 2—Patterns obtained with a balanced modulator having varying amounts of carrier feedthrough. First column: Wave-envelope patterns using an ideal linear sweep locked to show two cycles at the audio frequency. Second column: Corresponding trapezoidal patterns using the audio frequency as the horizontal sweep. Third column: Radio-frequency spectrum corresponding to the oscilloscope pattern. Fc is the carrier frequency.

tube 2's screen is adjustable, varying the latter voltage will cause the r.f. output to vary. This screen-voltage adjustment can be used either for obtaining exact balance and zero carrier output or for allowing any desired amount of carrier to get through.

Fig. 2 illustrates a number of possible conditions. The audio signal applied to the modulator is a sine wave having the amplitude shown at the top. In A the modulator is unbalanced sufficiently to allow a carrier of amplitude X to get through. The resulting signal is simple amplitude modulation of about 60 per cent, and the wave-envelope and trapezoidal patterns are similar to those shown in the preceding article. If the modulating frequency is 1000 cycles the signal has the r.f. spectrum shown in the third column, consisting of the carrier and two sidebands spaced 1000 cycles above and below the carrier.

If we now bring the modulator nearer to balance by adjustment of the d.c. voltage on one of the screens, only the carrier output is affected, since the modulating audio signal is still the same and the *variations* in output voltage are unchanged. The sideband amplitudes therefore remain constant, and bringing the modulator nearer to balance simply reduces the carrier. This has the effect of increasing the percentage of modulation, as shown at B. Here the carrier output has been adjusted so the wave is just 100 per cent modulated. As shown by the r.f. spectrum at the right, the relationship between the carrier and sideband amplitudes differs from that at A, but the same frequency components are present.

If we reduce the carrier amplitude still more, as in C, the sideband amplitudes are still unaffected. The lower and upper edges of the pattern now cross over for part of the time, the result being a picture that *appears* to have had something added to the modulation. What the scope does not show is that during this crossed-over period the phase of the r.f. output is reversed: In the patterns shown at A and B one of the two tubes — tube 1, perhaps — is actually supplying the output power, with tube 2 doing some bucking, but not enough to cancel all of tube 1's output since tube 2's d.c. screen voltage was deliberately reduced to let some carrier through. In C, the d.c. screen voltages are nearly enough balanced to allow tube 2 to take over during the part of the time where the crossover shows. Since the r.f. output voltages of the two tubes are out of phase, the resultant r.f. phase is determined by the tube which happens to predominate at any given time. When this is carried to the extreme and the carrier is balanced out completely, tube 1 predominates during exactly one half of the audio modulating cycle and tube 2 is top man during the other half. This is shown at D.

Note again that in all these examples the amplitudes of the two sidebands have remained exactly the same, as shown by the spectrum drawings at the right. Only the carrier amplitude has changed. Furthermore, in spite of the highly-distorted appearance of the modulation envelopes in C and D, there is actually no distortion. No new sidebands appear when the carrier is reduced beyond the limit of 100-percent pure amplitude modulation. The carrierless signal occupies no more bandwidth than the original a.m. signal, A, which had a low percentage of modulation.

Pattern Similarities

We said earlier in this series that the scope can deceive the unwary, and Fig. 2D exemplifies it. The pattern is not *necessarily* that of a balanced modulator with a sine-wave modulating signal. It is possible to get a pattern of exactly the same appearance with ordinary amplitude modulation. The apparent envelope in Fig. 2D is that of full-wave rectification of a sine wave. Such an audio waveform is shown in Fig. 3, and when used to amplitude-modulate an r.f. carrier to about 50 per cent would generate a pattern such as is shown at Fig. 3A. The r.f. spectrum of such a signal contains more than one pair of sidebands, the more important of which are shown in approximately the right relative amplitudes in the r.f. spectrum drawing in the third column.

When the modulation percentage is increased to exactly 100 per cent in the downward direction, as in B (this time by increasing the modulating voltage, not by decreasing the carrier amplitude), the resulting pattern is indistinguishable from Fig. 2D. The spectrum, however, is quite different, and includes the carrier as well as several sets of sidebands. Increasing the modulating voltage still more results in the typical overmodulated pattern shown in Fig. 3C. It is impossible to produce such a pattern with a balanced modulator by adjustment of carrier balance.

The r.f. spectrum drawings in Fig. 3 are based on the assumption that the 1000-cycle sine wave of Fig. 2 has been put through a full-wave rectifier to produce the audio signal shown in Fig. 3. The fundamental frequency of a rectified signal of this type is 2000 cycles, so this frequency, plus its harmonics, make up the actual nonsinusoidal signal. The side frequencies in the modulated wave therefore appear at 2-kc. intervals from the carrier frequency.

Signals of the type shown in Fig. 3 do not constitute very important practical cases, and the reason for bringing them up is simply to show that scope patterns can be misinterpreted if you have no supplementary information about the signal being inspected. Unless you know how the signal was generated, among other things, your diagnosis of a pattern may be quite wide of the mark.

Single Sideband

The balanced modulator represents the first step in the process of generating a single-sideband signal, in most circuit designs. However, regardless of the method, the ultimate result is the more-or-less complete elimination of the carrier and one of the sidebands from the final output. In Fig. 2D, for example, the spectrum consists of only two side frequencies, since the carrier has been suppressed and the modulating signal was of sine form. Eliminating one of these remaining frequencies gives a single-tone single-sideband signal which, since it consists of just a single frequency, differs in no respect from any other constant, unmodulated r.f. signal. Displayed on a scope tube, the pattern is the simple rectangle discussed earlier.

That, at least, is the *ideal* single-tone s.s.b. signal. The top and bottom edges of the pattern would be perfectly smooth, straight lines, as at A in Fig. 4. If more than the wanted single tone is present the edges will be rippled. Fig. 4B shows the case where suppression of the other side frequency has not been complete. This remnant modulates the desired frequency to produce a ripple that resembles a low percentage

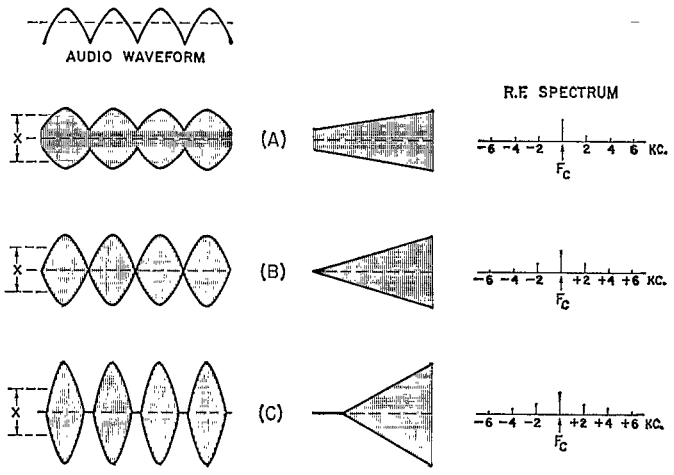


Fig. 3—Amplitude-modulation patterns using a rectified sine wave as the audio frequency. Columns correspond to those of Fig. 2.

of amplitude modulation by an audio frequency equal to the *difference* in frequency between the two sidebands. That is, if the original audio modulating frequency was 1000 cycles the difference between the two side frequencies is 2000 cycles. In the case shown, the amplitude of the undesired side frequency is 10 per cent of that of the desired frequency, or 20 db. down.

If the sideband suppression is complete but the carrier suppression is not, the edges of the pattern are again rippled, but in this case the difference in frequency between the two components is equal to the frequency of the original modulating tone, 1000 cycles in this example. This is shown in Fig. 4C, where the width of one ripple cycle is just twice that in B. This assumes that the horizontal linear sweep frequency is the same in both cases, of course.

When carrier and undesired side frequencies both are present, the ripple pattern becomes more complex, and the shape depends on the relative amplitudes and phases of the "spurious" signals that, together with the desired single tone, make up the composite pattern. These spurious signals may include r.f. components resulting from harmonics in the original audio modulating tone, since only a really pure sine wave will be free of such harmonics. At this stage it is better to resort to using a highly-selective receiver to identify the components in the complete signal, since anything more than a rough analysis of the pattern (based on the cycle width, as in C and D) becomes difficult.

The single-tone pattern is a useful one for showing carrier and sideband suppression up to the limit of resolution of the c.r. tube. With a tube in good focus and with the brightness adjusted to give the finest possible trace, it is possible to see the effects of unwanted components that are 35 to 40 db. below the desired output. This assumes a 5-inch tube with the pattern height adjusted to make the maximum use of the screen area, or about 3 inches. If the signal has gone through linear amplifiers before being applied to the scope, care must be taken to see that the drive level is kept well within the limits of amplifier linearity. There is no easier way to clean up the edges of a ripply pattern than by increasing the drive to the saturation point! While the pattern may look fine, tuning through the signal with a selective receiver will quickly dispel any illusions about its quality — just another instance of how one can be misled in interpreting a scope pattern without knowing all the factors that entered into its makeup.

The Two-Tone Pattern

The single-tone pattern just discussed is excellent for checking carrier and sideband suppression, but it tells little or nothing about the linearity of the single-sideband system. To get a check on linearity it is necessary that the output signal vary in amplitude (which it should not do in the case of a single tone), and this requires that at least two frequencies be present in the modulation. Hence the utility of the "two-tone test."

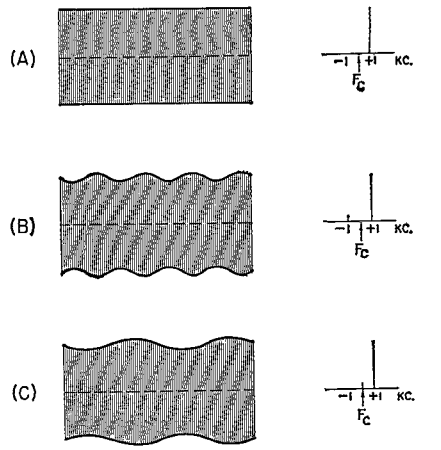


Fig. 4—Single-tone s.s.b. patterns, using the same type of horizontal sweep as in Fig. 2.

Ideally, the two tones should be quite pure (i.e., sine waves) and should have the same amplitude, since tones meeting this specification will give patterns that are easiest to interpret. In s.s.b. such a pair of tones will generate just two radio frequencies, each removed by its own frequency from the suppressed carrier. The pattern formed by two such tones will be identical with the pattern formed by the two side frequencies in a balanced modulator as given in Fig. 2D, insofar as external appearances go. But there is a difference. In the two-tone s.s.b. signal the relationship between the sideband frequencies and the suppressed-carrier frequency is not the same as it is in the double-sideband suppressed-carrier signal created by the balanced modulator alone. This does not show in the scope pattern, but it has an important bearing on the setup for *creating* the pattern.

The wave-envelope pattern of Fig. 2D was formed by using a linear horizontal sweep synchronized at one-half the modulating frequency so that two modulation cycles were displayed. The modulating frequency is equal to one-half the difference between the two side frequencies shown in the spectrum diagram. That is, a modulation frequency of 1000 cycles creates side frequencies that are 1000 cycles each side of the carrier, or 2 kc. apart. Thus when the 1000-cycle voltage is used for the sweep, to give the trapezoidal pattern in the second column, the picture has the bow-tie form shown, indicating that the modulation envelope has a double-frequency component. The two side frequencies automatically have the same amplitude, so the pattern is symmetrical when the carrier is completely suppressed.

To get the same type of pattern from a two-tone s.s.b. signal the sweep frequency has to have this same relationship to the tone frequencies. If the audio tones are, for example, 1000 and 1500 cycles, their difference is 500 cycles and the basic sweep frequency has to be 250 cycles in order to generate the bow-tie

pattern. It is possible to derive such a frequency from the two original tones, but not by simple means. In general, the bow-tie pattern must be obtained directly from a balanced modulator.

The linear sweep is a little different. It is possible to use an adjustable free-running (not synchronized) linear sweep and set it to a frequency that will meet the requirements for displaying one or more cycles of the modulation envelope. Often this is not too satisfactory because the sweep oscillator is not stable enough to hold the pattern stationary more than momentarily. An alternative is to use a pair of tones having a frequency difference equal to some submultiple of lower one, and then use the lower tone alone to lock the sweep sync circuit.

Whatever the synchronizing method, the linear-sweep two-tone test pattern is useful only for detecting fairly gross misbehavior in a linear amplifier. The problem is one of determining whether the envelope is without distortion. This is difficult at best with a wave-envelope pattern — "at best" being the non-s.s.b. case of single-tone straight amplitude modulation. Accurate analysis tends to become impossible with s.s.b., since the modulation envelope does not resemble the original audio signal at all. Here the best method is to observe the actual radio frequencies present in the signal and measure their relative amplitudes.

The bow-tie pattern, when it can be used, will provide more information than the envelope pattern. The linearity of the system can be judged by the straightness of the edges of the bow tie, just as linearity with regular amplitude modulation is judged from the trapezoidal pattern. The limitations in generating the bow tie, mentioned above, occur particularly in filter-type sideband generators. Most of these have no provision for bypassing the sideband filter to allow the entire balanced-modulator output to be used for exciting the following stages. This limitation is not so prevalent in phasing-type generators.

In any case, *if* the balanced-modulator output can be used to drive the rest of the transmitter a single audio tone will suffice, and it can be used to synchronize the scope to get a stationary pattern. The tone need not be very pure for the bow tie. However, for single-tone tests — which supplement the two-tone test as described earlier — the audio tone should be as pure as possible.

In general, the most practical linearity test for an amplifier, regardless of the type of s.s.b. generator, is one in which the r.f. input to a linear stage is compared directly with its output. In this way the signal is compared with its amplified reproduction. If the two are exactly in or out of phase, the pattern will be a sloping straight line, produced by exactly the same method described in an earlier article in this series.[2] The only difference is that the comparison is made at radio rather than audio frequency. Making this test requires a two-tone signal, since the instantaneous amplitude must vary over the entire amplifier characteristic in order to show its total operation. Provided no appreciable r.f. harmonics are present in either the input or output signals, the presence of curvature in the line pattern will indicate amplifier nonlinearity. R.f. harmonics will be inconsequential if the input and output signals come from tank circuits having ordinary Q values. QST

The next article in this series will appear in a subsequent issue. — *Editor*

[2] "The Flying Spot — II," *QST*, April 1964.

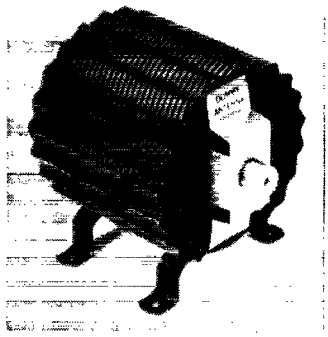
• New Apparatus

Gentec Model 525 Dummy Antenna

THE Gentec dummy load shown in the photograph is a hermetically sealed nonreactive load designed for use as an antenna substitute for transmitter adjustment and test. With a nominal impedance of 50 ohms, the load can be used from d.c. up through the 220-Mc. amateur band and shows an s.w.r. of less than 1.1:1 throughout this range. The power rating is 125 watts continuous duty or 250 watts ICAS. Radiation fins and ribbed surface areas allow for good heat radiation, yet heat transfer through the mounting brackets is negligible because of their high thermal resistance. Inside the can, mounted in a coaxial cavity, are film-type resistors which give the load its good r.f. characteristics. The r.f. connector is an SO-239.

The dummy antenna weighs 1¼ pounds and measures 5 inches high, 4¼ inches wide, and 4½ inches deep. It is manufactured by Gentec, Inc., P.O. Box 233, Raritan, New Jersey.

In a test made in the ARRL Laboratory, the impedance measured at the input terminal of the dummy load was as follows:



Frequency (Mc.)	Input Resistance (Ohms)	Equivalent Shunt Capacitance (pf.)
4	54	0
7	54	0
14	54	0
21	51	+0.5
30	54	+0.5
50	54	+0.1
145	50.5	−0.5
220	46.5	−0.8

— *E. L. C.*

Broad-Band Balun Transformers

Compactness and Efficiency Using Ferrite Cores

BY RICHARD TURRIN,* W2IMU

Ferrite cores lend themselves to the construction of wide-band transformers for low-impedance operation. Here's an application that will interest anyone who has the problem of connecting a balanced load to a single-ended source.

THE balun transformer is not new and has appeared in a variety of forms, the most popular of which are the bifilar air-wound coils for the low frequencies and the half-wave coaxial-line type. The line-section type is suitable for single-band operation while the air-wound-coil type can be made to cover the lower-frequency amateur bands in the region 3.5 to 30 Mc. However, both are somewhat bulky and awkward to apply.

With the advent of new low-loss high-frequency ferrite materials it is now possible to use the bifilar-coil balun with a toroidal ferrite core. In one stroke the size is reduced, the bandwidth and efficiency are increased, and full kilowatt power-handling capability is easily realized. This form of the balun and other types of broad-band transformers have been described by C. L. Ruthroff.[1]

This article will confine itself to the two basic baluns most widely employed, the 4:1 impedance transformer, balanced to unbalanced, and the 1:1 impedance transformer, balanced to unbalanced. One transformer will perform its design function over a frequency range of 1.8 to 90 Mc. when terminated in 50 ohms on the unbalanced side. Fig. 1 shows the winding method for each transformer. These transformers are transmission-line transformers at the high-frequency ends of their useful ranges, and tightly-coupled coils at the low-frequency ends. In fact, the low frequency response is limited simply by the winding inductance while the high frequency response is limited by transmission-line resonances.

By suitable selection of core material, winding size, and termination impedances it is possible to achieve very broad-band balun transformers. The power-handling capability is difficult to estimate since core flux varies with frequency. At low frequencies the coupled coils transfer most of the energy through their high mutual inductance. At high frequencies almost all the energy is transferred through the transmission line structure.

Core Material

The key component of this transformer is quite obviously the core material. While other sources of useful material may be available, the author has had experience only with a material called Ferramic-Q, manufactured by Indiana General Corporation, Electronics Division, Keasby, New Jersey. Ferramic-Q is available in three high-frequency grades, and a tabulation of two useful properties is given below:

Material	*Permeability*	*Approx. Frequency at which Core Losses Increase by a Factor of 10*
Q-1	125	10 Mc.
Q-2	40	90 Mc.
Q-3	14	200 Mc.

Toroidal cores are available in a wide variety

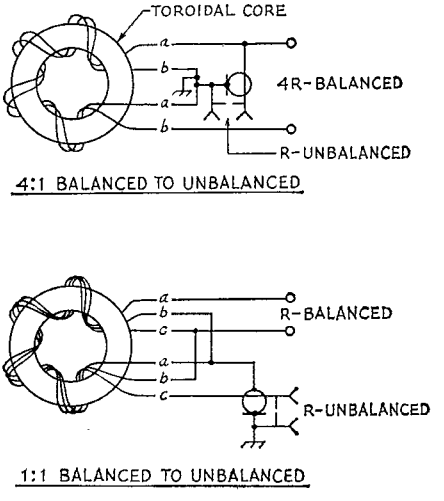


Fig. 1—Broad-band balun transformer schematics. The letters indicate single winding ends. By arranging the windings side-by-side without crossovers the connections can be made as shown.

* Box 45, Route 2, Colts Neck, N. J.

[1] C. L. Ruthroff, 'Some Broadband Transformers," *Proc. IRE*, Vol. 47, pp 1337–1342, Aug. 1959.

of diameters and cross-sectional areas. Outside diameters ranging from 0.020 to 9.0 inches may be obtained. Typically, the 2½-inch o.d. cores cost about $5.00 each, while the ⅞-inch o.d. cores are about $.60.[2] Q-1 or Q-2 material has been found to be quite satisfactory for 3.5- to 30-Mc. baluns. Little work has been done with Q-3 material at the higher frequencies because for 144 Mc. and higher the standard single-band coaxial-line balun is simple and efficient.

Since the transformer depends less on the core material at the high frequency end of its useful range it is easy to see that the fact that Q-1 material has poor intrinsic Q above 20 Mc. does not degrade the transformer operation at 30 Mc. Q-2 material, having lower permeability, requires more turns to operate at the lower frequencies.

All three grades of material are essentially nonconductive and are hard and brittle like ceramic. Any flaws or cracks in the toroidal cores will seriously impair the transformer. In general, the cross-section should be square and the outside diameter-to-thickness ratio around 4 or 5 to 1.

Winding may be done with Formex or Formvar copper wire directly on the core. The sharp edges of the core should be removed with care, using emery paper. Since the material is magnetostrictive, rough abrasion such as filing or grinding may alter the permeability and Q. Cores with rounded edges may be obtained by specifying tumbled cores. Since moisture affects the material Q, a small sealed enclosure is suggested for weather proofing.

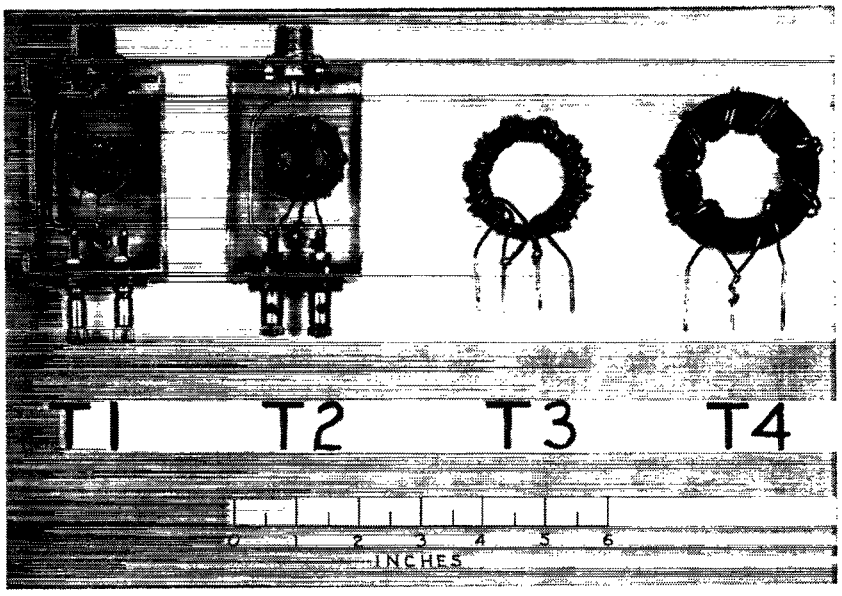
[2] Inquiries regarding Ferramic parts and materials should be directed to Mr. Joseph C. Venerus, Product Engineer, Indiana General Corporation, Electronics Division, Keasby, New Jersey.

4:1 Balun Transformer

As shown by Fig. 1, the transformer winding consists of a bifilar coil wound on the toroidal core. A bifilar coil consists of two side-by-side windings of equal numbers of turns. The wire size is determined by the maximum current at the low-impedance end of the transformer. No. 14 A.W.G. is sufficient for maximum legal power at a 50-ohm unbalanced impedance level. The number of turns is not critical unless the widest possible bandwidth is desired. Q-1 material requires between 5 and 10 turns per winding for 3.5- to 30-Mc. coverage. Q-2 material requires about two or three times as many turns for low-frequency coverage.

Operation of this type transformer at higher resistance levels or with reactive loads will rapidly reduce the bandwidth. For impedance levels above 1000 ohms single-band or, at best, two-band operation is all that can be expected. At higher impedance levels the transformer behaves like a low-Q resonant transformer and may be tuned for single-band operation by altering the number of turns. The photograph shows several 4:1 (200:50 ohm) baluns which were constructed and measured. Table I gives the pertinent data on these transformers.

The most common applications of the 4:1 balun are in feeding a folded dipole with coax or in matching an unbalanced transmitter output to a 300-ohm transmission line. In the first application the balun must be placed at the antenna terminals, which necessitates weather proofing. In particular, these transformers should be very useful in broadband high-power amplifiers. Other applications are too numerous to list here, and the reader with some ingenuity may find an application which will suit his particular problem.



Four broad-band balun transformers constructed by the author, using ferrite cores. Construction and performance data are given in Table 1 and Fig. 1.

TABLE I

Trans.	Z Ratio	Core Material	Core Size, Inches	Turns	Wire Size	R.F. Power Capacity, Watts	Frequency Range, Mc.
T_1	4:1	Q-1	5/8 x 5/8 x 5/8 O. D. (two cores stacked)	7	20	150	3.5-30
T_2	4:1	Q-1	1/4 x 1/4 x 1 1/4 O. D. (two cores stacked)	11	18	350	3.5-30
T_3	1:1	Q-2	1/4 x 1/4 x 1 7/8 O. D.	10	16	750	1.8-90
T_4	4:1	Q-1	1/2 x 1/2 x 2 1/4 O. D.	8	14	1000	1.8-30

Those who are interested in further applications are urged to consult the reference cited earlier.

1:1 Balun Transformer

This type of balun is also shown by Fig. 1, and requires an additional single winding in order to complete the magnetizing-current path. The key to all these transformers is to arrange one winding so it does not include the load but closes on the generator. This winding is necessary for proper magnetization of the core. The 1:1 balun consists of a trifilar coil with appropriate connections as shown by the figure.

This particular balun is well suited to the problem of feeding a dipole with coax, especially the driven element of a tri-band beam antenna. Since the impedance levels encountered at the center of the driven element of a parasitic beam may be quite low, the wire and core size should be increased accordingly. T_3 in the photograph is a 1:1 50-ohm balun capable of handling 750 watts over the frequency range of 1.8 to 90 Mc.

An exhaustive study of these transformers has not been made, and the values in the table are not necessarily optimum. The maximum power-handling capacity was measured at 14 Mc. and represents an estimate over the frequency ranges indicated in the table. Transformers T_1, T_2 and T_3 showed a slight rise in temperature after several minutes of continuous operation at the power level indicated. T_4 showed no increase in temperature at full power. The pass-band characteristics of each transformer were observed on a wide-band swept basis, and the useful operating range is a measure of the frequency range over which the insertion loss was less than one db. For full legal power transformers of either impedance ratio wound on a core similar to T_4 are recommended, especially for the tri-band beam application.

The two balun transformers described are broad-band, small in size, efficient and inexpensive. In addition, the r.f. field is confined to the core-wire space, and coupling to other circuits may be kept to a minimum. The problem of connecting balanced to unbalanced devices is apparently not fully appreciated, but does represent poor engineering practice when accomplished without a balun. Perhaps these transformers will help solve some of your feed-line, antenna matching or circuit problems. QST

Strays

An increasing number of hams interested in WAS are finding that the problem of displaying their cards has been licked by the very neat, compact plastic packets for wall display put out by Tepabco of Gallatin, Tennessee. These packets have now been enlarged and consist of two sets, each set having packets for 26 cards. These provide a total of 52 slots, giving a space for a card from each state, and leaving one for "specials" like NYC and your own card. For the OMs who hate shoving the file of WAS cards in a drawer where they can get lost, dog-eared or bent, this is just the thing!

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The erratic operation by FCC's license-issuing computer has made for some interesting mix-ups. WN4LBO passed his Conditional Class exam and was issued a Conditional Class license, but the call on the license still read WN4LBO. He tried using this call on the air, but in the bands permitted to Conditional Class license holders, and created quite a flap among the hams who worked him. Now he is WA4LBO, and all is calm.

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Novices take note! When using crystals near the band edges of your segments, remember that you cannot accept blindly the markings on the crystals, for the actual frequency of operation may differ somewhat because of the nature of the circuit in which the crystal is being used.

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Old magazine and bookshops in the Times Square area of New York City will purchase used *QST*s in any quantity and pay 5¢ each for them. *CQ*s will bring 3¢ each, and *73 Magazine* — nothing. — W2DTE

OPERATOR OF THE MONTH
Vote Once

Can you think back over the past month and pick out one operator who, by virtue of his clean signal and extra-special skills and courtesy, merits your "vote" as operator of this month?

Considerations to bear in mind include good keying, careful enunciation, correct procedures, judgment and courtesy. The League's Operating Aid No. 11 lists further examples.

If you come up with one nominee (just one, please), jot down his call, the band and mode on a postcard along with *your* name, call and address and send along your vote for "Operator of the Month" to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111.

ARRL National Convention

New York City — August 21-23, 1964

BY GRAY BERRY,* K2SJN

SEVERAL years of planning and hard work by the member clubs of the Hudson Amateur Radio Council will come to a climax within weeks with the opening of the 13th National American Radio Relay League Convention at the New York Hilton Hotel in New York City on Friday, August 21. Three of the fullest days in amateur radio are planned by HARC, representing some 40 amateur radio clubs in the Greater New York Area, with the key-note of the occasion being the celebration of the 50th anniversary of the founding of the ARRL.

First national gathering of the League since the meeting in Portland in 1962, the New York convention is expected to draw radio amateurs from all over the world. Running concurrently with the World's Fair in nearby Flushing, Long Island, the convention has been an added drawing card to attract amateurs and their families to the New York area during its three-day program, according to reservations already received from all parts of the country and abroad.

* Vice President, Hudson Amateur Radio Council.

"Club delegates to the Council have made every effort to have something for everyone at this Convention," said Harry Dannals, W2TUK, HARC president. "They have booked something for every available minute of the three-day session, and arranged programs to appeal to all from the newest Novice to the members of the Old Old Timers Club, from the smallest harmonic to the XYL who thought she might be attending the Convention just for the trip to New York. The only program problem we can foresee is trying to select which of the many attractions holds the most interest at any given time."

Equipment Show

An important part of the Convention will be the three-day exhibit, in which more than 40 leading manufacturers and local distributors of amateur radio equipment will present their latest lines to the visitors. Special booths will be manned by the ARRL Headquarters group; MARS; The Quarter-Century Wireless Association; the Antique Wireless Association; The Hudson Council clubs and others.

Behind such a well-spaded program as the national convention is acres of hard work. The aching backers of this affair under the auspices of the Hudson Amateur Radio Council include a large and active committee shown here hard at work.

Continuing concurrently with the various special interest sessions at the convention and with the exhibits will be administration of FCC license examinations by HARC member-clubs for the Novice and Technician grade, and by representatives of the New York office of FCC for both General and Extra Class licenses. Commercial phone and c.w. license examinations will also be made available on at least one of the three days of the convention. A continuing program of contests is also scheduled, with suitable prizes to be awarded.

Throughout the convention period, there will be special events for the ladies, to include fashion shows, special tours to the World's Fair, and the traditional initiation to SWOOP. Special breakfasts, luncheons and dinners are scheduled as well, and unlimited side activities are available throughout the period. The Hospitality Desk at Convention Hq. will have special admission tickets available for such activities as tours of network radio and TV facilities.

International VHF Conference

Of particular interest to many of those attending the Convention will be the first International VHF Conference taking place throughout the three-day get-together under the direction of the East Coast VHF Society, a member club of HARC. Prominent authorities in the realm of v.h.f. activities will be featured, including Ed Tilton, W1HDQ, v.h.f. editor of *QST*, and Karl Lickfeld, DL3FM, who is v.h.f. editor of DARC and chairman of the Permanent V.h.f. Committee of Region I of the IARU.

An allied program event will be the special session on Saturday afternoon on "Amateur Space Communications" to be chaired by Ed Clegg, W2LOY, assisted by David Bray, K2LMG, George Jacobs, W3ASK, and Nick Marshall, W6OLO, as panel members. Latest amateur achievement in the v.h.f. area of the spectrum will be reported in detail on Sunday at a session on "Moonbounce" under the direction of Sam Harris, W1FZJ, conductor of "The World Above 50 Mc." section in *QST*.

"Meet Old Friends" Party

On Friday, evening, a special cocktail hour get-together is planned to enable conventioneers to meet old friends from all over the world.

League officials will be on hand at the convention, taking an active part in all events, and of course, the ARRL aspects of the program. Officials to attend include ARRL President Herbert Hoover, Jr., W6ZH; directors and vice directors from many ARRL divisions; and past ARRL officials.

From the Newington staff those present will be John Huntoon, W1LVQ, Secretary and General Manager; Francis E. Handy, W1BDI, Communications Manager; Robert White, W1WPO, DXCC Awards; George Hart, W1NJM, National Emergency Coordinator; Lew McCoy, W1ICP, *QST* Technical Assistant.

Saturday Grand Banquet

On Saturday evening, August 22, the Grand Banquet will take place in the ballroom of the New York Hilton, with W6ZH serving as Master of Ceremonies. Feature address will be delivered by the Honorable Barry Goldwater, K3UIG/K7UGA. First issuance of the Hiram Percy Maxim Memorial Award will be made during the evening to John Reinartz, K6BJ, in recognition of his pioneering achievements in the development of amateur radio communications equipment and techniques. This award was unanimously voted to Mr. Reinartz at the last meeting of the ARRL Board of Directors held in May and previously reported in the pages of *QST*. Among other awards and honors scheduled to be

Senator Barry Goldwater, K3UIG/K7UGA, Main Banquet Speaker.

presented are suitable plaques to each ARRL Division which has achieved its quota for the Building Fund.

Immediately following the banquet, an initiation meeting will be held of the Royal Order of the Wouff Hong, famous amateur radio secret society founded by the late Hiram Percy Maxim, who was co-founder of the ARRL 50 years ago.

Program Highlights

In addition to the many continuing events on the program previously described, technical talks on a wide range of up-to-the-minute topics are on the three-day program. Individual interest groups will meet at a series of special breakfast and luncheon sessions as well as in regularly-scheduled panel meetings. Outstanding speaker authorities have been arranged for all sessions. In addition to those already named, these speakers will cover such areas as RTTY; ARRL traffic and communications; DX; military; s.s.b.;

YLRL forum; RACES and ARPSC; amateur TV; mobile operations; and antennas. Detailed program in condensed form follows.

Costs for this three-day National Convention, first ever held in the New York City area, have been arranged to take advantage of the wide range of prices for meals and accommodations available. Special room rates are being made available at the Hilton to convention registrants, and the New York City World's Fair Housing Bureau, 30 Rockefeller Plaza, New York 20, New York, will supply a complete "package" of information on rooms, meals, activities of general interest taking place in the city at the time of the convention, on written request without charge. This information package may also be requested via K2US, the Hudson Council amateur station being operated by member clubs at the World's Fair. Frequencies in use are 3950 kc.; 7215 kc.; 14,300 kc. and 21,400 kc. from ten to ten daily.

What You Need to Know

When: Friday, August 21, through Sunday, August 23

Where: N. Y. Hilton Hotel, New York City

What: 13th National ARRL Convention, combined with the First International VHF Conference

Registration: Last-minute by mail (closes August 1) to HARC Convention, P.O. Box 58, Central Islip, Lond Island, N. Y. or at the door.

Housing: At N. Y. Hilton under special rates; or ask for detailed information from New York City World's Fair Housing Bureau, 30 Rockefeller Plaza, New York 20. Also available through on-air request from K2US, HARC station at the World's Fair.

Cost: General Admission only $4 at door
All-session registration fee, including Banquet but exclusive of special interest luncheons and breakfasts, $18 at door.

Further Details, Write: HARC Convention
P.O. Box 58, Central Islip
Long Island, New York

CONVENTION FEATURES AND SPECIAL EVENTS

Equipment Exhibit: Open all three days, featuring latest amateur and military equipment. Special booths of ARRL; MARS; NASA; etc.

QSL Card Exhibit: Bring yours. Special awards for most unusual, prettiest; craziest, etc.

Contests: Something for everyone! C.w. copying tests; guessing games; special contests for YLs, XYLs harmonics, etc.

FCC Examinations: For all classes of amateur and commercial licenses during all three days

Operating Station: K2US at the World's Fair and v.h.f. link between it and the convention rooms.

Sight-seeing Tours: Available day and night from convention area
Wouff Hong Initiation
SWOOP Initiation
Fashion Shows for the Ladies

During the convention, K2US will maintain a v.h.f. link to the convention headquarters in Manhattan.

Registration

Registration price for all attending the day sessions of the Convention will be $4 and complete program registration fee, to include the Saturday Banquet and all day-time functions except for special interest luncheon sessions and breakfasts, will be $18. As previously announced, reservations received prior to August 1 are entitled to a 20% reduction in fees, with the full program fee at $15 and the day-time general admission fee $3 for the full three-day program. Reservations, together with self-addressed envelope, should be forwarded to HARC Convention, P.O. Box 58, Central Islip, Long Island. Reservations are being handled by the Suffolk County Radio Club, with Art Rauch, W2DID in charge.

Harry Dannals, HARC President, stated in summary, "New York City prides itself in being a 'summer festival' — this year, more than ever, in view of the World's Fair in nearby Flushing. We of the Council have done all we know how to make the coming convention play an important part in assisting amateurs everywhere in having the finest possible stay in New York City, by combining the biggest and best amateur convention program ever put together with the many attractions New York and the Fair have to offer. We feel that every amateur and his family will enjoy the League's "birthday party" the end of this month. HARC hopes to see you all at the Hilton."

Condensed General Program

Friday

Morning: General Registration. Exhibits open 10:00 A.M.

Afternoon: INTERNATIONAL VHF CONFERENCE
Ed Tilton, W1HDQ
Karl Lickfeld, DL3FM
DX FORUM
Conducted by Long Island DX Association and featuring prominent DX Visitors

Evening: SPECIAL INTEREST DINNERS

Saturday

Morning: V.H.F. AROUND THE WORLD
Ed Tilton, W1HDQ, V.h.f. Editor, *QST*
MARS
Representatives of all 3 branches will be present
ARRL Traffic and Communications Session
SCMs; PAMs; RMs; and Hq. personnel from Newington

Afternoon: AMATEUR SPACE COMMUNICATIONS
Ed Clegg, W2LOY
David Bray, K2LMG
George Jacobs, W3ASK
Nick Marshall, W6OLO
RTTY
W. L. Henn, Jr., K2OWD
Philip Catona, W2JAV
DX
Robert and Ellen White, W1WPO, W1YYM
SSB SESSION
Chairman, George Scott, W2LFX
Conducted by SSBARA, and will feature demonstrations of latest SSB equipment by prominent manufacturers
ARRL FORUM
featuring League officials

YLRL FORUM
Henni Poliakin, WA2DLK

Grand Gathering of Old Time Wireless Operators
Bert Osborne, W4MF, OOTC
"120 Years of Brass Pounding"

ANTIQUE WIRELESS ASSOCIATION
Bruce Kelley, W2ICE

Evening: GRAND BANQUET AND AWARDS PRESENTATIONS Toastmaster, Herbert Hoover Jr., W6ZH
Featured Speaker: The Honorable Barry Goldwater, K3UIG/K7UGA

Midnight: Wouff Hong initiation meeting
SWOOP initiation meeting

Sunday

Morning: RACES and ARPSC
MARS

MOBILE OPERATIONS

Afternoon: TRAFFIC NETS
George Hart, W1NJM, ARRL Hq.
and SCMs, PAMs, RMs.

ANTENNA SESSION
Robert L. Ruyle, WØFCH, Hy-Gain Products Corp.

YLRL FORUM
Henni Poliakin, WA2DLK

AMATEUR TV
Al Denson, Denson Products Co.

MOON BOUNCE
Sam Harris, W1FZJ

DX FORUM
Long Island DX Association

FCC AMATEUR RULES
Bill Grenfell, W4GF, FCC

K2US

Progress Report

K2US, "The Voice of Amateur Radio at the World's Fair," swung into high gear during the first six weeks of its operation and the pace is still gaining momentum. From the period of April 22, Opening Day, to June 3, the station played host to 2,510 licensed amateur radio operators, according to the guest book. Of these visitors 900 participated in operating the station; the balance were content to watch the activity. On May 30, one of its busiest days, K2US had 59 different operators who made a total of 258 two-way contacts! On occasion, there have been more visiting hams than the three operating positions will accommodate. Countless numbers of the public also visited K2US, watching and listening to the amateur radio activity from a vantage point outside the large, glass-windowed area.

During the first six weeks of operating 4,800 contacts were made, among which were QSOs sufficient for the amateur award certificates for WAS ("Worked All States") and WAC ("Worked All Continents"), and included twenty nine countries. Since K2US answers QSL cards on a received basis, 2,225 cards were sent out in response to requests.

Among the member clubs of the Hudson Amateur Radio Council who furnished volunteer operators on evening and weekends during the first six weeks were: Englewood Amateur Radio Association; Five Towns Radio Club; Knights of the Round Table; Lake Success Radio Club; Long Island Triboro Radio Club; New York City Young Ladies Radio League; New York Radio Club; Radio Club of Brooklyn; Staten Island Radio Club; Suffolk County Radio Club; Rockaway Amateur Radio Club; Tri-County Radio Association; Plainview Radio Club; and Westchester Amateur Radio Association.

K2US is on the air daily from 1400 GMT (1000 EDST) to 0200 GMT (2200 EDST). Its schedule includes operation on all bands from 2 to 80 meters, activity depending upon the preference of the volunteer operators, but with emphasis on 20-meter c.w. and sideband daily; 40-meter c.w. and sideband, usually during the daytime hours; and 75-meter c.w. and sideband alternatively as conditions warrant. V.h.f. activity on 6 and 2 meters is greatest during the evening hours.

Will Lierheimer, K2MJO, is the station manager in regular attendance Mondays to Fridays. Regularly-scheduled volunteer operators throughout the week share operating time with any visiting hams who wish to participate and who show proof of their original FCC licenses.

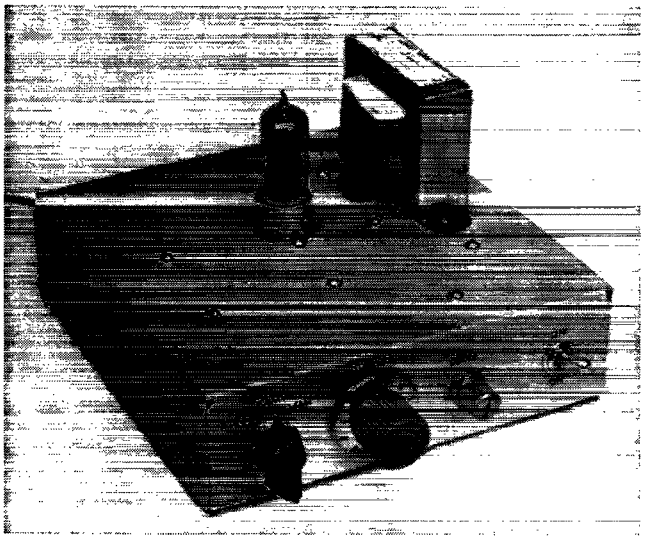
Responsible for the over-all operation of K2US are members of the Hudson Amateur Radio Council with the following comprising the K2US Steering Committee; Henry Levow, WA2NLL, Chairman and New York City Coordinator; Jules Rivman, W2NOS, Nassau-Suffolk Coordinator; George Diehl, W2IHA, and David Popkin, WA2CCF, Northern New Jersey Coordinators; Gray Berry, K2SJN, and Stan Zak, K2SJO, Eastern New York Coordinators; Will Lierheimer, K2MJO, Station Manager; Dorothy Strauber, K2MGE, Publicity and Public Relations; and Harry Dannals, W2TUK, Trustee for K2US.

All amateurs are invited to contact K2US and to visit the station during their tour of the Fair. It is hoped that they will share the pride of those who have voluntarily worked so hard to make K2US truly "The Voice of Amateur Radio at the World's Fair."

— *K2MGE*

Harry Dannals, W2TUK, president of the Hudson Amateur Radio Council, which supplies the operators for K2US, the World's Fair amateur radio station, takes over the rig as Gus Browning, W4BPD, enjoys the rare (for him) distinction of being a listener. In its first month of operation K2US welcomed over 1600 visitors and made several thousand contacts.

Applying v.f.o. drive to a crystal-controlled transmitter through a length of coax cable plugged into the crystal socket is convenient. However, the coupling circuit that results is apt to be quite inefficient, with the result that the drive to the final amplifier may be much less than with crystal operation. The simple v. f. o. amplifier described here should make up for coupling losses and provide some additional isolation.



More Drive

with Better Stability

The self-powered v.f.o. amplifier. Controls from left to right are for the band switch, tuning capacitor, drive control and power.

A Three-Band Neutralized V.F.O. Amplifier

BY ROBERT E. ANDERSON,* K1TVF

After a Novice gets his General ticket, one of the first accessories that he aspires to is a variable-frequency oscillator. A v.f.o. is (or should be) designed primarily for maximum frequency stability; power output is a secondary consideration. In the most usual application, where the v.f.o. is used to drive a former crystal-oscillator stage in the transmitter, it is sometimes found that the v.f.o. will not supply sufficient power to drive the oscillator tube to the same output that it delivers as a crystal oscillator. The simple buffer amplifier/multiplier shown in the photos will not only provide a considerable increase in driving power, but will add to the v.f.o. isolation as well. The latter means better frequency stability.

Circuit

The circuit of the amplifier is shown in Fig. 1. The output of the v.f.o. is fed to the input of the amplifier at J_1. Cathode bias is provided to protect the tube when v.f.o. drive is not being applied. The output circuit of the amplifier may be switched to cover the 80-, 40- or 20-meter bands.

To prevent oscillation in the amplifier when its output circuit and the output circuit of the v.f.o. are tuned to the same frequency, the stage is neutralized by the capacitive bridge consisting of C_2, C_3 and the tube interelectrode capacitances.

An inexpensive silicon voltage-doubling power supply makes the amplifier a completely independent unit. Amplifier screen voltage is taken from a variable voltage divider, R_1. This provides a means of adjusting the drive to the transmitter to optimum level. This method is preferable to the alternative of detuning the amplifier output circuit. The latter method re-

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sults in excessive amplifier-tube dissipation and reduced harmonic suppression.

The output of the amplifier is fed to the same points in the transmitter used with direct v.f.o. feed.

Construction

A 7 × 7 × 2-inch aluminum chassis serves as a mounting for the components. The layout of parts is not critical and may be determined with sufficient accuracy by an examination of the photographs. Referring to the front view, S_1 and S_2 are centered one inch in from their respective ends, while R_1 and C_1 are similarly spaced 2¾ inches from the ends. C_1 must be insulated from the chassis. The capacitor listed under Fig. 1 has an insulated mounting, and the only necessary precaution is to make the clearance hole for the shaft large enough to be sure that the shaft will not make contact with the chassis. Also, be sure that the metal skirt of the tuning dial does not make contact with the chassis. The tube socket is centered 3¼ inches from the left side of the chassis, and 4 inches from the front edge.

The v.f.o. is connected to the input of the amplifier through a short length of RG-58/U coaxial cable. The style of input connector to be used at J_1 will depend upon your preference. Since the output cable of my v.f.o. was already terminated in a plug (Mosley type 301) to fit the crystal socket in my transmitter, I used an octal tube socket, and centered it on the back surface of the chassis. If all odd-numbered pins are wired together to form one terminal of J_1, and all even-numbered pins wired together to form the other terminal of J_1, the plug will make the correct connection when plugged into the socket in any position.

Holes for ½-inch grommets are drilled in the rear lip of the chassis, one inch from each corner. One of these is for the a.c. cord, the other for the output cable to the transmitter. Grommets are also used at the four bottom corners of the chassis to prevent marring the operating table.

Looking at the bottom view of the chassis, it is seen that several tie-point strips have been provided for anchoring the line cord and mounting many of the small components. The coil is also mounted on one of these strips, to the rear of S_1. Extra terminals on this strip provide an anchorage for the output cable, a 2½-foot length of RG-58/U coaxial cable. The other end of the cable should be terminated in the same manner as your original v.f.o. cable, since it will be connected to the same points in the transmitter as your v.f.o. was formerly connected.

Be careful in making the taps on the coil so that adjacent turns will not be shorted. This can be more easily avoided if the adjacent turns are indented by pushing them inward with a screwdriver.

It will be easier to mark a layout on the chassis if the original wrapping paper is left on until all holes have been drilled. Pencil marks show up well on the paper and may be easily erased if you are not satisfied with your first attempt. The paper will also protect the chassis against scratches while the holes are being drilled.

Do the wiring as neatly and as carefully as possible. Study the diagram of Fig. 1, so that you will know just where every wire should go. Be sure that you have the electrolytic capacitors and silicon diodes connected correctly as to polarity.

When you are satisfied that the wiring is correct, the power supply should be tested. A multi-

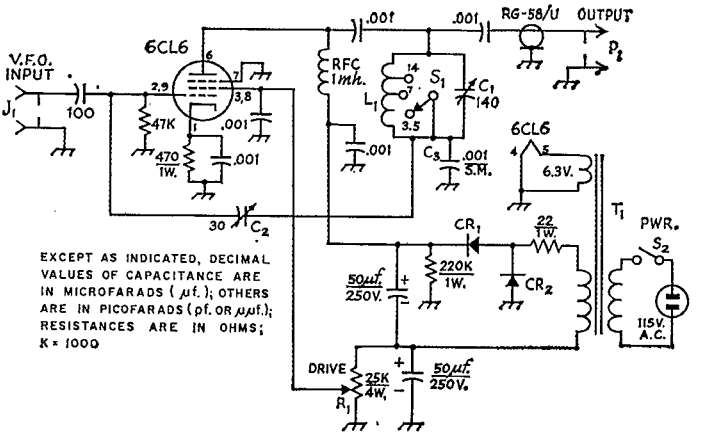
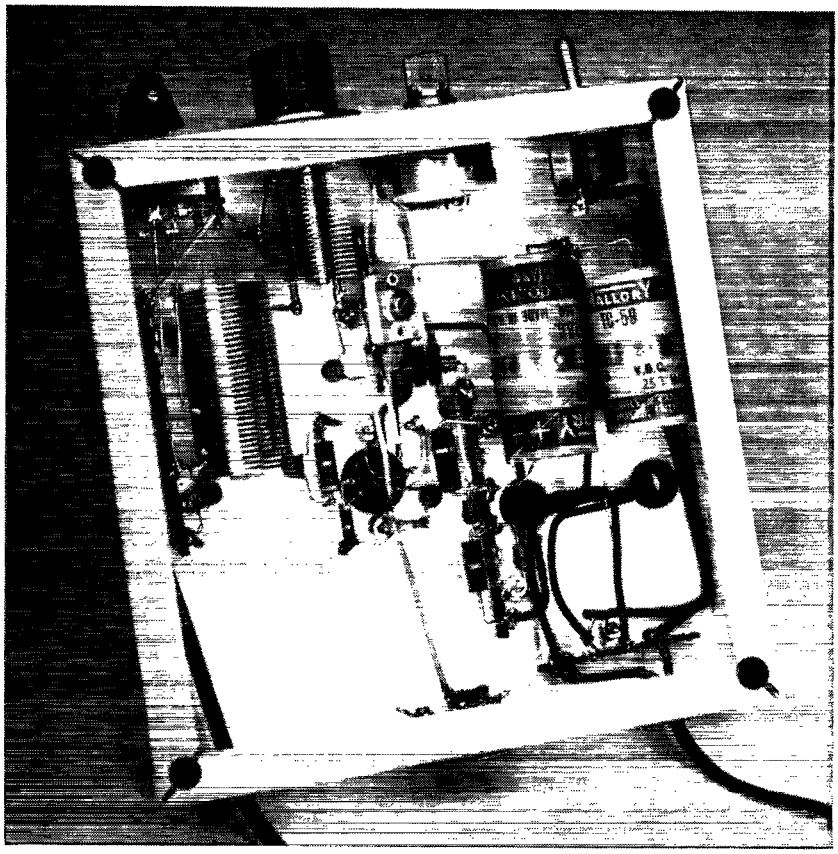


Fig. 1—Circuit of the neutralized v.f.o. amplifier. Capacitor designation SM indicates silver mica; polarity indicates electrolytic. Other fixed capacitors are disk ceramic. Unless indicated, fixed resistors are ½-watt composition.

C_1—Air variable (Hammarlund APC-140-B).
C_2—3–30-pf. compression trimmer.
CR_1, CR_2—Silicon diode, 600 p.i.v., 750 ma.
J_1—Octal tube socket (see text).
L_1—33 turns No. 20, 1-inch diam., 16 turns per inch (Illumitronics 816T Air Dux, B & W 3015 Miniductor), tapped at 22 and 31 turns from C_3 end.
P_1—Suitable plug for transmitter v.f.o. input connection.
R_1—Wire-wound control (Mallory M25MPK or similar).
S_1—Single-section, single-pole, 3-position phenolic rotary switch (Centralab PA-1001, 8 positions not used).
S_2—S.p.s.t. toggle switch.
T_1—Power transformer: 125 volts, r.m.s., 50 ma.; 6.3 volts, 2 amp. (Stancor PA-8421).



Bottom view of the neutralized v.f.o. amplifier. Small components are mounted on tie-point strips. The neutralizing capacitor C_2 is to the right and rear of the tuning capacitor. The filter capacitors used (right center) happen to be of different physical sizes, but their ratings are the same. Standard straps are used for mounting these capacitors.

meter or vacuum-tube voltmeter is required. Connect the voltmeter between chassis and Pin 6 on the tube socket. With the tube out of its socket, turn on the power switch. A reading of 300 volts or more should be obtained. Shift the voltmeter prod to Pin 3 (or 8). The reading should vary from 0 to about 160 as R_1 is turned through its range.

Neutralizing

This adjustment should be made with the plate- and screen-voltage leads disconnected at the power supply. CAUTION: Never touch anything under the chassis until you are sure that the power switch is off and the filter capacitors are discharged. The filter capacitors can hold a dangerous charge for a considerable time after the power has been turned off. Using a screwdriver with a well-insulated handle, place the blade firmly against the chassis near the bypassed end of RFC_4. Tilt the screwdriver so that its metal shank makes firm contact with this terminal and the chassis at the same time. The discharge of the filter capacitors will be accompanied by a pronounced spark if they are fully charged.

An indicating wavemeter, or a grid-dip oscillator used in a similar manner, will serve as the neutralizing indicator. If your v.f.o. is designed for 80-meter output only, set S_1 to this band. If the v.f.o. is capable of output on 7 Mc. as well as 3.5 Mc., set both the v.f.o. and the amplifier to 7 Mc. The tube should be placed in its socket, and the input and output circuits of the amplifier connected to the v.f.o. and transmitter, respectively. The amplifier output should be connected to the transmitter in the same way that you would normally connect the output of your v.f.o.

The wavemeter should be coupled to L_1 through a twisted-pair line about one foot long. One end of this line should be terminated in a coil of 3 turns of hookup wire approximately ½ inch in diameter, inserted inside L_1. The other end of the line should be terminated in a similar coil wound around the wavemeter coil or inserted in it. The amplifier unit and the wavemeter should be fixed in firm position so that the coupling will not be disturbed during the neutralizing process.

Now turn on the power supply (it is not necessary to turn on the transmitter), and make sure that the amplifier-tube filament is lighted.

Apply v.f.o. drive, and turn C_1 through its range. At some setting of C_1, an indication should be obtained on the meter. Adjust C_1 for maximum reading. Now adjust C_2 a bit at a time, *each time* readjusting C_1 for maximum deflection. At some point within the range of C_2, the indication on the meter should reach a minimum. If C_2 is adjusted further in the same direction, the indication on the meter should increase again. Set C_2 at the point where the indication is minimum when C_1 is adjusted for a maximum reading. Now turn off the power supply, discharge the filter capacitors as described earlier, and reconnect the plate and screen leads to the power supply.

Operation

In general, the v.f.o. amplifier will be set for the frequency band that you formerly used for direct v.f.o. drive, bearing in mind that it is always advisable to double frequency in the transmitter crystal-oscillator stage whenever this is possible. The amplifier has provision for 20-meter output. This output can be used to advantage in transmitters such as the simple two-stage 75-watt transmitter described in the current ARRL *Handbook*. This transmitter normally quadruples to 10 meters from a 40-meter crystal. More drive to the output amplifier in this transmitter can be obtained by driving the crystal-oscillator tube at 20 meters, permitting the tube to double rather than quadruple frequency. The 20-meter output from the v.f.o. amplifier may be used to similar advantage in transmitters that normally require doubling in the final amplifier for 10-meter operation, if a 10-meter coil is provided for the final-amplifier grid circuit.

If the drive control on the v.f.o. amplifier is set at maximum (arm of R_1 farthest from ground), sufficient drive may usually be obtained to show a small amount of grid current at the transmitter final when the transmitter driver stages are tuned, even though the v.f.o. amplifier is considerably detuned. After this small indication has been obtained, the v.f.o. amplifier can be tuned for maximum final-amplifier grid current. If this maximum is greater than the normal rated value, it can be reduced to proper level by adjustment of the drive control, R_1. If no initial indication of grid current is obtained when the transmitter driver stages are tuned, the v.f.o. amplifier may be tuned by tuning in the v.f.o. signal on a receiver tuned to the band to which the v.f.o. amplifier is switched, and tuning the amplifier for maximum S-meter reading. You can then proceed to tune the transmitter stages for maximum grid current in the normal manner.

It is my hope that this little unit will be as useful and helpful to those amateurs with low-output v.f.o.s as it has been to me. If there are any questions, I would be most happy to answer them if a self-addressed stamped envelope is included. QST

NEW BOOKS

Electronic Construction Practices, by Robert Lewis, W8MQU. Published by Radio Publications, Inc., Wilton, Conn. 136 pages, 5½ × 8½ inches. Paper cover. Price, $2.95.

Ideas, hints and suggestions on workshop practice for the electronic and radio constructor. The handbook covers everything from the use of tools to wiring and testing the final product. Chapters include a brief history of electronics and ' breadboard" radio, use and mis-use of tools, equipment planning and layout, metal working, partitions, shielding, metal finishing, components assembly, wiring and testing, and practical design data. This last chapter covers coil theory, coil stock, cutting, mounting, and tapping coil stock, winding small coils and several graphs, tables, and charts that will be a help when working with inductance and capacitance.

Westinghouse High-Voltage Silicon Rectifier Designers' Handbook, by the Semiconductor Division, Youngwood, Penna. 234 pages, 6 × 8⅝ inches, paper cover. Price $2.00.

Although not written for construction information, this handbook does contain a wealth of information on applications of silicon-diode high-voltage rectification. The advantages gained in the use of these devices as high-voltage rectifiers are pointed out, as is the basic theory and design philosophy, specific applications, reliability, ratings and specifications for various units now manufactured by Westinghouse.

Ham Antenna Construction Projects, by J. A. Stanley. Published by Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis 6, Indiana. 160 pages, 5½ by 8½ inches, paper cover. Price, $2.95.

This book is filled with almost all of the standard ham antennas that every amateur usually tries at one time or another during his ham life. Constructional information is given for horizontal antennas, vertical antennas, multiple-element beam antennas, vertical beams, compact and indoor transmitting antennas, long-wire beams, v.h.f. and u.h.f. antennas. There is a chapter devoted to using antenna test equipment that covers tune-up bulbs, s.w.r. instruments, field strength meters and grid-dip oscillators. The book is well illustrated with sketches, photos and drawings.

Practical Transistor Theory, by E. Patrick Wiesner. Published by Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis 6, Indiana. Cat. No. PTW-1, 128 pages, 5½ by 8½ inches, paper cover. Price, $2.50.

Understanding the theory of semiconductor devices is certainly a prerequisite to working with transistors from a practical standpoint. This book starts with the basic operation of the simplest forms of semiconductor devices and follows up with discussions on the basic design and operations of more intricate ones. Even in the advanced material, terms and explanations are such that one with a moderate technical background can follow it. The first chapters are on basic semiconductor theory with emphasis on characteristics, and simple physics is introduced to clarify certain points. There is a detailed description of basic transistor amplifiers, switching transistors, multivibrators, flip-flops, and gates. The book also includes information on digital computer logic design and intergrated circuits.

Amateur Radio and Civil Defense

After World War II, when it became evident that the Russian Bear was not destined to be a particularly friendly critter and the need for some civil defense measures became apparent, successive government agencies designated to head up such a program called on amateur representatives to participate. In the discussions that followed, we were interested in getting two points across: first, that amateur radio had a potential for and capability of playing a major role in this program; and second, that our participation should, this time as never before, be in our own name, as an *amateur radio service*, even if and after war should break out. These principles were included into the planning by the formulation of regulations creating a new branch of the amateur service, the Radio Amateur Civil Emergency Service, RACES.

What is RACES?

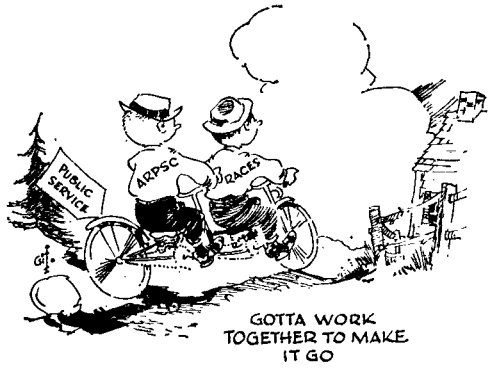
Ever since the RACES rules were announced in 1951, this sub-part of the amateur regulations and the new service it represents have been of greatest interest and concern to amateurs. There have been a few minor changes in these regs since they were finalized in 1952, and one major one when the frequency segments were expanded, but there has been no change in the basic intent of RACES. It was, and still remains, *a means by which amateurs may serve civil defense communication on an organized basis*, using their own bands and much of their own equipment. It is intended that this service, where properly authorized, will remain on the air in the event of any national emergency resulting from enemy action, although the *rest* of amateur radio will be silenced.

Note that we say the "rest" of amateur radio. RACES is part of the *amateur* service, its regs are part of the amateur regs, and it operates on the amateur bands. The segments of the amateur bands it uses are *shared* with the rest of the amateur service in peacetime; in the event of war, its frequency segments would be exclusive.

Licensing Procedures

We do not intend here to discuss the RACES regulations in any detail. The exact language is in the *License Manual* to read — besides, this would take pages, and we have other matters to discuss. However, let's run down the procedure for licensing briefly.

An amateur cannot apply for a RACES license as an individual. It is sponsored at some civil defense level — community, county, state or, in a few cases, federal civil defense region. The first requirement is a complete civil defense communications plan, drawn up in accordance with the RACES rules (97.163(i)). Second is appointment of a RACES radio officer, who must be holder of an amateur license (other than Novice or Technician) or of a commercial first or second class radiotelegraph or radiotelephone. The RO must be certified to FCC on a form provided for that purpose (482). Third is application for authorization of a RACES station or stations on FCC Form 481. Such application is made through the RACES radio officer, and applicant must be the holder of an amateur operator license other than Novice or Technician, *and* an appropriate amateur station license. (In other words, no *new* station licenses are issued for RACES.)



The three basic essentials (communications plan, certification of the RO and station authorization application or applications) are sent upstairs to state civil defense, whence they go to the appropriate OCD regional office, thence to OCD in Washington and finally to FCC where the plan is placed on file, the radio officer is certified and the station authorization(s) issued. At any one of these points, of course, the application may be bounced if there is anything wrong with it. Once the papers are approved and placed on file, subsequent applications and minor modifications can be made without going through the whole procedure.

FCC does not issue operator licenses or authorizations for RACES. This is done at the sponsorship level by the c.d. director on the basis of operator licenses already held. That is, the c.d. director issues "permits" to those enrolled in local c.d. whose FCC operator licenses make them eligible to operate in RACES. Just what kind of

* National Emergency Coordinator, ARRL.

A General Review of RACES

and Discussion of Some Current Problems

BY GEORGE HART,* W1NJM

license holders are eligible for what kind of operation is discussed in detail in the regulations.

Operation

RACES operation differs considerably from regular amateur operation, mostly because of the necessity for security (looking to operation during war) and the use of non-amateur operators in some cases. In addition, the RACES regulations provide for some exceptional operation not normally used by amateurs.

Let's point out something basic before we get into this. When we say RACES, as distinguished from "regular" amateur, we do not mean to imply that RACES is *not* amateur. Nevertheless, there are certain differences that obtain when operating as RACES which are more restrictive than when operating normal amateur. In normal times, an amateur station authorized for RACES may drop its RACES mantle at any time and assume its normal amateur identity, and operate accordingly — but in this case, the station must operate strictly according to the *regular* amateur regulations (Part 97, sub-parts A through E). When it is operating in a RACES network under c.d. supervision, it operates under the same regulations as supplemented or amended by the RACES regulations (sub-part F).

Now RACES is sponsored by civil defense, a government agency which operates at a number of levels. At federal level there is an office in the Pentagon where one man spends a small part of his time processing applications and passing them along to FCC; there are also federal offices at each of the eight OCD regions, with one man in each who spends part (15–20%) of his time checking RACES applications and corresponding with applicants.

At state level, civil defense blows hot and cold. Some states have active c.d. and RACES programs, some scarcely any at all. Generally speaking, the status of RACES in any state is determined by that state's c.d.-consciousness. In some states, serious RACES people at community and county levels have had tough sledding because of apathy at the state level. But it is usually a case of apathy at one level causing apathy at another, and usually apathy at state level is a reflection of the same thing at local level.

Nevertheless, it is at the local level where RACES operation takes place, for the most part. The RO, in coordination with the c.d. communications officer, who is his boss in most organizations, calls a drill or test exercise of one kind or another. The RACES crew turns out, complete with community-owned equipment purchased with taxes (half local, half federal). A typical RACES exercise would be controlled from the c.d. control center, usually located in a public building, using the call letters of a single authorized amateur (often the RO himself). All other stations would use unit-numbers of this station for identification, instead of the calls of the operators, if any. The group would go through its paces, then secure. There would be no casual "hamming." Once the RACES drill is secured, non-amateur operators (if any) would no longer be permitted to push the "transmit" button. Station units operated by amateur licensees would revert to regular amateur status and use the call of the operator, provided he is operating a station duly licensed to him. Only in duly-authorized (by c.d. authority) RACES operation are RACES procedures as permitted by the regulations used. At any other time, the operation is strictly in accordance with the first five sub-parts of the regulations, and any operator not having amateur status is not authorized to operate, *period.*

Natural Emergencies

RACES was set up for civil defense purposes *only*, on a temporary basis (presumably, as long as there is a need for civil defense, which *might* be forever!), and the regulations restrict operation to "Civil Defense communications purposes *only*" (emphasis supplied). Some states have interpreted this to mean that RACES cannot be used for natural disaster communications, but most have given the more liberal interpretation implicit in the definition of the term "civil defense communications" which makes specific mention of "safety of life, preservation of property, maintenance of law and order, alleviation of human suffering and need," as well as (not necessarily in connection with) results of enemy attack and "any disaster or other incident endangering the public welfare." So it appears obvious that RACES is authorized to operate during any natural disaster *as RACES*, and in

This article does not intend discussing all details of RACES. It merely reviews some of the background, summarizes the current situation and discusses the relationship between RACES and our own AREC. More details of RACES operation may be forthcoming in future issues.

fact a great many RACES organizations have done so to very good effect.

RACES and AREC

But peacetime disasters have always been the province of our own Amateur Radio Emergency Corps. In some cases where RACES has been activated, there has been lack of coordination with AREC units in the same area activated for the same purpose. "Who," some ECs have asked, "is the boss in such a case, the EC or the RO?"

There is no conflict between the AREC and RACES, and none should be allowed to develop. Each is a part of the other, and each supplements the other. The innovation of RACES has not made the job of AREC different, only bigger. It is one of our jobs and should be treated as such. In the average AREC group, the EC might designate an assistant EC to conduct coordination with RACES, or he might do it himself. The AREC organization is or should be the basis and nucleus of personnel for the RACES plan. The RACES radio officer might well be the "Assistant EC for RACES," and the EC might carry certification as an alternate radio officer. Such a lock-in system is actually in effect in some places, and works very well. In small communities, it is often possible and quite feasible for the EC to fulfill both RO and EC jobs.

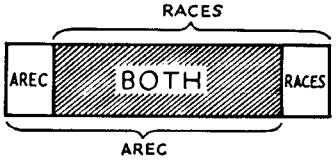
Of course it doesn't always work out that way. Sometimes the c.d. director appoints a RACES radio officer without regard to the AREC; this is usually because the EC did not contact him early in the game and someone else got in ahead of him. Sometimes the local AREC organization is so weak as to be effectively non-existent, in which case it is either ignored by civil defense or given the needed shot in the arm by the need for this new service.

Money and Control

'Tis said that the love of money is the root of all evil. In RACES work in particular, both government people and to a lesser extent the amateur are concerned with who is going to buy the equipment, and where the money will come from. Most of us amateurs are willing to use our own gear, fewer of us are willing to buy gear specifically for the purpose, and fewer still are willing to install it permanently in public places. The average amateur is apt to say, justifiably, "OK, if you want the equipment installed in a public place, appropriate some money and buy it." When the local government does just this (with the help of federally-appropriated funds), it naturally wants to dictate when, where and how this equipment is to be used and who uses it. Some amateurs object to this, with the attitude that "if they want my help, they have to do it my way." But we can't have our cake and eat it too, as the saying goes. If local government buys the equipment, they are going to have plenty to say about its use — much more so than if we amateurs supply the equipment as well as the operators and the basic organization from which to build. Government benevolence brings government control — every time.

Reciprocity

So we think there is both need and place for both AREC and RACES in our amateur public service operations. Because some amateurs are unwilling to be a part of a quasi-government organization requiring special security investigation, oaths of allegiance, and other regimental red tape, does not make them useless. They can be used in AREC. At the other end of the swing of the pendulum are amateurs who readily connect themselves with officialdom but then tend to feel above their amateur organization background. These can be used in RACES. Between these two extremes can be found the majority of amateurs who are willing to participate in both, to a greater or lesser extent, and to that extent the AREC and RACES may be identical, personnel-wise.



This simple diagram illustrates the typical overlapping of amateurs into AREC and RACES groups. Most who participate in one participate in both. See text for discussion of how they can best work together.

The League has always urged AREC personnel to sign up in RACES, if it exists locally, so that the facilities and personnel now existing in the AREC will be ready to serve c.d. if a war should break out. We have also urged, where possible, RACES amateurs to sign up in the AREC, so that civil defense can benefit from the availability of the greater flexibility and fewer restrictions thereof — because don't forget that AREC is self-alerting, self activating, and can operate on any frequency of any amateur band at any time. Where the two organizations exist together, whether completely or only partially overlapping, they can then do a complete and effective job in war or in peace.

In some places local c.d. is not organized and RACES does not exist, in which case a local AREC can do the job in peacetime while trying to get RACES started in case of war; and in other places RACES exists without the AREC, in which case it labors under restrictions which could be alleviated by formation of an AREC group. Reciprocity is the solution. ARRL has always urged that AREC members sign up in and embrace RACES; civil defense has seldom reciprocated by getting RACES amateur personnel signed up in AREC.

Does this change anything? Not at all. We must continue to do our part, whether or not others do theirs, to see that amateur radio emergency service is given the greatest possible strength and versatility. QST

A Practical Kilowatt Amplifier for 432 Mc.

BY ALAN T. MARGOT,* W6FZA

High Efficiency in the U.H.F. Range with an Easily-Built Amplifier

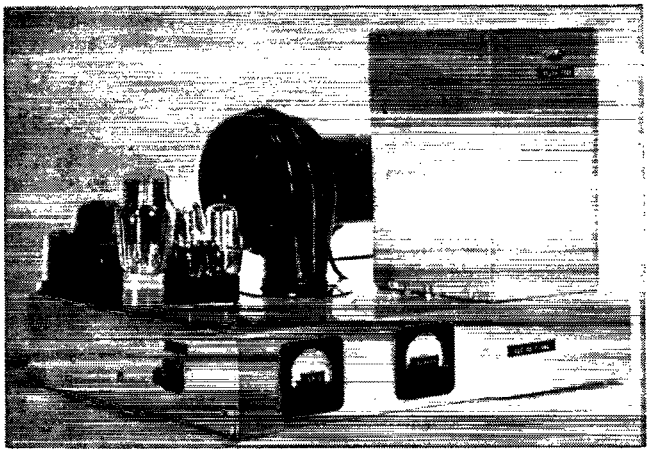


Fig. 1—External view of the complete 432-Mc. amplifier. Tubes and tank circuit are mounted vertically in the compartment at the right. Screen supply is at the left.

Ever since the lifting of the power limit on 420-Mc. operation there has been a demand for an amplifier that would operate efficiently at the kilowatt level at 432 Mc. W6FZA describes herewith the first such amplifier we've seen that employs construction techniques that are within the abilities of the average home-builder of ham gear. Using Class-AB conditions, it delivers a big signal in either c.w. or s.s.b. service, and requires only a small amount of drive. It may be run as an a.m. linear, or pushed harder for Class-C c.w. or plate-modulated a.m.

THE raising of the 420-Mc. power limit was good news here, as this location is some 150 miles from the nearest other regular user of this band. To make meaningful comparisons between 420 Mc. and the v.h.f. bands it was in order to use full power. A thorough search of recent periodicals revealed little information on high-power gear for 432. Lack of nearby surplus houses and well-equipped machine shops further complicated the problem, so it was decided to start from scratch, modifying techniques that had been used successfully in the v.h.f. range.

The resulting 432-Mc. kilowatt, while not the ultimate, can be duplicated readily by others in similar situations. It actually requires less mechanical work than many amplifiers for lower frequencies, and anyone who has built a 50-watt driver for 432 Mc. will find this far easier to build. Though the parts used were largely of the junk-box variety and the amplifier lacks such refinements as brass boxes and silver plating, it runs smoothly and efficiently, delivering 450 watts output in Class AB_1 with a 20-watt driver. This power gain of over 13 db. puts a readable s.s.b. signal into places where even c.w. was undetectable when operation was under the 50-watt power restriction.

* 167 Leggett Dr., Porterville, Calif.

Construction

As can be seen from the photographs and circuit diagram, the amplifier is simple and straightforward. Eimac 4CX300As are used, though with suitable allowance for differences in capacitance

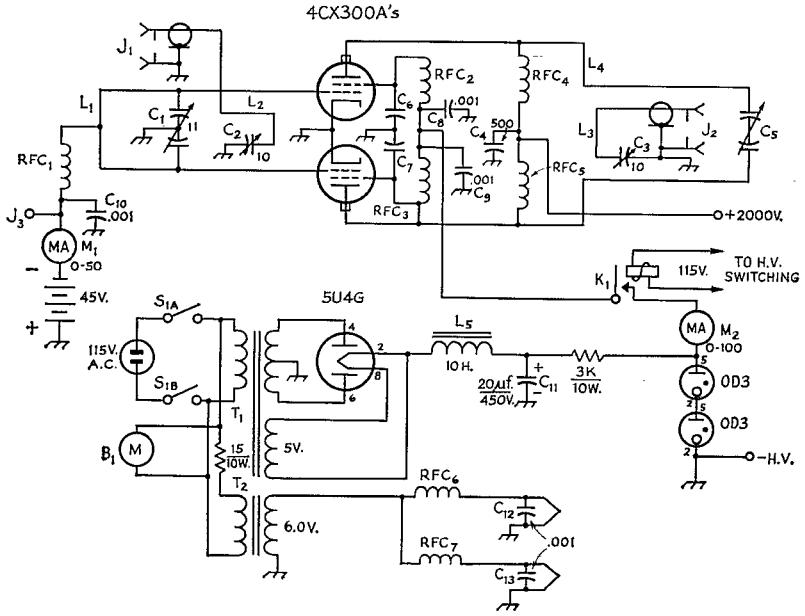


Fig. 2—Schematic diagram and parts information for the 432-Mc. kilowatt amplifier. Decimal values of capacitance are in μf., others, except C_{11}, in pf.

B_1—Blower, 75 c.f.m. or more.
C_1—11-pf. per section miniature butterfly.
C_2, C_3—10-pf. miniature variable.
C_4—500-pf. 20-kv. doorknob capacitor.
C_5—Moving-vane capacitor; see text.
C_6, C_7—Screen bypass in Eimac SK-710 socket.
C_8, C_9, C_{10}—.001-μf. button-mica.
C_{11}—20-μf. 450-volt electrolytic.
C_{12}, C_{13}—.001-μf. disk ceramic.
J_1, J_2—Coaxial receptacle.
J_3—Insulated test point.
K_1—S.p.s.t. relay, 115 volts.
L_1—Hairpin loop No. 12, 4½ inches long, ½-inch wide ¾-inch leads to socket. Connect C_1 2½ inches from closed end.
L_2—Hairpin loop No. 12, 2 by ½ inches, ¾-inch leads. Space ⅛ inch from L_1, with closed end toward tube sockets.
L_3—Copper foil or flashing ½ by 3 inches, bent into hairpin ⅝ inch wide. Mount at tube end of line.
L_4—Brass tubing, 1½ by 3¾ inches, 3 in. center to center. RFC_4 and RFC_5 connect 2⅜ in. from tube end.
L_5—10-henry 100-ma. choke.
RFC_1, RFC_2, RFC_3—10 turns No. 18 enam. on 1-watt resistor, or Ohmite Z-420.
RFC_4, RFC_5—10 turns No. 16, ¼-inch diam., ¾ inch long.
RFC_6, RFC_7—10 turns like above, but made from heater lead, No. 16 hookup wire.
S_1—D.p.s.t. switch.
T_1—400-0-400, or more, 100 ma.; 5 v., 3 amp.
T_2—6.3 volts, 7 amp. Adjust secondary voltage to 6.0 volts by means of 15-ohm 10-watt resistor in series with primary.
MA_1, MA_2—50-ma. and 100-ma. meters; zero-center type preferred.

4X150As or 4CX250Bs could be used. The former would require some reduction in power level.

The high input capacitance of the 4CX300As eliminates the possibility of using a quarter-wave grid circuit at 432 Mc. Even a half-wave grid line is too short for easy coupling, so a ¾-wave shorted line is used. This is shown in detail in Fig. 3. Contrary to one's first reaction this circuit is not resonant in its quarter-wave mode at 144 Mc., but considerably higher, so the possibility of 144-Mc. energy going through from a tripler is not great. It is prudent, however, to feed the amplifier clean 432-Mc. drive, to eliminate the possibility of radiating some signal in the 2-meter band when operating on 432 Mc. No great effort was made to optimize the grid circuit, as it worked satisfactorily from the start.

As may be seen from Figs. 1 and 4, the tubes and plate line are mounted vertically. The screen power supply is included in the assembly. The blower is mounted vertically on the top surface of the chassis. When the bottom cover is in place the air flow is into the grid compartment, up through the sockets and out through holes in the top of the plate-circuit shield. Note the 15-ohm resistor in series with the filament transformer primary. The value required to bring the heater voltage to 6.0 was determined experimentally and the fixed value wired in permanently. A small relay in the screen circuit, energized when plate voltage is applied, prevents application of screen voltage without plate voltage. The only other item of importance in the screen circuit is the liberal use of button-mica capacitors and r.f. chokes to discourage instability.

The plate circuit, L_4, is made of 1½-inch brass tubing, obtained from the local plumber. The 1⅝-inch copper tubing often used would have been simpler, but none was available locally. Either may be made to slip over the tube anodes

by slitting the pipes to a depth of about 1¾ inches with a hacksaw. Bend the segments to fit over the tubes, slip them over the anodes and clamp in place with radiator hose clamps, trimming off the unused portions of the clamps.

The plate lines are supported by the tubes. Tuning is done with a moving-vane capacitor, C_5, at the open end. This is made of heavy copper foil, flashing copper or other thin sheet metal about 2 by 4 inches, cemented to polystyrene rod. The front bushing for this rod was made from a demolished APC-type trimmer, with the rod cemented to the rotor shaft. The back end rides free in a quarter-inch hole. In a later model standard bushings were used for a more workmanlike job. There should be enough tension to keep the vane in any position in which it is set during tuning procedure. One way of achieving this is to use an ordinary phone jack for a shaft bearing, letting the jack leaves supply the tension. The shaft should be flush with the top of the plate line, and displaced about ⅜ inch to the right. Location is not critical, as the vane can be shaped and bent as needed.

The entire plate circuit is housed in an aluminum box 5 by 6 by 9 inches in size, with the 6 by 9-inch sides removable. The exact size is not important, so long as it is big enough. Holes large enough for the sockets are made in the bottom, and 1½-inch holes are cut in the top to line up with the pipes, to let the air flow out. It is important to center the box in a fore-and-aft direction around the tubes, in order to maintain balance. It is purposely offset in a lateral direction, to allow the grid tuning capacitor to be tuned from the outside. In another model the box was placed so as to have the grid tuning adjustment inside. This worked well, but was inconvenient.

The handmade r.f. chokes are soldered directly to the plate lines, and care should be taken to see that they are fastened at the point of minimum r.f. voltage. If the construction shown is duplicated, this will be 2⅜ inches from the tube end. Complete loss of two r.f. chokes brought the necessity for careful placement forcibly to our attention!

The output coupling loop, L_3, is barely visible in Fig. 4, it being made of ½-inch copper strap and mounted edge toward the camera, between the tubes. Its series-tuning capacitor, C_3, may seem small, but it has held up well, except when someone tried to transmit with no antenna connected. Feedthrough insulators, also mounted near the tubes, are not used. They were installed when it was thought that neutralization might be needed.

The short coaxial line and the output connector, J_2, are not clearly visible in Fig. 4. The receptacle is mounted on the right side of the tank-circuit housing, viewing the transmitter from the front, as in Fig. 1. Construction might be simplified if these were on the back, and the high voltage fitting mounted on the removable side. In any event, these leads should not be brought under the main chassis.

Adjustment

Tune-up procedure is similar to that for any tetrode amplifier. The grid circuit was first resonated and the coupling adjusted by observing the reading on a wattmeter in the line from the driver to J_1. The plate line was resonated in a similar manner, by feeding r.f. into J_2 and adjusting the vane until the plate circuit absorbed power. The vane should tune the line to the desired operating frequency with the vane vertical, and about ¼ inch from the pipes. Some degree of adjustment can be obtained by sliding the pipes up or down on the tube anodes. Needless to say, there should be no plate voltage applied during these preliminaries.

Adjustment of the plate circuit with power on should be done with a power-indicating device in the line to a 50-ohm load or antenna. Maximum output is the important thing; plate current need be watched only to get an idea of the input and to be sure that maximum ratings are not exceeded. Grid and screen currents may reverse

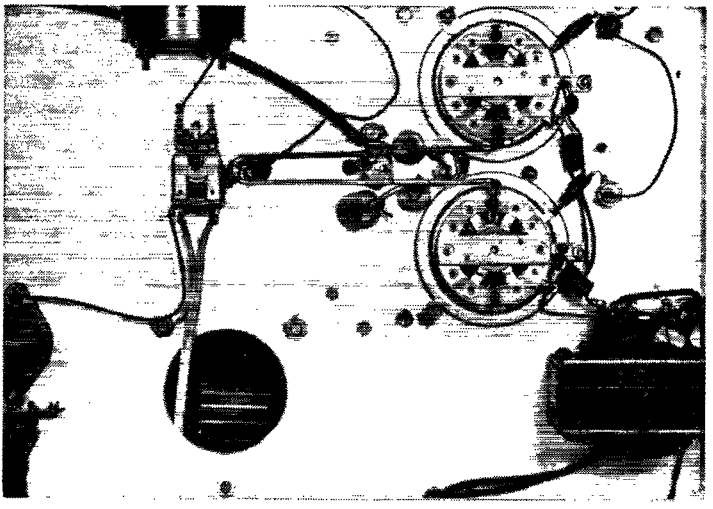


Fig. 3—Bottom view of the 4CX300A amplifier, showing sockets and grid circuit. Relay at the left opens screen circuit when plate voltage is removed.

polarity. We were assured by Bob Sutherland, W6UOV, that this is no cause for alarm. With this in mind, zero-center meters would be nice. Reversing switches also may be used.

It is important to have low internal impedance to reverse current in the supplies for both grid and screen. A stale bias battery was used here at first, and when drive was applied the reverse current dragged the battery down. The decreased bias caused more heating and aggravated the condition, causing more reverse current to flow. The plate current soared and everything went wrong. Some time was spent locating the trouble, after which a test point was installed for measuring d.c. grid voltage. A fresh battery cured the trouble. Grid-leak bias definitely is not recommended if you are contemplating Class C operation. More batteries, or a VR supply, would be better.

With 45 volts of bias and 300 volts on the screens, the plate current idles at around 180 ma. To get the 200 ma. resting current recommended by the manufacturer it was necessary to reduce the bias to 42 volts. This was done by connecting two penlite cells in series with the 45-volt battery in the proper polarity to subtract 3 volts. Some variation in bias, for various operating conditions, could be obtained by a switching arrangement that would connect this battery in opposite polarities, or eliminate it. Different tubes and installations may require some adjustment of bias in this way, or the use of a continuously-variable bias source.

Except for the experience with the bad battery, the amplifier appeared stable in every way. With no drive and no load, wide tuning excursions gave no sign of instability or indication of r.f. output. This stability may be due in part to the inefficiency of the tuned circuits for 432 Mc., as compared with those used on lower frequencies.

Application of 15 to 20 watts of r.f. drive causes the plate current to rise to about 500 ma. Further increase in drive sends it up to over 700 ma., but the law and tube ratings do not allow this. Much more than 2000 volts on the plates is not recommended for this frequency by the manufacturer, though the writer has tried 2200 occasionally without apparent ill effect.

The amplifier would make an ideal adjunct to a low-powered a.m. rig. Keeping the drive down to a point where the final draws 300 to 350 ma. (at 2000 volts) would allow an a.m. output of 200 to 250 watts, with the amplifier running as a Class AB_1 linear. A simple adjustment will then bring operation up to the kilowatt level, for c.w. DXing. Class C operation on c.w. was tried, but it produced only slightly more output. Since operation here involves frequent changes from c.w. to s.s.b., Class AB is used entirely.

Fig. 4—Interior of the parallel-pipe tank circuit used in the 432-Mc. kilowatt amplifier. Tuning is done by means of a copper vane, visible at the top of the picture.

A similar rig was built with its driver stages on the same chassis, duplicating the plate circuit shown here. Results were identical, almost to the watt. It is probable that similar performance could be expected from other ceramic-insulated members of this tube family (4CX prefix). Glass-insulated types (4X prefix) and particularly early 4X150As of the surplus variety, will require some reduction in maximum plate voltage and power input, for long life.

Thanks are due Bob Sutherland, W6UOV, of Eimac, for information and suggestions on the care and feeding of 4CX300As above 400 Mc.

QST

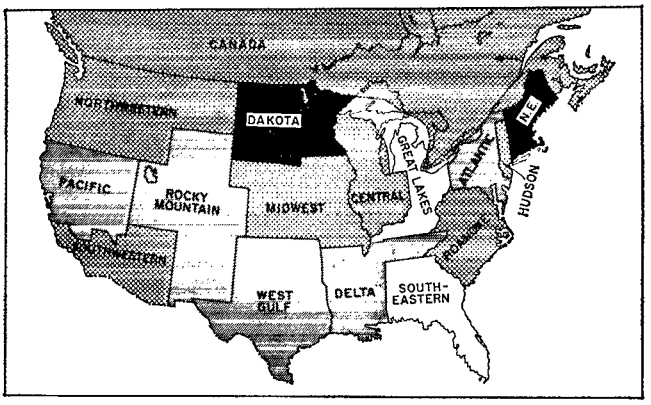
Strays

Three-land QRP QSO Party. August 15-16. All comers trying to work QRP stations in the tri-state third call area. Listen around 3740, 7040, 14,065 kc. Certificate awards. Send your logs to Ike Kerschner, W3AZR, R.D. 1, Box 254, Telford, Pennsylvania.

—···—

And if *that* QRP contest doesn't wear you to a frazzle, get on the air again between 1800Z Aug. 29 and 0000Z Aug. 30 and take part in the Second Annual QRP ARC QSO party. Look for QSOs on 3540, 7040, 14,065, 21,040, and 29,040 c.w., and on 3855, 7260, 21,300, 28,540, and 50,350 a.m./s.s.b. Send logs before Sept. 20 to Jerry Fiore, K4HPR, 229 Meadowdale Ave., Birmingham, Alabama, 35215. QRP stations score 1 point for c.w. contacts, 1.5 points for phone. Others score 1 point for any contact. Exchange QSO numbers. Awards.

Building Fund Progress



THE lines of progress continue to stretch across the country, and our map of divisions gradually darkens as more areas approach being "in the black" — 100% of quota. Of the fourteen divisions not yet 100%, during the past few months seven have moved to higher plateaus of achievement as shown on the accompanying map. And everybody is moving upward at a steady pace. As before, solid black indicates 100%; double cross-hatch is above 80%; single crosshatch is 60 to 80%; and white shows those below 60%.

A particularly big percentage increase has been registered by the West Gulf Division, which since March has gone from 56% to over 75% of quota. The Hudson Division has only a couple of percentage points to reach its goal, while Canada is right behind with less than 5% to go.

An achievement plaque will be awarded each division which, at the time of the National Convention in August, has completed its quota. Dakota and New England are already over the top. Hudson and Canada are virtual certainties. Several others can make the goal with a bit of effort. Help put your division in the black by mid-August — send your check or money order payable to the ARRL Building Fund.

Here's how the standings were at the end of June:

Dakota	**120.9%**	Midwest	80.8
New England	**116.0**	West Gulf	75.1
Hudson	97.6	Pacific	72.6
Canada	95.1	Delta	71.9
Northwestern	89.8	Rocky Mountain	64.5
Roanoke	85.9	Atlantic	63.7
Central	82.8	Southeastern	55.2
Southwestern	82.5	Great Lakes	51.4

Members Are Saying

Enclosed you will find a check to be applied to the ARRL Building Fund. This check represents 50% of the profit from the Cedar Rapids Hamvention, which was held in September of last year. Good luck on reaching your Building Fund goal. — *KØCOM*

I am glad to give what I can. I can't begin to thank ARRL for all the wonderful things it has done for me through *QST* and W1AW bulletins. — *WØAIP*

I enclose my contribution for the 27 years of enjoyment as a licensed radio amateur, of which I have enjoyed the privileges of continued membership in the ARRL for the past 25 years. — *KH6DQ*

I offer this small sum toward the Building Fund. I only wish it could be a hundred times ten more dollars. I feel that I owe much more for the many benefits I have gained from the League. I'm proud to be a member and to have such fine representation for my amateur radio interest. — *W5FZI*

Enclosed find a check which the Forx Amateur Radio Club sends as their donation to your Building Fund. — *WØGFE*

Enclosed is my check for your Building Fund. ARRL is indispensable for ham radio, and I would like to be able to do more to help. — *XE1NL*

Please find enclosed a dollar for each year of pleasant experiences since my ticket first arrived. — *KH6FIIA*

This contribution is but a small token of my appreciation to the League for a job well done. Best wishes for continued success. — *W7GKT*

Here is a small contribution to your Building Fund. I hope it will help our division toward the top. — *W3GRH*

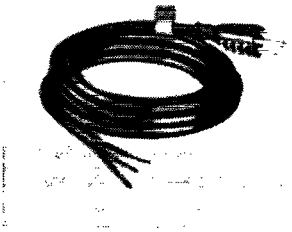
Enclosed is my contribution to the Building Fund. Even though I have been off the air for nearly two years after a hectic seven years of DX chasing on c.w., I want to continue supporting ARRL so that our bands and privileges will be available when I get bitten by the DX bug in years to come. — *W8KX*

In its last convention the LX amateurs decided by unanimous vote to contribute half of the 1964

(*Continued on page 152*)

Electrical Safety for Beginners

(And Old Timers, Too!)



BY GEORGE P. SCHLEICHER*, W9NLT

ANYONE who has received an electric shock from a faulty appliance should be relieved to note that most of the new appliances are being equipped with 3-conductor power cords. The third conductor is furnished to provide a means of properly grounding the device. Some fatalities and a number of near-misses occur every year because the metal handle or the housing of an appliance becomes energized through some internal electrical fault and is later used or contacted by someone who happens to be electrically "grounded." A great deal of the electronic equipment that is currently in use does not have a built-in arrangement to assure that it is safely grounded. This deficiency can be corrected by replacing the original 2-conductor power cord with one having three conductors terminated with a "grounding" plug. You can probably imagine the writer's feelings when, installing such a cord on an electric hand drill, he found that one of the conductors in the original cord had been accidentally but firmly clamped between the metal handle halves during factory assembly.

Power Wiring

Amateurs and experimenters can avoid or reduce electrical hazards more effectively if they learn the principles behind modern protective practices and apply them in their homes and hobby. In order to understand why some practices have been adopted by the electrical industry it will be helpful to study a typical power service to a residence. A simplified schematic is shown in Fig. 1. On the house-service side of the distribution transformer one conductor of the service "drop" is grounded. As a rule it is grounded at the transformer location and also to a cold-water pipe or a ground rod at the residence. This conductor is referred to as the "neutral" or the "grounded, current-carrying conductor"; in some places it is referred to simply as the "white wire." The other conductors are the "hot" or "ungrounded, current-carrying conductors." Branch circuits for 120-volt service are connected to the neutral and one of the "hot" conductors. Part of the branch circuit is a grounding conductor; it does not normally carry any of the operating current; its only purpose is to effectively ground the appliance. Where metallic conduit is used, the conduit itself furnishes the grounding path. Where non-metallic-sheathed cable is used, a separate conductor is provided. The branch circuit is connected to receptacles as shown in Fig. 2. An appliance is normally connected to the power source using 3 conductors: a "hot" or ungrounded, current-carrying conductor, a "neutral" or grounded current-carrying conductor, and a grounding conductor.

* 1535 Dartmouth Lane, Deerfield, Ill. 60015.

Appliance Cords

Individual appliance cords are connected as shown in Fig. 3. Two-wire connection is adequate for appliances which do not have a metallic housing (such as clocks or lamps) as shown in Fig. 3-A. Any portable power tool or metal encased appliance should be connected with a 3-conductor cord as shown in Fig. 3-C. The power switch and fuse are normally connected in series with the "hot" conductor.

An older arrangement, shown in Fig. 3-B, has been discarded because it is potentially unsafe. Many appliance failures occur when a cord conductor breaks at the plug. If the appliance had been wired as shown in Fig. 3-B, and the break involved the neutral conductor, obviously the "hot" side of the line would be connected to the appliance housing through its internal wiring. Enough current might pass to be fatal to a person touching the device; the appliance would limit the current flow, however, and the circuit-breaker or fuse would not operate. With the arrangement shown in Fig. 3-C, any of the conductors could be broken at any point without introducing a hazard.

It doesn't take long to make a check of the electrical appliances in the average home and a few potentially dangerous conditions will prob-

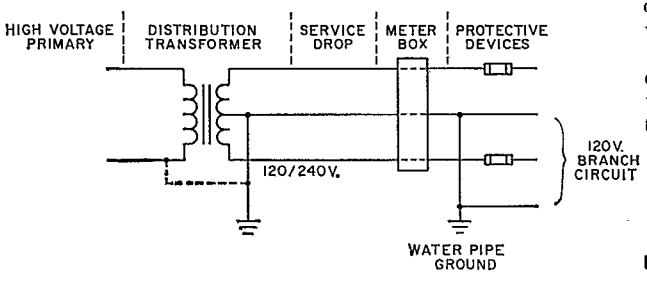


Fig. 1—Residential power service.

ably be found in every case. Leakage resistance tests are always in order; even the better insulation materials can deteriorate as the result of environmental conditions. During your own "switch to safety" crusade give some thought to grounding appliances in such places as the radio shack, garage and workshop. Your wife will be safer if you include appliances in the kitchen and the laundry, too. A 3-conductor cord should be provided on any appliance having exposed metal parts. This is particularly true if the device is used in a room having a concrete floor or containing grounded metal fixtures. Don't forget to check items that are used seasonally or out of doors or that are fastened to something else; these include automotive engine warmers, rotisserie motors for the charcoal grill and electric garden tools. The method of connecting the 3-conductor cord is indicated in Figs. 2 and 3-C. A typical commercially-available appliance cord is shown in the photograph.

Radio Equipment

Particular attention should be paid to radio transmitting, receiving and test equipment. Occasionally a fault will occur in a transmitter which raises its potential above ground. If it is connected by coaxial cable to an antenna system having grounded elements or radials, current may drain over the sheath of the coax. If the fault is not discovered in other ways, serious shock can result when the coaxial fittings are taken apart since the potential will appear across the opening in the sheath conductor. Receivers and test equipment are frequently equipped with r.f. bypass capacitors which are connected between each of the line conductors and the chassis. If these are of appreciable size or become leaky, a nasty shock can be received from the cabinet or panel. Additional hazards can exist in the use of test equipment; operator safety is enhanced if the cases of the test set and the equipment under test are both grounded.

Transformerless Supplies

Devices that employ a.c.-d.c. or "transformerless" high-voltage supplies can be particularly dangerous if good practice is not followed. Frequently the negative side of the plate supply is connected to one of the line conductors (the neutral should be selected) and may also be connected to the chassis. Where this is done the chassis should be completely enclosed so as to prevent personal contact with it. If the housing or external controls are made of a conductive material they should be well insulated from the chassis and connected to the grounding conductor in the power

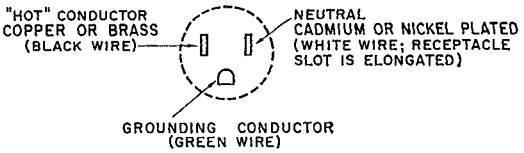


Fig. 2—Wiring side of receptacle or pin view of plug.

cord. In cases where the chassis is not electrically connected to the power supply circuit (small r.f.-bypass capacitors can be neglected) then the chassis should be connected to the grounding conductor.

Grounding

Of course, the 3-conductor cord will be of no benefit if the third conductor is not well grounded. In converting household electrical equipment to use 3-conductor cords care should be taken to see that grounding receptacles are available. Changing receptacles or extending house wiring should be done only by qualified people. The adequacy of the ground at the receptacle should be verified if older house wiring is being converted. Incidentally, it is a good idea to check to see that portable generator sets are properly wired and adequately grounded when in use at field locations.

Equipment which has been constructed by the amateur or experimenter should comply with generally accepted practices. Local ordinances, where they exist, should be followed. The city of Chicago, for example, has an electrical code which is rather extensive. It contains specific provisions regarding radio transmitting stations which apply to amateurs as well as others. Information regarding the selection of appliance cord type and the allowable current carrying capacity for the various wire sizes can be found in the *National Electrical Code*, published by the National Board of Fire Underwriters.

A little prevention is the least costly but most satisfactory insurance that is available. QST

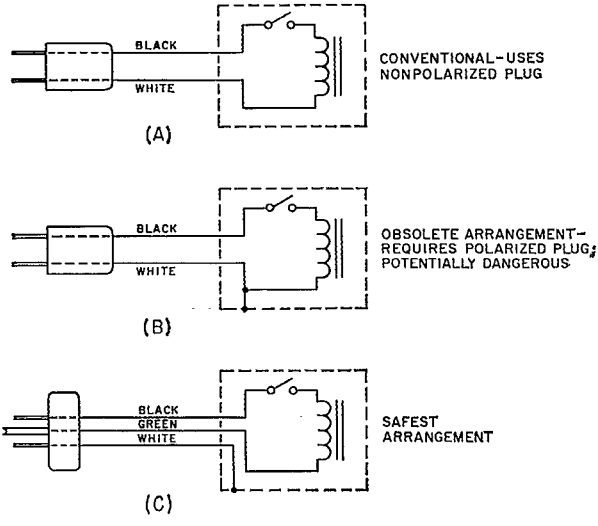


Fig. 3—Methods of connecting power cords to appliances.

The Monimatch and S.W.R.

BY S. C. SHALLON,* K6CYG

This short article explains how the Monimatch operates and some common circumstances under which it may give misleading information.

ONE of the most-misunderstood, most-confusing and most-discussed subjects in amateur radio today is the subject of standing-wave ratio. Prior to about 1956, few amateurs had means whereby they could measure the s.w.r. on their antenna transmission lines. The rest of us loaded our rigs into half-wave dipoles fed with 600-ohm open-wire line (perhaps resulting in an s.w.r. of 8:1), and went ignorantly on our ways working everything from AC4s to ZD9s. Everything worked fine, and everyone was happy.

Then Lew McCoy upset this apple cart of ignorant bliss with his description of the Monimatch.[1] The Monimatch was a simple, inexpensive device which indicated s.w.r., consumed negligible power, and could be left in the line during high-power operation. Today we find s.w.r. indicators of the Monimatch or similar design adorning the operating tables of amateurs everywhere. We also find much confusion, consternation and worry when this diabolical device indicates an s.w.r. other than 1:1, or indicates other than zero reflected power.

How does the Monimatch work? What do its readings mean?

One version of the Monimatch is shown in Fig. 1. R.f. power from your transmitter feeds in through the coax connector on the left, and the coax line to your antenna connects to the coax connector on the right. The two pickup wires, W_R and W_F, are equal in length, and are spaced equally from the center conductor. The r.f. voltage at one end of pickup wire W_F is rectified by diode D_F and read on meter V_F. Similarly, the r.f. voltage at the opposite end of pickup wire W_R is rectified by diode D_R and read on meter V_R.

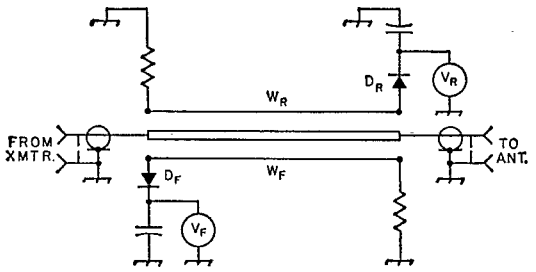


Fig. 1—Basic circuit of the Monimatch.

The r.f. voltages, V_F and V_R, are a resultant produced by both capacitive and inductive coupling from the center conductor. When the Monimatch is properly adjusted and terminated in its design impedance (e.g., 50 ohms), the two capacitively-coupled voltages, V_C, and the two inductively-coupled voltages, V_I, are all equal to each other. Fig. 2 shows the way these voltages are combined to produce the measured voltages V_F and V_R. Notice that on pickup wire W_F, the equal voltages V_C and V_I add in phase to give V_F; voltage V_F is an indication of the so-called "forward" power. On pickup wire W_R, the equal voltages V_C and V_I are opposite in phase because the voltage is measured at the end of the wire opposite from that at which the measurement is made on pickup wire W_F. In this case, V_R is the difference between V_C and V_I, and the resultant produces a zero reading at V_R; voltage V_R is an indication of the so-called "reverse" power, and the reverse-power reading is zero when the Monimatch is properly balanced and terminated.

The situation that has just been described is the one that we all strive so hard to achieve: zero reflected power. But notice that a zero reflected-power reading merely indicates that the previously-balanced Monimatch is properly terminated, usually by 50 ohms; without additional information it tells us nothing about what is happening on a transmission line that may be connected to the output end of the Monimatch.

* 11058 Queensland St., Los Angeles, Calif. 90034.

[1] McCoy, "The Monimatch," *QST*, Oct., 1956. "Monimatch, Mark II," *QST*, Feb., 1957.

Table I

Monimatch Voltages and Currents with 100 Watts in Load

	A	B	C	D
Load (ohms)	50	100	25	40 + j30
Load Voltage (volts)	70.7	100	50	63.2 + j47.4
Load Current (amperes)	1.41	1	2	1.58
V_C (proportional to load voltage)	70.7	100	50	63.2 + j47.4
V_I (proportional to load current)	70.7	50	100	79.0
$V_F = V_C + V_I$	141.4	150	150	142.2 + j47.4 = 150 $\angle 18.4°$
$V_R = V_C - V_I$ (or $V_I - V_C$)	0	50	50	−15.8 + j47.4 = 50 $\angle 108.4°$
Indicated Forward Power (watts)	100	112.5	112.5	112.5
Indicated Reverse Power (watts)	0	12.5	12.5	12.5

To get a better appreciation of what the Monimatch readings mean, let's assume that we have a transmitter delivering 100 watts through a 50-ohm Monimatch into a 50-ohm load connected directly to the output end of the Monimatch. The load voltage, to which V_C is proportional, is 70.7 volts; for the sake of simplicity, let's say that V_C measures 70.7 units of voltage. The load current, to which V_I is proportional, is 1.41 amperes; this must produce a V_I of 70.7 units of voltage since V_C and V_I are equal when the Monimatch is properly terminated. These voltage and current conditions for a 50-ohm load are tabulated in column A of Table I. Column A also shows that V_F (an indication of forward power) is 141.4, and that V_R (an indication of reverse power) is zero, indicating that there is no reflected power.

Now, let's replace the 50-ohm load with a 100-ohm load; but let's continue to pour 100 watts into it through our 50-ohm Monimatch. The load voltage is now 100 volts, and the load current is one ampere. These values for load voltage and load current produce new values of V_C, V_I, V_F, and V_R, as tabulated in column B of Table I. Since power is proportional to the square of voltage, and since the V_F of 141.4 in column A corresponded to a forward power of 100 watts, the new V_F of 150 must correspond to an indicated forward power of

$$\left(\frac{150}{141.4}\right)^2 \times 100 = 112.5 \text{ watts.}$$

Huh! Is the guy who wrote this article some kind of nut? How can the Monimatch indicate 112.5 watts forward power when we started with only 100 watts? To answer this, let's look at the reflected power. The V_R of 50 corresponds to a reflected power of

$$\left(\frac{50}{141.4}\right)^2 \times 100 = 12.5 \text{ watts.}$$

And it should be obvious that the 12.5 watts of reflected power subtracted from the 112.5 watts of forward power leaves 100 watts, the power we started with.

What this all boils down to is that the "forward" and "reflected" powers are both fictitious powers that help (?) in the understanding of transmission-line phenomena; but the only power that actually exists is the difference between the two, the power delivered to the load. The "reflected" power measured by your Monimatch is not wasted power that is not finding its way to your antenna; it is a fictitious power. If the "reflected" power were an actual power, the extra power would have to come from somewhere. But if you check the input power to your final amplifier, you will find that it is the same as it was when the "forward" power was 100 watts with no "reflected" power.

A 100-ohm resistive load is not the only load that will result in an indication of 112.5 watts of "forward" power and 12.5 watts of "reflected" power. A 25-ohm resistive load will produce the same results, as shown in column C of Table I.

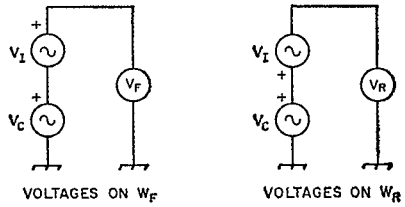


Fig. 2—Diagrams showing the various voltages involved in operation of the Monimatch.

There are infinite combinations of resistance and reactance that also will produce the same results; column D shows the circuit conditions for one such load: 40 ohms of resistance in series with 30 ohms of inductive reactance.

In the above calculations, lumped-constant loads were used at the output of the Monimatch. When the Monimatch is connected instead to a transmission line, the Monimatch readings depend upon the equivalent lumped-constant impedance "seen looking into" the line. The equivalent impedance depends upon the load impedance at the far end of the line, the length of line, and the characteristic impedance of the transmission line. Fortunately, there is a convenient relationship between the transmission-line s.w.r. and the impedance "seen looking into" the line which permits the Monimatch to be used for s.w.r. measurements. However, the Monimatch readings will be correct only if the Monimatch has been calibrated for the impedance of the transmission line with which it is used. To see that this is the case, consider the following situations.

Let's go back to the situation depicted in

column A of Table I, in which a 50-ohm Monimatch is terminated with 50 ohms. Now, insert one half wavelength of 200-ohm transmission line between the Monimatch and the load. The s.w.r. on the line is 4:1, but the Monimatch continues to indicate zero reflected power. This is because the impedance seen looking into a transmission line repeats for each half-wavelength increment of line. Thus, it is seen that the Monimatch gives erroneous readings for this situation of mismatch between Monimatch and transmission line.

Suppose we have a Monimatch that is not properly balanced for 50 ohms, but is balanced instead for 40 ohms. If we connect to the output of this Monimatch a length of 50-ohm transmission line feeding a 50-ohm load, the s.w.r. on the line will be unity, but the Monimatch will indicate an s.w.r. of 1.25:1. Again, the Monimatch gives erroneous readings because it is not balanced for the impedance of the transmission line being used.

But let's connect a 50-ohm Monimatch into a 50-ohm transmission line of arbitrary length, and let's suppose that the load at the far end of the line is mismatched so as to produce an s.w.r. on the line of 2:1. Depending upon the load impedance and the length of line, the impedance presented to the Monimatch may be 100 ohms resistive (corresponding to column B of Table I), 25 ohms resistive (corresponding to column C), or a combination of resistance and reactance (such as that in column D); but for all of these cases, the Monimatch forward power readings will be the same, as will the reverse power readings, and the indicated s.w.r. will be 2:1 (in columns B, C, and D of Table I, the forward power of 112.5 watts and reverse power of 12.5 watts correspond to a 2:1 s.w.r.).

Many fables regarding standing-wave ratio are rampant on the ham bands and in the literature. With knowledge of how the Monimatch works, the true facts should be evident:

1) If your Monimatch is properly balanced (and there is no r.f. on the outside of your coax line), the s.w.r. reading should be independent of the length of line. However, if there is a standing wave on the line, your transmitter loading may change as you change the line length because the impedance presented to the transmitter changes.

2) S.w.r. readings do not depend upon the length of coax line between your transmitter and the Monimatch.

3) Reflected power is not wasted power. However, transmission-line loss varies with s.w.r. as described in the *Handbook*. QST

Strays

Winner of the Cover Award Plaque for his article on "The Black Box" in the February issue of QST was Gil Countryman, W4JA, shown above at the right. Presenting the award was Roanoke Assistant Director C. L. Bradley, W4UEV.

Alexander McRoberts, K1MZS, was winner of the 1964 John Mansfield Memorial Award. He received this "ham-of-the-year" award at the New England Division Convention in May because of his outstanding work with disabled patients at the Veterans Administration Hospital in Providence, R. I. Through his efforts, 37 patients have passed their Novice and/or Technician exams. Here he receives the award from Father Dan Linehan, W1HWK, while Mrs. McRoberts looks on.

—•••—

ARRL isn't the only one celebrating a fiftieth anniversary. So is the National Company. They have published an interesting Anniversary Photo Album which pictures most of the important pieces of gear, both amateur and military, manufactured by National over the past 50 years, and copies of this album are available by writing to the National Radio Co., Inc., Dept P., 37 Washington St., Melrose, Mass. 02176.

• 1964 Novice Roundup Results •

EACH year ARRL sponsors a unique operating event tailored to the new amateur, the Novice. The 14th ARRL Novice Roundup February 1-16, 1964, showed a healthy rise in WN/KN participation, up 24.3% increase over 1963. Non-Novice activity also took an up-swing, 102 such logs received, up about 10% over the previous year. To the new ham, this event is a revelation. It's an unparalleled opportunity for DX QSO's, new states and an introduction to the best in clear concise operating techniques. The "teachers" are the non-Novices in there having as much fun as the newcomers. Each participant "won" something this year, be it a section award, a new state or a DX QSO. In particular one group of 19 demonstrated that extra something leading to better than 10,000 points.

WN8HQI	26,580	WN6HBY	12,150
WN4PRF	23,240	WN1AAY	12,054
WN2JEE	19,536	KN3FQS	11,730
WN9IYU	18,144	WN9HJMI	11,718
WN4OXD	15,400	WN4NLD	11,711
WN5GYW	15,070	WN4RPL	11,610
WN5HWH	14,213	WN1ATW	11,270
WN4PFD	13,724	KN1FNA	10,170
WN9HEU	13,014	WNJQC	10,164
	WN5IKW 10,000		

All certificate winners are reminded that section awards are due to be mailed Aug. 15.

Soapbox

"Three days after the NR I got up enough courage to pass my General. Maybe that code practice helped!" — *WN6GKG.* . . . "Lots of fun but boy am I tired!" — *WN2KDD.* . . . "At least someone in Hawaii entered this year." — *WH6FHN.* . . . "High score or low it's great and you're only a Novice once." — *WN6FRP.* . . . "I hope to be back in '65 with K7YOI to put Idaho on the map." — *KN7YOI.* . . . "My biggest thrill was working Chuck at W1AW." — *WN2LLK.* . . . "It really was great working Cuba on 80." — *WN4OYZ.* . . . "I'm beginning to see real fun in rag chewing after these 30 second long QSO's." — *WN6FHH.* . . . "I've never had so many phone calls or company as in these two weeks." — *WN2KXG.* . . . "Never dreamed so many people could be on one forty meter frequency." — *WM4PMW.* . . . "I called a WN4PRF and was pleasantly surprised to hear a snappy "GE HR NR 171 VA BK". The callbook lists him as Andrew V. Clark with the same address as the famous W4KFC. Then, after working WN4PAE the next day (Hester Clark) I began wondering if I was a member of the Clark-of-the-day Club!" — *W1AW* (W1WPR, opr.). . . . "I upped my WAS total from 23 to 28." — *KN3YGU.* . . "I feel I learned a lot but still listen to the W1AW code practice sessions and one of these days will take my General Class exam." — *WN4NWH.* . . . "Was surprised at the number of Generals participating." — *WN4OUS.* . . . "Three cheers for the Roundup, my biggest thrill since my first QSO as a Novice." — *KN1CGI.* . . "I learned how to operate more efficiently and how to keep log with my left hand." — *WN2LBF.* . . . "Now why couldn't I work KG4AM?" — *WN6GEL.* . . . "During the NR my first log sheet was burned by a cigarette. Since then I've given up smoking." — *KN1FNA.* . . . "I ran out of midnight oil!" — *WN2IKW.* . . . "Yoiks I'm glad its over!" — *KN3YQP.* . . . "A lot of Novices missed contacts by not listening on their frequency." — *WA2ZVJ.* . . . "This sounded like a vintage year." — *WA4IUM.* . . . "Was especially glad to hear W1AW telling a Novice about the roundup." — *K1YKT.* . . . "I'm being swamped with requests for Vermont QSL's!" — *K1APA/1.* . . . "Many fine operators in this year's crop." — *K2EIU/5.*

SCORES

Scores are grouped by ARRL Divisions and Sections. The operator of the station listed first in each section is award winner for that section. *Example of listings*: KN3ZXG 8800-200-44-40, or final score 8800, number of stations 200, number of sections 44, total operating time 40 hours.

ATLANTIC DIVISION

Eastern Pennsylvania

KN3ZXG	8800-200-44-40
KN3YQP	7755-165-47-39
KN3ZMC	7038-192-34-40
KN3YYT	5928-142-39-34
KN3ZKH	2990-100-26-12
KN3YUA	2673- 81-33-15
KN3ZTE	2610- 87-30-40
KN3ZOL	2187- 81-27-24
KN3ZYT	960- 40-24-26
KN3ZEU	819- 39-21- 5
KN3YRO	680- 40-17-12
KN3ZZL	208- 16-13-10

Maryland-District of Columbia

KN3FQQ	9143-207-41-40
KN3ZLP	2025- 75-27- -
KN3YGU	1101- 46-24-15
KN3WTV	416- 26-16- -
KN3ZBR	70- 10- 7-19

Delaware

KN3YHR	8084-172-47-19
KN3ZMI	8041-177-43-39
KN3YSW	1195- 65-23- 2

Southern New Jersey

WN2KVC	5285-151-35-40
WN2GPN	1638- 63-26- 4
WN2IHZ	504- 36-14-15

Western New York

WN2GPR	7869-168-43-28
WN2IFW	5775-175-33-36
WN2IPX	5341-167-32- -
WN2HWV	3844-109-31-14
WN2JWV	3645-135-27-35
WN2JJI	2850-114-25-12
WN2IDS	2660- 85-28-40
WN2KYQ	2160- 80-27-18
WN2LCS	2146- 74-29-28
WN2LGP	1850- 74-25-12
WN2KQR	1612- 62-26-11
WN2KTL	1600- 80-20-20
WN2KXN	420- 28-15- 9
WN2GWB	390- 20-13-17
WN2ITG	96- 6- 6- 6
WN2KTJ	88- 11- 8- 1
WN2LTY	84- 12- 7- 9

Western Pennsylvania

KN3FQS	11,730-255-46-32
KN3FCK	5109-121-39-37
KN3ZOP	2175- 75-29-23
KN3YVU	2030-130-14- -
KN3FOZ	1020- 75-12-14
KN3YAP	944- 44-16-10
KN3YRY	108- 12- 9-13
KN3YQR	24- 6- 4- 2

CENTRAL DIVISION

Illinois

WN9IYU	18,144-321-54-34
WN9HEU	13,014-226-54-40
WN9HJM	11,718-217-54-34
WN9HKF	8274-182-42-26
WN9KQU	7480-170-44-21
WN9HGZ	6930-154-45-24
WN9JAV	6048-134-42-27
WN9JKM	6031-163-37-28
WN9JCR	4104-108-38-17
WN9JGL	3301-108-28-27
WN9IOT	2656- 83-32-19
WN9HHH	2465- 70-29-12
WN9KDW	1965-116-42-32
WN9KRJ	1000- 40-25-18
WN9KRK	384- 23-16- 6

Indiana

WN9JEG	4900-125-35-31
WA9BWY	3850- 95-35-15
WN9HUP	2368- 74-32-20
WN9KFQ	2225- 89-25- -
WN9KBS	28- 7- 4- -

Wisconsin

WN9JDT	9660-210-46-30
WN9JFM	6816-132-48-39
WN9HRS	5480-137-40-32
WN9HTH	5320-133-40-40
WN9IMF	1888-118-16-40
WN9JRJ	820- 41-20- -
WN9KDS	448- 32-14-18
WN9JDW	297- 27-11- 7

What may be the first 4-H radio club in the country, sponsored by WN4PAE and W4KFC, is the Fairfax County group supplying plenty of Virginia novice activity in the Roundup. Left to right (standing) WN4s QFN RHX RDN QGK and (kneeling) junior group leader WA4IVP and WN4s QVT RHY PRF (Va. section leader with 23-K and a superb exhibition of snappy operating techniques).

WN9IIF 252- 21-12- 4
WN9HFO 189- 12- 7- 1

DAKOTA DIVISION

South Dakota

WNØHUF 3570-102-35-21
WNØFPR 2275- 65-35-17

Minnesota

WNØGNO 3132- 98-29-35
WNØFVL 2987-103-29-36
WNØFKO 2400- 80-30-18

DELTA DIVISON

Arkansas

WN5HNN 6808-184-37- –
WN5HGO 5616-117-48- 7
WN5HGP 3996-108-37- 8
WN5IHC 1998- 74-27-11
WN5IIS 360- 24-15- 8

Louisiana

WN5GVB 4428- 88-41-24
WN5IFW 3815- 89-35-18
WN5HOD 3201- 87-33-19

Tennessee

WN4OXD 15,400-260-56-32
WN4PFD 13,724-292-47-39
WN4NIV 1610- 70-23-22

GREAT LAKES DIVISION

Kentucky

WN4PGA 3680- 92-40-33
WN4QOP 3024- 74-36-20
WN4RKS 1050- 40-21- 8
WN4PCO 576- 26-16- 4
WN4SIO 207- 23- 9- 3

Michigan

WN8KBL 6380-125-44-16
WN8LFU 4551-113-37-39
WN8KYJ 3584- 97-32-27
WN8KFM 2016- 72-28-19
WN8KQZ 1690- 65-26-22
WN8JSF 1541- 67-23-13
WN8IUT 1311- 57-23-26
WN8JSC 416- 30-13- 3
WN8LAN 119- 17- 7- 7
WN8KEH 84- 12- 7- 2
WN8LCI 60- 12- 5- 5
WN8LBA 55- 11- 5-11
WN8LIK 20- 5- 4- 3

Ohio

WN8HQI 26,580-433-60-38
WN8KOR 18,645-329-55-38
WN8KOQ 11,250-235-45-29
WN8HTR 10,516-224-44-39
WN8IOY 4200- 95-40-18
WN8KBK 3927-104-33-37
WN8JOC 2370- 64-30- –
WN8HNF 1219- 53-23-14
WN8HJW 935- 45-17- –
WN8KHP 722- 38-19- 9
WN8HIJ 492- 23-14-10
WN8JZP 286- 26-11-10
WN8IAW 9- 3- 3- 2
WN8KYF 9- 3- 3- 9

HUDSON DIVISION

Eastern New York

WN2GSK 8946-213-42-24
WN2IBQ 6510-210-31-38
WN2IDW 3136-112-28- –
WN2HEY 2542- 72-31- 8
WN2KZU 2369-103-23-25
WN2MBH 403- 31-13-20
WN2KHQ 208- 16-13- 4
WN2IVP 165- 15-11-14
WN2HZY 12- 4- 3- 6
WN2JOA 9- 3- 3- 1

N. Y. C.-L. I.

WN2LFL 9840-225-41-27
WN2HQW 3696-132-28-27
WN2KDT 2530-110-23- –
WN2JRC 1848- 57-24- –
WN2GWC 1250- 50-25-12
WN2KYV 190- 19-10-10
WN2KXC 63- 9- 7- 2
WN2JOX 10- 10- 1- 4

Northern New Jersey

WN2JEE 19,536-392-48-40
WN2JQC 10,164-227-42-38
WN2LLK 7936-246-31-28
WN2KXG 4620-140-33-21
WN2LBF 4004-154-26-28
WN2KSG 3894-108-33-21
WN2KSN 2500- 85-25-25
WN2KDD 1956-163-12-25
WN2HDB 1848- 66-28-23
WN2JJY 1582-113-14-30
WN2IKW 1034- 94-11-17
WN2ITY 765- 45-17-12
WN2LLJ 234- 39- 6-23
WN2KLD 126- 42- 3-17
WN2IYK 15- 5- 3- 5
WN2MJA 12- 6- 2- 1

MIDWEST DIVISION

Iowa

WNØHJD 7320-183-40-24
WNØHCK 3026- 89-34-18
WNØHYT 1769- 61-29-13
WNØFSQ 924- 32-22- 5
WNØGGN 561- 33-17- 6

Kansas

WNØFJI 3116- 82-38-16
WNØHTJ 1680- 56-30- 9
WNØGSG 1053- 39-27-11
WNØGET 68- 17- 4- 2

Missouri

WNØHMN 1652- 59-28-20
WNØICX 1204- 43-28-20
WN9JDR/Ø 208- 16-13- 6

Nebraska

WNØGVJ 4150- 83-50-11
WNØIBD 3016- 94-29-33

NEW ENGLAND DIVISION

Connecticut

WN1AAY 12,054-277-42-36
WN1ATW 11,270-230-46-25
WN1BHJ 6650-190-35-26
WN1BBY 2835-105-27-16
WN1ABV 2025- 75-27-23
WN1AHQ 2000-100-20-22
WN1AHI 1100- 55-20-14
KN1FQC 1088- 48-16-17
WN1AAV 416- 26-16- 8

Eastern Massachusetts

KN1ETP 3312-129-23-32
KN1CGI 1869- 79-21-25
KN1FUP 364- 28-13-16
KN1FZO 341- 31-11-17

Western Massachusetts

KN1FNA 10,170-206-45-28
KN1FPI 1863- 69-27-21

New Hampshire

KN1EMM 4795-122-35-20

Rhode Island

WN1AGE 490- 25-14-15

Vermont

KN1FHD 2016- 84-24-24

NORTHWESTERN DIVISION

Idaho

KN7YOI 858- 33-26-19

Montana

KN7YEM 2356- 76-31-31
KN7WUF 12- 4- 3- 1

Oregon

KN7YAY 10,128-211-48-36
KN7ZTY 6120-170-36-31

Washington

KN7YDD 1100- 55-20- –
KN7WUH 546- 39-14-19
KN7ZJP 112- 14- 8-22
KN7YYA 48- 12- 4-12

PACIFIC DIVISION

Hawaii

WH6FHN 5- 5- 1- 2

Nevada

KN7ZBW 1632- 51-32-14

Santa Clara Valley

WN6FHH 5809-157-37-16
WN6HWD 1800- 80-20-20
WN6IZF 374- 22-17-14
WN6DZW 120- 13-10-11

East Bay

WN6HDH 5250-150-35-32

San Joaquin Valley

WN6HAI 504- 28-18- 7

ROANOKE DIVISION

South Carolina

WN4ORD/4 3003- 76-33- 9
WN4NRE 217- 26- 7- 4

Virginia

WN4PRF 23,240-400-56-40
WN4NWB 7360-164-40-20
WN4NVD 6765-145-41-36
WN4QNM 6318-162-39-31
WN4PAE 6109-134-41-21
WN4OUS 5180-170-28- –
WN4QGK 4805-155-31-25
WN4QVT 3332-119-28-16
WN4QOC 1092- 84-13-16
WN4RHX 972- 54-18-27
WN4RHY 954- 53-18-30
WN4RTD 630- 35-18-14
WN4RDN 609- 29-21-11
WN4SGD 12- 4- 3- 2

West Virginia

WN8KLZ 5412-132-41-20
WN8KQX 3894-103-33-28
WN8JXA 2726- 94-29-20
WN8KAN 1197- 57-21-13

ROCKY MOUNTAIN DIVISION

Colorado

WNØHIR 6116-139-44-18
WNØHYG 3510- 90-39-33

Utah

KN7ZRT 1045- 45-19-21

New Mexico

WN5IFX 3744- 94-36-14

SOUTHEASTERN DIVISION

Alabama

WN4NWH 5310-103-45-36
WN4OYZ 1225- 49-25-14
WN4NWG 1060- 53-20-15
WN4NAT 176- 22- 8- 2

Eastern Florida

WN4RPL 11,610-258-45-40
WN4NKA 5434-143-38-20
WN4PFN 1518- 66-23-31
WN4RIJ 592- 27-16- 8

Western Florida

WN4NLD 11,711-239-49-31

Georgia

WN4PMX 8820-195-42-25
WN4PMW 4690-134-35-31
WN4ODB 2079- 63-33-18
WN4QZY 414- 23-18- 9

West Indies

WP4BPR 9024-192-47- 1
WP4BPD 3468-102-34-16
WP4BQA 25- 5- 5- 1

SOUTHWESTERN DIVISION

Los Angeles

WN6HBY 12,150-243-50-37
WN6GAW 7791-159-49-25
WN6GEL 5676-132-43-22
WN6HCR 3636-101-36-14
WN6IPR 2184- 78-28- –
WN6HRC 1276- 58-22-16
WN6HIE 850- 35-17-16
WN6HNY 688- 43-16-21
WN6GQZ 684- 36-19-12
WN6HKO 344- 28- 8- 5
WN6HAM 189- 21- 9- 6
WN6IAC 138- 13- 6- 2
WN6FRP 100- 20- 5-15
WN6HLS 55- 11- 5-16

Arizona

KN7YOA 920- 46-20-16
KN7YQE 48- 8- 6- 2

San Diego

WN6IRA 4160-130-32-37
WN6GKG 2000- 80-25-17
WN6IUH 1176- 56-21-21
WN6FCR 850- 50- 1-20
WN6HNT 144- 18- 8-16
WN6FNV 70- 35- 2- 3

Santa Barbara

WN6GEE 3844-124-31-30

WEST GULF DIVISION

Northern Texas

WN5IKW 10,100-187-50-35

Oklahoma

WN5HWH 14,213-233-61-37
WN5IIL 234- 18-13-20
WN5HXD 154- 14-11- 8

Southern Texas

WN5GYW 15,070-259-55-39
WN5IBB 5460-130-42-23
WN5IMR 3534- 93-38-36
WN5GZX 2886- 63-37-10
WN5IPM 1403- 51-23-11
WN5FWT 368- 23-16- 7
WN5IGG 104- 13- 8- 3

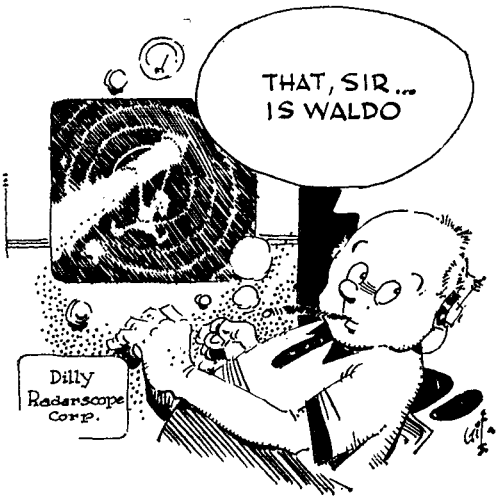
Check logs:
WB2HDL WN2KDL
KN3ZHC W5EUL
WNØHYT.

Non-Novice Scores

W1AW (Multi-opr.) 5412, K1BCS 4788, W1UOT 3531, K1QPN 2784, K1UYZ 2200, K1APA/1 1586, K1ZND 1500, K1UHE 893, K1VUT 533, K1YKT 312, W1PLJ 203, WB2EXW 5738, W2NEP 5400, WB2BFW/2 4437, WA2TAT 3612, WB2IQM 2871, WB2CIP 1998, K2PDK 1904, WB2EMJ 1610, WB2FCT 1292, WB2DVE 1224, WB2GLD 1122, WB2FPG 1008, WA2WWN 855, W2NIY 782, WA2QHQ 608, WB2ISD 560, K2KD 416, WB2CON

(*Continued on page 154*)

Section leaders all, left to right: KN1ETP high for E. Mass. with a homebrew 6V6-807; WN2JEE topping Northern New Jersey and the Hudson Division and WN5IKW earning the No. Texas certificate award.



Waldo

BY JOHN G. TROSTER, W6ISQ

45 Laurel Ave., Atherton, Calif.

T MINUS 5 and counting."

"Gee, this is exciting. Like my first QSO. Look at that missyle over there, steaming and smoking away. Poised like a giant arrow in a taught bow . . . and Oscar cuddled up there inside ready for the big ride to eternity . . ."

"Steady, fella."

"And in 5 minutes — just think — Oscar will disappear into — forever. Poor little Oscar . . . all cold and lonesome."

"T minus 4 and counting."

"Don't get all choked up now, buddy. Why, in a few hours hams all over the world will be talking to Oscar, and he'll be talking right back. You should be so lucky to work the DX ole Oscar's gonna work on two meters!"

"T minus 3 and counting."

"Everybody with recorders get ready. And boy, I hope that movie camera works, too. Hey — where's Bill Orr?"

"Who?"

"Bill Orr, W6SAI. The esteemed Director of the Oscar Association."

"T minus 2 and counting."

"Ya mean that fella with the polka-dot bow tie and oversized sun helmet?"

"Yeah, that's him. He had three or four cameras and a couple a tape recorders."

"Yeah, I seen him. He's over the hill there setting up all that stuff. Having trouble with the sun helmet — haw."

"Hmmmmm. Well, he's doing the close-up shots for our documentary."

"T minus 1 and counting."

"Turn on the cameras . . ."

"T minus 30 seconds."

"OK Oscar, old boy. Lotsa DX and all that. Say howdy to the astrinoids — and 73 to all the two-meter fellas around the world . . ."

"T minus 15 seconds."

"Hope old Bill remembers to push all the right buttons."

"T minus 10 seconds."

". . . hold . . . your . . . hats . . ."

". . . three . . . two . . . one . . . blast oooooffffff . . . !"

"Look . . . look . . . look at that . . . like the Sixth Circle . . . all fire and flame . . ."

"It was the Third Circle . . ."

"Oh, sorry . . . boy-oh-boy . . . look at him gooooooooo! Oh my . . . what a thrill . . . yeeeiii. This is the most thrilling . . . our little buddy Oscar sailing away up there into the wild bl . . . gone forever . . . off to infinity . . . kinda gets ya . . ."

"OK, it's outa sight, fellas. Quick, over to the radar shack to watch. Hope Bill Orr got the blast-off OK. Will make a terrific movie sequence for all the radio clubs . . ."

"See that big screen there? That's where they watch Oscar."

"Yeah . . . I see him — I see him — there goes Oscar, fellas. See that little dot there? See? Our Oscar!"

"Pardon me, radar operator, but I guess that little dot there on the screen is our Oscar, eh? Ha."

"No sir, that little dot is WALDO."

"No, no friend, we just watched the launch. That's Oscar . . . means Orbital Satellite Carrying Amateur Radio."

"Well sir, I'm sorry but . . ."

"Now hold on here, the missyle just went . . ."

"Well sir, on behalf of the launch group, I am authorized to inform you that the dot you see on the screen is *not* Oscar — it's WALDO."

"What do you mean, WALDO? We didn't have any WALDO."

"Well sir . . . you do now. You see, We Actually . . ."

"You Actually — what?"

"Sir, We Actually Launched . . ."

"Yes, yes — you Actually Launched . . . what?"

"Well, you know that fella with the sun helmet . . ."

"You mean our esteemed Director Orr?"

"That's the one! Well, I guess the sun helmet must have . . . well . . . that dot on the screen *is* WALDO. You see . . . We Actually Launched Director Orr!" QST

• Recent Equipment —

Shielded Ignition Systems

THERE is probably no subject more dear to the heart of the mobile buff than mobile interference. Any mobiler, no matter what his band of operation, has probably experienced in one form or another the pops, crashes, buzzes and other weird electrical noises that seem to accompany the radio station on wheels. Article after article has been written on the subject and each mobile mechanic has his favorite suppression scheme, but it is rare indeed to find a truly quiet mobile radio station.

Dismissing the noise caused by the other fellow's car, the major sources of interference can be boiled down to three areas: the ignition system (spark plugs, spark coil, distributor points), the charging system (generator, voltage regulator), and others (gauges, wheel static).

For years, amateurs (and some of the professionals, too) have used some so-called standard techniques to try and attenuate the interference generated by the above methods — resistor spark plugs, bypass capacitors, bonding and grounding, to name a few. However, the military and aviation people, who have also had their interference problems, solved them quite simply . . . bottling up the interference by shielding so that the "noise" can't be radiated or piped through connecting leads to contaminate the radio receiver. Systems involving shielding are expensive when compared to the stop-gap practices, but when you consider that, for all practical purposes, the majority of the interference can be eliminated with a properly installed shielded system, the extra price is worth it.

A shielded ignition system was described in *QST* some years ago, [1] and since that time several commercial models have appeared on the amateur market. Following is a list of some of the available models and a short description of each. The order of appearance does not necessarily indicate the relative noise-suppressing abilities of the systems! When writing the manufacturer for information about his product, be sure to include the make, model, year, and number of cylinders of your automobile.

[1] Campbell, "Exit Ignition Noise!" *QST*, May 1959, p. 30.

Hallett Signal Saver

Fig. 1 shows the components of the Hallett Signal Saver. It should be obvious where most of the components fit into the ignition system. The can in the center of the photograph, with the seven tips projecting from the top, is fitted over the existing distributor cap and is held in place by the original distributor-cap clips. Small hoods at the end of the high-voltage wires snap over the caps on top of the can to make a good electrical bond and to insure good shielding.

The other ends of the high-voltage cables contain hollow cylinders which fit over the existing spark plugs. These hoods have grounding springs inside that press against the plug base and ground this end of the lead. Included in the kit are clamps and hardware for dressing the leads to keep them clear of hot spots and moving engine parts. The manufacturer stresses in the installation manual the importance of good grounding, and that even includes the clamps used to support and dress the leads.

The shield can just to the left of the distributor cap in Fig. 1 is the high-voltage coil shield, which mounts over the end of the spark coil. A special coaxial feedthrough capacitor for the primary

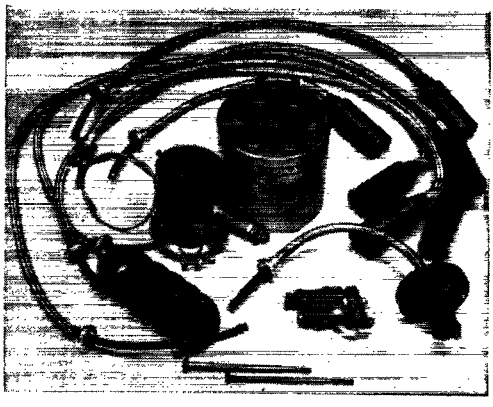


Fig. 1—Hallett Signal Saver.

lead projects out from the side of the shield. A shielded high-voltage lead, a part of the lid assembly, is attached to the coil shield after electrical connections have been made to the coil terminals. The other end of this lead plugs into the center tower of the distributor cap. A shielded low-tension lead is supplied with the kit for making connections between the spark coil and the distributor, as is also an adapter lead for "timing" the engine.

The Signal Saver service and installation manual is complete with photographs and step-by-

step methods for installing the kit. Included is information on preparing the engine before installing the shielding, installation check list, and some notes on servicing the shielded engine. The Signal Saver is manufactured by Hallett Mfg., Co., 5910 Bowcroft Street, Los Angeles 16, California. Price class: $45 to $70 depending on engine model.

Johnson "Eliminoise" Shielding Kit

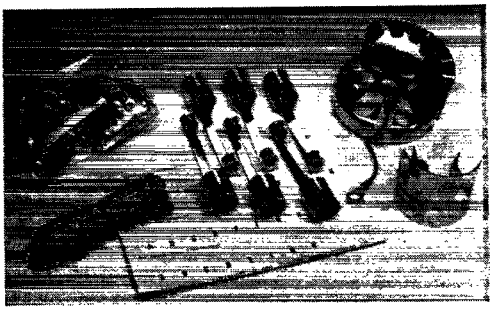


Fig. 2—Johnson "Eliminoise."

THE photograph in Fig. 2 shows the components included in the Johnson shielding kit. This kit doesn't completely shield the ignition system but does reduce radiated interference over the frequency range of 2 to 1000 Mc. One advantage of the Eliminoise kit is its universal application to practically all types of American engines, 6 or 8 cylinder, V or in-line types.

Original high-voltage wiring is used in the Eliminoise installation. Braided shield, furnished with the kit, is placed over it. The distributor-cap shield, in the upper right corner of Fig. 2, goes on top of the distributor cap. A partial coil shield, in the lower-right corner of Fig. 2, is attached to the end of the spark coil. This shield has a special coaxial feed-through capacitor for filtering the low-voltage lead to the spark coil.

Special spark-plug fittings make up to the spark plugs and the shielded braid. These fittings and the other shields are made of heavy gauge metal finished in bright chrome. Rubber grommets, a tube of lubricant, and mounting hardware are furnished to facilitate assembly and installation.

One handy accessory that comes with the kit is a card with punch-out labels that can be used to identify leads and components before installing the shield. The instructions outline the preparations and identification needed to make sure the ignition system goes back together correctly, without a crossed spark plug lead or mixed-up distributor connection. A chart and table in the manual has spaces for recording the length of existing wires. The accompanying table then shows the correct length to cut the braid to cover the leads. The table also shows low-tension coil-lead braid lengths.

The Eliminoise is a product of E. F. Johnson Co., Waseca, Minnesota. Price class: $30 to $40, depending on the number of cylinders.

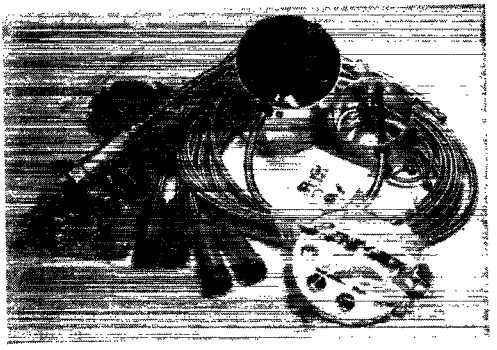


Fig. 3—Webster Electro-Shield.

Webster Electro-Shield

THE Webster shielded system is shown in Fig. 3. A new distributor cap is included in this kit and is already fitted inside a shielded cap cover. The shielded spark-plug snap-on covers come attached to the shielded high voltage leads.

The shielded cap for the high-voltage spark coil is similar to the Hallett unit and has the built-in coaxial feedthrough capacitor for filtering the low-tension line to the coil. A shielded high-voltage lead for the coil comes made up and ready for connection to the coil.

To install the Electro-Shield, it is necessary to do some work with the high-voltage leads that make up to the distributor cap. Small snap-on caps must be attached to the cable ends. Shielded braid is formed over them and held fast by clamps. After soldering clip connectors to the inside conductor the leads are plugged into the distributor and the snap-on caps are pushed on the shielded distributor-cap cover.

Treatment of the spark-coil and low-tension wiring is about the same in this kit as in the others already described.

Webster includes an excellent step-by-step instruction manual with the kit. Some of the kit parts are grouped together in identified plastic bags. The contents of the bags are listed in the

manual, which also shows the order of their use. Included in the instruction sheet are a list of tools necessary for the project, check-out lists, and trouble-shooting data.

This kit is a product of Webster Mfg., 317 Roebling Rd., South San Francisco, California. Price class: $65 to $80, depending on the number of cylinders.

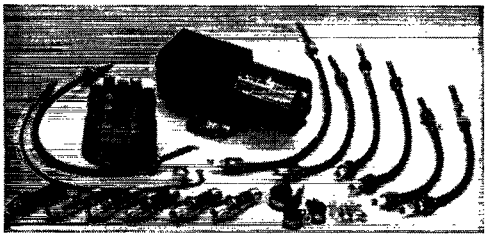


Fig. 4—Mercury Interference Shield.

Mercury Interference Shield

THIS shielding kit is different from the others described in that it is custom designed for each model of engine. The existing ignition system is completely removed and is not used at all in the conversion to the shielded system. Included is a new distributor cap that has been "metalized" and a special shielded high-voltage spark coil. The manufacturer claims that the capacity added to the high-voltage system by the shielding requires an extra-high-voltage coil for good engine performance, especially at high speeds.

Kit components for this system are shown in Fig. 4. The shielded high-voltage coil has the built-in coaxial feedthrough capacitor. High-voltage cables come with connectors attached at both ends and are ready for hook-up.

Another difference in this kit is the use of shielded spark plugs instead of shielded covers for existing plugs. Regular aircraft-type fittings are used on the cables to make up to the plugs. The kit is available with or without the plugs and the manufacturer says that shielded plugs are available for almost all popular American cars.

Instructions are furnished with the kit. The manufacturer is Mercury Enterprises, Box 273, Granby, Connecticut. Price class: $70 to $125, depending on the number of cylinders and type of engine. — *E. L. C.*

Strays

Stolen: An SB-33 transceiver, Serial No. 1626, was stolen from the operating position during the Mobile, Alabama, hamfest on May 31. Anyone with info on this unit should contact the Mobile, Ala., police department.

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The seventh Jamboree-on-the-air for Scouts will be held October 17 and 18. The object is to let Scouts talk or listen to their brother Scouts in other towns and countries, and to introduce them to amateur radio and electronics. *You* can participate by inviting local Scouts to visit your station during the Jamboree and talk with other Scouts visiting other ham stations. This is *not* a contest. Suggested sideband frequencies are 3790, 3805, 7290, 14,130, 14,310, 21,195 and 21,350 kc. Suggested a.m. frequencies are 3760, 3850, 7190, 7290, 14,195, 14,210, 21,195 and 21,350 kc. Call "CQ Jamboree," and when it's all over send a report on who visited your station and who you worked to Boy Scouts World Bureau, 77 Metcalfe St., Ottawa 4, Canada.

At the recent ARRL convention in Swampscott, Mass., ARRL General Manager W1LVQ cuts a 50th-birthday cake under the watchful eyes of some of the conventioneers.

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Is there educational TV in your area? Look for "Electronics at Work," an introductory course in basic electronics which uses, as one of its texts, the ARRL *Handbook*. The course consists for 90, ½-hour sessions. It will be available in the New York City area over Channel 13/WNDT during the fall and winter of 1964-65. For further information on the course, and for information concerning renting the films for use in other areas, write to C. Fred Kelley, Channel 13/WNDT, 1657 Broadway, New York 19, N. Y.

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Watch your license expiration date! Don't be caught short with an expired license. It is all too easy to forget when that expiration date is due to roll around.

Hamfest Calendar

Alabama — The 11th annual North Alabama hamfest will be held in Florence on Sunday, Aug. 16. Further info available from Carl Powell, W4TEX, 3906 Jackson Highway, Sheffield, Ala.

British Columbia — The British Columbia ARA will hold a picnic on the afternoon of August 23, at Bear Creek Park, Surrey. All hams and their families are welcome. For further info contact D. G. Gilmour, VE7YG, 1150 Comox St., Vancouver.

British Columbia — The Pacific Northwest DX Convention will be held at the Bayshore Inn, Vancouver, on Aug. 1 & 2. Sponsored by the BC DX Club — no other info available.

Delaware — The Delaware Hamfest will be held on August 16 at Wheeler Park in Harrington. For further info contact Peter A. Robinson, K3OCI, 417 Wyoming Ave., Dover, Del. 19901.

Illinois — The Fox River Radio League's 5th annual Swap 'n Shop Picnic will be held on Sunday, Aug. 16, beginning at 0900, at Phillips Park, Business Route 30, east side, Aurora, Ill. Refreshments, rides for the kiddies, picnic grounds. Further info from R. L. Sherwood, 727 Garfield Ave., Aurora, Ill. 60506.

Illinois — The Hamfesters Radio Club will hold its 30th annual picnic and hamfest at Santa Fe Park on August 9. Over 3000 hams and friends are expected. For further info contact John Curtis, WA9DDY, 9919 South Washtenaw Ave., Chicago, Ill. 60642.

Indiana — The TARS Hamfest will be held on August 30 at ECCO Valley, Hwy. 66, west of Evansville, Ind., with registration beginning at 0900. No other info available.

Indiana — The 7th annual Delaware ARA hamfest will be held on Sunday, Aug. 16, from 1000 to 1600 E.S.T., at the Lions Club Fairgrounds, Muncie, Indiana. Bring the family — entertainment for all. Lunch available. Advance registration $1. Talk-in frequency 50.4 Mc. a.m. and 52.525 Mc. f.m. For further info contact Bob Brandon, K9LBF, 2705 W. Jackson St., Muncie, Ind.

Kansas — The Boothill ARC hamfest-picnic will be held in Hoover Pavilion, Wright Park, Dodge City, on Sunday, Aug. 23. Registration begins at 0900, covered-dish dinner at noon. 75-meter mobile hunt at 1330. Games for the ladies. For further info contact Harold R. Fick, KØJDD, 1903 Hart Ave., Dodge City, Kansas.

Kansas — The annual Kansas-Nebraska RC hamfest will be held Sunday, Aug. 2, at the National Guard Armory in Concordia, Kansas. Games, contests, free drinks. Held in memory of WØFNS, who passed away two years ago while attending this event. For further info contact C. Wilbur Naylor, WØWXY, P.O. Box 157, Concordia, Kansas.

Kansas — The Burstein-Applebee Company will sponsor a Kansas City Hamfest on August 16, from 1:00 P.M. to 7:00 P.M., at Wyandotte County Lake, Shelter House #6. The Program includes free food and drinks, 6-meter transmitter hunt, boating and fishing.

Kentucky — The Kentucky Colonel ARC of Bowling Green will hold its second annual hamfest on Sunday, Aug. 2, at Beech Bend Park, Bowling Green. For further info contact T. C. Cottrell, Jr., 1530 State St., Bowling Green, Ky.

Louisiana — The Catahoula hamfest will be held at Jonesville on Aug. 23. No other info at hand.

Missouri — The Southwest Missouri ARC will hold its annual picnic Aug. 30., at Fassnight Park in Springfield, Mo. Registration begins at 0900. For further info write to William J. Cain, KØBWE, P.O. Box 291, Springfield, Mo.

Nevada — The NARA will sponsor the Nevada Centennial Hamfest on August 22 and 23, at Bower's Mansion, 10 miles south of Reno on Route 395. Program includes picnic, swimming, transmitter hunt, homebrew mobile contest, and a c.d. exhibit. For more information, write N.A.R.A., P.O. 2534, Reno, Nev.

New Jersey — Burlington County amateurs plan a hamfest on Aug. 22 at Jobstown. No other info at hand.

New Jersey — On Saturday, August 8, the East Coast VHF S.S.B. Association will hold a dinner meeting at the Flying W Ranch, Fostertown, N. J. There will be a social get-together at 3:00 P.M, and dinner will be at 5:00 P.M. There will be a guest speaker and entertainment for the ladies is being arranged. The full course steak or chicken dinner is $4.50. There is swimming and a 4,000 foot macadam runway for those who want to fly in. For those who might want to stay over and attend the Mt. Airy Hamfest the next day, details are available from Jack Powers, W2AXU. For reservations, which must be in by Aug. 1, write Abe Cutler, WA2ONB, 45 Birchall Drive, Haddonfield, N. J.

New Mexico — The White Sands ARC will hold a picnic at Cloudcroft on Aug. 16. No other info at hand.

Ontario — The Seaway Valley hamfest is set for Aug. 30. No other info at hand.

Pennsylvania — The annual gathering of the Knuckelhead clan will be held Aug. 22 at Community Park, Coopersburg, Pa. Bring a basket lunch. Music will be furnished by W3WJY, W3PVY, and their 75-meter band. For further info contact Ralph Krebs, W3ESY, 1739 East Susquehanna St., Allentown 60, Pa.

Pennsylvania — The ninth annual picnic of the Mt. Airy V.H.F. Radio Club, Inc. will be held Sunday, Aug. 9 (rain date Aug. 16), at Fort Washington State Park, Flourtown, Pa. The "Pack Rats" will be joined this year by the Delaware Valley Chapter of the Quarter Century Wireless Association. Contact Francis Brick, W3SAO, 829 W. Fishers Ave., Philadelphia 19141.

Quebec — The annual RAQI convention at St. Gabrie de Brandon will be held on Aug. 14-16. No other info at hand.

South Carolina — The annual ham picnic sponsored by the DX ARC in Camden will be held on Aug. 30 at the Kershaw County Park about 5 miles from Camden. Each family bring its own picnic lunch. Everything else furnished by the club. Talk-in frequency 3915. Further info on the South Carolina s.s.b. net on 3915, and on the a.m. net on 3820 kc. Or write to Arthur E. Tyndall, K4KAX, 700 Savage St., Camden, S. C.

South Dakota — The Mitchell RAC is sponsoring a picnic at Hitchcock Park, Mitchell, on Sunday, Aug. 30. Everyone invited. Mobile talk-in. For further info contact Donald V. Leetch, 1405 Bridle Drive, Mitchell, S. D.

Tennessee — The Delta RC is holding a hamfest on Aug. 30, but we don't have any further details.

Tennessee — The fifth annual Cedars of Lebanon hamfest will be held August 30, at Cedars of Lebanon State Park, 10 miles south of Lebanon on Route 231-S. Bring enough food for your party and any gear you wish to trade. 50.25 Mc. and 3980 kc. will be monitored. Contact R. C. Brown, W4VJW, 203 W. Main St., Gallatin, for further information.

Texas — The Big D Hamboree, sponsored by the Dallas ARC, will be held at Vickery Park, August 15. Talk-in on 3915. For more info write Dave Wheeless, K5DMN, P.O. Box 30532, Dallas, Texas.

Utah — The Utah Council of ARClubs hamfest will be held in the amphitheater and picnic grounds in Millcreek Canyon near Salt Lake City on Aug. 22. Bring the family and a picnic lunch. There will be activities for XYLs, a transmitter hunt, and contests. For further info contact Tom Miller, W7QWH, 3148 South 3360 East, Salt Lake City, Utah, 84109.

Virginia — The Bristol ARC will hold a hamfest on Aug. 22-23 at the American Legion Park, 1 mile north of Bristol, Tenn, Va. For further info contact Bill Lillard, WN4RUT, 1100 Weaver Pike, Bristol, Tenn.

Virginia — The Shenandoah Valley ARC will hold its 14th annual hamfest on Aug. 1-2. For further info contact George B. Ritter, W4UGX, P.O. Box 139, Winchester, Va.

Washington — The Skagit Salmon Bar-B-Q will be held the last weekend in August. No other info at hand.

West Virginia — The 5th annual Black Diamond RC "Ham-Pic" (formerly the Bass Lake Ham-Pic) will be held this year at the new city park in Bluefield, on Sunday, Aug. 30. Picnic on the grounds as you like. Free gifts for everyone, and many programs and activities for your enjoyment. For further info, write BDRC Ham-Pic, P.O. Box 292, Bluefield, West Va.

Wyoming — The annual Wyoming hamfest will be held at Lions Park in Cheyenne on Aug. 22 and 23. For further info contact K7NQX, Box 52, Cheyenne.

Hints and Kinks For the Experimenter

6-VOLT TAP ON 12-VOLT BATTERY

To tap a 12-volt storage battery, use a screw binding post salvaged from the center carbon rod of a No. 6 dry cell. Simply screw the post into the lead strap on the proper cell. The fitting is a convenient one to use since it is already threaded and has its own screw-on cap nut. Some storage batteries have the connecting straps completely covered with hard rubber or pitch. In this case, merely locate the correct position for a tap by noting the outline of the strap through covering. Gently hammer an expended .22 caliber cartridge down to the lead strap. Lift out the cartridge and expose a neat clean hole. Now attach the screw binding post to the lead strap.

— *Albert Kristek, W5KT*

MOBILE MOUNT

THE accompanying sketch and photograph show my mobile mount; it does not require drilling holes or making modifications in the car. Although this mount was designed for the KWM-2 and the P & H Spitfire, the idea can be used to build one to fit almost any of the popular transceivers. The frame is of 1¼-inch aluminum angle, which can be the Reynolds do-it-yourself type available at most hardware stores, and can be put together with nuts and bolts or taken to a welder for a more permanent job. The "three-leg-suspension" is the secret of the mount's stability and is designed to straddle the car's transmission hump. Due to its low center of gravity, the mount and equipment will stay put even

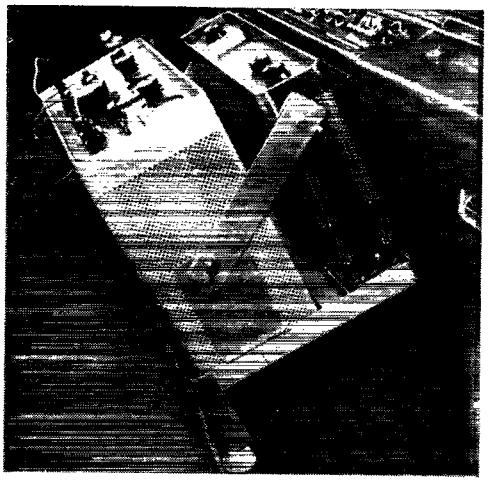


Fig. 1—W9KCM'S mobile mount does not require drilling holes in the car.

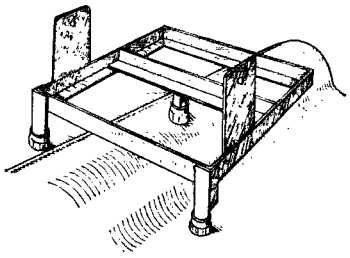


Fig. 2—The mobile mount straddles the car's transmission hump.

when you're making "tight turns" in the car. Three rubber crutch tips placed over the mount's legs will help protect the car mat and give additional stability.— *Henry Kampe, W9OKM*

"PAWNEE" NOTES

WHILE preparing a recently-constructed Pawnee for mobile use, I noticed that the transmitter output was low and that the audio sounded "fuzzy" and had some feedback at certain settings of the FINAL TUNING control. The transmitter difficulty was traced to r.f. leaking out from the final-amplifier compartment. The 0.001-μf. (FT15, FT16) feedthroughs were bypassed to ground with additional 0.001-μf. disk capacitors. FT_{14} was bypassed with 0.001-μf. capacitors on both sides. RFC_{11} was replaced with a Millen 34300-2.7 r.f. choke which eliminated the r.f. leaking back into the modulation transformer and audio section. These modifications brought the r.f. output up to the rated 8 to 10 watts, and gave good audio with no signs of feedback.

The receiver section of the Pawnee had several images from local f.m. stations. The trap in the grid lead of the 6BS8 (V_1) was adjusted, using a signal generator as outlined in the instruction book, but the images were as strong as ever. I then tried adjusting the trap (capacitor C_1) by listening to the loudest image, which in my case was 144.9 Mc., with the antenna connected. I found a setting of C_1 that completely eliminated the image and, in tuning across the band, I could not find any other images. — *W1KLK*

DECAL NOTE

AFTER applying decals to a panel, cabinet, etc., they should be "fixed" to insure their permanency. Using a small camel's-hair paintbrush, or cotton swab, apply a small amount of actone fingernail polish remover or lacquer thinner to the decal. Use just enough of the solvent to dissolve the clear decal backing.

— *Malcolm F. Crawford, WA2IPC*

STACKED HALOS FOR OMNI-DIRECTIONAL COVERAGE

With the increased activity of emergency net operation on the v.h.f. bands, it has become quite evident that some type of omnidirectional antenna must be utilized in order to provide good signal coverage over a wide area. To solve the problem at my location, I have stacked two 6-meter halos 5/8 of a wavelength (12 feet for 50 Mc., 4 feet for 144 Mc.) and attached them to the side of my guyed tower that also supports a 5-element 6-meter beam (see photograph). Each halo was tuned after being mounted on the tower with the aid of an s.w.r. bridge. The feed-line arrangement for stacking two halos is shown in Fig. 3A. The 72-ohm feed line (RG-11/U) from each halo is parallel-connected at a coaxial "T" connector. This results in a feed impedance at the connector of about 36 ohms. A quarter-

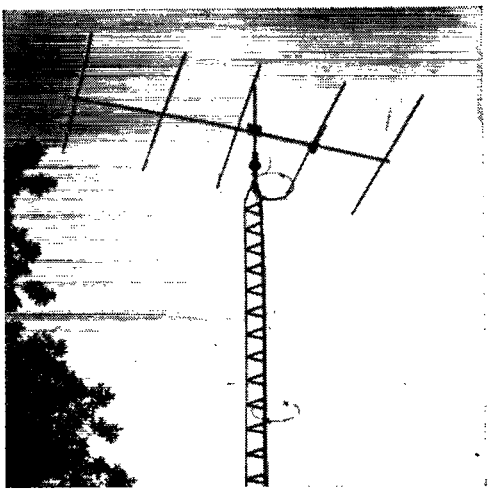


Fig. 4—K2JKA's stacked halos.

wave transformer (Q-section) made from a 1/4 wavelength of 52-ohm coax (RG-8/U) (37 inches for 50 Mc., 12 inches for 144 Mc.) transforms the 36 ohms back to 72 ohms. A 72-ohm feed line (RG-11/U) of any length is attached here and goes to the transmitter. Of course, proximity of the tower and other factors tend to upset the balance and match of the system. But in my case, the s.w.r. was about 1.3:1 at resonance. Since the halo is a relatively high-Q device, its bandwidth is rather narrow. Deviations of more than 150 kc. from resonance will cause the s.w.r. to rise above 2.5:1. If this antenna is intended to be used in net operations, however, this is not a major drawback as these operations are usually centered around a single frequency.

I use two commercially-manufactured halos that were intended for mobile applications and are not designed for super high power. For operation in the half-kilowatt or above range, the halo capacitors should be replaced with ones of larger voltage ratings and the plastic insulators replaced with porcelain ones.

More halos can be stacked as shown in Fig. 3B. It is easier to stack the halos in pairs.

The above antenna is by no means the ultimate in a radiating system for DX work, but for omnidirectional coverage it does the job.

— *Jack Layton, K2JKA*

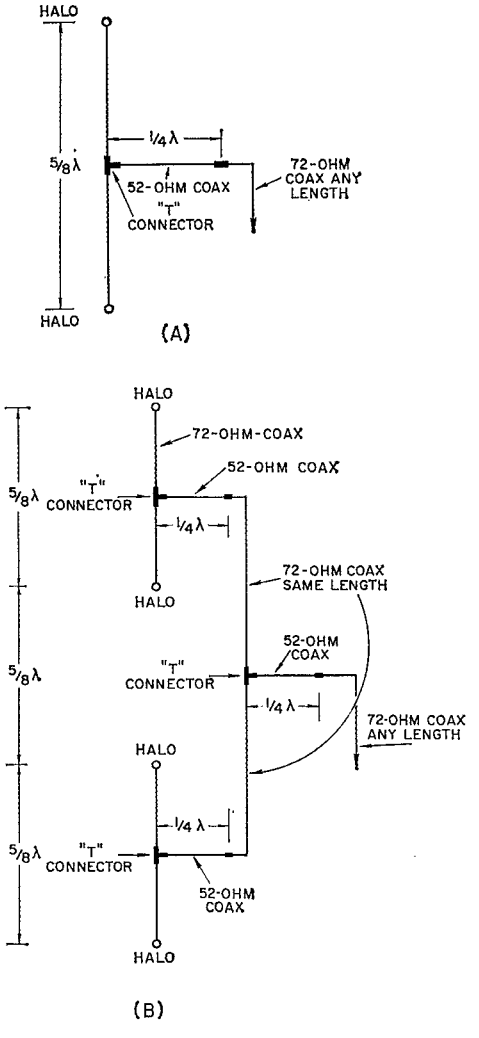


Fig. 3—Transmission-line hookup for stacking two (A) or four (B) halo antennas.

OILING UNREACHABLE PULLEYS

To oil a pulley which is out of reach on a mast or tower, use a toy balloon. Fill the balloon with a half cup of fairly heavy oil. Tie the neck of the balloon to the pulley rope with light thread and slowly pull the rope until the balloon is pulled through the pulley, which will break the balloon and spill the oil on the pulley bearings. If it's possible, it probably would be better to attach the balloon to the antenna side of the pulley, since here it would be in a better position to spill the oil down on the bearings.

— *Glen Winger, W9KXG*

ARRL Serves in Wartime

IT WAS 1939. Fifty-one thousand U.S. hams and twenty thousand others around the world went happily along in their pursuit of amateur radio activities. W2USA and W6USA added ham flavor to the New York and San Francisco World's Fairs. The 1939 DX contest busted records for the number of participants and their eagerness, new high scores being rung up despite so-so conditions. The Board of Directors held its annual meeting in San Francisco. The "new 1939" broadcast receivers were the worst in five years — lots of gadgets, but no r.f. stages and little effective shielding against BCI. European broadcast stations on the forty-meter band were causing some interference and much irritation to Western Hemisphere amateurs.

Suddenly, in September war came to Europe. By the sixth, 121 of the 250 countries on the DXCC list were off the air, including Canada and most of the British Commonwealth. Canadians flocked to the colors en masse. By early 1941 more than half of the 3380 VEs were in uniform, some 900 as officers.

The United States was determined for a time to maintain the strictest of neutrality.[1] The League announced its own neutrality code for amateurs within a day or two of England's declaration of war against Germany: ARRL officials urged its adoption by amateurs in the strongest of terms, thus avoiding or minimizing government restrictions. Though lacking official force, the code was widely adopted by amateurs, accruing additional support for the amateur radio service in governmental circles.

After widespread uneasiness for a few weeks, things did settle down, and it was almost "business as usual" for W hams. There was some interesting DX to be worked yet, including KC4USA, KC4USB and KC4USC with the Byrd expeditions to the Antarctic. Marathon ragchewers could enjoy "duplex" operation on the 112–116-Mc. band. Experimenters began tinkering with wide-band f.m. in the 58.5–60 Mc. portion of the five-meter band. FCC regs were renumbered into a series beginning with 12.1. To streamline its operations, multiple choice tests were adopted by FCC, 50 questions for Class B & C and 40 for Class A, with grading now to be done in the field, at the examining points.

The Board came back to Hartford for its 1940 meeting, where George Bailey, W1KH, was elected as president. Charles E. Blalack, W6GG, became vice-president on the third ballot after spirited voting.

But remote though trouble may have seemed on the surface, it was in the Board's consciousness: $10,000 was appropriated from surplus for expenses tied to the preservation of amateur radio, and the president was appointed a committee of one to represent the Board in any situations requiring quick and decisive action.

Not long after, in June, 1940, the United States invoked provisions of the Telecommunications Convention prohibiting contacts between amateurs in the United States and those elsewhere; in other words, we were placed on the "ban list" by our government. Simultaneously, FCC banned all portable and mobile work on frequencies below 56 Mc. — except for ARRL Field Day! At League request, this restriction was modified to permit Amateur Emergency Corps drilling and testing during daylight hours

[1] The neutrality code had made things difficult for historians in one respect — since Canada immediately joined her British and French cousins in the war, the League had to regard Canadians as belligerents, and thus no news of Canadian participation in the war was printed in *QST* until May, 1941, when the column, "The Month in Canada" was begun.

on weekends and to permit genuine emergency communications at any time. All licensees, commercial and amateur, were required to send a set of fingerprints, a passport-type photo and proof of citizenship in to FCC by August 15, 1940, later extended to October 15. Some 100 amateurs quietly turned in their tickets!

It became apparent that there was at least a little subversive radio activity going on. The FCC monitoring system was, accordingly, expanded to several times its peacetime size; a call went out in September *QST* for 500 operators for this work and the quota was quickly filled; thus amateurs largely supervised and staffed the famous Radio Intelligence Division, headed by George Sterling, W3DF. The Navy Communications Reserve and the Regular Army both stepped up their recruiting of amateurs. The National Youth Administration and the Civilian Conservation Corps both called for amateurs to be instructors in radio training programs. And the famous ARRL code proficiency program was inaugurated, with more than 900 hams responding to the first certificate run.

In the spring of 1941, Arthur A. Hebert, W1ES, the League's convention traveler and treasurer for years (and its first general manager, before World War I) died at age 67. David H. Houghton, then as now circulation manager, assumed the additional duties of treasurer. Doubleday Doran & Co. published Assistant Secretary Clinton DeSoto's second book, *Calling CQ — Adventures of Short Wave Radio Operators*, this one for general public consumption.

The League adopted two classes of membership: Full, for licensed U.S. and Canadian members, and Associates, all others. (The practical effect was slight: unlicensed people who had joined or rejoined the League after a lapse since 1934 had already been denied voting privilege, the directors having felt that the affairs of the League must be strictly controlled by amateurs.)

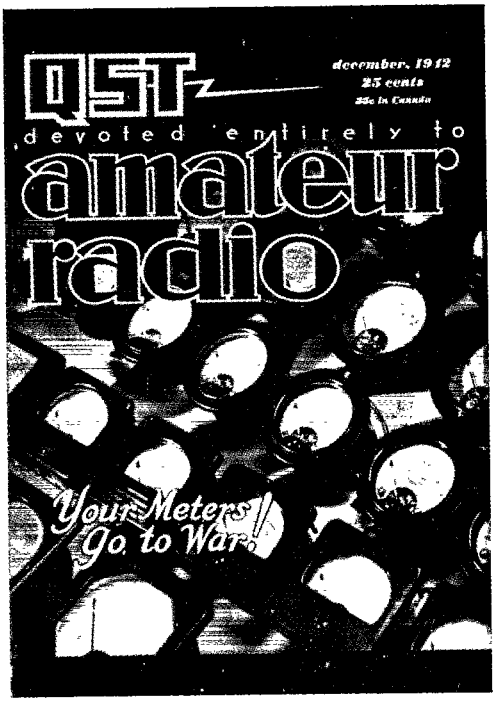
It became possible that spring for G.I.s on active duty to renew their licenses by informal letter, without proving activity on the air. Ten phone was expanded again to read 28.1–30.0 Mc., with f.m. from 29.25 to 30 Mc., at League request. Calling requirements were tightened, with identification necessary at the beginning and end of every QSO and every 10 minutes during longer transmissions, to aid monitoring stations. The League requested and got relief, however, for transmissions of three minutes or less, identification being required then only at the end of the series.

By June of 1941 tubes and parts were in rather short supply. The United States was then in a phase of "positive neutrality" and U.S. amateurs were recruited for a "Civilian Technical Corps" to operate and repair British radar equipment. Hams were also needed for a Bureau of Standards project connected with the war effort. The Office of Civil Defense began to get off the ground, and the League offered amateur radio as the backbone of c.d. communications. With greatly expanded armed forces, FCC announced that the Army would require parts of the 80-meter band, on a date to be determined, at which time in compensation for loss of phone frequencies, 7250–7300 was to be opened to A-3. The date finally settled on for the switch was December 20, 1941.

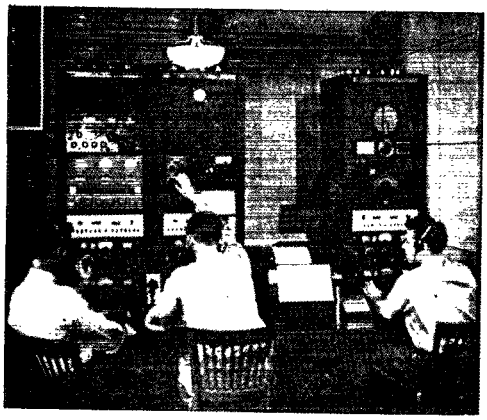
An uncanny sidelight here: in October, 1940, Secretary Warner had issued a statement to ARRL officials, echoed in his November editorials, to calm a jittery market in amateur equipment: "I believe we have all of 1941 clear before us, and that an amateur who wants to buy or build will get his money's worth." His prediction fell short by only three weeks: on December 7, 1941, Pearl Harbor, Hawaii, was bombed, the U.S. was at war and normal amateur operation was QRT.

By special FCC order W1AW continued on the air for five more weeks, at first calling the hams who had not gotten he word, and then with special war information bulletins to all amateurs. After the initial closing, special temporary authority was granted to some hundreds of amateurs at municipal request to continue on the air for local emergency communications only. Federal uneasiness about the war in general, and perhaps a suspicion that some municipal requests were merely political favors, led to a cancellation of all temporary authorizations, including W1AW's, on January 10, 1942.

On the Washington front, League officials maintained pressure on the authorities to create a civil defense communications system, which was



Meters, meters, meters. ARRL rounded up thousands at $3 a piece in less than three months, to relieve an acute Signal Corps shortage. This photo appeared on the cover of QST for December, 1942.



One of the earliest war-connected calls on the amateur service was for 500 hams to man the receivers and Adcock direction-finders of FCC's Radio Intelligence Division, headed by W3DF, W3LO and W7OK. Here, unidentified operators pin down a signal in the "Cruising Room."

Both coasts had World's Fairs 25 years ago, and hams were well represented by W2USA and W6USA. At the New York shindig W2DKJ holds the mike while W2HYJ points a TV camera at him.

finally accomplished effective in June 1942, under the name War Emergency Radio Service. Initially the rules were available to the public only through *QST* — the Government Printing Office was snowed under. The League also insisted successfully that, although station licensing was dropped, amateur operator licensing continue throughout the war, enabling amateurs to prove their ability before enlisting in the armed forces, and providing standards for WERS applications.

The League's position in 1942 was vastly different than it had been in 1917. The League and amateurs generally enjoyed an excellent reputation in Washington. Instead of being supplicants treated with suspicion, it almost seemed that — in the vast confusion which existed in official Washington — the ARRL was the cool calm voice of reason. "There is a shortage of radio operators, engineers, technicians? We'll get them through *QST*; how many and where do they report? The manufacturers can't fill the government's orders for communications equipment fast enough? Ham gear will do nicely: we'll collect a list of who has what, and send it along." More than once an amateur sold his gear to the government and enlisted as a radioman — and found an oh-so-familiar HRO staring him in the face at his first duty assignment!

By March 15, 1942, 14,813 amateurs were known to be in the service. The League published the Defense edition of its *Handbook*. Some miscellaneous chapters, on learning the code, etc., replaced the standard *Handbook* construction material, and the theory section was expanded. The booklet, *Learning the Radiotelegraph Code* was first published, and quickly became a best seller. A series of *QST* articles by George Grammer was reprinted as the booklet, *A Course in Radio Fundamentals* which used the *Handbook* as its text. All three of these works were immensely popular, not only with the armed forces but with teachers — the majority amateurs — in the thousands of radio training schools which sprang up all over the country.

For the next two years, ARRL was a printing

Among the first of many "alphabet agencies" to help win the war was the Defense Communications Board. Here, at the formative meeting January 6, 1941, ARRL's Bailey and Warner sit in the front row, next to the Navy's Reinartz, now K6BJ.

house and *QST* a clearinghouse. The "apparatus bureau" and *Uncle Sam Calling* kept humming through the pages of *QST*, among stories of "wired wireless," elementary cryptography, news and pictures of hams in service. The League shipped *Handbooks* and its other technical and training publications by the ton.

Though its public life was concerned only with the war, behind the scenes ARRL was preparing "insurance" of postwar amateur radio. In 1943 the Board appointed a post war planning committee and gave it $1000 for meeting expenses and the like. Then a national industry advisory group, the Radio Technical Planning Board, was organized, and the League was represented thereon by President Bailey with Secretary Warner as alternate.

In 1944, the Board authorized the president to open up a temporary full-time office in Washington if the need developed. Close liaison was maintained with the various official bodies in Washington; as a matter of fact, the Coast Guard was represented on the Interdepartment Radio Advisory Committee (IRAC) by Lt. Cmdr. A. L. Budlong, on leave from his post as Senior Assistant Secretary of ARRL!

Early in 1945, the joint FCC/IRAC allocations plan for postwar use of the 25 Mc. to 30,000 Mc. portion of the spectrum was announced. The new u.h.f. bands for amateurs were assigned adjacent to military segments rather than in strict harmonic relationship to lower bands, in order that the bands could serve as reserve frequencies for military use in wartime. The joint plan also provided for the first time for a Citizens Radio Service from 460–470 Mc. In May the remainder of the postwar proposal was published, calling for a new amateur band at 21.0–21.5 Mc., and retention of all other bands except 160 meters, already occupied by Loran.

There was quite a struggle within the U.S. before the table was accepted in all its particulars. For instance, the f.m. broadcasting service wanted to be left near 5 meters and expanded while the TV service also had eyes on six or eight contiguous channels in the vicinity. The domestic fixed service didn't get nearly what it wanted, and the U.S. idea was to wash out international broadcasting for direct consumption, substituting therefore an international relay broadcasting scheme to be delivered to the ultimate listener on v.h.f. f.m. broadcasts.

The allocations planned by FCC and IRAC with the cooperation, or at least the participation, of radio user groups was intended primarily as U.S. proposals to be presented at the first postwar international allocations conference, but those parts of it dealing with v.h.f. and u.h.f., particularly in the new territory above 300 Mc., were made effective immediately.

At every occasion, the League dropped the hint that amateurs, having had more than three years "vacation" from hamming, would be ready, willing and anxious to get back on the air as soon as possible. The old-timers remembered all too well that it had been almost a year after the armistice in 1918 before amateurs could resume transmitting.

By the time the shooting stopped, an estimated 25,000 amateurs had worn the uniform, and another 25,000 had done their bit at home, in essential war industry.

Organization and planning paid off. Hostilities ceased on August 17, 1945. League officers went into action. Just *four days* later, one band was released and amateurs were back on the air.

Sidelights 1939–1945

Call letter license plates were available to amateurs in Michigan in 1939, but were withdrawn the next year. . . . Freeman F. Gosden, the front end of "Amos 'n' Andy", received his license as W6QUT. . . . The first quarter-century of ARRL was marked by a special section in the May, 1939 issue of *QST*. . . . A League protest against the premature operation of "Radio Mondial", French broadcaster on 7280 kc. brought about its QRT. . . . "Picofarad" was defined as a "High-brow term for micromicrofarad". . . . A lace-bordered ad for *200 Meters and Down* triggered a letter from Ethel Smith, W7FWB, in July 1939 *QST* which in turn led to the formation of the Young Ladies Radio League. . . . The ARRL Secretary grumbled about amateurs asking Washington for precise interpretations of amateur regulations, and thus generating restrictive new rulings. (He had a point — it's still a good idea to ask ARRL first, so that the question may be answered informally.) . . . A voluntary questionnaire sent out by the Signal Corps in 1941 was returned by 72% of the amateurs within two months. . . . With national defense moving to the fore in 1940, amateur transmitter hunts were modified to simulate detection of a parachutist. . . . There was much talk of a Class-D license, with code speeds from five to ten w.p.m. suggested. Some proposed a simpler written exam, others a grade of 60% on the standard test. The idea was choked off by the War Department, which didn't feel that the increase in quantity of operators would make up for the lower quality. . . . After Pearl Harbor, some stations with special temporary authority to transmit for local emergency work relied on a key broadcasting station for news of an alert, an informal forerunner of Conelrad. . . . Early in 1942 radio equipment was in such short supply that Army officers toting satchels full of "green stuff" went around to hams' houses and bought up standard radio equipment on the spot. . . . As the Air Forces were troubled with little creatures called Gremlins, Signal Corps activities were loused up by Squimps, according to the January, 1943, *QST*. . . . The one-millionth copy of the *Handbook* was wrapped and shipped from LaSalle Road on September 9, 1943. . . . Several United Nations Amateur Radio Conventions were held at approximately six months' intervals in Cairo, Egypt, a crossroads of Allied war efforts. . . . A movie short, "Patrolling the Ether", was based on activities of the Radio Intelligence Division, FCC, and played up the fact that most of RID's personnel were drawn from the ranks of amateurs. . . . Two well-known New England hams, W1BVR and W1ALP, emerged from the 1944 director election with a 435-vote tie. W1BVR won the repeat three months later. (The two currently run ARRL affairs in Massachusetts, Mr. Noble as SCM in the West, Mr. Baker as SCM in the East.) . . . ARRL's President Bailey became executive secretary of IRE, while FCC's Gerald Gross (W3GG and now HB9IA) accepted an appointment to the headquarters of the International Telecommunications Union of which he is now Secretary General.

Communications in the War Years

In the months preceding Pearl Harbor amateur work was blacked out in one country after another. The U.S. observed a tight neutrality code. But two DXCC Awards were made in 1941, compared to some twenty the previous year! However, in 1941 there was a successful ARRL Member Party, a Battery-powered Equipment Test, our Ninth Field Day, the 12th Sweepstakes, a Code Proficiency Frolic and 1.8- and 28-Mc. WAS Parties in the last pre-war year. DX Competition work with certain W-areas had to be permitted (under quotas) to bolster the country multipliers. Canadian hams were off the air altogether. In December the United States entered the war. W1AW's authorization was extended after the general shut-down to permit latest bulletins to be sent to amateurs on defense matters, as well as to assist FCC in clearing the frequencies for use of the services.

During World War II ARRL continued the chief instrument to build our reservoirs of technical skill and talent. Affiliated club training programs were stepped up. The ARRL field organization continued to function, but with all activities bent toward aiding the war effort. Many directors and staff members and a membership self-trained and skilled in leadership as well as radio-operating and mechanics techniques entered the armed services. Additional to representation on land, at sea, and in the air, amateurs were recruited into many hundreds of vital posts in industry and used in training and expanding radar and electronics means. In this fashion the amateur repays the nation a thousand fold for his peacetime privileges!

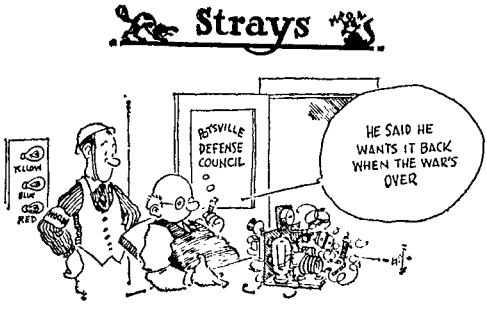
Our civilian defense (WERS) effort is a story covered separately in detail. Those amateurs still at home as a substitute for operating turned to experiments with visual signaling, wired wireless, light-beam communication, and use of induction fields, also to use of tape recorders and academic familiarization with the Japanese Morse radio telegraph and Russian telegraph codes. By such means those who could do so filled out the wartime interlude in amateur operating.

The FCC amateur licenses that had been "suspended for the duration" were re-instated for the period August 1–November 15, 1945 in FCC's first post-war re-opening order. This permitted LSPH (licensed since Pearl Harbor) operators and others to use just 112-115 Mc. W1AW, given FCC-IRAC approval, was provided a limited reactivation to operate daily 8 to 11 P.M. EST on 3.5, 7.1 and 14.3 Mc. As of November 15, 1945 our ten- and five-meter bands also were officially opened. Canadian operators were similarly placed back on these bands by the DOT. General use of h.f. bands was to come later. A first post-war operational action by ARRL was to announce its Emergency Corps as opened to all civic-minded amateurs. The AREC and v.h.f. organizing job was expedited in the hope that every one of the 300 WERS-licensed cities would have provision for emergency communications without interruption on the November 15 disbanding of that service. The post of Section Emergency Coordinator was announced by the League to guide and promote regional ARRL-AREC planning.

Emergency Communication

With the Japanese attack on Pearl Harbor, most of amateur radio went into suspended animation, but the Emergency Corps remained active. At the request of some civilian defense directors, certain amateur stations were reactivated for c.d. communications only, with the strict understanding that there was to be no casual "hamming," no rag-chewing, no DXing —nothing but necessary communication for civilian defense purposes. Said K. B. Warner in a yellow insert in Jan., 1942, *QST*, headed "WAR COMES!": "Amateurs in defense work are on their honor to censor themselves. . . . No rag-chewing will be tolerated and the fellows who engage in it will fare much worse than simply to lose their permits. . . . As we value our return to the air, let there be no monkey business about this."

Within a month's time, about 2000 amateur stations had been reauthorized for civilian defense. All ARRL Communications Department appointments were suspended except Emergency Coordinator. ECs were advised to contact their civilian defense directors and get their AREC



groups reactivated for defense work, but we received little information regarding who had been reactivated, where, or for what purpose. Secrecy and security were tight.

But most amateurs were not used to the rigid controls, and some of them did not succeed completely in subduing the traditional ham urge to chew the rag. Uneasy at the laxness of operation, the Defense Communications Board in early January, 1942, requested FCC to cease issuing authorizations and to cancel all existing ones.

One of the first WERS licenses issued was to Akron, Ohio, which was assigned the call WODF. This is one of its control stations, with W8OJN 1 and W8BFJ operating. Equipment was Abbott TR4 transmitter-receivers and Abbott DK3 transceivers, featuring modulated oscillators and super-regenerative receivers.

Thus, on January 9, 1942, FCC issued the order which completely silenced amateur radio for the duration.

This was not the end, however. The Office of Civilian Defense was hard at work on a civilian radio service for communications in connection with Air Raid Protection, to utilize the former amateur 2½-meter band (112–116 Mc.), and other amateur bands on higher frequencies. Although not an amateur service, amateurs were specifically requested (by OCD) and expected (by ARRL) to participate, and were strongly urged to do so.

They did. There was no other operating outlet for amateurs, and they flocked to the implementation of the War Emergency Radio Service (WERS), with all its restrictions. ARRL supported the effort 100% with articles of advice in *QST*, technical articles on building WERS gear or modifying existing 2½-meter equipment to meet the rather rigid technical (for those days) requirements of the regulations. Non-amateur civilians were also recruited, qualified for low-grade commercial operating permits and put to work, usually under the supervision of an amateur.

WERS was administered by the local Civilian Defense Corps and licenses were issued to communities, not individuals. It was supervised by a "radio aide," almost invariably a licensed amateur. Most of the equipment was donated by amateurs, or modified or built by them for the purpose. July *QST* ran a complete list of ARRL emergency coordinators, over 700 strong, requesting non-AEC amateurs to register with them to assist establishing WERS in the community.

John Huntoon's first *QST* article as Acting Communications Manager was a description of the workings of OCD's "District Warning Center" plan for WERS licensing, based on telephone toll-line organization. The first two WERS licenses were issued to Akron, Ohio, and Lawrence, Mass., on this basis. A few weeks later, however, FCC issued a WERS license to the town of Manchester, Conn., which was in the Hartford Warning District. Since the regulations as written made no mention of licensing by warning districts, FCC said it could not deny a license if other requirements were met. Subsequently, many towns and cities were licensed independently of their warning district control centers. OCD and, at its behest, ARRL pushed the d.w.c. method of licensing, however. By mid-November, 1942, 53 municipalities had received WERS licenses in 20 different states, and 98 applications were pending at FCC. Leadership was about 98% amateur and personnel well over 50% amateur.

Recognizing, and in fact being largely responsible for, the preponderance of stay-at-home amateurs in WERS, ARRL during the ensuing war years went all out to support and advance it. After all, it was our only operating activity. October 1942 *QST* carried articles on operating procedure and how to train auxiliary (non-amateur) operators. February 1943 *QST* detailed OCD's plan for selection of frequencies. Technical articles on WERS equipment appeared in nearly every issue. Changes and amendments in the WERS rules were detailed as faithfully in *QST* as though the rules under question were the amateur regulations themselves. As far as most amateurs were concerned, WERS *was* amateur radio.

WERS was a poor substitute for amateur radio in emergency work, but they did their best. Here's the Granite City, Ill., control station in operation during a Mississippi River flood in 1943. That's Radio Aide W9THB at left, with W9GFF at the microphone. Note the ubiquitous TR4, a fixture in most WERS station units.

In 1943, FCC wrote more WERS rules, authorizing Civil Air Patrol stations to participate under their own licensing setups, separate from civilian defense and state guard stations. The complication of having three different kinds of WERS, each of which included a great number of amateurs, prompted separating them into categories as CD-, SG- and CAP-WERS. This categorization was made clear in an April 1943 *QST* article which examined and commented on changes. Descriptions of WERS organizations and pictures of gear used — much of it makeshift, because parts for 112–116-Mc. operation were scarce in those days — were also contained

in many issues of *QST* to keep the amateur at home interested and amateurs in the services informed of what was going on.

But, everything considered, WERS was a long way from amateur radio as most of us know it, and in 1944 and 1945, as the tide of war turned in favor of our side and the threat of enemy action against our homes diminished, enthusiasm for the prospect of reactivating the amateur bands built up rapidly.

For a few months following the outbreak of war, amateur radio took little part in natural disaster communications. Once WERS was activated, however, such activity became a part of its duties. An editorial by K.B.W. in the March 1943 issue decried the paper work in WERS which kept many amateurs from helping out in such emergencies; but in May and July amateurs were able to be of material assistance in floods along the Mississippi River and Lake Erie, respectively. In 1944, WERS was reported active in a hurricane along the Atlantic Coast and in three man-made emergencies, none of them caused by enemy action. In 1945, WERS participated in a Western New York snowstorm near the beginning of the year, in a number of spring floods, and in September in a Florida hurricane,

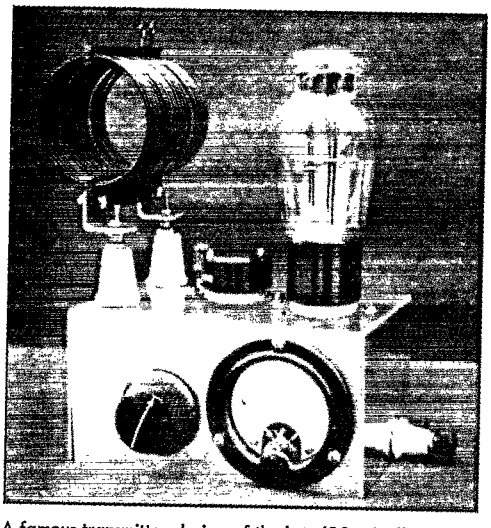
Shortly after "VJ Day" in 1945, FCC authorized the return of part of the 2½-meter band, to regular amateur operation, to be shared with WERS until the latter service was terminated in mid-November. Tension built up rapidly, and on November 15 FCC released amateur bands at 10, 5 and 2 meters for amateur use. Meanwhile, Communications Manager W1BDI returned from the wars, removed the eagles from his shoulders and announced reactivation of the ARRL Emergency Corps and the creation of a new appointment, Section Emergency Coordinator.

A new and very significant post-war era in amateur radio public service had commenced.

Technical Progress

IN the spring of 1934 a typical ham might still be using a regenerative receiver and a Hartley oscillator with his Zepp antenna. A more advanced station would boast a multistage crystal-controlled transmitter (plug-in coils) and a homemade or a commercial superhet (plug-in coils). A 5-meter superregen receiver and a modulated oscillator, or perhaps a homemade or commercial transceiver, would be a station adjunct for local rag chews.

Transmitter progress in the period 1934 to the start of WW II was primarily refinement of established lines. Possibly spurred by increased commercial availability, more and more transmitters were built in metal cabinets and relay racks. At first they were still assembled on wooden bases and housed in the cabinet or rack, but eventually they went all the way in the "commercial" look and utilized metal chassis construction. A minority school stayed with the wooden framework or breadboard layout. The 6L6 receiving tube was the first "beam-power" tube to appear (1936), followed shortly by the 807 transmitting type, and they quickly became the "work horses" for all low-power applications. The 6L6 was touted as a good tube for the crystal oscillator stage, and the 807 was a small (relatively) powerhouse that required very little drive and, under some conditions, no neutralization. A popular series of articles by Fred Sutter, W8QBW, described many transmitter applications of the 6L6, starting with the "QSL 40" and culminating in the 100-watt "QSL Push Pull." These were compact 6L6 crystal-oscillator transmitters, built with a minimum of components and as much overload as the 6L6 could take.



A famous transmitter design of the late '30s, the "QSL 40" was widely duplicated. The caption for this picture read: "With chassis area the same as that of a postcard, this little rig packs quite a wallop."

Band-switched exciters and transmitters were considered and discussed in 1935 and '36, but the first applications appeared in exciter units about 1938. A band-switched exciter would be used to drive a final that used plug-in coils, or a more elaborate station might boast separate finals for each band. DX chasing prompted rapid-QSY designs, which included band-pass coupling, ganged tuning, and relay-switched circuits. Twenty-meter c.w. DX was often found *outside* either the low- or the high-frequency end, and band-edge crowding was the W pattern in the middle '30s. This called for good crystals and no little faith.

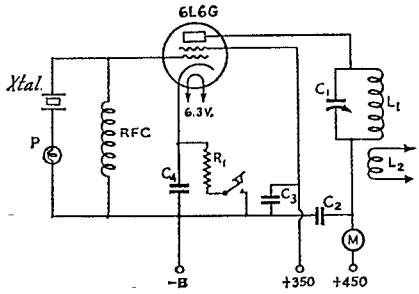
However, the major evolution in transmitter design was dictated by economics, and this in turn gradually resulted in a change in operating habits. Crystal-controlled multistage transmitters

were obviously superior to single-stage transmitters, particularly on 20 and 10 meters, but no one could afford a crystal for *every* frequency. Some form of stable adjustable-frequency control was needed. Earlier m.o.p.a. (master oscillator, power amplifier) design had centered around relatively high-powered oscillators driving amplifiers on the same frequency, and their use never became widespread. Commander Dow had described the "electron-coupled" oscillator-doubler in the January, 1932, *QST*, and George Grammer described in November, 1933, an exciter that used a *low-powered* oscillator that converted easily from Tritet crystal oscillator to electron-coupled self-controlled oscillator. Frequency multiplication took place in the oscillator stage and in a subsequent stage; the self-controlled oscillator became a crystal substitute, always on the same band regardless of the output band of the transmitter. However, it took several years and articles, and a change in operating techniques in the 1937 and '38 DX Contests, before the v.f.o. (it was always "e.c.o." in those days) really got off the ground. And when it did the T scale wasn't versatile enough to describe all of the variations in notes and keying characteristics! (Fortunately for historians and other interested parties, healthy examples of these aborigines are still available for study in any of our bands.) With the added freedom of v.f.o. operation the slow march began toward QSOs with both stations on the same frequency. In the late '30s a crystal manufacturer developed a variable air-gap crystal holder and a crystal cut that permitted a 1½% frequency excursion, but it wasn't enough to stem the tide.

One amusing (but not at the time) sidelight to c.w. transmitter design during the middle '30s was the use of "resonant filters" in the power supply. New regulations required "adequately-filtered" power supplies for all stages. A tongue-in-cheek article in *RADIO* described the virtues of a 120-cycle series-resonant filter across the rectifier output. While the 120-cycle component was suppressed as claimed, the higher-order harmonics came riding through beautifully, to add a distinctive modulation to the note!

In 1940, Harry Beecher, W2ILE, described an "electronic bug key" that made automatic dashes as well as automatic dots. Previously several commercial keys had been devised that made the dashes by other than electronic means, but they found little acceptance in amateur circles. The electronic bug, with its relative simplicity and single-knob speed control, was greeted as a forward step, although the first versions did not have the self-completing dash feature and consequently required considerable skill and a knowledge of what good code sounds like.

Encouraged by inexpensive Class-B audio power and increased spectrum assignments, phone activity increased rapidly from 1934 to 1941. It suffered many growing pains in the process. Overmodulation was a continual problem, despite many *QST* articles on proper operating and adjustment. Commercial oscilloscopes



The QSL-40 circuit was the essence of simplicity.

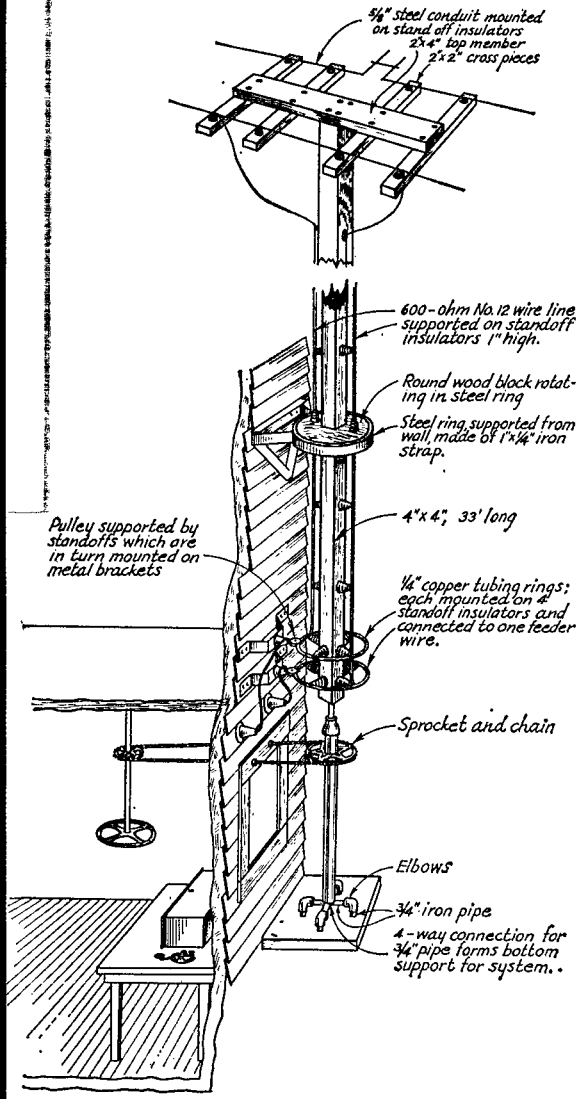
were available in 1934, as was the information on their use and interpretation. The inexpensive 913 'scope tube was introduced in 1937, but throughout the entire period an oscilloscope was more often than not the status symbol of an affluent amateur rather than a properly-used tool for better phone operation. There was much trouble with BCI (with the radio receiver always at fault), and this was particularly true on 160 meters. The not-infrequent Saturday-night "binges" (house party, open microphone broadcasting) on this lowest-frequency band did nothing for the radio amateur's "public image."

Suppressor- and control-grid modulation systems were described in 1934 and '35, and they were appealing to the ham who didn't want to go all the way with a big-enough modulator for the plate of his final. A big splash was made in 1939 when "cathode modulation" was rediscovered and loudly proclaimed to have all of the advantages of plate modulation with the economy of grid modulation. By the time a few down-to-earth articles on the subject had been published, however, a number of the special transformers that were required had been sold. Controlled-carrier operation, even with VOX (February, 1939) had a few staunch supporters, as did speech compression, but in retrospect it would seem that the promise of something-for-nothing always overshadowed a guarantee of something-for-something. The new (1939) technique of the Armstrong frequency-modulation system and its remarkable resistance to electrical noise found only a few followers, despite the fact that it did away with the need for large amounts of audio power in the transmitter. It did require a special receiver (or adapter), and this above anything else probably accounts for the apathy.

In the field of receiving the progress was almost strictly in the refinement of existing techniques. New tube types (metal tubes, 6-volt heater tubes, acorn tubes) were available in 1935, and in that same year iron-cored i.f. transformers first became available. (Good 455-kc. *powdered*-iron core transformers; the transformers of a decade earlier were lossy affairs.) In the December, 1938, *QST* D. K. Oram described a wider-range crystal filter circuit that made the 455-kc. crystal filter usable for phone, a significant advance over the previous circuitry that was used almost exclusively for single-signal c.w. reception.

In 1934 all commercial receivers used plug-in coils, and even in late 1936 the well-designed NC-101 used a tray of individually-shielded coils that substituted sliding contacts for the usual plug-in ones. However, the old bugaboo that switched coils would never work well at high frequencies was finally dispelled, and by the end of the '30s only the HRO stored not-in-use coils outside of the receiver.

Automatic volume control was, of course, merely a broadcast-receiver development applied to ham work. It did, however, make possible the use of a tuning indicator, later to become known as the (almighty) S meter. Probably the most sensational development of the period was the i.f. noise-silencing circuit developed by Technical Editor Jim Lamb and first described in the February, 1936, *QST*. It was hailed by the popular press as a "static eliminator" (which was never claimed by the inventor) and consequently received wide publicity. The circuit, in its original form or with modification, has been used in a number of commercial receivers ever since.



An example of the slip-ring technique used on rotary beams before coaxial line was available. Note also the use of the "armstrong" rotator.

In power supplies, neon bulbs had been found useful as voltage stabilizers (October, 1935), and amplified electronic stabilization was described in August two years later. The various voltage-regulator tubes (VR-150, etc.) became available in 1939, and it became standard practice to stabilize oscillator voltages in receivers.

Amateur radio pretty much discovered directional antennas for itself during this period, probably spurred on by a growing interest in DX. The first 14-Mc. rotatable beam described in *QST* (July, 1934) was a huge affair consisting of two 3-element vertically-polarized beams spaced a half wavelength. The "armstrong" method of rotation was used, and it is doubtful if this ambitious antenna, built and described by John Shanklin, W3CIJ, was whirled as often as some of today's lightweights. A 14-Mc. antenna that started a trend was the famous "Mims Signal Squirter," first described by W5BDB in December, 1935. This was a simple two-element beam with the ends folded. With wire elements, it was relatively simple to build and, best of all, it did show some directivity. Not all of the interest turned to rotary beams, however; there was a group of faithful followers of the rhombic, the Vee, and various phased arrays. Certainly the most popular of the phased arrays was the "8JK beam," two half-wavelength elements spaced ⅛-wavelength and driven out-of-phase to give a bidirectional pattern. W8JK is the well-known Dr. John Kraus, also responsible for the square-corner reflector and many other antenna designs. By the end of 1938 rotary 3-element beams similar to those used today were commercially available. A big handicap to the rotation of beams was the absence of flexible coaxial cable (essentially a WW II development), and devices such as slip rings or inductive coupling were required at the antenna. The standard transmission line was open-wire, although by the late '30s some lossy 75-ohm twisted pair was being used with dipole antennas for "matched" feed. It is interesting to note that the multiband antenna using several dipoles connected together at the feed point and fed by a single (twisted-pair) 75-ohm line was first described in June, 1937. The "pi network" was first described (February, 1934) as an antenna-coupling device between transmitter and either single- or two-wire feed. Its application to transmitter output tank circuits came much later.

The 5-meter band made several contributions during the period. In 1934 Ross Hull had almost accidentally established communication with Boston over a 100-mile path and five or six horizons through the use of a simple beam antenna at his end. Thinking the key was the beam, Hull was surprised to find that the communication could not always be duplicated. Seeking a solution to this variable propagation, he spent the

next several years recording signal levels over the path and trying to correlate the variations with some atmospheric condition. In May, 1937, he announced that his observations indicated that the extended range was possible whenever there was a "temperature inversion" along the path. It was a brilliant piece of work.

Along similar lines, amateurs were reporting 900-mile 5-meter contacts in the early summer months. These were duly reported in *QST* each year, with much speculation as to the cause. It was summed up in the September, 1938, *QST* by J. A. Pierce, W1JFO, of Harvard University. He told how, using the available amateur reports, he was able to establish that the DX was made possible by sporadic E ionization (called "abnormal E ionization" in those days).

Technical development in the 5-meter band generally tended toward refinement of stabilized-transmitter techniques, particularly after the FCC regulations made them mandatory in late 1938. This moved the transceiver and "fun" activity down to the 2½-meter band, which hadn't received too much attention up to that time.

An extensive series of articles on television started in the December, 1937, *QST* and continued for several years. An experimental commercial transmitter was broadcasting from New York City, and Ross Hull became interested in receiving their pictures. A rhombic antenna made the 115-mile reception possible, but on Sept. 14, 1938, the radio world was shocked to hear of Hull's death through accidental electrocution the night before. The high-voltage supply for his picture tube used a pole transformer (because one was available), and in his usual impatience with details not directly relating to the experiment he had failed to exercise the necessary precaution. *QST* lost an inspiring author and the world lost a fine gentleman.

Any report of the period should not overlook mention of "The Shadow." During October, November and the first half of December, 1935, a number of services (Army, Navy, aeronautical, commercial and amateur) reported serious interference with their communications. The QRM was caused by a rough unkeyed a.c. signal or cluster of signals, heard between 8 and 25 Mc.

Ross Hull.

but most frequently around 14 Mc. It was heard from coast to coast and in Europe, Africa and Asia. Its frequency would be relatively steady for a few minutes and then it might jump a few hundred kc. It was dubbed "The Shadow", after a popular radio program of the day, and in the January *QST* a plea went out for further reports on it.

From the start the Naval Communications Reserve, among many others, started to track it down. Oscillographic checks were made on modulation frequency and waveform, and it was eventually determined that not one but many Shadow signals existed. However, in Boston only one of these signals was identifiable as being supplied by Boston commercial power. Someone eventually suspected the brand-new "diathermy" machines, but a check of the Boston hospitals revealed none in use. However, one was found in a Boston athletic club, at about the same time ones were tracked down in Seattle and Charlotte, N. C. The Boston one was keyed with a CQ wheel and removed any doubt as to the origin of the mysterious "Shadow" signals. The machines were running a half kilowatt input to a self-rectified self-excited oscillator, and the 12 feet of insulated cable that was wrapped around the patient was enough antenna to put signals around the world!

The War Years

DURING 1940 advertising followed the pattern of the late thirties, but in the following year a few companies like Amperex, Bliley, Eimac, Hallicrafters, Hammarlund, National, talked of supplying the armed forces. Commencing with January of 1942, the *QST* containing the yellow WAR COMES notice, and continuing through most of 1945, the advertising pages of *QST* took on a different appearance.

In 1940 and 1941 new advertising included such well known names as Alsimag, Birnbach, Clarostat. Old friends continued to bring out new models. Hallicrafters: HT-9, HT-11, HT-12, S-29, SX-28, others. Hammarlund: Super Pro 200. National: NTX-30, NC-45.

Astatic, Eimac, Hammarlund, RCA, used DXers in testimonial ads during 1940 and 1941. How many calls can you identify, using these clues? A tennis champion; the first to make pre-war DXCC; a former ARRL director; "Doc"; a famous XYL. (There was no Ø Call Area — but why no W1s on the list?) W2AZ, W2GT, W2IXY,

From advertisement in June 1943 QST

...bably you have noticed that in the May and June issues of *QST* much less space is devoted to advertising than has been the case in previous recent issues. One might suspect that this is because we have been unable to sell as much space as heretofore. Quite the contrary; it is the effect of one of the finest pieces of coöperation we have ever seen.

Like all other magazines, *QST* is rationed. We must use less paper than we did last year. What with circulation growing, owing to the great new military interest in radio, any reduction in paper means considerable reduction in the number of pages. But as you have seen, and will continue to see in future months, *QST* has many important editorial jobs to do which are directly related to the war effort. Reducing the number of pages we could use for editorial material was a sad prospect.

So we put it up to the advertisers. We told them we needed to *cut in half* the number of pages we could devote to advertising if we were to continue an editorially adequate magazine. And then we told them, "*. . . but we must have the same number of dollars we have had in the past if QST is to operate at a profit so that the League will be financially able to undertake the job of postwar rehabilitation of Amateur Radio. In other words, we want you to use half the space at twice the rate!*"

Well, the rest of the story is short but very sweet. We doubled *QST's* advertising rates and rationed advertisers to approximately half the previous space they had been using. Almost without exception, *QST* advertisers said, "Okay, we'll go along with you." The result is that, in this and in the previous issue... twenty-five pages in each issue have been paid for by *QST* advert... editorial.

● ● ● ●

QST is glad to announce, effective immediately with the November issue, a return to advertising rates on the pre-war basis. While the paper situation is not yet sufficiently clarified for us to know how much advertising we shall be able to carry in the immediate future, there seems to be good prospect that we can meet the most urgent needs for somewhat expanded schedules and for new schedules which we have been unable to accommodate during past months.

The enclosed new Rate Card establishes rates on the basis of circulation so far as predictable at this time. It returns to our pre-war basis, making provision for our present circulation increase of approximately 40% from the pre-war level; although it is probable that our circulation increase soon will greatly exceed that figure because we shall be able to improve upon our restricted distribution of the recent past and also be able to resume more normal solicitations of paid-in-advance circulation.

We are grateful indeed for the kind cooperation which QST advertisers have extended to the American Radio Relay ... through the League, to the Amateur Radio ... and believe that now we shall be able ... much more satisfactory

From *QST* Adv. Dept. letter dated Sept. 15, 1945

W2UK, W3BD, W3EMM, W3EOZ, W4CYU, W4NG, W5CXH, W5GIK, W5VV, W6GRL, W6MQF, W6KQ, W6KW, W7HXU, W8CPC, W8CRA, W8OSL, W8OXO, W8RG, W8RHZ, W9GHW, W9JID, KA1LZ.

RCA spoke of Amateur TV in 1940 and Johnson announced the purchase of Bassett's antenna and cable business. (In 1945 Johnson would start to manufacture certain Mallory-Yaxley components.) In 1941 Collins had an interesting series of ads featuring mythological characters like Perdix, Briareus, Argus. In February of 1941 the Zenith ad reproduced a letter from President McDonald which started with this question: "Frequency modulation is here — but where are the amateurs?"

As the United States began to recover from the shock of Pearl Harbor, electronic companies increased production facilities in an all-out effort to supply our fighting men. In the years 1942–1945 most *QST* advertisers explained that they were doing one or more of these:

1. Supplying equipment and components to the armed forces. It seemed that nearly all *QST* advertisers were in this category. Hallicrafters' red, white and blue ad in August 1942 started with a letter to the Army Signal Corps and Navy Communications calling attention to the excellent job done by distributors of electronic equipment for the armed forces. The letter was followed by 6 pages in an unusual layout listing 24 of these distributors. Hammarlund ran a series of ads in 1943 showing the SP-200 in six war theatres: Africa, Guadalcanal, Russia, Australia, Italy, China.

2. Supplying equipment and components for home defense. Abbott, Hammarlund, Newark, Wholesale, were representative.

3. Buying amateurs' equipment and meters for the armed forces. The well known Hs — Hallicrafters, Harrison, Harvey, Hammarlund, Henry — along with Raytheon, Triplett, Mallory, were examples.

4. Offering preparatory training in radio for the armed forces through schools or equipment. Meissner, McElroy, Ayers, Teleplex, displayed equipment and Melville, American Radio Institute, were among the schools. Candler offered a course. ARRL's Defense Edition of the *Handbook* was in great demand by all branches.

5. Asking for personnel to maintain essential production or urging amateurs to enlist. Philco, Westinghouse, Hammarlund, Hazeltine, Collins, Raytheon, advertised for civilians. Hallicrafters and G. E. recommended the Signal Corps, Terminal talked of the army. Taylor Tubes said that every branch needed men. Cinaudagraph emphasized the need for Waves and Spars. The September issue of *QST* carried an editorial section on the Signal Corps; Hallicrafters with several distributors including Terminal, Harvey, Sun, Scott, Harrison, Wholesale, Henry, joined in the salute.

6. Promising better products for amateurs after the war. It is interesting to note that as early as 1942 Raytheon in a July ad prophecied that radar "may, for instance, be standard equipment on commercial aircraft after the war."

The Army-Navy E Award was won by Hallicrafters, Alsimag, Eimac, Clarostat, Bliley, Raytheon, Zenith, Burgess, Sickles, Amperex, Sprague, UTC, and many others, Hallicrafters making the first announcement in October of 1942 and reporting in January of 1945 on winning it five times.

The Electro-Voice ads on the differential microphone were particularly interesting to those who knew that the mike was invented by F. C. Beckley, then *QST*'s advertising manager.

Hallicrafters' letter-writing contest for hams in the service which started in November 1943 and ran for about a year and a half was stimulating.

As the country got deeper into the war the shortage of paper became acute. In a letter dated March 8, 1943 limitations on purchasing of paper were explained and it was pointed out that *QST*'s circulation could not be curtailed without interfering with important education, printing of recruiting ads and the obligation of holding amateur radio together. Advertisers were asked to pay twice as much for advertising space and to use less space, besides. This letter was sent to all advertisers and their agencies.

The response was a mighty demonstration of loyalty to *QST* and faith in ARRL.

War Time rate card No. 11 went into effect with the May 1943 issue of *QST*. Rates were doubled: a page cost $480 instead of $240. ARRL agreed to set aside one half of *QST*'s net advertising revenue to be used for post-war rehabilitation of amateur radio.

Pages of advertising were comparatively few for a couple of years. However, as the war and 1945 neared the end, some manufacturers said they would soon have new amateur equipment; more made definite offers. Coto Coil said, "We can plan on that new rig now and be ready." Jensen promised that new products were coming. RME announced the post-war RME-45 receiver, Collins offered the (1939) 32RA to civilians, Hallicrafters announced in October the availability to hams of receivers with ads on certain models by Henry, Radio Shack, McElroy, Newark, Harrison. Hammarlund came out with the HQ-129X. National advised that production would be concentrated on the HRO, NC-240C and NC-46. New tubes were offered by Eimac, Hytron, G. E., Taylor, Raytheon.

New advertisers included Allied, Amphenol, Andrew, Bell Tel Labs, Burlington Instrument, Concord (Lafayette), Hallicrafters as RFC agent, Jennings, Marion, New York Transformer.

In November, Taylor Tubes and Crystal Research Labs announced contests.

QST began to look like its pre-war self and the good news that war time advertising rates were no longer necessary was given in a letter dated September 15, 1945 to all advertisers and agencies. Circulation had increased to approximately 65,000 and rate card No. 12, which went into effect with the November 1945 issue of *QST*, gave the cost of a page of advertising as $325. QST

Happenings of the Month

Director Election Notice

Calls Not For Sale

Legal Battles: A Victory

Incentive Licensing Steps

ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1965-1966 terms. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 21. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the.....Division, hereby nominate.....of..... as a candidate for director; and we also nominate..... .....of.....as a candidate for vice-director; from this division for the 1965-1966 term.
(Name Call City Date)

The signers must be Full Members in good standing. The nominee must be a Full Member and the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate and must have been a member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 21st day of September, 1964. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not neces-

For their first Amateur Radio Week in West Virginia, the officers of the West Virginia State Radio Council picked June 28 to July 4, 1964, thus covering both the Field Day and the ARRL State Radio Convention at Jackson's Mill. While Governor W. W. Barron signs the bill, Council officers look on. From the left: K8HID, vice president; W8SSA, treasurer; W8DUV, secretary and W8JM, president. [EDITOR'S NOTE: W8JM is also Convention Chairman and Section Communications Manager for West Virginia.]

sary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 1 and November 20, except that if on September 21 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Central:* Philip E. Haller, W9HPG (Vice-directorship vacant). *Hudson:* Morton B. Kahn, W2KR, and Harry J. Dannals, W2TUK. *New England:* Milton E. Chaffee, W1EFW, and Bigelow Green, W1EAE. *Northwestern:* R. Rex Roberts, W7CPY, and Robert B. Thurston, W7PGY. *Roanoke:* P. Lanier Anderson, Jr., W4MWH, and Joseph F. Abernethy, W4AKC. *Rocky Mountain:* Carl L. Smith, WØBWJ, and John H. Sampson, Jr., W7OCX. *Southwestern:* Raymond E. Meyers, W6MLZ, and Virgil Talbott, W6GTE. *West Gulf:* Roemer O. Best, W5QKF and Ray K. Bryan, W5UYQ.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1964

JOHN HUNTOON
Secretary

CALLS NOT FOR SALE

To their chagrin, many amateurs are making a costly misinterpretation of FCC application-fee rules. Section 97.55 sets up a fee of $20 for application for a specific call sign *pursuant to Section 97.51* (*a*) (Our emphasis). That "pursuant to Section 97.51 (a)" is important!

> "97.51(a) The call signs of amateur stations will be assigned systematically by the Commission with the following exceptions: (1) A specific unassigned call sign may be reassigned to the most recent holder thereof; (2) A specific unassigned call sign may be assigned to a previous holder if not under license during the past 5 years; (3) A specific unassigned call sign may be assigned to an amateur organization in memoriam to a deceased member and former holder thereof; (4) A specific call sign may be temporarily assigned to a station connected with an event, or events, of general public interest; (5) An unassigned "two-letter call sign" (a call sign having two letters following the numeral) may be assigned to a previous holder of a two-letter call sign the prefix of which consisted of not more than a single letter."

Thus, *only* if an amateur can qualify for a special call under one of the five provisions above should he send his $20.00 to the Commission. And yet, an amateur who thinks he's qualified cannot ask the question of FCC without putting his $20.00 on the line: "In no case will an application . . . be . . . processed prior to payment of the full amount specified."

The final clinker is that "All fees will be charged irrespective of the Commission's disposition of the application."

Governor George W. Romney of Michigan and WA8HHC of the Central Michigan Amateur Radio Club make a swap. The Governor gets a plaque from the club containing a c.w. key and the club's 73, while the amateur accepts a proclamation for Amateur Radio Week, June 21–27, 1964, at least the fifth such proclamation in Michigan.

Thus, if an amateur who does not understand the rules sends in an application and a money order for $20, to get his call changed from WB6XYZ to W6QRO just because he doesn't like the WB prefix, he has simply thrown away the twenty. The Commission is obliged to tell him he is not eligible for a special call sign. The money will have been deposited already and it cannot be returned.

The League headquarters will be pleased to assist members in determining whether they are eligible for a special call sign under the terms of §97.51, provided the applicant furnishes complete and accurate information about previous licenses having a bearing on the application so as to narrow the search here.

LEGAL BATTLES — A VICTORY

There has been much discussion, some of it not strictly founded on complete facts, about the struggles being made here and there by amateurs against local restrictions.

A notable victory has recently been scored by K3DSF of Fairless Hills, Pennsylvania. In 1961, fourteen neighbors of Peter and Agnes McManus brought a civil suit against the McManuses seeking to make them remove radio and television "aerials" prohibited by restrictive covenants. On April 24, 1964, Judge Edwin H. Satterthwaite found in favor of the defendants, making these points, among others: The only purpose of the convenant was founded on aesthetic considerations, incapable of adequate judicial interpretation; the covenant against radio and television aerials is judicially unenforcible; the benefit of the McManuses' antennas to themselves and others outweighs any slight and inconsequential detriment to the complaining neighbors; plaintiffs acquiesced without protest to other television and CB antennas in the area; and the restriction against TV antennas if enforced would work an eventual hardship on the

Governor Richard J. Hughes signs a proclamation designating June 7–13 as Amateur Radio Week in New Jersey. Onlookers, clockwise from the governor, are WA2IGQ, president of the Knights of the Roundtable Radio Club; K2PSW; State CD Director Thomas S. Dignan; K2TZC and WA2PII.

whole community as u.h.f. becomes more important and outside antennas become necessary in this particular community for its reception.

With particularly clear insight, the judge pointed out that the neighbors really were getting at the 39-foot steel tower which supports a triband beam. The covenant however specified that "aerials" were to be prohibited, and Webster's dictionary defines "aerial" as the "elevated conductor portion of a condenser antenna." Thus the tower would be legal but not the beam. Yet, v.h.f. TV antennas in the attics of the houses within the development, installed there by the builder who wrote the covenant, also come within the strict definition of an "aerial"!

The judge ordered the plaintiffs to pay all costs. The decision has been appealed by the neighbors, but it appears to be sound enough to prevail. The League's General Counsel, Robert M. Booth, Jr., W3PS, is keeping in close touch with the McManuses' attorney, particularly as concerns the plaintiff-neighbors' appeal. Copies of the decision, a 20-page mimeo, may be obtained on request from League headquarters by amateurs or their attorneys where similar legal problems are involved.

The decision in the McManus case may have come at a fortunate time for Mace Warner, WØJRQ of Denver and Lakewood, Colorado, who is also involved in a restrictive covenant case. Mr. Warner has specifically asked *QST* to report that General Counsel Booth has been watching the case closely and is in constant touch with Mr. Warner and his attorney. The misinformation being circulated elsewhere has caused him considerable distress.

The Seaman case, wherein K3IOP and the Borough of Elizabeth, Pa. have been at odds, appears to be headed for a quiet settlement by agreement between all parties concerned. The pressure on Seaman, because of TVI involving Seaman's earlier 6-meter operations, has been eased by his current operations and interest in the lower amateur bands.

Other cases are in varying stages of litigation; *QST* will have a further report as events warrant.

INCENTIVE LICENSING STEPS

The petition filed by the League looking to a strengthening of the existing incentive licensing system, RM-499 in FCC parlance, and petitions filed by others generally along the same lines but differing over a wide range in detail, are all awaiting action at FCC.

Under the terms of the Administrative Procedures Act, the FCC has two broad choices; to deny any or all of the petitions, or to issue a "Notice of Proposed Rulemaking." It cannot adopt any important changes in the rules without first going through the rule-making steps, except when the national interest is clearly and imminently at stake.

The Commission could issue a "Notice of Proposed Rulemaking" quoting the League's proposal almost word for word. It could issue a Notice based on one of the other proposals pending. It could take ideas from several petitions, add some of its own and publish a composite Notice. It could call for comparative filings, asking interested parties to set forth reasons why one approach might be preferable to another.

The Commission would then allow sixty to ninety days for comment by an interested party (e.g., any licensed amateur, whether or not he has previously written the Commission on this subject). There would be a further thirty days or so during which rebuttals could be filed by any interested party, refuting comments filed by others. If the Commission feels that oral argument of the entire matter or some phase of it would be in the public interest, it may so order. Finally, the Commission may adopt, modify or dismiss the proposals contained in its Notice of Proposed Rulemaking. Any persons not agreeing with the final outcome may file suit in Federal Court to overturn the agency (as for instance the current suit, in which the League is actively participating, which asks the courts to upset FCC's license application fee rules).

The FCC has repeatedly stated that its rulemaking proceedings are not popularity polls, and that it is interested only in solid reasons in favor of or opposed to a proposal.

When FCC issues a Notice of Proposed Rulemaking or takes other action on incentive licensing there will be bulletins from W1AW and other ARRL official bulletin stations, and full information in the first available issue of *QST*.

GROUP EXAMINATIONS BY MAIL

In recent months volunteer code examiners who have submitted a single certification to FCC attesting to the successful completion of code tests by a number of candidates have had the certification and accompanying applications returned without action by FCC.

At League request the situation has been cleared up, and in the future group certifications will be accepted. Volunteer examiners are cautioned to ensure that all necessary information for each applicant is contained in the certification. A review of sections 97.27, 97.29, 97.53 and 97.55 (old sections 12.44, 12.47, 12.50, 12.85 and 12.86) by examiners is strongly recommended.

ARRL Form S-45, designed for individual certifications, is still available on request. A self-addressed envelope will be appreciated.

CANADIAN LICENSE FIGURES

Below we present, through the courtesy of Director Eaton, amateur station license figures by regional offices, as of March 31, 1964, with comparison for earlier years:

Region	*1964*	*1963*	*1962*	*1961*
Vancouver	1398	1415	1150	1280
Edmonton	1073	986	939	912
Winnipeg	1201	1193	1118	1087
Toronto	3907	3742	3417	3192
Montreal	1890	1773	1692	1586
Moncton	1161	1073	1016	953
Shipboard VEØ	10	26	15	21
TOTALS	10,640	10,208	9347	9031

FCC THIRTY YEARS OLD

On July 11, 1934, seven men were sworn in as Commissioners of the new Federal Communications Commission, created by the Communications Act of 1934. With the ceremony, the Federal Radio Commission ended its seven years of existence. The new group was charged with all the functions of the FRC, plus some regulation of common carrier rates and of the wire services previously carried on by other agencies. The men named to the Commission at its birth were Judge Eugene O. Sykes, Col. Thad Brown, Paul A. Walker, Norman S. Case, Dr. Irvin Stewart, George H. Payne and Hampson Gary.

Through the years some activities of the Commission, mostly because of the proximity of broadcasting and politics, have been the subject of almost continuous controversy. In all this time, however, relations between the FCC and the amateur service have been uniformly good. It is with great pleasure that the League offers its hearty congratulations to the Commissioners and their staff, past and present, upon the thirtieth anniversary of the agency, together with our hearty thanks, expressed formally by the Board as recently as its May, 1964, meeting, for FCC's helpfulness, support and understanding of the amateur service.

WHAT BANDS AVAILABLE?

As of June 20, 1964, the following amateur bands and modes were available to holders of Conditional, General, Advanced and Extra Class FCC amateur licenses:

Frequencies are in megacycles.

AØ — unmodulated carrier
A1 — c.w. telegraphy
A2 — modulated c.w.
A3 — a.m. radiotelephony
A4 — facsimile
A5 — television
FØ — steady, unmodulated pure carrier
F1 — frequency-shift telegraphy
F2 — audio frequency-shift telegraphy
F3 — frequency or phase-modulated telephony
F4 — F.m. facsimile
F5 — F.m. television
nfm — narrow-band frequency or phase-modulated radiotelephony

3.500–4.000	A1
3.500–3.800	F1
3.800–4.000	A3 and nfm
7.000–7.300	A1
7.000–7.200	F1
7.200–7.300	A3 and nfm
14.000–14.350	A1
14.000–14.200	F1
14.200–14.350	A3 and nfm
21.000–21.450	A1
21.000–21.250	F1
21.250–21.450	A3 and nfm
28.000–29.700	A1
28.500–29.700	A3 and nfm
29.000–29.700	F1
50.0–50.1	A1
50.1–54	A1, A2, A3, A4, nfm
51–54	AØ
52.5–54	FØ, F1, F2, F3
147.9–148	A1
144–147.9	AØ, A1, A2, A3, A4, FØ, F1, F2, F3
220–225	AØ, A1, A2, A3, A4, FØ, F1, F2, F3, F4
420–450[1]	AØ, A1, A2, A3, A4, A5, FØ, F1, F2, F3, F4, F5
1215–1300	AØ, A1, A2, A3, A4, A5, FØ, F1, F2, F3, F4, F5
2300–2450, 3300–3500, 5650–5925	AØ, A1, A2, A3, A4, A5, pulse, FØ, F1, F2, F3, F4, F5
10,000–10,500	AØ, A1, A2, A3, A4, A5, FØ, F1, F2, F3, F4, F5
21,000–22,000 and all above 40,000	AØ, A1, A2, A3, A4, A5, pulse, FØ, F1, F2, F3, F4, F5

[1] Plate input power must not exceed 50 watts in certain parts of California, Arizona, Nevada, New Mexico, Texas, Mississippi, Alabama and Florida. Exceptions may be authorized after application to the FCC.

NOTE: The bands 220 through 10,500 Mc. are shared with the government radiopositioning service, the latter having priority.

In addition, portions of the 1800–2000 kc. band are available in each state, as shown in the table on page 60, *QST* for July, 1963; in the 51st or 52nd edition of the *License Manual*; or on Form S-15, a copy of which will be sent free of charge from headquarters upon receipt of a request accompanied by a self-addressed envelope. QST

I.A.R.U. News

NEW MEMBER SOCIETIES

The Union is pleased to announce the acceptance to membership, after appropriate balloting, of the following societies: The Jamaica Amateur Radio Association, The Radio Amateur Association of Greece, and the Radio Society of Ceylon. Results of the ballot, sent out last December, showed 43 aye votes cast for each society with no negative votes cast. These additions bring the Union total to 63 societies.

Recent applications for Union membership include Nationalist China and Barbados. The results of the balloting on these proposed members will be known in December.

GREAT BRITAIN

The Radio Society of Great Britain has announced that beginning June 1, a revised licensing system has been instituted by the U.K. licensing authorities. Replacement of existing licenses will be spread over a year and will take place as renewals are made.

The new license structure includes the Amateur A, Amateur B, Amateur Mobile, and Amateur Television licenses.

The Amateur B is a phone-only license, restricted to operation above 420 Mc. Distinctive call letters beginning with G8 and ending with three letters will be assigned to this group.

Future amateur television stations will be assigned G6 three-letter calls followed by /T. Stations operating from a temporary location will now be able to substitute the prefix of the G country they are in and follow the call with /P. This will replace the previous system of using /A.

Amateurs are now specifically authorized to receive transmissions in the Standard Frequency service. (In U.K., as well as many other countries where licenses are issued for receiving as well as transmitting, an amateur license does not grant authority to listen anywhere except in the amateur bands.)

Log keeping rules have been amplified and times must now be kept in GMT, while the exact frequency must be recorded rather than merely the frequency band.

The use of recordings intended for entertainment is prohibited but special recordings of audio frequency tones can be used.

A new sub-clause has been added to the rules to make it clear that speaking into the microphone is regarded as operation of the station and is therefore restricted to the licensee and other holders of U.K. amateur licenses.

Minor amendments to the types of emission have been made and now include A3A (s.s.b. reduced carrier), A3H (s.s.b. full carrier), and A3J (s.s.b. suppressed carrier).

One other important point added to the rules requires the license to be kept with the station.

Also effective June 1, the RSGB reports that its 70-Mc. band has been extended from 70.2-70.4 to 70.1–70.7 Mc. The band is allocated until further notice to stations in the amateur service on a secondary basis on condition they do not cause interference to other services. Radio amateurs in Great Britain do not have any 50-Mc. assignment as this is used for television broadcasting by the government. Amateurs outside of Europe are invited to listen for and report on 70-Mc. amateur signals.

JAPAN

Radio amateurs visiting Japan for the Olympics are cordially invited to contact and visit with the Japan Amateur Radio League. The JARL promises to make everyone welcome and make the visit a memorable one. Interested parties should write to Mr. Keniti Kazii, President, JARL, P.O. Box 377, Tokyo, Japan.

U.S.S.R.

In reference to complaints that Soviet non-amateur stations are causing interference in some of the amateur bands, N. Kazansky, Secretary-General of the Russian Sports Federation, has asked the Union to inform all radio amateurs that his government denies operating radio transmitters on any amateur frequencies.

The third DUØDM Field Day sponsored by the Philippine Amateur Radio Association found DU1GF, DU1OR and DU1RTI around the rig on Corregidor. The event was dedicated to the memory of the heroes of Bataan and Corregidor and a tribute to the late General of the Army Douglas MacArthur.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

You will be glad to know that this month we are going to dispense with all the high-falutin' philosophy and discuss a few down-to-earth traffic details. Now, don't you AREC people look somewhere else! This concerns you, too, because if you don't know how to handle a message, it's time you learned.

Handling Instructions. Some traffic originators have advised us that they have used the HX symbols but have never received compliance on them, so what good are they? Well, we think compliance with handling instructions on a routine message is more a courtesy than a duty or obligation. Actually, this applies to most of our amateur radio operating activities. Anything recommended by ARRL is voluntary, anything in the FCC regulations is mandatory. We have been operating this way for fifty years, can't we keep on doing it? On priority and emergency messages, compliance with handling instructions is more urgent than on routines, but on any message it's a courtesy. Let's be courteous, fellows and gals.

Service Messages. Odd how some of the old AARS and commercial procedures are so ingrained that they are still being used by many amateurs. The practice of inserting the word "service," or the letters SVC in place of the check of a service message is not recommended ARRL practice and never has been. This type of message should contain an accurate check like any other message. The word "service" or letters SVC, if used, should precede the number.

Filing Time. Phone traffic men are the greatest offenders here. If the date of a message is June 17, you often hear it given as "six seventeen sixty-four," or, even worse, "today's date." Either one can be mighty confusing. Why not just "June Seventeen?" Also, in amateur practice we do not use date-time groups, such as (for the above example date with a filing time) 171410Z; we would send it as 1410Z June 17.

"Q" signals on phone. Everybody, but everybody uses them, but doggonnit, they shouldn't be used. Nine times out of ten, it's just as easy to say what you mean, and usually easier. Q signals are for c.w. Sometimes they can be used to save space in writing. But on voice, don't use 'em! QRK? QSL?

Counting Checks. We are doing better on this, but a majority of traffic handlers *still* neglect counting the check on messages received. This is a check for *accuracy*, a most important consideration. We *need* more accuracy! Copy five words (ten, if you're typing) to a line, make a quick count at the end of each message received, be sure the check agrees with your count. If it does not, make sure you copied correctly, and agree with the transmitting station on the check count. Don't argue about *how* to count, just make sure you have it *right.*

Getting Fills. On c.w., use WA (word after), WB (word before), BN (between), AA (all after) and AB (all before); better yet, use "break in" so the receiving operator can interrupt the transmitting operator during transmission. On phone, *say* it, don't use c.w. abbreviations.

Break-In. Much time can be saved if two stations can interrupt each other. If your break-in system isn't fast enough to interrupt in the middle of a word, exaggerate your spacing between words; many of us need more spacing anyway. When you break, give the last word you received correctly (and that's *all*) or the first letter of the word you missed. The transmitting station should *not* re-transmit words already received. When copying, do *not* break in the middle of a word (he *may* repeat it). However, if he starts to repeat a word you have received correctly, break him so he will not do so. There are many fine points about break-in operation which can make our traffic handling more efficient. It's a device that ought to be used more.

Refiles. When a message is received by some means other than amateur radio and "refiled" on amateur circuits, as far as the refiling station is concerned it is an *originated* message and should contain a complete *amateur only* preamble. This is a general principle that will not be changed. Some of the details of its application may be subject to modification with respect to handling of some MARS refiles. Keep listening.

These are just a few traffic-handling details we jotted down for discussion, many of them at the suggestion of amateurs in the field, some of them made a long time ago. Keep the suggestions coming.

National Traffic System

We suppose most of the readers of this section are those who participate in NTS nets. *This* particular column is being written, however, to those members of nets which do not belong to NTS, especially at section and local level. We want *you*, who read this, to carry the message to them. If we want NTS to be the nationwide *emergency* communications facility (we do, don't we?) as well as a traffic system for handling of routine, low-priority messages, we need more contact with the nets which will be originating and delivering many such messages in an emergency; that is, the emergency nets.

In any communications emergency, there are always three factions — the organized, the disorganized, and the *un*organized. Of course you might say that whether or not a certain group is organized or disorganized is a matter of opinion, and it is also true that what appears to be an organized group might very well become a disorganized one in an emergency. Anyway, we like to feel that NTS is in the first group, generally speaking, and that by application of a little liaison contact the second group can be brought in. The lat-

* National Emergency Coordinator.

ter category are those who can't be bothered ordinarily, but who show up and magnanimously offer — nay, insist on giving — their "help" when an emergency exists. With such help, who needs opposition?

Some of our SECs and SCMs have reported difficulty in getting local AREC groups to see the need for conducting liaison with an NTS net when they have a drill, exercise, or real emergency. Many ECs, we suspect, just don't know how to go about it, whom to contact, or are just plain bashful or for other reasons reticent about "breaking the ice." You NTSers, it seems to us, can help a great deal by *going to them* with an offer to provide the needed NTS liaison. So what, if this means you may have to take part in a local AREC net drill once a week or so? If it's good for them to conduct liaison with you, it's also good for you to conduct liaison with them; after all, liaison isn't one way.

Perhaps you don't know who your EC is. We'll be glad to tell you, if you have one. If you haven't, nothing against your trying to get an AREC group organized in your home town; or maybe, in the absence of a designated organizer you will feel called upon to contact your Red Cross and c.d. director and other officials to advise them of your connections with NTS in case they ever need your services in an emergency. Why not? What can you lose?

But most of all what is needed is to establish good intra-organizational relations with the leaders of the other division of our ARPSC. At the ground floor, working level, we are not enough in contact with each other. One of the biggest troubles with us traffic people has always been that we do our work quietly and don't say much. But you, with access to a nationwide message-handling system that activates itself in an emergency, have something to offer. Get out and offer it.

May reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
EAN	31	1747	1.048	56.3	100
CAN	31	1134	.838	38.1	100
PAN	31	1227	.871	39.6	100
1RN	61	525	.347	8.6	78.7
2RN	62	712	.633	11.4	99.7
3RN	62	588	.379	9.5	96.1
4RN	56	738	.371	13.2	91.5
RN5	62	1087	.443	17.5	96.8
RN6	62	1094	.648	17.3	99.7
RN7	31	423	.343	13.7	92.1[1]
8RN	62	482	.297	7.8	81.2
9RN	31	481	.630	15.6	95.9[1]
TEN	62	488	.411	7.9	62.2
ECN	27	118	.222	4.4	76.5[1]
TWN	31	301	.420	9.7	78.7[1]
Sections[2]	1405	7823			
TCC Eastern	99[3]	618			
TCC Central	97[3]	911			
TCC Pacific	88[3]	864			
Total	2107	20,626	EAN	9.8	EAN/CAN/PAN
Record	2227	22,882	1.100	22.1	100

[1] Representation based on one session or less per day. Others are based on two or more per day.

[2] Section nets reporting (48): MSPN (noon) MSPN (eve) MSN MJN (Minn.); AENB, AEND, AENH, AENM, AENO, AENP (noon), AENP (eve), AENT (Ala.); CN (Conn.); SCCW (S.C.); OQN (Ont.-Que.); ILN (Ill.); MDD, MDDS (Md.-Del.-D.C.); EPA, PTTN (Pa.); VSN (Va.); OZK (Ark.); NJN, NJFN (N.J.); RISPN (R.I.); QMN (Mich.); WIN, WSBN (Wis.); OSN (Ore.); Wash. Sect.; TN, TSPN, ETPN, Tenn. Phone (Tenn.); GBN (Ont.); VTN (Vt.); GSN (Ga.); SCN (Calif.); BUN (Utah); WFPN (W. Fla.); Buckeye, Ohio SSB (Ohio); NTTN (Texas); NCSSBN, NCSN, NCCW, NCN (late), THEN (N.C.).

[3] TCC functions reported, not counted as net sessions.

No new records this month, but we came close. Some nets report that traffic is up from the same time last year, and we hope this trend will continue. Have you originated any good traffic this month?

K1WJD reminds all EAN reps that EAN starts promptly at 0130. This was EAN's third consecutive month with 100% representation. W9DYG reports that condx were pretty good but traffic seems to have dropped off. WB6JUH sez PAN is running along smoothly with a minimum of tie-ups. WA2GQZ reports that WA2KQG has been named manager of the 2RN Traffic Clinic, and a slow speed version, Traffic Round Table, will also start this fall. K3MVO sez 3RN is dropping into the summer slump. WB6BBO has created a third rep spot to PAN to handle the overload, and it's working quite well. W9QLW has issued 9RN certificates to K4DZM and WA9EED. Summer is taking its toll on TEN but WØLGG hopes that students home for the summer will help to bolster the net. TWN is showing improvement and the activation of some section nets may help the situation.

Transcontinental Corps. W3EML reports 100% reports again this month. There are 16 open functions waiting to be filled by qualified stations. W4ZJY sez that things are going well with a minimum of functions being missed because of poor condx. The Pacific TCC also has open functions. Stations should contact W7DZX if interested and qualified.

May reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	79.8	1790	618
Central	94	93.8	1379	864
Pacific	124	78.2	1822	911
Summary	342	83.0	4991	2393

The TCC roster: Central Area (W4ZJY, Director) — WA4AVM, *W5s* PPE QMJ, *W9s* AKV CXY DYG JOZ VAY ZYK, K9DHN, WØBDR, KØFPC.

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Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
7290	42	961	438
EASN	27	79	26
20 Meter SSB	22	450	1326
Northeast Area Barnyard	26	744	2
Hit & Bounce	31	390	484
North American SSB	25	513	420
Interstate SSB	31	907	239

Diary of the AREC

On Feb. 15, after roll call had been completed on the Frisco Net, WØVLB called Joplin (Mo.) EC WØAIM and reported that there had been a train wreck between Liberal and Lamar, Mo., and the postmaster at Lamar needed to know how the mail would be re-routed and the schedule it would follow. WØAIM called the "super" at the local railroad station and obtained some of the required information. Assistant EC WAØDGT took over the on-the-air-operation while WØAIM tried to get further info, but this proved futile. KØMMR also assisted in the operation. — *WØAIM, EC Five County Area, Mo.*

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We have received an additional report on the Ohio, Indiana, Kentucky flood of March 10 (see p. 101, June 1964 *QST*). When it became evident on March 9 that the Ohio

During the Ohio River Valley flood, W4TOY and K4UDZ (l. to r.) operated from communications headquarters in Owensboro, Ky.

Valley area could expect major flooding, the AREC members in Owensboro, Ky. were alerted to the probable need for emergency communications. On the following day, the Owensboro c.d. director requested that facilities be established in view of the inundation east of Owensboro and the anticipated crest of only five feet less than the 1937 flood. *W4s* VJV and SUD drove the c.d. communications bus to the National Guard Armory at Owensboro where headquarters operations were to be centered for the following five-day period. Military communications equipment was also installed at the communications center for contact with military aircraft and vehicles in the area. Within an hour after the alert, the RACES station, W4YOQ, was in operation on both 6 and 75 meters with communications established with the state capital at Frankfort (K4OPW) and Red Cross headquarters at Louisville. Local communication was primarily on 6 meters while state-wide coverage was made on 75. Emergency telephone equipment was installed in the communications center, and provided a link for distributing incoming traffic to the metropolitan area. Suburban areas were completely flooded and a house-to-house search using power boats was conducted by local volunteers who reported back by radio. In some instances, mobile units were dispatched to act as relay stations when the distances became too great for reliable communications with low-powered gear. Although not required in this particular case, communications gear from the c.d. bus providing contacts with state police, sheriff and highway department systems was tested. Amateurs participating were: K2AVP/4, WB2FSI/4, *W4s* EWL PFQ OYI TOY YYI YPF LUB EPD, *K4s* HKB UDZ URX TQX GEQ EQR, *WA4s* KFO ALW. — *W4PFQ, EC Owensboro, Ky.*

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On Apr. 21, the Madison County (Ind.) Emergency Net was alerted at 2230 GMT because of flooding in a section of Anderson, Ind. At the request of the Red Cross and National Guard, stations were set up at Red Cross headquarters, the National Guard Armory, and the City Hall. Mobile units were dispatched to the disaster areas where volunteers were working, providing a direct communications link between the disaster area and headquarters. Amateurs participating were: *W9s* EEL MTU FWH VCV DUM, *K9s* KFX RPZ CWA FOI TZH ONY FVV QXI WHI, *WA9s* BQU JCF JWL CWE JQG KCV. — *W9FWH, EC Madison County, Ind.*

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On May 8, the Southern Michigan 6 Meter Net was activated because of a severe windstorm. The net was held in session by K8WPO. Storm fronts were followed, with information being forwarded to the sheriff's office. Once the storm passed, mobile stations *K8s* YYE CDZ NWO REM FZL and W8VZY were dispatched throughout the county to report damage to the sheriff's office, where K8UCQ set up a portable station. Other stations taking part in the net were: *W8s* WXJ/mobile KHY NZ NVH RQG RWJ, *K8s* YYC NEY KMC UCY TDF BJH AEM JGT, *WA8s* CZJ DVB GEY. — *K8AEM, EC Calhoun County, Mich.*

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On Dec. 23, Knoxville, Tenn. experienced a heavy snowfall and ice storm with good potential for broken landlines and power transmission facilities. EC K4CPC alerted the Knox County Six Meter Net, which remained in continuous session with ten amateurs taking part from 0700 to 2300 to handle any emergency communication which might develop. Fortunately none did, but the AREC was on the job. Three formal messages were handled. — *K4CPC, EC Knox County, Tenn.*

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On Mar. 9 and again on Mar. 25, the members of the Morgan County, Ala., AREC went on tornado alerts. Forecasts of tornado activity in the area brought a request from the c.d. director for the services of AREC. A station was maintained in c.d. headquarters where operators and equipment for 6 and 75 meters, local police and state police were available. Mobiles were spotted over the county in areas which were not covered by county and state units resulting in a complete, up-to-the-minute weather report at all times. Although amateurs were deployed for emergency operation, only minor damage occurred and operations were closed after 6½ hours. — *K4WHW, EC Morgan County, Ala.*

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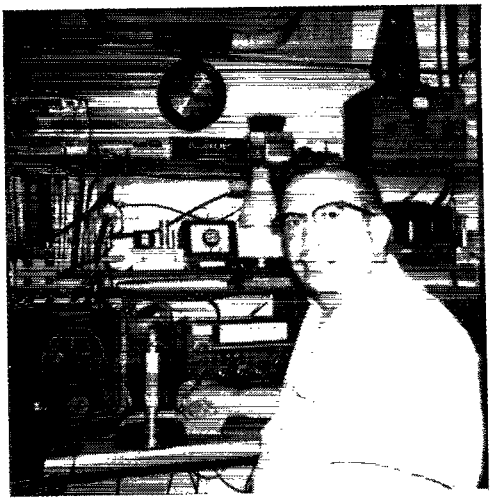
On Apr. 28, the Southern Michigan 6 Meter Net was alerted to storm warnings in Calhoun County. The net was in session for an hour and a half, but no emergency conditions developed. — *K8AEM, EC Calhoun County, Mich.*



One of our more active ECs is Gene Henry, K5RDP, who has the unenviable job of organizing Harris county, Texas in which Houston is located.

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On the night of May 20, KØWGC, EC for Delta County, Colo., was notified of the breaking of an ice jam at Lake Irwin. An unknown amount of water was quickly released and it appeared possible that the North Folk Valley might be flooded. *KØs* WGC WWL, *WØs* AJH QOT and WAØBHV formed a net on 3980 kc. until such time as the wall of water passed WAØBHV's house. BHV noted that the danger of flooding had passed and that only pieces of bridges and washed out logs from along the river appeared on the small crest. WØAJH was mobile along the river and all was secured at 0130 GMT. The Colorado state patrol and civil defense had been alerted and were kept well informed on what was going on. — *WØSIN, SEC Colo.*

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We recently received a letter from WA8KZY informing us of the activities of the Central Michigan Amateur Radio Club/AREC/RACES. These activities are summarized below:

Nov. 13: CMARC finalized their disaster plans with a drill in which communications were established between all four Lansing hospitals and the simulated disaster scene.

January was March of Dimes month. Mobile units were provided for the "Mothers March of Dimes" and a "Teens Against Polio Bread Sale." Communication links were set up between collection sites and headquarters.

Feb. 29: Thirty-eight fallout shelters were stocked with 70 tons of supplies in a four-and-one-half-hour period. Communications were established at each shelter coordinating stockpiling in record time.

Apr. 7: CMARC established communications at 41 polio vaccination stations. A total of 90 operators took part in coordinating immunization of some 140,000 people.

May 2: CMARC's RACES network participated in a Federal Civil Defense exercise.

May 10: A repeat of the Apr. 7 operation. — *WA8KZY*

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On Jan. 19, Feb. 23 and Mar. 22, 43 members of the Morgan County, Ala., AREC provided communications for the County Polio Vaccine Program. Many schools were used as feeding points and headquarters was set up in the County Courthouse. W4PKA/4, at headquarters, was net control, keeping in contact with the feeding points and mobile units. Supplies were replenished by helicopter or car and a running total of persons vaccinated was kept. Medical officials stayed at headquarters and answered any questions that came up by direct contact. — *K4WHW, EC Morgan County Ala.*

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On Apr. 26, the Baltimore Area, Md., AREC was activated for a simulated emergency test in the form of a search centered around a large area of brush and woods where a

mock radioactive substance had been hidden. One mobile and four handheld units were used in the search which lasted for about half an hour. — *K3SGD EC, Baltimore Area, Md.*

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The Corpus Christi, (Texas) Amateur Radio Club station, W5MS, with K5PNC and W5SIL operating on 75 and 2 meters, was activated on May 2 and acted as net control station for 17 mobiles providing communications for parade officials while assembling and readying units for the Buccaneer Days Parade. Communication was also provided for six Red Cross emergency units which were set up along the parade route for the purpose of rendering first aid in case of accident or illness of spectators or parade participants. — *W5AQK, EC Nueces County, Texas.*

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On May 5, after much preparation and a trial run, the Muskingum County, Ohio, AREC provided communications for the primary election. Two nets were set up on ten meters and one on six, the net control of one of the ten-meter nets being located at a local TV station. A total of 32 amateurs and 24 mobile units were active, covering each of the 149 precincts and reporting tabulation data promptly to the net control. — *W8LQB, EC Muskingum County, Ohio.*

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On May 6, the Houston (Harris County), Texas, AREC held a simulated emergency test in which an airplane was reported to have crashed, exploded and devastated a wide area. W5KWU was activated at the Red Cross and handled official dispatches in the West Gulf Emergency Net on 6 and 75 meters.

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The Fairfax County, Va., AREC again handled the communications for the Fairfax County Medical Society's polio vaccination drive on May 17. Things went so smoothly that W4ZMT was able to relinquish net control during the afternoon and make spot checks around the area. Later on, he operated mobile carrying vaccine. The amateurs received much praise from the Fairfax County Medical Association. — *W4ZMT.*

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On May 23, the NNJ Section held its second annual emergency exercise "PreSet." This exercise was planned to further the efforts to bring AREC and NTS closer together with the ARPSC goal in mind. Special effort was exerted in bringing AREC cooperation with civil defense and other agencies so that all will be able to combine in the efforts of smooth emergency communications. Sixteen of the 20 ECs in the section and four traffic nets took part. The SEC received 90 messages. — *K2ZFI, SEC NNJ.*

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On May 23, the Fraser Valley area (B.C.) of the AREC held a practice alert under EC VE7BLA. VE7ASC operated from Red Cross headquarters and maintained constant touch also with c.d. headquarters by v.h.f., covering the Fraser Valley from Chilliwack to Haney. Both c.w. and phone were used by the five stations which took part. — *VE7BLA, EC Fraser Valley, B.C.*

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On May 30, nine members of the Milwaukee, Wis., AREC provided communications for the annual Memorial Day parade in downtown Milwaukee. Two-meter portables were used to keep the various marching units in contact with net control and the Red Cross field units which were deployed in case first aid was needed. — *K9KJT, EC Milwaukee, Wis.*

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Thirty-nine SEC reports were received for April, representing 18,320 AREC members. This, along with February, is the highest number of reports we have received all year, and compare with 40 and 17,510 for April of 1963. Sections reporting: East. Mass., Colo., Minn., N. Dak., Wash., N. Carolina, Ore., B.C., Nev., Ind., Ala., Alta., Ohio, Maine, Okla., Va., Ark., NYC-LI, S. Dak., NNJ., Tenn., Kans., Mich., Ont., W. Pa., Utah, E. Fla., Ariz., Mo., S. Tex., S.C.V., Ga., Iowa, Del., Hawaii, E. Bay., Los A., Miss., E. Pa.

RACES News

Cayuga County (N.Y.) civil defense held a test alert on April 16. County-wide communications were tested under the call of K2AVJ, units operated by *K2s* RLE HWC, *WA2s* GNY GQB, *WB2s* IQE IPX. QST

Strays

VE1US was in Boston recently and upon landing at the airport discovered that he had nothing with him to prove his identity other than his membership card from ARRL. The examining officer took one look at it and said, "Well, you sure are a Canadian if you have that," and VE1US was able to go on his merry way. Moral: always carry your ARRL membership card.

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The c.w. and phone winners for Los Angeles Section in the 1963 ARRL Sweepstakes, W6SBB and K6CYG, both work in the Space Systems Division of Hughes Aircraft Co. at El Segundo, Calif. W6SBB is the Head of Contract Administration for the Syncom Communications Satellite program, and K6CYG is Chief Scientist of the Surveyor Spacecraft Laboratory. Although their offices are in the same building and separated by only one flight of stairs, W6SBB and K6CYG did not meet each other until after the SS results appeared in May *QST!*

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WA1ALB wonders whether QSL cards have ever been presented as an art form in their own right? As he says, many of these cards show great originality, creative design and excellent execution. Hams having connections with the Museum of Modern Art please copy.

HAMS AT HEADQUARTERS
W1AW, ARRL Headquarters Station

The following list shows the present calls and former calls (if any) of the Headquarters gang:

W1BDI	F. E. Handy (1XAH, 1XL, 8BCM)
W1BGD	Peter Chamalian (K2UTV/1)
W1CUT	E. Laird Campbell (W5TQD)
W1DF	George Grammer (3AIH, 3ARJ)
W1DX	Byron Goodman (W6CAL, W6QV, W1JPE)
W1ECH	Gary Foskett
K1FLG	Raymond Higgs (W6OGI)
W1HDQ	E. P. Tilton
W1ICP	L. G. McCoy (W9FHZ, WØICP)
W1IKE	Richard L. Baldwin
W1JMY	J. A. Moskey
W1KLK	Douglas Blakeslee (F7DB)
W1LVQ	John Huntoon (W9KJY)
W1NJM	George Hart (W3AMR, D4ALS)
W1NPG	A. M. Wilson
W1QIS	Murray Powell (1BHQ)
W1TS	D. H. Mix (4DM, 9AT)
W1UED	Perry Williams
W1VG	L. A. Morrow (8AOF, 1VC, 8BZJ, 8BAB, W8JNI, W8DKE, W9VKF)
W1WPO	R. L. White (W6QEZ, W6YYN, W2QPZ, KH6QJ)
W1WPR	C. R. Bender (W3ODU)
W1YDS	Walter Lange
W1YYM	Ellen White (W6YYM, W2RBU, KH6QI)
W1ZIM	Miriam Knapp
W1ZJE	Lillian M. Salter

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Who:

Your triennial "How's" photo index and contributors recap fall due this month. Hardly seems like 36 *QST*'s ago that we ran the last one, does it? Jeeves reports that defending champion W8KX did it again, volunteering fifteen usable pictures to your DX family album.

Walt's stiffest competition came from prolific K2UYG who weighs in with thirteen accepted pictorial offerings. Other leaders are Ws 1WPO 7QYA, 6; K3CUI, 5; W7DJU, 4; W1s BB TS, 3; Ws 1ECH 1VG 2GHK 3ICQ 4NJF 9JFT and WA2KQG 2 apiece. Fine usable singles arrived from

W1s AGS BAN DGL NTH WKO WPR YYM, **W2s** CTN DTE ELW GT KUW MES RHX RSO SNM, **W3s** HNK INH MVK NKM, **W4s** ANE IEN TAJ, **W5s** AI LDH UXE VSQ WW ZWT, **W6s** BSY RW SFM, **W7s** EMU HTB ZAS, **W8s** EMZ KML QNW, **W9s** DRS GFF IHN KYK VZL, **WØs** KJZ VSJ, **K1s** BDP IGO MEM, **K2s** HEA IEG LSX MGE MRB, **K3s** DCP KMO MNJ QDW, **K4s** ORQ RJN, **K5s** CDA PSO WSE, **K6s** ALH HPR LWW QPG SXA, **K8s** GHG TBR, **K9**VRV/4, **KØ**GVB, **WA2s** EDV HCP RAU, **WA4**BIX, **WA6s** HRS IVM ORS PMK, **WB2**FMK, **CO2**ZQ, **EL4A**, **HB9**KC, **VP4s** NC PL, **VQ8**AI, **ZS1**VW, E. Collins, J. Phillips, Bill Smith and S. K. Smith.

If a picture is still worth ten thousand words, as the old Chinese saying claims, the aforementioned "How's" correspondents racked up a tremendous amount of column copy over the past three years. Here's the outcome in order of issue, taking up where we left off in August '61 *QST*:

— 1961 —

July: VK4EL, UA1KAE, UB5WF, JA1s CO YL & friends. *August:* BV1US, GD6UW, EP group, VU2EZ, VU2NRM (VU2s NR RM). *September:* CR7s DK EO, IS1DKL, CP5EA, HK7ZT, VU2AK, KR6LY. *October:* 5N2JKO, EA2s CA CQ, OK1AMS, DM3YM, TL8AC, YV5AGS. *November:* HV1CN, VR1G, KX6BU, ZE2JA, HM1AP. *December:* ZK1s AK AR, KW6s DF DG, PZ1AY, 7G1A, VR6TC, KG6GX.

— 1962 —

January: KC4USN, LZ1BZ, YV5 gang, UA2BD, VP4s LQ NC, 9G1DE. *February:* KG1BX, M1/HB1EO, CE9AL, ZC4CT, W2ZXM/mm. *March:* SVØWZ, SV1AB, VP5s BB CH CW GT, VP7s BO BQ, HA9OZ, HARTS members, VU2SO. *April:* VQ8APB, UA3BW, VR6AC, VKØVK, HS1R. *May:* UA9BZ, 6O1MT, PYs 2AJK 3FO 4OD 5VN 7EC 7GC 7YS, 9M2GV. *June:* EP2BK, JZØPH, KC4USS, CT3AF, HL9KT. *July:* HB1ABU/vs, M1/I1SVZ, FA3OA, AP5CP, 5N2RSB, HC1AGI. *August:* FG7XL, 5N2JKO, VP4s with G2YL, CE9AF, W6FB and trophies. *September:* VR1B, VS4RS, VU2US/AC5, VP4NC, W1MV/KP6, K1AZA/KP6. *October:* HH2CE, KG1BO, HL9KB, MP4BDC, DM3RBM, VP2SM, ZD8RN, 5N2s AMS DMS. *November:* ZC4PB/p field day, ZS1 group, GW3s meeting, ex-EP2BK with Gs 2ARN 2FUU 3ERN, ST2AR. TG9AD, TT8AJ. *December:* UB5UG/UJ8, LX1TJ, HL9KR, HC4CD, COs in exile, YVs 2DW 6AV/2, 4X4DK.

— 1963 —

January: G8FC/G3RAF, HM1AP, JA5FQ, PY4AP. *February:* SU1IM, HB9JB, SPs 2PI 3PL 4JF 5AR 7HX 7LA, VS6EP. *March:* 5A3BC, PZ1BA, 5B4WS, UR2KAE, JA3BQII, LA4W. *April:* MP4BBE, LA8SE/p, ZD8JP, VP2SY, G3PU. *May:* LU1ZN, LA1LG/p, W4BPD abroad, HA5BU, PJ3AI, HL9KH. *June:* 9A1IR, ET3s FW JK, DU1s at DUØDM with friends, ET3 group, SP gathering, JA1 meeting, IT1AGA. *July:* ZL1NG, VK4CC, VU2AK, GD6UW, VP9EP, VR2DK. *August:* YO3AG, TT8s AC AJ AL AM, FY7YJ, ZD6HK, YU2DB. *September:* ZS1A, HP1ME, F2BO, W2QHH, VR2s BZ EH EO. *October:* K1KSH/KG6, BV1US, PX1IK, 3V8CA. *November:* VE8CL, JA1FBW, YS1O, ZS2FM. *December:* 9M2s FK GD JJ, KC4USP, KH6IJ with F8EX & Co., OX3DL, PX1s MO QX.

— 1964 —

January: CR9AH, OK1CG's WACC, OH5TK/OHØ. *February:* VS9MB, YK1AA, VS9ADV, 5T5s AB AD, VP8HF/mm. *March:* M1M, KA2USF team, KC6BO, 4U1ITU, MP4s DAH QBG. *April:* YVØAA & Co., 5N2RSB/TJ8, XW8AL. *May:* KJ6CC, 5Z4ERR, 9M2DQ, 5H3JR, EP2DM. *June:* VU2s BG BZ GV LC, 9Q5HF, W4BPD/U.S.A.

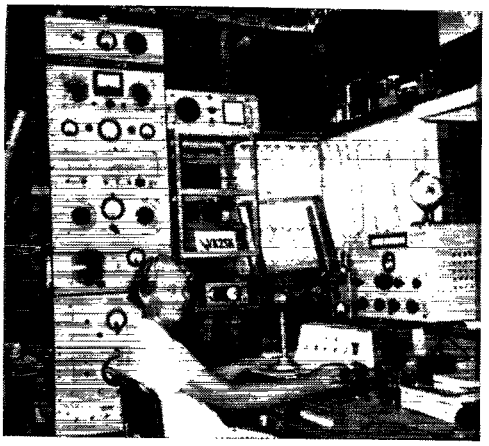
Got a fairly fresh photo with a DX slant you think the brethren would like to see? Well, that's what we're here for. Send it along for possible publication — we'll take good care of it.

What:

This has been the short-skippiest summer we've experienced in a long time. Or, in the absence of consistently solid F_2 signals, perhaps it just seems that way. All DX bands have been jammed day after day with S9 signals hopping in from near-by rarely-heard skip zones. It's a refreshing diversion, and you get a chance to swap 73 with old acquaintances you haven't worked for years. In Europe, sporadic *E* action is an international affair. One can rope off a good chunk of DXCC with a watt or two on a 28-Mc phone week end, sunspots or not. . . . *'Board!* "How's" Bandwagon now departing on Track 88. . . .

10 phone, as we were saying, is a midsummer day's dream on the Continent. Not much distance but plenty of variety. DARC's *DX-MB*, ISWL's *Monitor*, assisted by **Ks** 3SLP ØAID, **WA5**AER and **I1**ER, give this month's 28-Mc. report a European accent: **CE1**GJ*, **CN8**GV*, **CT1s** CX EZ FL JG LD MS OR, **CX4**BR, **DL3**CK*, **DJ8**CT, **EA8**CL *1800 GMT*, **EI7**E, **Fs** 2PY 3FQ 8SJ, **Gs** galore, **GI3**JIM*, **GM3**BCO*, **GW5**XN, **HKs** 1XT* 4EB*, **HP1**JC*, **I1**SF, **IS1**FIC, **IT1**GAI, **LA3**C*,

*7862-B West Lawrence Ave., Chicago, Ill. 60656



VK2SK's Sydney hamshack is typical of the indefatigable homebrew artist. The XYL holds down the pilot's seat while Sam wires up an HBR-11 receiver from *QST*. (Photo via W6CZP)

LUs 4AM* 5DM 8DZH, LZ1KPZ 17, OA4KY*, OEs 3UW 6UL, OK1VK*, ON5EJ, OZs 3GW 3Y* 6OL, PAØWAR, PJ2s AD CY*, PZ1CE, SMs 4CMG* 5OV, SP7HX, TG9s MP* SC* SL*, TI2s JIC* UW*, UAs 1KBW 2KAW 3KE 3UDQ, UB5s EVT KNZ KSD KST XY, UC2OS, UP2s KNZ NBU, UR2IO, UT5UY, VPs 2AB 2AF 3HAG, VQ2s AB* DT, YN4JG, YOs 2CD 17, 4WU, YVs 2CJ* 3FJ* 4GD* 5AGD* 5AHG* 5AJ* 5BIG* 5PJ, ZD6PBD*, ZP5DD*, 4X4s DK* MJ, 5A5s TE TW, 5B4AK, 9G1s DM 15, EC and 9Q5AB, the asterisks representing single-sidebanders. . _ . _ . Week-end voice traffic gets so fierce at times that even **10 c.w.** awakes to the keying of Fs 3AT 8VN, HA1SD, HB9KD, LA2EB, OEs 3AT 7UD, OHs 1OU 1TN 2BAZ 6UO, SMs 3AGO 6VY, SP8AJK, VQ2AS, UA3s ATF EU, UN1BR, UO5AA, UP2s KBC NM, UQ2HO, UR2GV, UT5XK, 5A1TW and 9Q5AB.

15 phone is a spirited proposition at any time, so W3HNK, Ks 7VMO ØAID, WAs 2WIJ 4JJY 5AER 5CIY 6SLU, WB2s AYU and FVD keep plenty busy with AP2MI, CE3s UF XA*, CN8BU, COs 2FA 8RA*, CPs 1DQ* 8AB, CRs 4AD 4AG 4AO 4AY*, 5SP 6AL* 6BC 6CN 6DB 6DC 6DO 6DQ 6EV 6FW 6GB 6GO 6GQ 7CR* 7FH 7FN* 7GR, CT1HF, CXs 3BH* 4BI, EAs 6AM 8BQ 8DR 8DS 8FN* 11, ELs 6B* 6D* 6E* 8C, ET3s FF GC* JF*, FG7s XL* XR, FM7WE, FY7YE, HC1KX, HH2V, HIs 4XAB 8JV 8MMP 8MN 8NAM 8NMS 8RRM 8XEF, HKs 1ZU 4EB*, HP5DJ, HRs 1AB 3AC, HZ2AMS*, IS1ZUI*, JAs 2DDN 6HK 14, KZ5s DG* JK 21, LC MC RL SS* SX, MP4s DAA TAI, OA4s AI* 13, PH (21,*293 kc.*), OD5LX*, OX3JV*, PJs 2CU 2CW 3AH 3AT 5CE*, PZ1s AR BA BE BW (310), SM5DIC/9Q5, SV1s AB* BK DL*, TG9s MP* SC, TI2s AN* DR*, TJ8YL, TL8SW*, TN8s AD BD BI, TR8AD, TT8s AE AN, TU2s AJ AQ* AU* AW* (282) 15, TY2AB 15-18, UA6BB, several VK/-ZLs, VPs 1WS 2AR 2AX 2KJ* 2KR 2LM 2SG 2SE 0, 4LG 6AT 6JC 7CF, VQs 1GDW* (122) 19, 2AB* 2DL 2DT 2JN, VSs 1LV 9ADN 9AE 9ARC* 9OSC 9RAC 9RRC, VU2CQ 11, W6ICM/KM6, XE3s AF CP CW EB, YN9AK, YOs 4WU 5CT, YS1IM*, YVs 1IT 2DN 3FJ 3HB 4GW 4HO 4IQ 5FS/4 8AS, ZB1BX, ZD6PBD*, ZE1BP, ZPs 5EB 9AB, ZS3HT 17, 4W1D*, 5As 1TK 1TO 3CI 4TE 5TE 5TI* 5TF, 5B4s AK GY, 5H3s JJ JL JR* 5N2s EBL FEL JKO* LJM, 5R8AH, 5T5AD, 5X5JK 5Z4s AA* AQ* IX RF, 6O6BW*, 6W8s AC BL, 6Y5AH, 7Xs 2SQ 2VP 3CT* (251) 11, 9G1s DI* DM DV DY EZ FI, 9K2s AM AN, 9L1JR (102) 19, 9Q5s BK 18, BQ GE FD HF PA TH TJ* YL*, 9U5s BK 19, DL IB (200) 19, 9X5s GG* and LR, the stars blinking for s.s.b. types.

15 c.w. treats W8EQA, Ks 1WPR 4MYO 4TWJ, WAs 2WIJ 4JJY 4MMO 5AER 5CIY 5EQA ØAPN, WBs, 2ARD 2FVD 2GJW and 6IFC to CEs 1AD 2DK 2OF CN8GC, CP5EZ, CRs 4AG (41) 14, 6AQ 6CA 6CD 6DB 6DX 6GO 6JL 7IZ, EA9AY, ELs 6ND 8X, ET3JF, FR7ZD, GCs 2FMV 3FKW (33) 14, HC1LE, HKs 3LX 3RQ 7UL, IS1CXF, IT1SBT, JAs 1OHV 5ADR, KZ5HK, MP4s BED BEO, OA4PF, OD5LX, OR4VN (70) 14, PZ1CM, TN8AF, TU2AW, UI8AI (55) 11, UH8AA, UM8KAA (80) 12, UO5s AA PK, VO2JM, VPs 7NQ 8GQ, VQ2s BC W WR, VSs 1LV 6FK 9MG (51) 14, VU2GG, YVs 1AB 4DX 4IO, ZB2A, ZD3A, ZE1BL, ZK1AR, ZPs 5LS 9AY, 4S7PG, 4W1D, 5As 3CI 5TR, 5B4s JF TJ, 7X2DU, 9G1FE, 9K2AD, 9L1TL, 9Q5s AL PA SL TJ TR and 9X5MW.

15 Novice news comes from WNs 2GPR 2LLJ 6FHH 9JNU and 9KCD who cracked the hot and slow season for DJ2FA, HK3RO, JA8BY, KP4s AOO BPH 18, KZ5AX 3, PYs 2BGA 5ASN 23,5BO 0, XE1s H PCL, WG6AOV (160) 1-2, WN5GYL/mm, WP4s BOE and BPD. It's rough nowadays, all right, but WN5HZY isn't too impressed by the sunspot scarcity (see "Whence").

40 c.w. takes its usual scattered QRN attacks with good grace, enabling Ws 1ECH 2BTQ/KH6 5KTC 6YKS 7DJU 8EQA, Ks 2UKQ 3SLP 4CSY 4MWO 4TWJ 5JVF 7QXG, WAs 2FUL 2WIJ 5CIY 5GZX, WBs 2ABD 6IFC and KH6ACC to capture r.f. from BY1PK (19) 19, CEs 1AD 1EK 1FT (11) 7, 4AD 4BS (8) 2, CN8s FN FW, CO2s BB VQ, CP5EZ 0, CRs 4AH (31) 18, 6DT (23) 23, CT2BO, DU7SV, ELs 2AD 23, 8X, FY7YK 22-23, GC2FMV, HA1KSA (8) 1, HC1LE (21) 12, HIs 7JR 8DAB, HKs 3CL 3LX 3VV 4JC 7YB (8) 5, HR2FG (17) 3, IT1AGA, JAs 1BYL 1CSX 1FNR (14) 12, 1KSO 1KTR 1VX 2AGP 2BTF 2NX 3DDG 3DPW 3GHN 3GSM 4YAR 18, 5AJQ (8) 13, 5ALA (11) 10, 7LK ØAZJ, KA2KS (10) 13, KC6BK 13, KGs 4AM (15) 5, 6AAY 6AOX (18) 12, KM6CE, KR6s EX (10) 9, SB, KX6BU KZ5AW (16) 22, LU1ZC (8) 7, LZ2KSK, MP4s BBA 18, BBE QBF, OA4s EM (11) 5, OX (19) 7, PF, OD5LX, OR4VN (8) 10, PZ1s AH (1) 10, CM CP (30) 5, RAEM of Moscow SVØWN, one TA2EE, TI2RK (4) 3, UAs 9TD ØAA 16-18, ØAG ØGU ØIK (10) 7, UB5AC, UI8BZ, UI8AU, UWØs AF FP IX (19) 22, VE8RX 7-8, VK9MD (32) 16, VPs 4TR (21) 9, 7NY (15) 5, 8GQ (9) 5, 9BO 9DL (17) 7, VQs 1GDW 2BC (3) 19, VRs 1G 10, 2DK (13) 12, 2EG 12, 6TC (25) 5, VU2PF 18, XE2s DC (15) 8, OK (6) 5, VF (9) 7, YOs 5KAI 8KAE 8OK, YV2s AH CJ, ZD3A 7, ZEs 3JO (4) 18, 6JA 18, ZK1AR, ZL5AA of New Zealand's antarctic outpost, ZS2MI 4 of Marion isle, curious 3B1AA, 4S7WP (4) 18, 4X4MR, 5H3HZ (8) 5, 5Z4IV, 6O6BW (7) 23, 6W8DN (9) 4 and 9L1TL. _ . _ . _ The **7-Mc. Novice** gang is represented by WN6FHH with KL7s AZN FAR, WH6s FIL FJL and XE2IL, and WN9KCD with KC4USN and WH6FHQ.

40 phone interests W6YKS, WA5CIY, WB6HSO and some of the club journals with EP3HS, G2PU, GB2SM*, GIs 3CDF 6TK, GM3NOV, GW3AX, HB0s UD VD*, HK3s AOW* LX OW*, IS1MAR*, KC4USN (219) 10, LZ2s KPL* KXZ*, MP4BBW, OH5s NW SM, OK3CDR, OX3JV 21, OZ9SL*, PI1PT* PY1CW, PZ1AX, SV1AB, TI2JIC 7, UAs 1CK 2KAP* 3KYA ØYE 7 in Tannu Tuva, UB5KMW*, UP2KNP, UQ2KAT, UR2KAX*, UW9AF, plenty of VK/ZLs, VK1ATR, VP8GQ, VQ2WR, VS9MG, YN1LP (95) 7, YOs 3JU 5TI* 7GJ*, YV5BPJ, ZB1CR, ZL4JF (70) 7 of the Campbells, 4U1ITU, 4X4IX, 7Z1AA and 5A5TR, the asterisks standing for straight-a.m. employers.

80 c.w.'s midyear siesta is disturbed by Ws 1SWX/1 and 7DJU with the help of DJ5BV, G8TD, HA3GF, JAs 1AEA 1BRK 1ELX 1GNX 1KGT 1LQU 1ORM 2WB 3CZT 3EJK 5AJQ 6AK 6AVO 7AAP 7BNX 7LK ØCJ ØVZ/1, KC6BK, LU1ACF, OKs 1AGI 1BB 1CEJ 1MF 2BGO, OZ2BA, far-south OR4VN (3) 0, TF3CJ, TI2LA, VKs 2QK 2QL 3AXK 3DQ 5GP 5ZF, VP8GQ, VR2DK, YO6SD, ZL2s BAA and BCG. What about the 3.5-Mc. Novice bunch — any off-the-mainland stuff coming back to you guys?

75 phone is always topical among DARC and ISWL DXcavators who report summertime voice work by CN8AW 22, DMs 4DT* 6DT* 8DT*, EI6Y*, GBs 2WS* 3RCM, GM3CBB*, GWs 2AP* 3MIS*, HBØAAZ, OX3s JV RV, OYs 7ML 8KR, PJ3CF, PY7VBR, TI2JIC, UP2ON, UQ2FO, UR2s GZ RCC, UW3FW, VO1BR, VP9s AK BO CP FE HA, XE1IL, YV5s AMW ANS BIG BMW BPJ, ZLs 2BCG 3UC 4LM 4OD all 5-6 and 4U1ITU the stars signifying outnumbered non-s.s.b.ers.

* * *

No 160-meter notes in the mailbag for urgent dissemination but August is the month when things start stirring on top band. More VKs this year? And what about those JAs now lurking on 1880 kc.? . _ . _ . _ No space for a 20-meter peek this trip, but next *QST* will see the subject well covered by Ws 1ECH 2BTQ/KH6 3HNK 7DJU 8EQA 8YGR, Ks 3SLP 5CDA/mm 9HXY ØAID ØGVA, WAs 2WIJ 4JJY 6SLU 9FMQ, WBs 2AYU 2FVD 6IFC, 11ER on c.w., Ws 3HNK 8KML, Ks 7ZLO 9HXY ØAID, WAs 2WIJ 5AER 6SLU and WB2AYU on phone, plus dispatches arriving from subsequent reporters. So much for QSOs — let's check up on the payoff. You know, QSLs 'n, stuff.

Where:

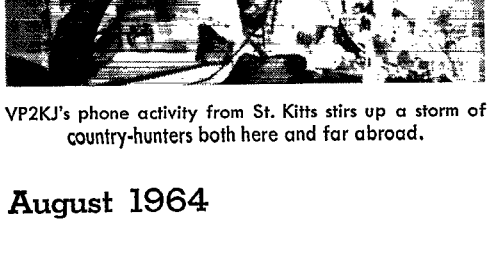
AFRICA — VQ1GDW, who desires to operate as inconspicuously as possible in troubled Zanzibar, wants no direct correspondence outwardly indicating amateur activity. *E.g.*, no QSLs sans envelopes. He writes K1IGO, "For my convenience and safety I require 'made up' QSLs with IRCs and s.a.e. These are promptly filled out and mailed back." . _ . _ . _ W1ECH points out that the correct 9G1 bureau address is P.O. Box 3773, Accra, Ghana. _ . _ . _ W1BPM has TL8SW logs through April 15. Syd returns

to C.A.R. soon after concluding a summer vacation in the states .-.-.- "Every contact made with Johannesburg stations during August, September and October, 1964, will be confirmed by special QSL. Arrangements have been made with SARL to ensure 100-per-cent QSL. Thus will radio amateurs help participate in the Johannesburg Festival now going great guns in ZS-land .-.-.- "TR8AD's card will come within the week, airmail special delivery," declares NEDXC's *D X Bulletin*. You have to catch him first, of course, preferably in French on 21-Mc. a.m., 2000-2100 GMT .-.-.- HB9TL notifies, "I've made arrangements with 5R8BC to handle all s.s.b.-only QSLs for QSOs with FB8s WW XX and ZZ."

ASIA — "New BV1USA QSLs are on hand and we hope to be able to reply to many new contacts when our complete schedule is in operation," writes WAØGLT, Taiwan American Radio Club president .-.-.- "I send 100-per-cent QSL for first contact with any station," assures UWØIK through NCDXC's *DXer* .-.-.- Two International Reply Coupons plus self-addressed envelope get quick QSL response from EP2AU for the FDXC gang. Their *D X Report* also indicates that 7Z1, eastern; 7Z2, Persian Gulf; and 7Z3, northern, are new Saudi Arabian call areas .-.-.- When shipping KA-bound cards through the FEARL bureau, skip mention of calls or names on the cover. FEARL, APO 925, San Francisco, Calif., 96525, is sufficient and will cause no rerouting confusion. KA2CM, FEARL secretary, is convinced that the KA gang's QSL reputation could be much improved. Curt's working on it .-.-.- VS6FH tells K1IGO that the HARTS bureau does such a steady job that VS6s are rarely inclined toward appointing Stateside or other QSL representatives .-.-.- LU2XL/9K3 has no QSL arrangements with W5DOZ, according to LIDXC advices. Try the address in the list to follow.

OCEANIA — The QSL effects of avid DX hound KH6DKA, an air crash Silent Key in mid-July of '63, are being looked after by WA6MWG who communicates, "I've received Bill's final logs for the period October 15, 1962, through July 15, 1963, many unanswered W/K and DX QSLs, and other KH6DKA cards made out but not yet mailed. Bill was very active, mostly working European DX, and I note that many incoming QSLs state that his contact was the clincher for WAC, DXCC, etc." If you still await a QSL from KH6DKA, WA6MWG may be able to help. Pete also assists in the confirmation of QSOs with KH6BIH, a shut-in op who really keeps Hawaii on the DX map .-.-.- K7ADL is collecting VK9GC's 1964 logs and will handle Sandy's QSL chores on the usual s.a.s.e. basis .-.-.- LIDXC reports VS5MH QSLing virtually completed, VS5LH confirmatory matters being mopped up, and ZC5AJ pasteboards well under way. W/Ks only can consult WA2WUV .-.-.- Thanks to a hint from PAØHES, YV5AXQ got fast response from PAØWAN confirming a '62 QSO with old JZØPN.

EUROPE — Belgium's UBA or ON4VN accepts QSL inquiries concerning OR4VN of Belgian Antarctica but W5KTC hears that you may have to wait till 1965 for QSLs .-.-.- W4HKJ of FDXC recommends a check with International Short Wave League, 12 Gladwell Rd., London N.8, England, regarding membership terms which include an effective outgoing-QSLs service. ISWL was founded in '46 .-.-.- WB6AKZ needs s.a.s.e. from Stateside, s.a.e. with IRCs from non-W/Ks, to accommodate OH2BS/OHØ QSL requests for 1964 Alands activity. W2CTN is the OH2BH/OHØ proprietor .-.-.- "At present I handle QSLs only for TF5TP and HC1LE," W2MUM tells W1WPO of the ARRL DXCC Desk .-.-.- DL9PF affirms via NCDX that F9UC/FC answers no mail direct. "Save your time and money. QSL Jean only via DL9PF or DARC." .-.-.- "I am QSL manager for TF2WIU as of this June," notifies WA6WTD .-.-.- SL3ZO, who



VP2KJ's phone activity from St. Kitts stirs up a storm of country-hunters both here and far abroad.

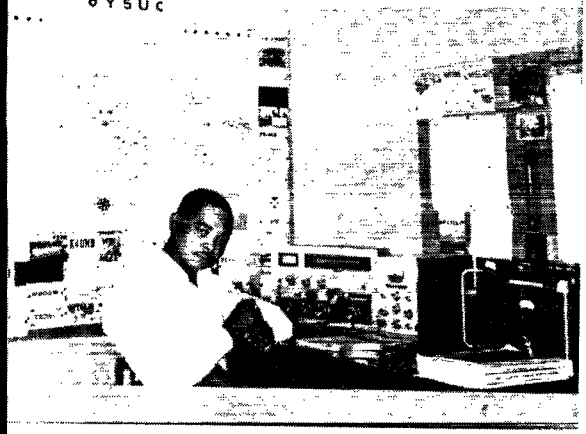
CR7GF, a popular week-end item on 21-Mc. sideband, recently swapped this cozy corner for a roomier Mozambique QTH. (Photo via K9RNQ)

may visit our west coast this summer, may be of assistance in running down reluctant JT and U QSLs. Sven has quite a grapevine toward the east.

SOUTH AMERICA — K5JVF agrees that LU1ZC QSLs go via LU9DFB but hears they won't be answered till he returns from subantarctic adventures .-.-.- Remember that cards for most antarctic KC4s can go via KINAP. This is mail relay only — no logs there .-.-.- DARC's *D X-MB* periodical indicates that G3AWZ may be of help in confirming QSOs with OM-XYL team PY2s PA and PE .-.-.- W2GHK advises, "All South Sandwich VP8HF QSLs have been acknowledged and every straggler picked up to the best of our knowledge." Stu expected to tackle YV8AJ logs by mid-June.

HEREABOUTS — "QSLers of the Month" nominees are CN8GB, FG7XL, FY7YF, HI3XEG, HKs 3VV ØAI, HP3RL, HZs 2AMS 3TYG, I1MOR, IS1VAZ, JA1CFD, K4CSY/VP9, LA4EI, MP4s BEQ QBF, OA4PH, OX3UD, PAØWAN, PZ1s BH BW, SM3AF, SP6SO, SV1BA, TG9SC, TL8SW, UB5ARTEK, VKs 7SM 9NM, VP9L, VQ2IE, VS9ART, YS1FQM, ZDs 3A 6PBD 7BW, 4U1ITU, 5T5AD, 5Z4IV, 9A1ZG, 9G1s EI FK and 9L1JR, plus QSL agents Ws 1BPM 2CTN 9WHM and WA8CHU, all sponsored in "How s" mail from Ws 1BPM 1ECH 1SWX/1 5KFN 8EQA 8YGR, Ks 3SLP ØAID, WAs 2WIJ 4JJY 91CQ, WB2AYU, VE3AU and YV5AXQ. Any swift confirmers you'd like to commend through this means? .-.-.- Ks 5YCP 7BHJ 7VRO 9VGE and R. Smeltzer, 805 Liege, Apt. 1, Montreal 15, P. Q., Canada, offer their services as QSL aides for deserving DX stations .-.-.- Help! W4FPS needs an up-to date QTH clew for his 1957 VKØCJ QSO; W5FIX is foiled by JT1CA; W5KFM hunt hints on CR8AD and VR1MM; W6NJU needs a nudge toward ZC5DO; W9TQL seeks scoop re AP5B, CR5AR, FD8AB, KG6SG, MP4BCU, PK6VK, VR4AB, ZD1GM and ZM6AK all worked in the '50s; K9HXY is stumped on CN2BK; WA6SLU desires 7G1G data; and WB2ABD will settle for a ZD8DW '63 steer .-.-.- WGDXC learns that W4SSU holds VP2MJ logs for March 27-31, 1964, s.a.s.e and GMT requisite .-.-.- From PRARC's bouncy *Ground Wave:* "ARRL KP4 QSL Manager KP4YT holds DX QSLs for most of the KP4 gang, and those for two-letter oldtimers make the files bulge almost out of the room. Send Joe a 4½-by-9 inch s.a.s.e. to get your due and overdue QSLs." .-.-.- "I can't understand why DXers still use the old IRCs method," declares W3HNK. "W2SAW is to be commended for his exclusive foreign-mint-postage service.' .-.-.- WA2NQP/mm, on SS *Steel Chemist*, promises exceptional QSLs for QSOs made during the vessel's New York-Hawaii tour which began July 27 .-.-.- VE7IR hasn't used his FP8AE call for years, recent evidence to the contrary notwithstanding .-.-.- K5JVF finds that W2CTN has no QSL connections with the current KG4AM .-.-.- A flurry of midsummer DX commotion seems to have swelled our QTH catalog. Remember there's nothing necessarily complete, "official" or accurate about these suggestions, but they just might do the job:

AP2MI, AKM Maimul Islam Regional Tel. Tng. School, Tejgaon, Dacca 8, E. Pakistan



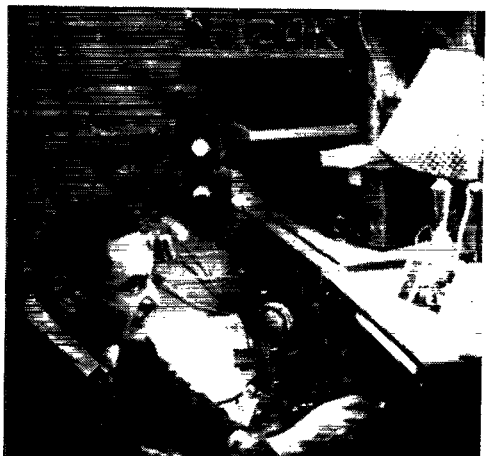
6Y5UC likes 20-meter s.s.b. with an Apache, R-388 receiver and TA-32 spinner at Kingston. (Photo via W3ICQ)

CP5AJ, Rev. L. Sommer, M.M., Casilla 546, Cochabamba, Bolivia
CR4AD, H. da Silva S. Brito, P.O. Box 16, Praia, Cape Verde Islands
EA8s EC ED, Box 162, Santa Cruz de la Palma, Canary Islands
EA9EO (via EA4GZ)
EIØAC (via EI5AB)
EP2RC (to K1KOM or direct)
FB8s WW XX ZZ (see preceding text)
FY7YF (via W2FXA)
FG7XV (via W2CTN)
HK3APC (via LCRA)
HK3HC, Rev. H. Correa, S.J., c/o Weston College, Weston, Mass.
I1GLQ, Box 181, Venice, Italy
JA1PAQ, S. Mitsumata, 405 Rindo, Iwatsuki, Saitama, Japan
ex-JZØPN (to PAØWAN)
K5CDA/mm, M. Stout, RO, SS *Cathy,* Marine Mgrs., Inc., 80 Broad St., New York 4, N.Y.
KØRAX/KL7, C. Helber, Box 467, Shemya, Alaska
ex-KA2RC, Maj. C. Rakestraw (WØBJJ), Hq. ESD (ESSGT), Hanscom Field, Bedford, Mass., 01731
KH6s BIH DKA (see preceding text)
KS6BL, W. Conway (K7VAX), Box 458, Pago Pago, Samoa
ex-KZ5KW (to KP4CKC)
LI2C (via NRRL, Box 898, Oslo, Norway)
LU1ZC (to LU9DFB)
LU2XL/9K3, Box 8112, Salmaui, Kuwait
LU6EB/mm, SS *Rio Araja,* Box 2, Victoria, B.A., Argentina
LUs 6FA 8DLK (via RCA)
OA1B, Rev. G. Flynn, Padres de Santiago, Casilla 324, Piura Piura, Peru
OH2BII/OHØ (via W2CTN)
OH2BS/OHØ (via WB6AKZ)
OR4VN (via UBA)
OY8KR (OZ8KR; via EDR or direct)
PAØWAN, W. Noomen, Wethouder, Gerbertstraat 47, Enschede, Netherlands
PI1GOE, A. L. van Zeeland, Bergweg, Netherlands
PJ5CE, Coral Cliff Hotel, Curacao, N.W.I.
PJ5MG (to W9IGW)
PZ1BE, E. Robles, Box 981, Paramaribo, Surinam
SP5AHL, via R. Wallis, 5238 Ridge Av., Philadelphia 28, Penna.
SPØs AJL TA (via PZK)
TF2WIN, D. Whitney (K1MTG), 932nd AC&W Sqdn., FPO 568, New York, N.Y.
TF2WIQ (via K1RFE)
TF2WIU (via WA6WTD)
TJ8AK, Box 26, Garoua, Cameroons
UW0FK, S. Lyubchenko, P.O. Box 102, Yuzhno-Sakhalinsk, Sakhalin Is., U.S.S.R.
VK4JQ (via VK3AWX or W6HYG)
VK9GC (via K7ADL)
VP6PJ (via W2CTN)
VP7NQ (via KØBLT)
VS9MG (to VS1LX)
VU2NR (via G3MVV)
WA5IOZ/KH6, c/o U.S. StarCom Stn. (4875), APO 958, San Francisco, Calif.
YI3D (via YU2DO)
YJ1DL, D. Laing, Luganville, Espiritu Santo, New Hebrides
YN9AK, P.O. Box 2, Matagalpa, Nicaragua
YS1IM (via W2CTN)
YV5FS/4, O. Michelena, P.O. Box 65, Valencia, Venezuela
ZB1FG, 8 Cameron St., Gziram, Malta G.C.
ZC5AM (via MARTS, Box 777, Singapore)
ZP6BB, USAF Mission, c/o U.S. Embassy, Asuncion, Paraguay
ZP7FF, c/o Franciscan Fathers, Coronel Oviedo, Paraguay (or via W5ZBC)
ZS6AP/Antarctica (via ZS6BDS)
ZS7M (via W2CTN)
3A2CP (via RSGB)
4W1D (to HB9AAW or via USKA)
5X5IG (via W2CTN)
7Z1AA (to HB9AET)
7Z3AA (via MP4BDM)
9G1FK, Box 194, Accra, Ghana
9Q5GE, Box 552, Elisabethville, Katanga, R.C.
9X5GG, G. Goodwin, Ngoma Hospital, B.P. 65, Kibuye, Rwanda

These addresses come from the diggings of **Ws** 1MLD 1SWX/1 1WPO 1YYM 2BTQ/KH6 7DJU 8YGR 9AKY, **Ks** 1IGO 1LFW 3SLP 7VMO 9VGE ØGVA, **WAs** 2WIJ 6MWG 6SLU 8GDR 9ICQ, **WB2AYU, HB9TL, YV5AXQ,** R. Wallis, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2CM), Florida DX Club *DX Report* (W4HKJ), International Short Wave League *Monitor* (12 Gladwell Rd., London N. 8, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2FGD), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (W1BPW/K1NOL) Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV) and West Gulf DX Club *DX Bulletin* (W5IGJ). Fine culling, fellows!

Whence:

ASIA — The 5th All-Asia DX Contest, a c.w.-only fracas, gets the DX spotlight on the last week end of this month. Sponsor JARL (Japan) invites world-wide participation from 1000 GMT on the 29th to 1600, the 30th. Non-Asians will work Asians on 1.8 through 28 Mc., exchanging serials each consisting of RST plus the operator's age (YLs are gallantly permitted to substitute two zeroes for the latter revealing figure). Final score derives from total contacts multiplied by total ARRL List band-countries. Single-band, multiband, single-op and multiop categories are available, certificates of meritorious performance will be awarded, and there's a special trophy due the highest scorer on each continent. Entries must arrive JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan, no later than November 30, 1964. A self-addressed envelope and sufficient IRCs to that address will secure instructions on preparation of your contest summary in the preferred form. Good long-haulin'! . . . . . In JARL's '63 AADXC affair the top U.S.A. totals were turned in by WA6IPY, W6AFI, K6BWX and WA6IVM. W3MSK and K4HPR won 14- and 21-Mc. single-band honors. Japan's leaders were JAs 1VX 1FHK 1BWA 5FQ 1AEA 7AD 3AA and 1MML in order, with JAs 7LK 1AEA 1FHK and 6PY the winners on 3.5, 7, 14 and 21 Mc. respectively. KL7COI, VE2NV, KH6IJ and XE1NL paced their countries, while cotinental highs were registered by HL9KH, UB5WF, WA6IPY, HC1DC, 5A1TW and VK5NO. JARL found it necessary



XE2OK's c.w. DX pursuits take him all the way from 10 through 160 meters. Rafael has a Viking II feeding a simple 25-ft.-high 66-ft. Windom that really works out. (Photo via W6QHQ)

to disqualify twelve entries for rules violations — be careful .-.-.- K5CDA/mm visited VU2s KV MD TP and friends while cruising the far east aboard SS *Cathy* this summer .-.-.- EP2RC tells W1WPO he's out for Del., Mont, Nev., N. H. and Wyo. to complete his 20-c.w. WAS, .-.-.- "Hello from Japan!" greets KA5RC. "I've had six weeks on 14,290-kc. s.s.b. and 14,050-kc. c.w. and already have a good bite on WAS and DXCC. My chief gripe so far are those W/Ks who call blind, just *hoping* to hear me on the comeback." .-.-.- BV1USA data from WAØGLT on the scene: The station is operated by rotating military/civilian personnel, usually 10 or 20 in number, on assigned spot frequencies, 14,050-kc. c.w. and 14,307-kc. s.s.b., using 32S-3, 75S-3, 30L-1 and accessories. The present fixed 14-Mc. beam soon will be replaced by a TA-36, and RTTY action is imminent. There are no individual licenses issued for private stations on Taiwan but personal gear can be used at BV1USA by authorized operators. BV1USA is likely to be heard around the clock, and TARC has petitioned for permission to use all international ham frequencies .-.-.- Typhoon Viola turned the verticals of VS6s FH and FJ into low horizontals, according to K1IGO. VS6FE's 90-watt Heath job is in lively competition with VS6FH's Japan-built sender on 20 c.w., snatching W/Ks at 1200-1400 GMT, Europeans between 1400 and 1800 .-.-.- W1ECH's friend K1KSH expects to sample

VS6EY runs 35 watts to a v.f.o.-807 outfit on 3.5-, 7- and 14-Mc. c.w., loading a wire-wrapped bamboo pole in crowded Hongkong. Victor signs G3GKI when on holidays back home.

Pakistan conditions soon .-.-.- Don't forget that ARSI (India) schedules the first VU2/4S7 DX Contest on the 10th–11th and 17th–18th of October .-.-.- W1ECH observes that 4X4YL's suffix flips the flock on 20 .-.-.- Aforementioned club organs round out our Asian report: 4W1D (HB9AAW) replaces 4W1B on 14,110 kc., 1830 GMT. Rolf wants to try YK1 DXing en route home this month. . . . HS1Y (W6CYI) plugs for early clearance on W/K QSOs but that ITU ban list is easier cursed than eliminated. . . . YK1AA's SB-175 haunts 14,100 or 14,320 kc. daily at 1300-1660 GMT, and W6OSU may give you a push. . . . AC5s PN, 14,081 kc., and SQ, 14,285, are said to be workable now and then around 1600 GMT. W4BPD may be getting back that way soon with the XYL to lend the lads a hand. . . . LU2XL/9K3 infests 14,320 kc., 2100 GMT, when propagation is profitable.

EUROPE — DARC (Germany) invites amateurs throughout the world to participate in its WAE DX Contest, No. 10 in the series, heduled for c.w. from zero GMT, August 8, to 2400 the 9th, and phone on August 15-16, same times. Non-Europeans will trade RST001, RST002, etc. (no "T" on phone, naturally) with Europeans once per band at one point per QSO. Additional points are yours by sending "QTC" (QSO reports) to European stations at one point per QTC. Each QTC consists of (1) time in GMT, (2) station call, and (3) QSO number of any previous WAE Test contact. For example, W9GFF raises DL9YL and earns a contact point thereby; W9GFF previously worked G3IDG at 1207 GMT for G3IDG's 96th Test QSO. So, besides the QSO point for his serial swap with DL9YL, another point accrues to W9GFF if he successfully sends "1207/G3IDG/096" to DL9YL. W9GFF can work DL9YL

Mozambique Contest

August 1-2

The League of Radio Amateurs of Mozambique has just announced a competition open to all amateurs during the 48-hour period of August 1-2. Only contacts with stations with a CR prefix count and any mode may be used. The exchange will consist of a report and a serial number (starting with 001). Logs with appropriate information should be received by the LREM no later than August 31. Send to Box 812, Lourenco Marques, Mozambique.

later on the same band only for transmitting additional QTC. Over the entire Test period each QTC can be sent to Europe by W9GFF but once, and DL9YL can accept no more than 10 QTC per band from W9GFF. It thus figures that the more Test QSOs accumulated, the more QTC are available to parlay into additional points. *Scoring:* Multiply combined QSO and QTC points collected on all bands by the combined numbers of multipliers collected on all bands, the latter deriving from DARC's Worked-All-Europe Countries List — CT1 CT2, Germany, Spain, EA6 EI F FC G GC GD GI GM, Shetlands, GW HA, Switzerland, Liechtenstein, HV I IS IT, Norway, Bear isle, Jan Mayen, Spitzbergen, LX LZ, San Marino, OE OH OHØ OK ON OY OZ, Holland, PX, Sweden, SP, Greece, Rhodes, Crete, European Turkey, TF, UA/UW1-6 UB5/UT5 UC UN UO UP UQ UR, Franz Josef Land, YO YU ZA ZB1 ZB2 and 3A2. Entries go to Dr. H.-G. Todt, DL7EN, Chlodwigstr. 5, 1 Berlin 42, Germany, postmarked no later than September 30, 1964. Top Test performances in many regions will be rewarded with certificates of merit. G'luck! .-.-.- Last year's WAEDC c.w. division saw Ws 1BPW 2JAE, K3JJG, Ws 4HTV 5WZQ, WA6SBO, Ws 7ABO 8RQ 9IOP ØYCR, VEs 1ZZ 2BV 3BPJ and 8RH take call-area honors on our side. Continental killers were OK1GT, W2JAE, HC1DC, 6O1ND, UA9DN and VK5ZP, while DJ3KR, DL7AA and DJ1PN ran 1-2-3 on the home front. U.S.A. phone champs in reporting call areas were Ks 1UDP 2HFX 3BNS 5MDX, WA6OHJ, K8CFU and KL7AQU. Voice leaders by continent were F8RY/FC, OX3JV, PZ1CE, 5N2JKO and VS9AAA, while DLs 1KB 5AO 6EN and 7AA miked triumphantly in that order for the home team .-.-.- OZ8KR, visiting buddy OY7ML in Torshavn, enjoyed s.s.b. DXing in April through June as OY8KR. OY7ML will try 14-Mc. RTTY with his new TA-33, W2PAT rig and tape printer but intends to remain in touch with world-wide c.w. friends .-.-.- OH2s BS BH EQ and QV tried their DX luck in the Alands last month on 3.5-28-Mc. c.w. and sideband with an HX-20, linear amp, 2B and TA-32 jr. .-.-.- IRTS members DXcursioned to Valencia isle off Ireland's west coast in early July to sign EIØAC on 80 through 10 meters, c.w., s.s.b. and a.m. .-.-.- W8YGR and K3SLP turn up YL Polina at the 20-c.w. key of UB5ZR .-.-.- Club periodicals add Continental comment: HB9ZT expects to invade Liechtenstein again this month as HBØZT following his 900-QSO spring sojourn. . . . GC3IFB dropped over to Jersey with a KWM-2 in July. . . . Ex-EL4A turns up at DL4IO. . . . Foreign visitors are heard signing PA9 calls in Holland. . . . UW1KAE, 7020 kc. at 2300, is a Franz Josef Land surprise.

AFRICA — "I'm the only active amateur in Zanzibar," VQ1GDW writes K1IGO, "and there are no prospects of new calls here for a long time. My own activities are curtailed by studies but I manage to get on 14-Mc. c.w. and single-sideband several times a week, 1600-1900 GMT." .-.-.- "TL8AC is finishing his homebrew s.s.b. exciter and expects to have it ready soon," tempts W8KML .-.-.- FB8WW may be using HB9TL's restless sideband transceiver shortly. The latter writes, "This rig will first be used by FB8XX. It covers 14,108, 14,113 and 14,125 kc." .-.-.- W/Ks who contact five Johannesburg ZSs in July through October this year can qualify for the Johannesburg Festival Award, details available from Awards Manager, P.O. Box 7227, Johannesburg, S. Africa. This via W1BPM .-.-.- Africa dispatches courtesy the clubs press: CR6s BX and DX, with DL9VH an independent darkhorse, contemplate further CR5 and/or EAØ DX doings. . . . Antarctican ZS6AP likes 14,150-14,165-kc. sideband, 1600-1700 GMT, while iced-in neighbor OR4VN prefers 40 c.w. at later hours. . . . ZD3A skeds W4RLS Sundays, 14,008 to 14,265 kc., 1900 GMT. . . . Ex-VQ9HJB sets up shop in Qatar in the wake of MP4QBF's departure. . . . 6V3AN is mentioned as radiating from the Senegal. . . . 9U5DS has a KWM-2 and G4ZU-type whirler on 14,170 kc. around 1900 GMT. 9U5s DH and DL prefer 21,240-kc. straight a.m., and BB hits 14,106-kc. a.m. at 1300 or so. . . . TJ8s AG AK and YL like 15-meter a.m. and c.w. . . . 5N2RAM points out a lack of ham activity in the Fezzan administra-

(*Continued on page 158*)

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

Puerto Rico to Europe on 432 Mc.!

THE 420- and 144-Mc. moonbounce schedules arranged by KP4BPZ for June 13 and 14 paid off with many contacts on both bands. Gordon Pettengill, KP4BPZ, W1OUN, assisted by Rolf Dyce, K6DSJ, Andy Sanchez, KP4BEU, Walt Zandi, K2KWL, and George Thome, W8OSJ, were manning the station at the 1000-foot reflector at Arecibo, P. R. Advance notice had been circulated to all parts of the world by ARRL Official Bulletin, in time for interested parties to prepare for the unparalleled moonbounce opportunity that this history-making event would afford.

Starting as advertised at 1842 GMT, June 13, KP4BPZ fired up on 432 Mc., sending a series of V's and a long dash to check reception of their own echo. This signal was heard 20 to 40 db. above the noise at W1BU, and in 3 minutes following the first "CQ MB DE KP4BPZ" contest information was exchanged. Next in line was W9GAB, Beloit, Wis. Then followed several CQ's, and a real thrill — "KP4BPZ DE HB9RG!" This contact shattered all distance marks for the 420-Mc. band, and pointed up an advantage of the EME route: distance hardly enters the picture at all!

We don't know what HB9RG has on 432, but his signal was only slightly weaker in Puerto Rico than that of W1BU, where a 29-db. antenna is in use. G3LTF was worked soon after, for the first England to Puerto Rico v.h.f. QSO, and the first successful amateur moonbounce work from England.

By this time CQ's were going unanswered. KP4BPZ could hear many weak signals that could not be identified, so we decided to try an A3 call. W1FZJ was acknowledged with an R4 S5 report. The transmitter was running only 100 watts output on a.m., but Gordon was able to copy about 75 per cent, and even recognized the operator, W1EHF, by his voice.

W1EHF and W1HIV, operating the W1BU setup on c.w., and W9HGE running the W9GAB equipment, also exchanged reports with KP4BPZ. The only 432-Mc. heard-reports thus far received are from K8HRR, who heard the signal at the station of W8TYY, Columbus, Ohio, and WA6QQI, who was with the K6TJL 6 contest station at San Benito Peak, Cal. Net result of the 432-Mc. operation: 3 countries, 2 states, a 5000-mile DX record, and a pile of letters and telegrams asking "When are you going to be on again?"

The KP4BPZ moonbounce station. KP4BEU is in the foreground, KP4BPZ at the operating position, K6DSJ standing.

Puerto Rico to Everywhere on 144 Mc.

The 144-Mc. test was set for Sunday, June 14, to begin at 1938 GMT. Unfortunately, at this time Puerto Rico was knee deep in a tropical downpour, complete with wind and lightning. The carriage house, normally weatherproof, developed leaks which necessitated covering the 144-Mc. gear with plastic sheets. Furthermore, the trip up to the 535-foot high transmitter location was hampered by a natural human aversion to being struck by lightning. There was a 20-minute delay in getting on the air, and the number of grey hairs resulting from this delay can only be estimated.

Finally at 2000 GMT the first "CQ MB DE KP4BPZ" was sent on 144 Mc. First signal heard was W4HJZ, Raleigh, N. C., but no contact was made at the time. W1BU was worked at 2020 GMT. By this time the low end of the band was a mass of QRM, with everyone calling KP4BPZ. Standing out above all the rest was K2LMG, Lansing, N. Y. Dave was making good use of his satellite tracking antenna, built for work with ECHO II and Oscar III, and his signal was the strongest logged on 144.

The balance of the KP4BPZ log shows the following worked: G2HCG, WB6GZY, DJ3EN, W3TIK/3, W9GAB, DJ8PL, W4HJZ, W4FJ?

*P.O. Box 334, Medfield, Mass.

and WØIC. The next to the last, logged as a 3-letter W4, was almost certainly W4FJ, Richmond, Va. Ted was calling at the time, and heard KP4BPZ reply with the query. DL3YBA was heard at 2200. Also discernible in the taped record of the whole affair made at KP4BPZ are K3NKB/3 and K2MJA/2, both very faint and open to question. Exchanges were completed with W1HIV, operating at W1BU, and W3TMZ and W3LUL, using the setup originally worked as W3TIK/3. This is reported to have been a large dish in the Washington area, appropriated for the occasion.

As we go to press, evidence is still accumulating at ARRL Headquarters in the form of tape recordings, heard reports and logs. More will undoubtedly arrive, hopefully filling in some of the holes still existing in the record. We have tapes from OH1NL, Nakkila, Finland (co-holder of the 144-Mc. moonbounce record with W6DNG — June *QST*, p. 94), W4FJ and K2LMG. OH1NL had some pretty fair reception at times. W4FJ's excerpts are clearly readable, especially in the early part of the test, before he finally got through to KP4BPZ. K2LMG recorded the entire 144-Mc. period, the tape running in excess of 2 hours. Several calls and signal reports can be copied, and at times the signal peaks strongly above the noise.

Heard reports have come from K5IQL, Dexter, N. Mex., W8BAX, Columbus, Ohio (reported by K8HRR), W4GSH, Louisville, Ky., W8KAY, Akron, Ohio, and K8AOE, who was working with several members of the East Shore V.h.f. Club, near Cuba Lake, N. Y.

Everyone seems to have had trouble reading the signal consistently, though peak intervals were reasonably strong. It appears that anyone who managed to aim a fairly good antenna at the moon could hear the signal on either band. Stations using plane polarization made out well, though K2LMG's switchable-sense circular seems to have been outstanding. Dave made several

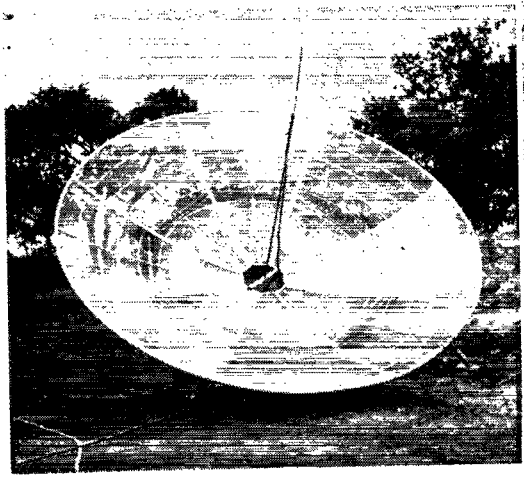
1000-foot reflector at the Arecibo Ionospheric Observatory, used in the 420- and 144-Mc. moonbounce tests.

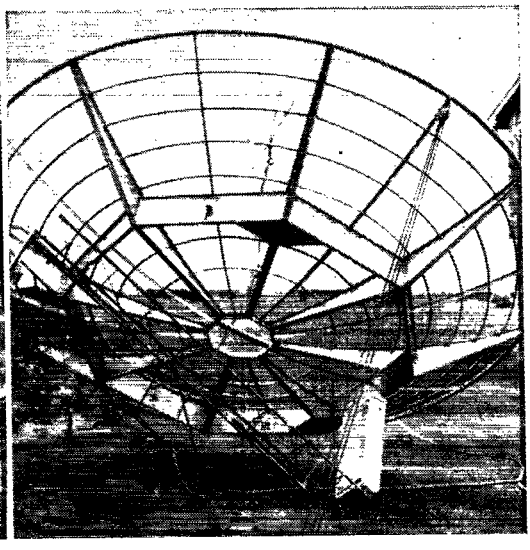
tests with reverse polarization, always finding it far below the correct sense. He also tried plane polarization, with reduced effectiveness. Transmitter power used by the successful stations ranged (so far as presently known) from about 175 watts output to the best that can be done with 1 kw. input. Circular polarization is known to have been used only at K2LMG and WØIC. Parabolic reflectors were used by W9GAB (15 feet), the W3s (believed to have been 50 feet) and W1BU. The only signal heard other than by or from KP4BPZ was W1BU, heard faintly on 432 by W9GAB.

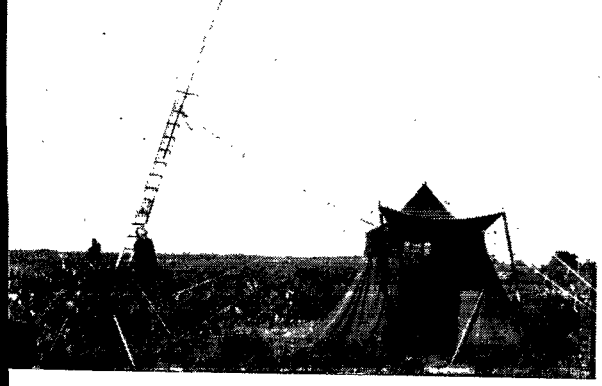
The test results seem to bear out what has been learned from numerous amateur efforts in the moonbounce field: the EME approach is marginal for amateur techniques and power levels. The 1000-foot reflector at Arecibo put moonbounce into the realm of practicality for many who could aim their antennas properly, but the margin of signals over noise demonstrated that only the biggest and best amateur installations have much hope for success in working each other. Moonbounce is possible for amateurs, but just barely — a real challenge for the future.

Net results of the 2-meter operation: 15 contacts, 3 countries, 8 states, a wet transmitter, and another pile of messages asking for more tests. As to the last, the facilities at the Arecibo

15-foot dish used by W9GAB on 432 and 144 Mc.







K8AOE lines up the 2-meter beam for moonbounce tests conducted by the East Shore V.h.f. Club, near Cuba Lake, N. Y.

Ionospheric Observatory are booked for various projects far in advance. The problem of obtaining "dish time," plus the considerable effort required to set up amateur gear for use with the big reflector, make an early repeat performance highly unlikely. In the event that additional tests can be scheduled, plenty of advance notice will be available. Information will be sent, as it was this time, to all OES appointees, Official Bulletin Stations, IARU Societies around the world, and ARRL-affiliated clubs.

50 Mc.

It's beginning to look as though we just have to go a-visitin' to find out what goes on 50 Mc. in various portions of the country. The 1's know for instance that when the band is open to 8-land it's almost always to the Dayton/Columbus/Cincinnati area in southern Ohio. We receive no news of activities in northern Ohio so decided to find out for ourselves. Real reason for the trip to Ohio was to attend the Fourth International YLRL Convention in Columbus. On the way home we stopped to visit with W8HRV at New Waterford, Ohio and of course the band was open during the whole time we were there, and we had a chance to see just what comes into northeastern Ohio during a skip session. Some of the skip is the same as we hear in 1-land. Stations such as VP7DD and VP7CX come into Ohio with that same crashing signal as they do into 1-land. In fact, W1HOY finally had a chance to say hello to Scotty, VP7DD, from the QTH of W8HRV although she has still to do it from her home QTH. Not that he hasn't been heard a number of times, it's just that he is such a popular fellow when he does come through. We also had the chance to say hello to Hal, VP7CX from that location. VP5 and VP9 lands are also heard fairly regularly at the W8HRV location. Regular sporadic *E* skip includes 4's, 5's and 6's. 4- and 5-call areas including all the various states in these areas. Also included in things heard and worked are TI2, FG7 and HC1 lands.

W4FJ, Richmond, Va., stands beside the 28-foot Yagi used to work KP4BPZ on 144 Mc.

VP7DD/W5DZF would like the 50-Mc. gang to know that there are two stations active on Carter Cay at the present time; himself and VP9CF/W5QKX. The boys are hoping to be on two meters also as soon as they can get permission for same. They operate usually on 50.07 a.m. only (at present) with about 40 watts into the antenna. They hope to be active soon on both c.w. and s.s.b. May 30 and 31 were big ones for Scotty and Charlie when they worked all U.S. call areas except the 7th. Scotty wants everyone to be sure that there is no question of hearing them when they give him a call it's just that everyone seems to be hearing him at the same time and all seem to call on the same frequency. While a number of stations call on another frequency (Scotty's — 50.07), he does not go back to those operating phone in the c.w. band. (Wonder why?) "It's difficult for one to imagine the congestion on the band as it comes to us out here, it's got to be heard to be believed," sez Scotty. (Now maybe that's where we should visit next, just to find out for ourselves.) He's also like the Florida gang to turn their antennas in his direction when the band is not open. "We're only about 130 miles east northeast of West Palm Beach and would sure like a bit of ground-wave operation."

One of the very well known DX stations for six meter operators is Hal, VP7CX. However, Hal would also like to meet and make a few friends on 144 Mc. and 420 Mc. He has yet to work the mainland on tropo, according to W4APV, although he has maintained skeds with several operators on the Florida east coast. Jim, W4ARV sez: "I think the problem is this; most of the two-meter gang in the Miami area forget that Hal is out there." Hal also mentioned to Jim that "a number of stations on the various Caribbean islands are interested in six-meter operation, but lack equipment and funds. If some of the state-side hams could donate some of their older gear, Hal can make arrangements to deliver it. A simple 2E26 rig would do a lot for the 50-Mc. DX scene." For those of you who have such gear and would be willing to part with it, either mention it to Hal on the air or drop him a note (QTH in *Callbook*). He'll be delighted to take it from there.

K1VPJ sez that skip and groundwave were both common during the month of May with the 13th being exceptional. Open for six hours. In New Hampshire KN1FXM sez the bands were good during May. He heard 50-Mc. skip about five times during the month with 4's and 0's coming through. The week end of June 6 and 7 was exceptionally good in New England. Among many heard were VP7CX,

VP7DD, VP9WB, KP4AST, CO, Florida, Alabama, Tennessee, Georgia, Missouri, Indiana and Illinois. Around 1700 EDST W4BCL was heard (off the back of his beam) calling a T12 station. Don't know whether he nabbed it or not but he was definitely hearing the station. The week-end was also exceptional for it's "out of this world" back-scatter propogation. In 1-land we were hearing 2's, 3's, 4's, a few 5's 8's and 9's via back-scatter. K2RPZ also mentions the June 7 opening as exceptional. The band was open half the day into Passaic and Stu worked a number of 4's and heard VP7DD and VP7CX plus VE1UW. At New Rochelle, New York WB2HZY sez that DX during May was limited mainly (for him) to the western U.S. and he worked 5's and 7's. WA2DRP at Schenectady upped his total states worked on 50 Mc. to 17 during the month of May. Jim heard openings on 13 different days during the month and aurora on May 10. On the 16th he heard VP7CX, KP4AAN and FG7XT. Best day was May 30 when Jim worked 13 stations in ten states. "Where are your DX buffs?" queries K3MDL. "The band was open to the south quite often during the month during the daylight hours when no-one (under-lined) was on the air. Don't know about your area, Francis, but up here in N.E. they were a-callin'. Alabama reports received from K4IQU, W4UAR and W4YRM concerning skip agree that the band was open almost every day during the month of May. Dave, K4IQU mentions the XE stations (XE1CT and XE1OE) coming through. First of these reports for this season. W4UAR worked WØGNS in North Dakota to bring up his "total" to 30. Among the goodies heard or worked by W4YRM were VE3, VE4 and a number of 7's. Down in Panama City, Florida WA4FIJ reports openings on June 2 and 3. On the 3rd he heard K7GBZ in Idaho (watch for that one, fellas) but was unable to make a contact. On the same day K7VCH (Wyoming) was heard in Panama City for over an hour. Incidentally, Dick (WA4FIJ) was one of the skip stations heard in New England during the contest in June and the only station heard in Western Florida section. W4ZGS sends a long list of openings and stations worked during May and sez that he noted "much of the 50-Mc. skip wasn't always on the other side of a high pressure area as shown on the weather maps." At Hollywood, Florida, WA4STJ worked California off the back of his beam and Puerto Rico off the front of it on May 17, and of course worked any number of other skip stations during May.

Reports have been received from all the other call areas for the month of May, all to do with openings, etc. There just is not room to list all reports in this month's column but we'll do our best to catch up with a few of them in the next issue. Of course this is probably wishful thinking 'cause we'll be getting these skip reports for the next few months and never have room for all of them. However, we promise to start off next report with activities from 5 land and to "go on from there."

144 Mc. and Up

California and Florida are with us this month with news of doings on the 1215-Mc. band. W4SRX, the Elgin AFB Amateur Radio Club, is working like mad to get a rig going on 1296 and expects to have it in good shape by fall. There are 40 members in this club and they've been divided into groups of four, each group to work on a separate part of each project. So far they've been mighty successful and by the time you read this they will have their ham TV rig on 420 Mc. "on the air." Mighty good way for a club to operate, no one gets in anyone's hair. WA4GHK tells us that he has been working K4IXC crossband on 1296 for some weeks. Initial contacts were made using various types of antennas including the 6-db. gallon oil can and a 4-feet parabolic u.h.f. TV antenna. Transmitter was a crystal controlled APX-6 on John's end and Jim used the converter described in the ARRL *Handbook*. Jim has recently completed a 2C39 tripler and amplifier for 1296 and hopes to set up skeds with K4OCK in Miami, about 175 miles away. He'll be using a four foot dish for antenna for these skeds. Jim sez he is still active on 144, 220 and 432 but 220-Mc. activity is mighty scarce. He'd like to sked anybody within 500 miles on 220 Mc. Various frequencies are: 145.027, 220.067, 432.250 and 1296.750 ± 6 kc. Out in California WB6DME tells us that "propagation on 1215 seems to be at its best around sunset and the early twilight hours." Bob has built a 32-element colinear array which seems to be doing a good job for him on that band. Now that the 1215 gear is "well on the way," he is going to concentrate on the 10 gc. band for his next experiments, using waveguide components instead of the Polaplexor type of setup. Presently he's in the process of gathering together all the various pieces of gear to get going. It's nice to hear from the boys and to know that there are hams scattered throughout the country working on *building* gear for the bands.

Another group of experimenters, this one in the TV circuit, is the newly formed Ham Video Club on the west coast. Everyone has the common interest in the furtherment of amateur TV and many have their own stations in operation. Meetings are held on the first Sunday of the month at QTH of one of the members. Further information can be obtained from Phil Mahru, K6YEI — 589 N. Hay St., Bontebelli, California, 90640. K3NUZ and K3PXP are also among the TV group, both having "live" TV on 440 Mc. The boys are using vidicon cameras and transmitters of 20 to 30 watts output, working over a five-mile path through the city. We're also informed that the new log TV antennas for channels 7 through 83 work fine on 440 TV. News received via K4CLE tells us that his 1296-Mc. converter is ready for trial operation and a few modifications should put it in operating condition. Doug has also completed his 500-watt final for 432 and skeds were made with W4HHK for June 2. No word on results of said sked. According to Doug 432-Mc. conditions were good around the first and middle part of May with the last week being far below normal. Conditions on 144 Mc. were average during May with the exception of the 9th when a tropo occurred into Georgia, Mississippi and Louisiana. K9AAJ sends word to the effect that his totals can be raised in both the 144 Mc. box and the 420 box. "Finally worked K5TQP in New Mexico on meteor scatter last December. After almost four years of talking about it and planning for it, Fred finally got his new set-up on a mountain and we made it on the first try. (Eureka!) That makes 34 states on 2 meters. On 432 I've added two states since my last report. I worked W4HJQ in Kentucky last August and last week I finally worked Missouri, a state that I can see from the top of my tower on a clear day. This makes nine states on this band and for the time being anyway, marks the end of operation on 432. My tower and antennas have taken a beating in some strong winds that past two years and am going to take down the 40 elements on 432 and the 15 elements on 144. Probably be back in the not too distant future." Out in Topeka, Kansas, WØDRL

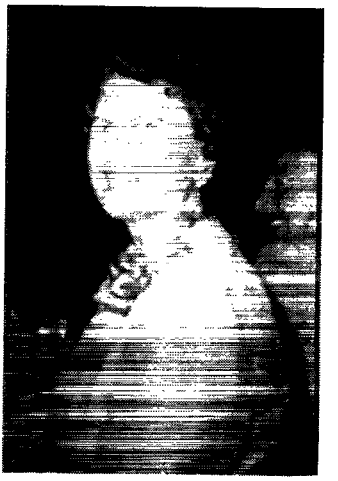
(Continued on page 156)

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

SINCE the first international convention held in Santa Monica, California, in 1955, successive YLRL conventions (the second in Chicago, Illinois in 1957, and the third held in Cambridge, Massachusetts in 1960) have continued to grow in attendance. President of the Buckeye Belles, Toni Chapman, K8PXX, and originator of the now well-known slogan "Migrate to the Buckeye State in 1964," was well heeded by 169 YLs who did indeed migrate to Ohio for the 4th International YLRL Convention held in Columbus, Ohio on June 19, 20 and 21. By plane, bus, train, car and camper, YLs flocked to Ohio from 25 different states, Guatemala and Canada making this convention, YLRL's 25th anniversary celebration, the finest attended in YLRL history.

The beautiful Nationwide Inn, scene of convention activities, proved to be all the brochures had said. In the 90° temperatures, comfort was found in either the air-conditioned rooms or poolside, providing a very relaxing atmosphere for everyone's enjoyment.



Enid Aldwell, W6UXF, the convention's interesting and stimulating guest speaker

YLRL International Convention

June 19, 20 and 21

Columbus, Ohio

The special radio station established for the occasion, issued the call W8YL, could be heard days before convention time. Many YLs aided in the operations of the station trying to provide contacts with as many stations as possible.

Friday found the majority of YLs all registered for three glorious days of conventioning. The appearance of several YLs on a Columbus TV program highlighted Friday afternoon. Many different aspects of amateur radio were explained and demonstrated by Joy, K8GWF; Corinne, TG9BC; Helen, W7GGV; and Ruth, W8LGY.

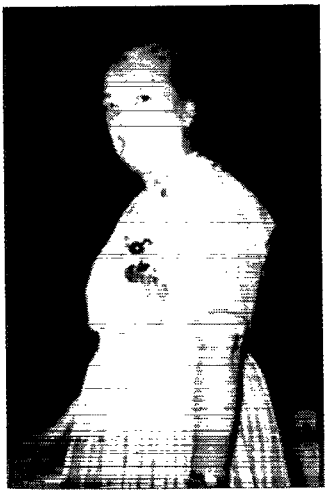
Adding to the warmth and spirit of friendship were the many different exchange gifts. These were symbolic of many sections of the country and were provided by YL clubs the country over. They included miniature clusters of oranges from California, violets from Illinois, rose covered hangers from the Portland Roses, buckeyes from Ohio, acorn gals from WRONE, beans from Idaho, branding irons from Texas, and from the sunshine state of South Dakota a replica of the sun surrounded by pheasant feathers. These colorful swaps are but a few of the festive exchanges seen adorning convention attire.

The YLRL Forum on Saturday morning, at 9:30 A.M. in the Ohio Ballroom, found all YLs settled down and ready to discuss the business at hand. OMs departed for a day's tour of Colum-

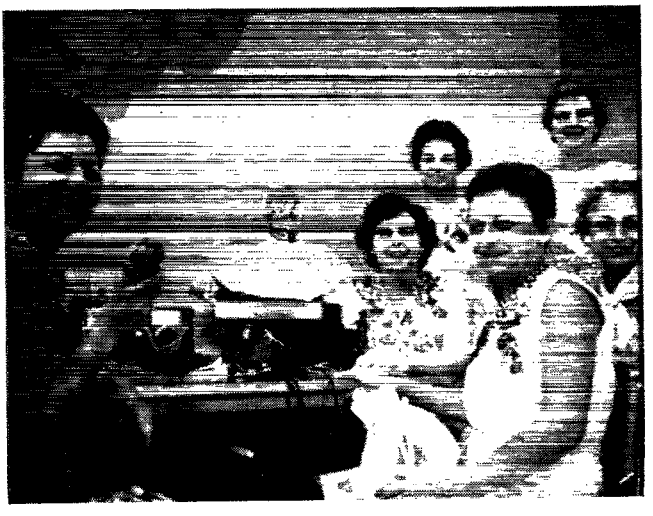
* YL Editor, *QST*. Please send all news notes to K1IJV'S home address: 139 Cooley St., Springfield, Mass.

Blanche Randles, K1IZT, president of YLRL, shown leading off all convention activities during the YL Forum.

Eleven YLRL past presidents gathered at Columbus, Ohio. Shown seated (l. to r.): W1ZEN, W6UXF, K1IZT, W7NJS, W6DXI. Standing (l. to r.): W8DUV, W3PVH, W7HHH, W3CDQ, K5BNQ, W6CEE.



(left) Liz Zandonini, W3CDQ, the longest licensed YL in attendance. (right) W2QHH de W8YL! Hoping to add one more YL contact to Howie's long list (about 1400 YL contacts), Pauline, WA9CNV, operated W8YL as YLs from 5 of the 25 states represented looked on. Shown seated is WA9CNV. Others are (l. to r.) W4TVT, Virginia; K1WZY, Vermont; WA2UAB, New York; W6QGX, California; KØORH, South Dakota.

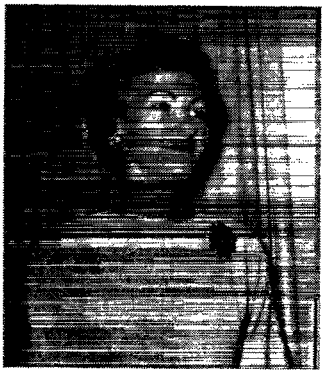


When TV viewers are inspired enough to phone the studio, you know the show was a hit! Many of the above YLs assisted in doing this in Columbus. Shown (l. to r.) are: K8GWF, W8LGY, VE3DGG, WA8ARJ, W7GGV, and TG9BC.

Happy to be together in Columbus are K9HGY, TG9BC and W1YWT.

bus which included the Center of Science and Industry. Fran Yelch, K9ILK, very aptly began official convention activities with the invocation. A warm welcome then followed by General Chairman Shirley Rex, K8MZT, after which all YLs joined in the singing of "YLRL" and "Buckeye Belles" which were both composed by Ruth Rickett, W8LGY, Co-Chairman. YLRL's president, Blanche Randles, K1IZT, conducted the YL Forum that followed. Subjects were introduced in order of their importance for discussion by all YLs.

Onie, W1ZEN, past president of both WRONE and YLRL, gave the invocation which preceded the luncheon and afternoon activities. Some fine past memories of YLRL were renewed through a tape recording compiled by Lenore Conn, W6NAZ. This brought greetings from many of the original YLRL members who were unable to attend the convention in person, but who certainly attended in spirit to the delight of all. Many YLs were then recognized by the convention committee with gifts and applause which included the presentation of eleven beautiful past-president plaques to the past presidents in attendance, special gifts for all QCWA YLs present, YL editors, DX YLs and to Liz Zandonini, W3CDQ, licensed since 1922, for being the longest-licensed YL present.



"Harmonize with the Harmonies" WB6GYI, Alice MacKenzie, is the first president of the new Harmonies YL Radio Club in Southern California.

A first in YLRL history occurred during the evening activities. Never before has it been possible to make a personal presentation of the prize-winning cup to the first place winner in any of the YL-OM contests, but at this convention, terming it a "Martha to Martha award," Martha Edwards, W6QYL, vice president of YLRL, presented Marte Wessel, KØEPE, with her award for being the first place winner in the phone portion of the contest.

Enid Aldwell, W6UXF, co-founder of YLRL, author, and staff member of the Parker Foundation of Human Relations, highlighted the YL-OM banquet as guest speaker. Her excellent analysis of how to find "CQ Happiness" will long be remembered.

Sunday morning all YLs were invited to join the Buckeye Belles for brunch, after which, one by one, YLs began departing for their homes after an exciting three days. The Buckeye Belles' months of hard work in preparation were highly acclaimed by all fortunate enough to attend. In addition to the Buckeye Belles mentioned, other members of the convention committee were: Alice, W8OTK; Charlotte, K8DHF; Carol, W8WRJ; Rosie, K8YFB; Betty, K8WZF; Marie, W8MBI; Louise, K8CEN; Zip, K8UKM; Carmella, W8NAL; Eva, WA8AHU; Dora, K8OMC; Marilyn, W8WTB; Dorothy, K8DPB. All Buckeye Belles have added some fine and lasting memories to YLRL history.

YL Net and Club News

The Floridoras announce the appointment of WA4FJF, Ellen Ackerman, as their new Publicity Chairman. Ellen has also reactivated the Floridora Novice Net on 7185 kc., Thursdays at 1430 GMT. All Novice Class YLs are invited to check in and all other YLs would be most welcome.

The Harmonies YL Radio Club has recently been formed on 6 meters in Southern California with 19 charter members. Officers elected on May 16, 1964 are: Pres., WB6GXI, Alice MacKenzie; V. Pres., WB6ANN, Annette Yowell; Secy., WB6FKD, Helen Whitcomb. The club members meet on 50.35 Mc., Monday through Friday at 0900, 1400, and 2100 PDST. Dues are a voluntary donation. Certificates are given to any radio amateur upon contacting 6 members for local stations (S. Calif.) or 3 members for DX stations (outside S. Calif.) and sending a card showing log entries to Cert. Chairman, WA6KWV, Val Wasson, 3770 N. Strang Ave., Rosemead, Calif. together with 50¢ to cover costs.

Coming Events

For all YLs — Howdy Days — Tuesday, September 22, at 1700 GMT to Thursday, September 24, at 1700 GMT. Complete rules will appear in the next issue.

Silent Key

With regret it is reported that on May 3, 1964, WA6BEK, Effie Robertson, of Torrance, California, a member of the Harmonies YL Radio Club, became a Silent Key. QST

Correspondence From Members-

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

MANY HAPPY RETURNS

While we are patting ourselves on the back on the fiftieth anniversary of the League, let us not forget to congratulate the organization that is making our hobby possible, on their thirtieth anniversary. The Federal Communications Commission, though originally known as the Federal Radio Commission in 1927 and before that as part of the Department of Commerce, has grown up beside us. You might say that it is the Godfather of the League in that it is the official guiding hand of our hobby that the Congress of the United States has provided to help us so we can help others.
HAPPY ANNIVERSARY FEDERAL COMMUNICATIONS COMMISSION — *K5YMV*

ON DXCC

In regards to W1FH's comments on starting DXCC anew, I'm all for it. I have 154 countries confirmed and I like his idea very much and would like to see it put into effect.

When a top DXer like Charlie can step down and challenge anyone or all amateur radio men on starting DXCC all over again, I think this is a great show of fair sportsmanship and I think many amateurs will feel as I do. — *W3VQE*

In answer to the W1FH letter in June *QST*, my answer is "no."

A year or so later results would be the same, so why?

DXCC is fine as is; giving both totals a good idea. Let's leave well enough alone. — *W1GKK*

I am not as high up on the DXCC totem pole as W1FH, but I certainly agree with him that it is about time to take a good long look at DXCC.

I don't know what the answer is, but for some time I have felt that DXCC had reached the stage that WAC attained so many years ago. — *VE2BV*

I heartily endorse the suggestion of W1FH.

Twenty stations have worked all available countries; over one hundred are in the top ten; we are now starting sunspot cycle number 20; and reciprocal operating has been passed by Congress. — *W9RBI*

Sure hope you don't listen to W1FH and start over. It would be a great injustice to the rest of us struggling to the top. And if some of these top men would lay off the rare ones we would have a better chance. — *W4HUE*

I think that not only should we start over on the golden anniversary but should make a special DXCC award. Since the sunspot cycle has fallen off, it is certainly tougher now to work 300 countries than when a piece of wire and QRP power was good for a skip of several thousand miles. Why not make a new DXCC award, counting QSOs that have taken place in the last couple of years and during the next couple. Perhaps stickers could be added for running, say, 100 watts and not a kw., and also for not using a 6 el. quad, etc. limiting the antenna to no more than X db. gain and XX F/B ratio. The possibilities here are seemingly endless.

I'm sure you'll agree that it takes more know-how now to work DXCC with 100 watts and only a 3-el. beam than it does when almost anything would give you an easily attained DX QSO. — *WA2TYF*

Let's start a DXCC from one sunspot minimum to the next minimum, roughly every 11 years. To me this sounds like a good idea and would put everyone in more or less the same conditions of operations every 11 years. Also it would allow the newcomers to the game a fair chance to be on even terms with the old timers. — *W4BPD*

I vote yes. A fresh start would bring many of us back in. — *W7PZ*

I would emphasize that when a country is deleted then credits should be "stricken" from all DXers' lists to keep the DXCC current and equitably competitive at all times in the future — for oldsters and newcomers as well. Only one competitive total would be shown for each station. It is also my belief that the DXCC committee be an elected group of 7 members of the DXCC Honor Roll, elected by the DXCC Fraternity membership in ARRL. — *W3GJY*

One of the things that makes the DXCC so popular is the perpetual contest atmosphere that exists. Having to start over periodically may mean too much. I would like to suggest that only contacts made during the last ten years count (approximately one sunspot cycle). At the first of every year one would lose credit for the contacts made ten years ago. Obviously, we would not want this to happen and would try to re-confirm with newer QSLs. We would find the "unfairness" of the newcomers not being able to work deleted, or banned countries not so much a factor either. A little thought on this reveals many interesting (and exciting) situations that can arise. — *W.12HOK*

A SECOND LOOK

I take issue with using the U.S. Congress as an analogy to the ARRL Board of Directors. The comparison is probably not meant to be in poor taste, but it approaches that area.

More to the point, the Board of Directors does not in any way operate like the U.S. Congress. Mr. Orr is correct in stating that the "duly elected Directors" have the power to run the League without a poll of the membership. Neither does the U.S. Congress have such a requirement placed upon them. The comparison suffers horribly from this point onward.

The U.S. Congress does its deliberating in open forum. Reporters, tourists, or just plain citizens can and do enter the gallery to hear the deliberations and to see democracy in action. The reporters tell

the world about the deliberations. We, the people, can register our approval or disapproval *while the debate is going on.* No element of surprise exists for those who bother to read the papers or listen to news via radio or television. The Congress does not have any requirement to heed our protest: they have the power to enact laws. The Congress, my dear sirs, wants its constituents to know what it is doing *while it is doing it.*

The ARRL Board of Directors meets in a closed room where no eavesdropper may approach. We, the membership, have no opportunity to learn the subject of these lofty deliberations; we have no opportunity to register either our approval or our disapproval of proposed actions. We read about them in *QST* three months later.

Mr. Orr had a difficult task. He could have just made the statement that the Board of Directors does not have to conduct a poll. He could have referred to the pertinent portion of the Constitution (ARRL) or by-laws as the source of this authority. He would have probably received a good many brickbats.

The rest of his article is quite good. Some of his "comments" are a bit terse — even acid — but are all quite valid, I believe.

RM-499 has done more to spark interest in the technical side of amateur radio than any other event in recent years. It has done this merely by being. I will even accept the idea that the very manner of its announcement was designed to raise hackles and to cause people to think.

Please, gentlemen, remember that I love the ARRL and I love my country. I love each in a different way and for a different reason. Let us not put forth the suggestion that the ARRL Board of Directors is in any way comparable to the Congress of these United States. — *W5KR.*

(Members had adequate opportunity to register their views, and in the past year nearly 15,000 have done so by correspondence to directors and Hq. ARRL Directors, like Congressmen, give full consideration to member or constituent correspondence as well as discussions at club meetings, hamfest and conventions. Board actions are reported in bulletins via W1AW and affiliated clubs in a matter of hours or days, and in *QST* in a matter of weeks, not three months. — EDITOR)

¶ I am writing to express my thanks for the low-pressure, common-sense evaluation of RM-499 presented by Bill Orr in the June issue of *QST.* The sensationalism generated in some quarters, concerning this effort to improve Amateur Radio as a service rather than as a "personal possession" is, indeed, unfortunate. Many of the comments convey the "hurrah for me and the —— with everyone else" attitude which is all too prevalent today. This can only lead to tighter governmental control and eventual reduction or revocation of operating privileges as service to the public fades from the amateur scene.

I can only hope that each and every licensed amateur might find a few minutes to think logically and intelligently about: (1) the real reasons for the continued existence of amateur radio; and (2) how he as an individual can contribute to the maturity and growth of the amateur service. — *WØDSW*

THE VALUE OF TRAFFIC

I have just completed reading a note in the June '64 issue of *QST* by K3VQW regarding the value of traffic handling in the amateur bands. Amateur radio is defined as a service by the FCC as are the commercial services. I will repeat what has been said before: how can amateur radio be justified if it does not present some benefit to the country? Amateurs are not permitted to handle traffic for compensation but in a time of emergency haven't we outdone any of commercial means of communication? I'm afraid that the service amateurs provide is recognized by the masses only in a time of great emergency. However, I know that amateur radio operators have won many friends and admirers, through their unselfish efforts in the relay of messages for families and friends who are separated and would not be able to communicate by other means. I suggest that members who do not hold this feeling should listen to some of the twenty-meter traffic nets on daily. I know I will never be embarrassed when asked to QSY by one of these stations for I know that they are bettering the name of amateur radio. — *W.12VNZ*

¶ The letter from K3VQW is indicative of the misconception many have of the true purpose of amateur radio. Without traffic handling, which renders a continuous service, and without contests to train operators and test equipment under adverse conditions, what is ham radio? What earthly use would the general public have of it? It would then fall in line with stamp collecting and other strictly personal hobbies — *W5QMJ*

¶ It irks me to think that there are those who consider "traffic" to be "QRM." Amateur radio is defined as a public service, and what better way is there for amateurs to be a public service than by handling "traffic"? If those people who consider "traffic" to be QRM would take the time to handle some instead of avoiding it, they would find out that it is a rewarding experience, especially when they receive that big "thank you" from the receiving party. — *WB6ØPV.*

¶ No doubt many people will say that the majority of traffic is immaterial and trivial; that still doesn't give them the right to condemn it. Maybe the idea of sending birthday greetings and the like doesn't seem to be the most important thing in the world at that time, but how about remembering the occasional emergency type. During the days since the Alaskan disaster, traffic has been handled in great volume. The majority that I have heard has been handled by the people who have had experience in "traffic" before. I'm not trying to say we're all angels, or we never make mistakes, but I would like to make a plea for some operating courtesy. If you don't like traffic stay away from it. Please don't try to bluff us off the air or use brute force. I would just like to say thanks to those who do have the courtesy to let us handle traffic. It is appreciated, and maybe I can do them a favor sometime. — *WAØASG/6*

FOOD FOR THOUGHT

¶ The League through *QST* has carried articles down through our colorful years on every phase of our hobby or interest except one important one and that one thing is the use of correct grammar.

Amateur radio operators are intelligent, alert, and fine citizens but those who use poor or incorrect grammar on the air are giving non-radio amateurs the opposite impression of us.

I would like to see the League start a crusade to encourage all radio amateurs to use correct grammar. — *W4DOP*

(*Continued on page 152*)

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
GEORGE HART, W1NJM, Natl. Emerg. Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, W1YYM, Ass't. Comm. Mgr.

Code Still Basic. We're proud of the extent to which we amateurs have developed our interest in different modes and techniques. Many of us today specialize in equipment employing voice, a.m., s.s.b. or n.f.m. radioprinter (RTTY), also f.m. and television forms of modulation; this in addition to our keyed c.w. transmission. When on the air we often run into situations that point up the need for continued high personal proficiency in c.w. and operating procedure. When *accurate* copy is essential through fading and QRM conditions or ultimate DX at stake, code knowledge and the fact we have a station that can change instantly to c.w. is important. C.w. continues to be the *basic method* of radio communications. W3ECP invites attention (in *Auto-Call*) to the fact that a study by the Department of the Army also has concluded *for the services* a continuing requirement for a sound and undiminished c.w. capability. To excerpt the transmissions (from WAR to Army MARS members (Mar. 9 and 16):

"(This) will continue indefinitely . . . doctrine, training and equipment (for the services) must be kept compatible or consistent with such requirements ——— C.W. continues to be used in a multitude of . . . radio nets where a high degree of reliability is required . . . (It) is used extensively . . . as a standby or backup for RTTY and voice during periods of . . . interference, and atmospheric disturbances. The use of c.w. . . . has increased (in) importance. It is frequently the only effective means of communication due to system or equipment incompatibility, language barriers and frequency congestion. . . ."

Field Day and Your Part in Emergency Preparedness

The Kansas SCM (WØALA) in the Jayhawk Amateur Radio Societies *Midwest Chirps* announced a Field Day Trophy to go to the leading Kansas club. The Indiana Radio Club Council, as in earlier years, this year again offered Indiana FD Awards to the leading clubs, entries to go to Frank Carrol, W9QYQ. At this writing some weeks before the annual ARRL FD we don't know who will get these and many other tokens of friendly competition. News of these items shows the broad interest in FD and we hope all had a successful field test. The significance of the occasion was best stated perhaps in the South Eastern Illinois Ham Society's *Ham News:*

"Field Day takes on an added significance this year because of an action at the May Board meeting. The Board has established preparedness in emergency communications to be a primary objective of the amateur fraternity in line with the increased emphasis on public service. The ultimate goal of *every* amateur should be this capability. . . . Emergency preparedness is a round-the-clock round-the-calendar goal and Field Day our chance to field-test our preparedness and skills before an actual disaster strikes."

Sweepstakes Periods Modified. As already announced in the CD Bulletin the hours and entry plan for the annual Sweepstakes will be changed this coming November as a result of staff study. The "SS" this year will determine

MEET THE SCMs

On the left, new S.C. SCM W4PED, Charles Wright. W4PED holds an MS in Physics and is employed by Dupont. Licensed since '49 he now holds Amateur Extra as well as numerous awards for public service and contest/DX activity. On the right, Indiana SCM Ernest L. Nichols, W9YYX. This SCM has been licensed since 1941 and is Assistant Indiana RACES Radio Officer. Current interest is in the design and construction of amateur equipment.

operator standings based on SS operating accomplished between 2400 GMT Saturday and 2400 GMT Sunday. The 24 hours for contesting will be:

PHONE CONTEST — Nov. 14–15 '64
C. W. CONTEST — Nov. 21-22 '64

As pointed out in the April CD Bulletin (by W3GRF) section leaders almost always take their lead in the first week end with relative positions unchanged at the finish. The ARRL staff advisory group examined all comment and suggestions reported, also considering some Board sentiment in favor of shorter major activities. One week end specifically for each kind of participation has the advantage that neither voice or c.w. interest interferes with the other. In this domestic contest, the c.w. band sectors will be left free of contest work in what is usually a first week end; the sub-bands used for voice will be contest-free likewise the following week. About operator exchanges: the items simulating a message preamble met with general satisfaction last November, so the SS rules for this are retained without change for the '64 SS. That is the CK will show (by two digits) the year first licensed. In place of the date in a message one sends the month and day of his birth. Such exchanges add considerable interest and meaning to the basic November test of station capabilities in the most popular of major ARRL contests. —*F. E. H.*

A.R.R.L. ACTIVITIES CALENDAR

(Dates are shown in GMT)

Aug. 6: CP Qualifying Run — W6OWP
Aug. 18: CP Qualifying Run — W1AW
Sept. 1: CP Qualifying Run — W6OWP
Sept. 10: Frequency Measuring Test
Sept. 12–13: V.H.F. QSO Party
Sept. 16: CP Qualifying Run — W1AW
Oct. 1: CP Qualifying Run — W6OWP
Oct. 3–4: Simulated Emergency Test
Oct. 15: CP Qualifying Run — W1AW
Nov. 15: Sweepstakes Contest, phone
Nov. 22: Sweepstakes Contest, c.w.

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Aug. 1–2: Mozambique Contest, LREM (p. 87, this issue).

Aug. 1–2: Illinois QSO Party (p. 108, this issue).

Aug. 8–19, 15–16: WAE DX Contest, DARC (p. 87, this issue).

Aug. 14–16: New Jersey QSO Party, GSARA (p. 122, this issue).

Aug. 29–30: Fifth All Asian DX Contest, Japan Amateur Radio League (p. 86, this issue).

Aug. 29–31: West Virginia QSO Party (p. 138, this issue).

ELECTION NOTICE

To all ARRL members residing in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the .....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— *F. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
West Indies	Aug. 20, 1964	William Werner	Aug. 10, 1963
San Joaquin Valley	Aug. 20, 1964	Ralph Saroyan	Apr. 10, 1964
Alaska	Aug. 20, 1964	Kenneth E. Koestler	Apr. 10, 1964
Ontario	Aug. 20, 1964	Richard W. Roberts	June 15, 1964
Nevada	Aug. 20, 1964	Leonard M. Norman	Oct. 10, 1964
Santa Clara Valley	Aug. 20, 1964	Jean A. Gmelin	Oct. 15, 1964
New Hampshire	Aug. 20, 1964	Albert F. Haworth	Oct. 26, 1964
Kansas	Aug. 20, 1964	C. Leland Cheney	Oct. 29, 1964
Delaware	Oct. 9, 1964	M. F. Nelson	Dec. 10, 1964
Southern Texas	Oct. 9, 1964	Roy K. Eggleston	Dec. 10, 1964
Maryland-District of Columbia	Oct. 9, 1964	Andrew H. Abraham	Dec. 10, 1964
Alabama	Oct. 9, 1964	William S. Crafts	Dec. 26, 1964

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

South Carolina — Charles N. Wright, W4PED — June 26, 1964

In the Wyoming Section of the Rocky Mountain Division, Mr. Wayne M. Moore, W7CQL, and Mr. Gordon L. Schmehl, W7LVU, were nominated. Mr. Moore received 73 votes and Mr. Schmehl received 17 votes. Mr. Moore's term of office began June 9, 1964.

NET REGISTRATION INFO

Our plan for accelerating the production of the Net Directory is still in effect. The deadline for registrations for the 1964 year-end net directory is Sept. 1, and we urge all net managers of public service nets to make sure their nets are properly registered prior to that date.

Take a look at your copy of the 1963 year-end net directory. You will note that column 9 contains the date on which the net was last registered prior to the compilation of the directory information. If this date is prior to Sept. 1, 1963, and no new registration has been made subsequent to that date, your net will *not* appear in the new directory unless it is reregistered prior to Sept. 1, 1964. On the other hand, if the registration date is *after* Sept. 1, 1963, and no changes have been made it is not necessary to reregister at this time.

During the past year we have notified all nets as their registrations have expired that they were being put on the "inactive" list pending receipt of further information. Net registrations are good only for one year. If you received such a card and have done nothing about it, and your net is still active, better reregister before Sept. 1.

Nets whose last registration date was *after* Sept. 1 will be included in the net directory. If there have been no changes since your last registration, please *do not* reregister. On the other hand, if there *have* been changes, please *do* reregister so the information in the directory will be correct. Use CD-85 or facsimile, or give us the information listed below. Even if you do use CD-85, refer to the data below for explanation of exactly what we need. *Incorrect or sloppy registrations waste both your time and ours and may result in your net appearing incorrectly or not at all.* Only nets rendering a public service are eligible for registration.

1. *Name of Net.* On the top line (two lines if you need them) of CD-85, write the name of your net *exactly* as you wish it to appear in the net directory. Do not write, in this space, anything you do *not* wish to appear in the name. Although two lines are provided, we have found that the best nets are those with short, concise names.

2. *Net designation.* This is optional. Many nets, especially c.w. nets, have designations used in the net call-up that are useful net directory data. If you have one, let us in on it. Examples are QMN for Michigan Traffic Nets and NYS for New York State Net, etc.

3. *Frequency,* or frequencies in kc. If your net operates on more than one frequency, be sure to include both or all and correlate them with days and times. Frequency bands or segments are not sufficient.

4. *Call of Net Manager.* Just his call letters, that's all. If no official with that title, give us the call of the amateur from whom further information on the net may be obtained.

5. *Days.* Tell us *which* days of the week, not how many or "all." If not properly entered, this may disqualify your net from registration. "Daily" means *every* day, including Sunday. Make sure the days given are in accordance with the time used; that is, don't give the days according to local time, then give the time on GMT. We suspect a great many registrants have done just this.

6. *Net starting time(s)* and ending time(s). All nets are registered in *Greenwich Mean Time* (GMT), otherwise known as "zulu" or "zebra" time. If you don't know how to convert (shame on you), use your local time, but be sure to let us know *what time zone* that is. "Local time" means absolutely nothing. If your net operates an hour earlier six months of the year (*i.e.*, "daylight saving" time), put an asterisk after your operating time so this can be included in the net directory.

7. *Direct Coverage.* The coverage area assigned the net (if part of a system) or the coverage provided by *regular* participants. Do *not* include coverage provided through liaison with other nets. Do not put down such meaningless phrases as "50-mile radius" unless you also give us the center of the circle it's radius of.

8. *Purpose of Net.* Please, not a lecture, just a one or two word description. Does the net fall in the category of an emergency net (E), a traffic net (T), or both (ET), or some special purpose (S)? If the latter, be sure to indicate *what* special purpose. Don't say "training" unless you indicate training *in what.*

9. *NTS?* Indicate whether or not your net is a part of the ARRL National Traffic System. If you don't know, it probably isn't.

10. *Liaisons.* NTS nets indicate their NTS liaison net; other nets may indicate any nets with which they conduct *regular* liaison.

11. *Previously registered?* Give us your latest registration date, if you know it. If not, the year. If you don't know the year, just say yes. Of course, if this is a newly formed net it will save us some searching if you just say no.

12. Give us your call letters. If you have more than one call, give us the one by which you are best known. This makes you responsible for all the information in the registration. Unauthenticated registrations will not be entered.

Don't forget, **September 1** is the deadline. On that date we start compiling the net directory, and we hope to have it in distribution by October 1. This is a month earlier than last year, and this is the date when we will be distributing the directory from now on, when it is most needed. Please get those registration cards in early. — W1BGD.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for May Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	239	2113	1902	196	4450
K6BPI	73	1474	1404	70	3021
WØLGG	289	663	582	45	1579
KØONK	118	779	615	32	1544
WØBDR	76	724	698	16	1514
W1PEX	43	668	605	36	1352
W3VR	52	492	469	23	1036
VE7BDJ	21	480	424	2	927
W7BA	10	411	375	33	829
K9KZB	22	384	374	10	790
W6WPF	15	380	346	34	775
W3EML	44	410	312	2	768
W3IVS	15	363	345	18	741
W6RSY	38	344	294	66	737
WB6BBQ	74	340	293	7	714
WA9CCP	14	350	327	13	704
W7DZX	13	363	304	8	688
WB2ALF	19	337	327	4	687
WA2RUE	62	294	247	39	642
W6EOT	4	303	317	1	625
K6IWV	6	295	295	22	618
W5DTA	14	292	232	71	609
WB6JUH	26	289	253	35	603
K4VFY	161	213	202	11	587
WAØFSW	24	281	276	5	586
W5CEZ	11	288	271	5	575
W7JHA	6	264	264	9	543
W6GYH	109	204	207	3	523
WA6OUK	55	232	215	15	517
K9DHN	19	271	218	5	513
WA9AUM	33	237	241	0	511
K6MDD	4	251	241	10	506
W2GVH	22	235	243	5	505
W1TXL	87	219	183	14	503
K1WKK	18	252	231	0	501
Late Reports:					
W4KIS (Apr.)	151	241	219	22	633
K1RYT (Apr.)	21	272	227	1	521
W7WST/6 (Apr.)	22	243	246	2	513
K1WKK (Apr.)	18	247	243	3	511

More-Than-One-Operator-Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W6IAB	939	1249	880	369	3437
KR6GF	435	75	30	45	585

BPL for 100 or more *originations-plus-deliveries*

WA6TAW 317	W8DAE 142	WA8DGE 104
K6GZ 235	WA2TQT 136	K1VGM 103
K3GJD 200	W2RUF 119	W4NML 102
W2EW 170	K2SJN 117	WA4EUL 101
W4PQP 153	W4FDV 117	K4SJH 101
W7APS 153	W1LES 112	K9IMR 101
WA4BMC 147	VE2AGQ 112	Late Reports:
K4PXY 146	WA6GJR 111	WA4IMC (Apr.) 137
WB6GZY 145	W1ZLX 106	W2RUF (Apr.) 106
	WA8FIC 106	

More-Than-One-Operator Stations

WA4KJF/4 119	WA4ECY 110

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: K4SDS, K6PZM, WA6TWS, WA9AUM, W9HAS.

The BPL is open to all amateurs in the United States, Canada, and U.S. Possessions who report to their SCM a message total of 500 or a sum of 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.

SUGGESTED

OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.

WIDE-BAND F.M. 52.525 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST −3, AST −4, EDST −4, EST −5, CDST −5, CST −6, MDST −6, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

VHF SS

In the July *QST* VHF SS report, the Georgia leader appeared as W4YZE. This should have read K4YZE. Our apologies Jim!

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 Aug. 18 at 0130 GMT. Identical tests will be sent simultaneously by transmitters on 3555, 7080 and 14,100 kc. The next qualifying run from W6OWP only will be transmitted Aug. 6 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *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, 0130 GMT Aug. 18 becomes 2130 EDST Aug. 17.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 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.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 2330 and 0130 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun. Mon. Wed. Fri. (GMT date) from 0130-0220; 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0130-0220; 10, 13 and 15 w.p.m. daily from 2330-2140 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0130-0220 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* and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130-0220 GMT practice on those dates:

Date Subject of Practice Text from June *QST*

Aug. 3: *It Seems to Us. . . .*, p. 9
Aug. 4: *A Complete Mobile Package*, p. 11
Aug. 13: *An Electronic Storm Finder*, p. 23
Aug. 20: *The Flying Spot — III*, p. 31

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

Aug. 26: *Resonant Circuits*, p. 21
Aug. 28: *Series Resonance*, p. 22

DXCC Notes

Announcement is hereby made of the addition to the ARRL Countries List of the *Saudi Arabia/Iraq Neutral Zone*. Authorized operation from this Neutral Zone has taken place under a prefix of 8Z4. Acceptance of this area as a separate entity on our Countries List is based on "distinctively separate administration," (Point 1 of the criteria; see July, 1963 *QST* DXCC Note).

Confirmations for contacts with the Saudi Arabia/Iraq Neutral Zone may be submitted for DXCC credit starting October 1, 1964. Confirmations received for this listing before October 1, 1964 will be returned without credit.

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Details appear on page 35, this issue. Let's hear from *you*.

During June the following additional amateurs were nominated in recognition of their extra skills and courtesies:

W2GKR	WA9CNN
W3MCG	WAØDSE
W3QCW	WØOAQ
K3TTM	WØEVI
K4HSB	WØUSL
WB6ACY	WØVBQ
K6BIA	KL7MF
W7OEB	KP4BJU
WA8CZH	VE2ALH
WA8DEV	VE3NG

W1AW SCHEDULES

(August, 1964)

Operating Hours

Daily: 2230 to 0430 GMT.

While the reconstruction program is in progress, there is *no* provision made for visiting of the station. Visitors to the ARRL headquarters building, located on the same premises, are of course welcomed during regular office hours from 8:15 A.M. to 4:30 P.M. EDST Monday through Friday.

Operating Frequencies

C.w.: 3555 7080 14,100 **Voice:** 3945 7255 14,280

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:

C.w.: Mon. through Sat., 0000; Tues. through Sun. 0100.
Voice: Mon. through Sat. 0100; Tues. through Sun., 0330.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW NOTE

The ARRL Headquarters Station, W1AW, will be undergoing extensive reconstruction this summer. Operation during this period (2230 to 0430 GMT daily) will be conducted from temporary positions in the basement of the building on a curtailed schedule on 80 40 and 20 meters only. Full W1AW services will be continued for the transmission of voice and c.w. bulletins, as well as both periods of tape-sent code practice, as noted elsewhere on this page. During most of this period, with the building in disarray as construction progresses, it will not be feasible to invite visitors.

We hope you will bear with us in these slight but necessary inconveniences with the expectation of renewed and extended complete schedules when the changes are completed, from a rebuilt and better W1AW.

DX CENTURY CLUB AWARDS

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date or receipt. All totals shown represent submissions credited through May 31, 1964.

W1FH.....310/336
KV4AA.....310/334
W6CUQ.....310/335
W8BRA.....310/333
W4DQH.....310/334
W2ACW.....310/334
W8UAS.....310/331
W8PQQ.....310/327
W7GUV.....310/333
W9RBI.....310/335
W1GKK.....310/335
4X4DK.....310/328
W8JIN.....310/335
W2TQC.....310/329
CX2CO.....310/331
W4GD.....310/331
PY2CK.....310/333
W3GHD.....310/334
G4CP.....310/334
W8MPW.....309/327
W2JT.....309/328
W8KIA.....309/333
W8BF.....309/330
W9NDA.....309/333
W9YFV.....309/333
W2DEC.....309/325

W7PHO.....309/327
W2BXA.....309/333
W1ME.....309/332
W4QCW.....308/335
W9HUZ.....308/328
W9LNM.....308/331
W8KML.....308/329
W3JNN.....308/332
W8JBI.....308/327
W1BIH.....308/332
W1JYH.....308/331
WØQVZ.....308/329
W5MMK.....308/329
CE3AG.....308/332
WØDU.....308/330
W6YY.....308/328
K3UPG.....308/332
W3LMA.....308/330
DL3LL.....308/324
DJ1BZ.....308/326
W3KT.....308/332
W8EWS.....307/331
W9DMD.....307/329
W7GBW.....307/331
G3FKM.....307/324
G2PL.....307/330

W1CLX.....307/330
W6GPB.....307/328
W8LKH.....307/327
W6EBG.....307/332
HB9J.....307/331
W2LV.....307/326
W2ZX.....307/326
VE7ZM.....307/331
K2DCA.....307/324
W4TM.....307/329
W2BOK.....306/323
W5ABY.....306/323
W4ML.....306/326
W8HGW.....306/331
W6AM.....306/331
K2BZT.....306/323
W2ZGB.....306/322
WØAIW.....305/328
W3JTC.....305/328
W2WZ.....305/328
WØBFB.....305/323
WØELA.....305/328
W5KC.....305/328
W7ENW.....305/329
OE1ER.....305/327

W8DAW.....305/328
W2SUC.....305/322
WØQDF.....305/322
G8KS.....305/323
K2GFQ.....304/325
W5ADZ.....304/326
W6CYV.....304/322
K6ENV.....304/321
W4MR.....304/324
W4AIT.....304/327
WØSYK.....304/322
W1ZW.....304/321
W3ECR.....304/321
W9AMU.....304/321
W2FXN.....304/318
W2OKM.....304/322
K4LNM.....304/318
W2HMJ.....303/323
W5ASG.....303/327
LU6DJX.....303/327
W4VPD.....303/320
W1HZ.....303/321
W2UVE.....303/321
W2GUM.....303/325
W2SAW.....303/320
W2TVR.....303/321

W5AFX.....302/327
W7AC.....302/326
W2AYJ.....302/321
W8PUD.....302/319
W5UX.....302/317
K6EVR.....302/319
W8IRN.....302/320
WØNTA.....302/322
W9KOK.....302/326
W4GXB.....302/323
DJ2BW.....302/319
W8BKP.....301/323
W5CKY.....301/320
W4OPM.....301/316
W1HX.....301/321
W2OHH.....301/322
K4RID.....301/315
W4PLL.....301/316
W2LAX.....301/318
WØPGI.....301/316
W8KPL.....301/319
PAØFX.....301/321
W3RNQ.....301/319
HB9MQ.....301/318
W8NGO.....301/318
I1AMU.....301/320

Radiotelephone

W9RBI.....310/333
CX2CO.....310/331
PY2CK.....310/333
W3RIS.....310/335
W8GZ.....309/332

W8BF.....309/330
4X4DK.....309/327
W7PHO.....309/327
W1FH.....308/329
W8PQQ.....308/325

W8KML.....308/329
PY4TK.....307/324
W6YY.....307/327
5Z4ERR.....307/329
W2ZX.....307/326

W4DQH.....307/329
W3JNN.....305/326
W2JT.....305/319
W2BXA.....304/326
W9JJF.....303/320

W8HGW.....302/324
WØAIW.....301/322
W4QCW.....301/314
W6AM.....300/324
I1AMU.....300/319

New Members

From May 1, through May 31, 1964 DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

I1ZL.....256
WA4ACA...217
W9GDM....170
W9FBD....120

W1YGK....112
DJ1YU.....110
OH2CU.....110
WA4OAE...107
DL9YG.....106

W1LEL.....104
K4UIE.....104
K4WMB....103
W6UGA....103

W9UC.....103
ZE1BK.....103
W9MLR....102
KG6AII....102
WA2KRN..101

W6GSV.....101
W8LT.....101
K3MHZ....100
W7VKO....100

W8MSG....100
VE1ADH...100
OE1HGW...100
XE1FE.....100
ZS5S.....100

Radiotelephone

WA4ACA...204
HK4EB.....183
W9DWQ....132

F2LZ.....121
OA4KY.....120
WA2WPP...118

W2ZPO.....114
COSRA.....109
VE6ABP....108

G3PZO.....106
K6AHV.....105
W4HVU....104

K1MCL....102
K2IDF.....101
K3PDC.....100

W4ELB.....100
W7MKI....100
WA9ENB...100

Endorsements

W6LDD....318
W6WWQ....315
W2NUT....313
K6EC.....313
DL1IN.....313
G3DO.....311
W9SFR....310
W5HDS....307
W7CNM....305
W4NNH....302
VE3BWV....302
WA6EYP....301
W2RDD....300
W9YND....296
W2SHC....294
CR6BX....291
W3MWC....290
W6MVL....290
W6ULS....290
W9WFS....290
YS1O.....285
W2KIR....284
K4ZKI....283
K2CPR....282

W4MS.....281
W6WX.....281
W4TDW....280
G3HCT....280
W5PWW....274
WØNFA....272
W7GHB....270
W4OEP....267
LA8LF....264
W2BMK....261
W4NJF....261
W2RWE....260
W3INH....254
K4HYL....252
W9ZB.....252
G6VQ.....252
W7ACD....244
K4TWK....242
W5PMK....242
K4SCT....240
K5JKH....240
K5RFJ....240
G8JM.....240

W1AUR....236
W2GKZ....234
W4IUO....233
K6OHJ....232
DL7BK....232
W2QQ.....230
I1FO.....230
VK3YL....228
EA4CR....223
OK3EA....221
ZS6A.....220
WØQMD....218
HB9JG....217
W9YT.....212
OK1GT....212
W4HKJ....210
W4TP.....210
VE7PU....210
G3HCL....207
W4SHX....205
F3ZU.....204
W1DGJ....200
W8GMK....200

W2HC.....195
W3AHX....195
K6ASL....194
W1YYM....190
WØQKC....190
K2PKT....188
W1NJL....187
KØIFL....183
WØVIP....183
WØFRX....180
WA2OMR..177
W2ZTV....174
DJ5LA.....174
W2RWQ....172
KL7DTB/6.172
WB2FMK..170
W2OCL....170
WA6OHJ...170
W6UMI....170
W8MFW....170
W4TFL/1...169
DL1LD.....167
K1PNL.....162

K8ZBY.....162
WA6GFE....161
VE3DGX....161
OE8SH.....161
K2KNV.....159
W2GRA.....158
VE6AAV....155
Z87M.....155
W1BRX....151
K5QVH.....151
OZ5DX.....151
W2IOT.....150
K4RZK.....150
WA5CBL...150
W2NR.....145
K5IIX.....142
5A3CJ.....142
WA2PWI...140
W6FET.....140
W8NPF.....140
W8WUO....140
LA1M.....133
DJ1QP.....132

K3JLI.....131
W3MYE....130
W7MX.....130
WØGNX....130
K2LAF....129
DJ5JH.....128
W3EAI....123
K5RUO....122
K7UCH....121
YU1BCD...121
K1AQI.....120
W1HNI.....120
K3LJZ.....120
W7VRO.....120
K9AMD....120
WA6LBP...119
W3STA.....118
W6CZP.....115
K4CEB.....113
VP2MV.....113
WA2HZO...111
K7ADL.....110
KØGSV.....110
I1BOL.....110

Radiotelephone

G8KS.....311
DL1IN.....305
ZS6Q.....293
WA2IZS....281
PAØFX....281
W2BQM....280
W1PST....274
W8NGO....270
W4SSU....262

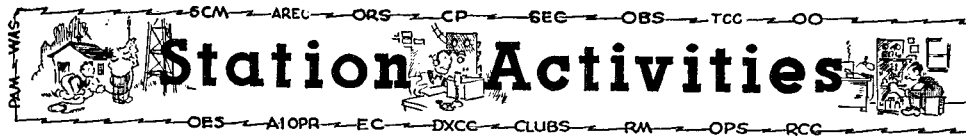
W1JYH.....260
W9SFR.....257
W4UMC....251
WØNFA....251
K4HYL....250
LA8LF....250
W2PTM....240
W4NJF....240
YU5BBU...234

W3YZI.....233
K6VVA.....230
W5GXP....221
WA2EOQ...220
W9PQA.....220
W4FPS.....210
WØGAA.....205
W6KLC.....200
W8HBI.....200

W8WC.....200
W1AUR....192
W2QDO....190
DJ5LA.....174
VE3MR....173
K1UDP....170
W4HKJ....170
W1IUQ.....166
WA6TGY...160

W8EVZ....160
WB2CNA...158
W2ATV....153
W6WX.....153
OA4PD....146
VE3DGX....141
K6OHJ....140
W8JFD.....140
K1INO.....135

KØIFL.....127
W3MYE....125
I1LCF.....125
OZ8EA.....125
TN8AA.....124
W2HC.....120
G3KLL....120
KØBJK.....119
W9YT.....111



• 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

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ–SEC: W3ELI, RMs: W3EML, K3MVO, K3YVG. PAM: K3CAH, V.H.F. PAMs: W3SGI, W3SAO. The EPA C.W. Net had a QNI of 320 with QTC of 276. The PTTN had QTC of 40. A time lapse of traffic work at W3OY is caused by gremlins in the rig. After a bad winter and broken antennas, W3AXA is back in the EPA. K3SWZ got his WAS and so far 40 countries with 100 watts. Loss of K3YEO's license was caused by a mail car fire. With regret we record the passing of the XYL of W3OP. W3RV is having good luck with the medics and pill peddlers. After a 2-year lapse, K3JLW is active on the bands. K3JHT is entering the Navy. W3YYO moved to Germantown and is working 40 and 15 meters. W3EU is landscaping and making antenna repairs. The Brookline 50 Year Anniversary Parade was given radio communications by W3IVK, W3DQE, W3PBR, W3LNQ, K3LSV, K3DST, K3OJA, K2PWM, K3MHD, K3PGX, K3YTC and K3ITH. A newcomer to the PTTN, K3RZE, is changing the rig to break-in. W3BUR, working in New York City, finds it hard on his hamming activities. The Lancaster Transmitting Society is making plans for a new club shack. The Bucks ARC purchased a trailer mobile unit. K3MEH is operating on 20-meter sideband. K3HNP has boosted his appointment to Class I Observer. Another newcomer to the PTTN is K3HKW, from Trainer, Pa. The PTTN, by coincidence, is a training net which meets nightly on 3610 kc. at 6:00 P.M. EST. New Gear Dept.: An 80-meter inverted "V" antenna for K3YQJ; a Heath-Sixer for K3TEJ; an HW-12 to K3AKN. The "Scout Radio Award" issued by Troop 52 of Coplay, Pa., is a very fine piece of wall paper. For information contact Peter Somshch, K3VWH, or the club, K3WQW. New club officers of the University of Penna. RC are K3QFF, pres.; K9GRQ, vice-pres.; K3ALD, secy.-treas. Traffic: W3CUL 4450, W3VR 1036, W3EML 768, W3IVS 741, K3FHR 244, K3OMP 227, K3MVO 201, K3MQE 156, K3HNP 119, K3KTH 73, K3YQJ 73, W3QDW 59, K3JSX 55, W3ZRQ 44, K3RUA 40, W3ELI 39, W3RV 33, K3RZE 24, K3IMR 22, W3VAP 20, K3UIS 18, K3SFP 16, K3HKW 15, W3LXN 10, K3TEJ 10, K3YVG 10, W3BUR 8, K3KNP 6, W3PDJ 6, K3LSV 5, K3AKN 3, W3BFF 3, W3JKX 3, K3MNT 3, K3HTZ 2, K3JHT 2, K3NZD 2, W3AHZ 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY–SEC: W3CVE. RMs: W3QCW, K3JYZ, W3ZNW, W3MCG. PAM: W3RKK. The MDD meets daily on 3849 kc. at 0000Z. The MDDS (slow) meets daily on 28.1 Mc. at 0130Z. The MEPN meets M-W-F at 2200Z and Sat.-Sun. at 1700Z on 3820 kc. The Foundation for Amateur Radio will hold its big Annual Hamfest at the Howard County Fairgrounds, 15 miles west of Baltimore on route U.S. 40, Sept. 27. W3AHQ is keeping a live signal on 220 and 432 Mc. by working W4UBY. W3CDQ copied the 50th Anniversary Message from WIAW. W3CQH is now mobile with a Utica 650. The club station of U. of M., W3EAX, reports that a Lincoln 6-meter transceiver was stolen from the club room on May 17. K3GJD received a CAN certificate, also a BPL certificate. K3GZK is busy with yard work. K3HFV and gang operated K8HKM from the Martinsburg, W. Va., airport during the V.H.F. Contest. WA4GSV is recovering from a very successful operation (removal of a disc in the neck). W3HQE is feeling better after a long siege in the hospital. K3KMO is a new member on MDD. Al was the operator in the DXpedition to San Marino, Italy, last November. K3LLR has a new 6-meter antenna with very low s.w.r. W3MCG went to the PVRC and FRC get-together in Wilmington, Del. Karl was nominated outstanding operator on MDD for May. K3MDL will start a code and theory class for new amateurs. K3NCQ is working skip with a whip antenna on 6. W3OHI rebuilt his quad and has the Warrior linear working. K3OSX graduated from Wheaton High School. W3PQ approves the incentive licensing. W3QCW will move to a new home this summer and will have room for an antenna and a den for the equipment. K3QDD has struggled through the final exams. W3RKK is our new PAM and is doing a fine job. K3RUQ will take a transceiver along to school this fall. K3TJE likes traffic work and has an electronic keyer. K3TUJ is back on the v.h.f. bands. K3VPZ is working on a hand-held 2-watt transmitter. W3YZI had a broken knee cap but is OK now. Joel has a five-element beam up on that big tower. W3ZNW has been doing a fine job with the MDDS (slow) Net on 28.1 Mc. Stations operating on the 10-meter band should check into this net to increase code speed and learn a little about traffic-handling. Traffic: K3GJD 243, W3AHQ 148, K3UFV 148, W3PQ 97, K3RUQ 71, K3QDD 53, K3TJE 53, W3QCW 50, K3LLV 42, K3JYZ 32, K3OSX 30, W3EOV 25, K3GZK 18, K3URZ 14, W3ZNW 14, W3ATQ 12, K3CXX 8, K3LLR 7, W3MCG 4, K3VPZ 3, K3NCQ 1, K3TUJ 1.

DELAWARE—SCM, M. F. Nelson, K3GKF–PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSMN meets Tue. on 50.4 Mc. at 2100 local time. Renewals: K3SXA as ORS. Delaware Amateur Radio Week will be observed Aug. 10-16 and recognition will be given by Governor Carvel and other officials. Let's all be very active on the bands during the week. The Delaware Hamfest will end the week's activities on Aug. 16 and will be held at Wheeler Park in Harrington. The 1964 Hamfest Committee has included K3RUD (pres.), K3OCI (secy.), W3IUO (treas.) and the following from the various clubs: K3s GHC, KEO, KRH, MPZ, NVV, OCE, OPF; W3s CFA, LQE, UDR, URR; as well as Stalins and Weissman. Hope to see all of you in Harrington. Traffic: (Apr.) W3EEB 156, K3OWS 29, K3SXA 8, W3HKS 1. (Mar.) K3OWS 197, K3SXA 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG–SEC: K2ARY. PAM: W2ZI. RMs: WA2BLV and WA2VAT. N. J. Phone & Tfc. Net totals for May: 31 sessions, QNI 606 and traffic 177. W2PEV succeeds K2SLG as its Asst. Mgr. W2BZJ, Pennington, is back on NJN after quite a long layoff. W2BAY, Haddonfield, is W1BBK at his summer QTH on Cape Cod. The Levittown (N.J.) Club is now known as Rancocas Valley Amateur Radio Assn. and meets at Riverside. WB2CRT is pres. K2YBN, Willingboro, vacationed in W4-Land. W2NZH, Medford, was So. Jersey winner in the NYC-LI Contest this year. Mac also won the Vermont QSO Party award for the national high score. The Salem County ARC Net meets Wed. at 9 P.M. on 50.9 Mc. Southern Counties ARA meets in Northfield, contact WA2OZQ for information. The club will hold its hamfest Sept. 20. SJRA's Hamfest will be held at Molia Farms, Malaga, Sept. 13. Burlington County plans a picnic on Aug. 22 at Jobstown. W2DAJ and WA2GSO were top SJRA scorers in the recent DX Contest. WA2IEK and WB2GPH placed second, phone and c.w., respectively. K2BZK's new QTH is Haddon Twp. W2HBE was SJRA's Field Day chairman. The Club operated from Pennsauken. All clubs are urged to report their Field Day activities. The new traffic-handlers reporting in the section are WB2GUK, Atlantic City, WN2ILU and K2GIO/2, Woodbury. We appreciate their reports. Traffic: WA2BLV 286, W2ZVW 126, W2RG 84, WB2GUK 78, W2ZI 41, WN2ILU 39, K2RXB 26, K2GIO/2 25, WA2KIP 25, W2MMD 12, W2BZJ 5, W2IU 2.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK–SEC: W2ICZ. RMs: W2RUF, W2EZB and W2FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 1800, NYS C.D. on 3510.5 kc. and 3993 kc. S.S.B. at 0900 Sun. and 3510.5 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 1900, IPN on 3980 kc. at 1600, 2RN on 3690 kc. at 0045 and 2345 GMT. Congratulations to BPLers W2GVH and W2RUF. Appointments: K2BWK, WA2TUI and WB2GAL as OPS's; WB2IPX as OES. K2TDG has added a BC-1031C Pan-adapter to the station. K2QDT is up to 144 for DXCC. The Franklinville Central School station, W2ODM, will be operated after a year of QRT by W2GSL and WB2JQS. The NYSPTEN plans to hold a picnic in mid-

(*Continued on page 108*)

JUST ABOUT the time this page appears, we'll be getting ready to exhibit at the National ARRL Convention in New York City and at 1964 WESCON in Los Angeles. If all goes well, National will show *two* important new products for the first time.

ONE PRODUCT is the NCX-5 transceiver for the 80 through 10 meter amateur bands. The NCX-5 is a high performance transceiver with exceptional frequency stability (essentially *no* warm-up drift) and an unusual digital dial read-out which is *calibrated directly to 100 cycles* on each amateur band. Selectivity, both transmit and receive, sets a new level of comparison — National's 8-pole high frequency lattice filter exhibits a 1.7:1 shape factor! *Two* RF stages in the receiver section assure incomparable sensitivity, and a *Transceive Vernier* control is provided to allow ± 5 Kc. of receiver offset from the transmitter frequency when desired.

THE NCX-5 concept is one of a total station equipment without compromise for mobile *or* fixed station operation. Like the NCX-3, the NCX-5 incorporates fast attack-slow decay AGC, an S-meter, full VOX or PTT operation, break-in CW keying with adjustable release time, plus ALC (*and* external ALC input for use with the NCL-2000). To further increase the versatility of the NCX-5 as a *complete* amateur station, an optional console will be made available which provides not only a separate receiver VFO, but crystal controlled transceive or split frequency capability for novice or net operation. The VFO console will also incorporate some truly unique features designed specifically for the CW operator — about which you'll hear more in a month or so.

PRICE? THE NCX-5 will be priced competitively with ordinary five band transceivers — the NCX-5 or our popular NCX-3 should provide the prospective transceiver owner with all the choice he needs for either three-band or five-band operation.

THE OTHER new equipment you'll see is the product of a 30 year tradition and three years of concentrated design effort by National's Advanced Development Team — the new *solid state* frequency-synthesized and phase-locked HRO-500 receiver.

MIKE FERBER, W1GKX

National Radio Company, Inc.

(*Continued from page 106*)

August, reports net mgr. K2HOH. K2HUK regrets that personal business prevented attendance at the RARA WNY Hamfest. From all reports this was the best yet and many compliments were received on the new location. W2CIL won the code contest by copying 40 w.p.m. with a pencil. K2SIL was runnerup. W2RUF won the ladies QSL contest. New calls—WN/B2NHR, WN/B2-NHS and WN2NHB. K2DNN gave a talk to the West Elmira Emerg. Corp. W2EUP and K2GUG gave a fine talk to the RAWNY on the 2-Meter F.M. Net in the Buffalo area and described repeater operation in detail. At last count 26 stations were active on 146.94-Mc. f.m. in Erie county. K2ISO, EC and Radio Officer for Wyoming county, has acquired f.m. gear for its RACES Net. Erie county soon will have 44 stations on 145.560-Mc. F.M. for the Radiological Net. Each station has a 100-ft. tower, gain antenna and emergency diesel power. Plans also are complete for an emergency operating center which will be fall-out proof. The Trend definitely is to f.m. for local RACES and AREC nets (fixed frequency). Extensive tests have proven that 5/8ths-wave 2-meter mobile antennas are superior. The RAGS is providing communications for the 1000 Islands Power Boat Marathon for the third straight year. Operation will be on 2-meter f.m. and will include W2AMY's repeater. K2PBK spoke at a recent GRAM meeting. WN/B2IQE is pres. of the S. Cayuga ARC. K2VOX and WA2BGH discussed f.m. gear at a recent ARATS meeting. Traffic: (May) W2GVH 505, W2RUF 284, W2-OE 232, WA2KQG 179, W2HYM 92, W2FEB 83, WA2-HSB 60, WB2DPR 54, K2OFV 37, WB2GAL 33, K2-QDT 32, WA2RLV 30, W2FCG 29, W2PV1 27, K2RYH 26, K2IMI 24, W2RQF 20, WA2GLA 18, WB2DMU 14, WA2GCH 14, K2JBX 12, WB2HSK 11, WA2ANE 10, WB2JCE 10, W2RUT 8, K2DNN 6, K2TDG 2. (Apr.) W2RUF 277, K2AYQ 17, WA2GLA 14.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN, K3-OOU and W3NUG. PAM: W3TOC. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. K3VPI visited at K2US. W3TOC now has an SB-10. Winners in the recent West. Penna. Mobileers Ground Wave Contest were W3LDB, K3MNN, K3SNW and K3MJW. The Steel City ARC reports via *Kilo Watt Harmonics*: W3SHT is now home recuperating; W3ZPZ attended the '500' race at Indianapolis; K3ZLV is being transferred to Los Angeles; W3KPI and W3NKM were elected to the offices of pres. and secy.-treas., respectively, of the Western Penna. DX Society. K3DFD is working in Columbus, Ohio. W3EGJ and W3EGK are now back on the air. Up Erie way: K3SBU is in W7-Land using the call W7LAH; K3UIK and K3ZGI now are on 6. The Uniontown ARC reports via *Magpie*: K3SAA now is on s.s.b. with a 20A; W3LSU has been appointed C.D. County Radio Officer. The Rorsehoe ARC reports via *Hamateur News*: W3LIV has his quad up; K3PCE in the U.S. Navy; KN3FGL has his Triband beam completed. The Coke Center RC reports: K3YCR now has his General; W3NCE attended the Dayton Hamvention; the range station, W3NAV, still is without commercial power. The Two Rivers ARC reports via *Spark Gap*: "Operation WESTPA" had W3M1W, W3-MRZ, K3QHM, K1SQP, K3NLL, KN3ZWB and K3-RQV participating; K3PGP won top honors in the State Science Contest held by the Penna. Jr. Academy of Science at Pitt. The Nittany ARC (K3HKK) is thinking seriously of sponsoring the Penna. QSO Party this fall. W3MIZ attended the '500' at Indianapolis. W3UHN has now discarded his old faithful 32V-1 and is using an Apache. Traffic: (May) K3PIE 203, W3NEM 192, K3PYS 95, W3KUN 80, W3LOS 39, W3IYI 29, W3JHG 29, W3OEO 24, W3UHN 23, W3SMV 17, K3OWN 16, K3SMB 12, W3GJY 8, W3LOD 4, K3EXE 3, K3-OOU 2, W3TOC 2. (Apr.) W3EGJ 16, K3SIQ 9.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU: RM: W9USR. PAM: W9VWJ. Cook County EC: W9-HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CDT. The EC Net meets every Sun. at 1600 GMT on 3840 kc. The reports coming in indicate that this year's Field Day final score will no doubt be the largest in the League's history. The traffic count for the ILN for the month of May was 32 and for the North Central Phone Net was 497. K9DDQ is recuperating from a neck injury received in an auto accident. WA9AJF was featured in an article on amateur radio in the *Elmhurst Press*. W9SXL, EC of McLean County, reports that 11 mobiles were active in the Bloomington Memorial Day Parade. The 147.5 Club held its annual dinner with an attendance of 80 members. This column's sympathy goes to the family and many friends of W9JZZ, who passed away June 1. WA9DXA's new 80-meter antenna is working FB. The Ninth Regional Net had a total traffic of 484 messages during 31 sessions. The North Central Phone Net held its annual picnic and get-together at the Kankakee River State Park July 12. WA9CKQ has a new inverted Vee for 80 meters. During the month of May many station activity reports were received from the OES appointees commenting on the various 6-meter band openings on both local and DX frequencies. WA9LJA is a new call heard in the Rockford Area. WA9KEH, WA9EVF, K9ZNS and K9-GPN participated in the Chicago Council Scout Fair held at the International Amphitheatre. The ARRL's Board of Directors approved the Cook County Ham Club's affiliation with the League. New OO appointees this month include W9QQG and K9SDZ. K9QFR was elected president of the Southern Illinois University Amateur Radio Club. K9KZB and WA9CCP are recipients of the BPL award. Traffic: (May) K9KZB 780, WA9CCP 704, W9HAS 163, WA9AJF 159, W9AKV 148, W9USR 115, K9CYZ 80, W9JDF 77, K9BTE 76, W9IDA 59, W9JXV 48, W9OKI 27, W9SMD 25, W9IFY 21, WA9-FVD 18, W9HBI 16, WA9DXA 14, W9PRN 10, K9FNB 4, W9LNQ 4, WA9HSZ 3, WA9FIH 2, W9KMV 2, K9RAS 1. (Apr.) WA9APT 2.

ILLINOIS QSO PARTY

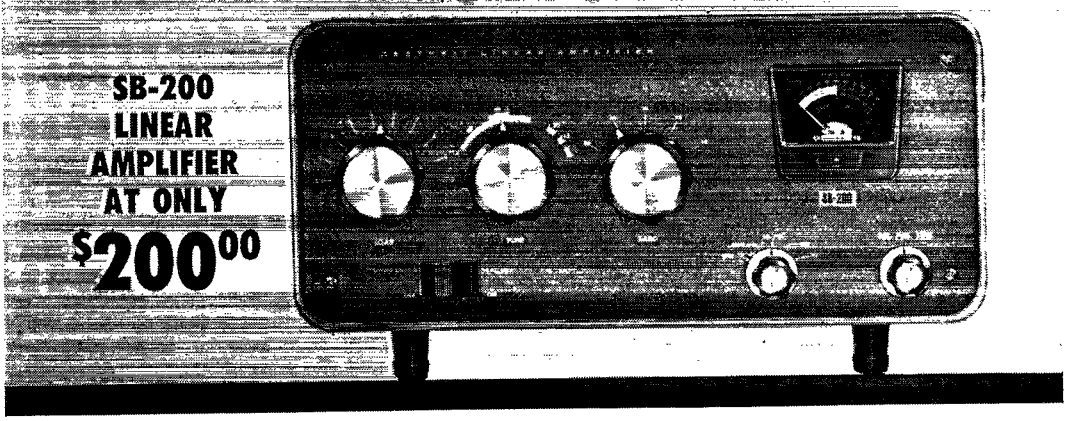
August 1-2

All amateurs are invited to participate in the Second Annual Illinois QSO Party, sponsored by the Illinois Chapter No. 17, CHC. The contest starts at 1600 GMT August 1 and ends at 2200 GMT August 2. The same station may be worked once on phone and once on c.w. Suggested frequencies are 3600 3900 7100 7220 14,100 14, 3100 21,100 21,300 28,100 and 28,700 kc. Exchange QSO number, report and county (in Illinois) or State, Province or Country. Illinois stations multiply total QSO points by the number of different states, Provinces and countries worked. All others use the number of different Illinois Counties for multiplier. In Illinois, single and multiple operator stations will compete for 1st, 2nd and 3rd place certificates. Outside Illinois, a certificate will go to the high scoring station in each State, Province and country. Logs must show dates, times, stations, exchanges, band, mode and score claimed. Illinois stations must show whether single or multiop. Postmark logs no later than Sept. 15, 1964 and send to Illinois QSO Party, c/o Cliff Corne, K9EAB, 711 West McClure Avenue, Peoria, Illinois, 61604, U.S.A.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9GLL, K9IVG. RMs: W9DGA, K9DHN, W9JOZ, W9TT. Net skeds in GMT: IFN 1330 daily and 2300 M-F on 3910 kc. ISN 0030 daily on 3920 kc. QIN daily at 0000 and RFN at 1200 Sun. on 3656 kc. New appointments: K9MAF and K9RJO as OOs Class III and IV. BPL awards: K9DHN and WA9AUM. QIN honor roll: K9VHY, K9HYV, WA9IZR, W9QLW, K9-DHN, WA9AUM, and K9WWJ. A 9RN certificate went to WA9EED. K9LGQ is the Red Cross club station in Indianapolis. Purdue ARC was voted the Best Club Award by the Purdue Student Union, and its officers are WA2SKY, pres.; WA9KCQ, vice-pres.; K9VNV, treas.; K9UKM, secy.; and WA9AMZ, member-at-large. Fine weather and a nice gang met at the Columbus Hamfest. The South Bend ARC used five 6-meter mobiles for coordinating the Memorial Day Parade. *Amateur radio exists because of the service it renders.* May net traffic: IFN morning 105, IFN evening 75, QIN 135, ISN 77, RFN 34, Hoosier V.H.F. 65, 9RN 484 with Indiana represented 100%. Traffic: (May) K9DHN 513, WA9AUM 511, K9IVG 420, W9JOZ 334, W9QLW 219, W9VAY 179, W9ZYK 126, W9TT 79, W9RTH 75, K9RWQ 55, W9FZW 52, W9YYX 48, K9HYZ 40, W9RUQ 30, K9CRS 29, K9VHY 29, W9DGA 23, WA9CJR 21, K9BSL 19, K9ILK 19, K9KTL 19, W9YIP 18, W9CC 17, K9SWL 17, WA9IZR 15, W9QYQ 14, W9FWH 13, W9DZC 12, W9ENU 11, W9FJI 9, W9DOK 8, W9BDP 6, W9SNQ 6,

(*Continued on page 114*)

#3 IN THE HEATHKIT® SSB SERIES



• 1200 watts PEP SSB—1000 watts CW • 80 through 10 meter band coverage • Built-in SWR meter—antenna relay solid-state power supply • Automatic Load Control (ALC) • Shielded, fan-cooled amplifier compartment • Pre-tuned cathode input circuit • Circuit breaker protection—no fuses • 120/240 volt operation

Handsomely styled to match the Heathkit SB-300 Receiver and SB-400 Transmitter, the new SB-200 is a completely self-contained desk-top KW Linear that provides globe-circling SSB power at tremendous savings!

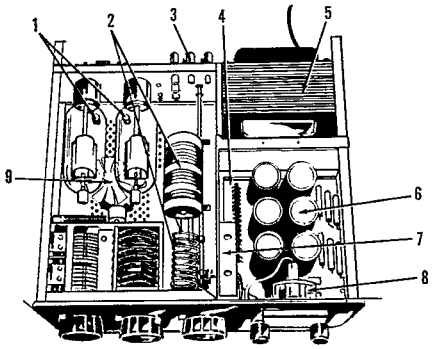
Many Advanced-Design Features! Incorporated in the SB-200 is a pre-tuned cathode input circuit for maximum efficiency and low distortion . . . ALC output for automatic exciter control . . . a rugged, well-rated solid-state power supply, protected by circuit-breakers (No fuses to replace or worry about) . . . two heavy duty 572B/T-160-L final amplifiers, fan-cooled for maximum life . . . complete shielding for maximum TVI protection and stability . . . plus a built-in SWR meter and antenna relay for full operating convenience. Antenna is automatically transferred to the exciter when the Linear is switched "off".

Quality Built Throughout! A heavy-gauge one-piece aluminum chassis, partitioned for extra strength and isolation of circuits . . . use of high quality well-rated components . . . and clean circuit layout all contribute to assure extra years of dependable, trouble-free performance.

Complete Operating Versatility! Compact and lightweight the SB-200 is an ideal companion for the SB-400 Transmitter, the soon to be released SB-100 Transceiver and nearly all other popular SSB & CW exciters in use today! Power supply operates on either 120 or 240 volt power sources for use anywhere. When you go "high power" choose the SB-200 for extra value, performance and dependability!

Kit SB-200, 38 lbs., $20 dn., $17 mo.....$200.00

SB-200 SPECIFICATIONS—Band coverage: 80, 40, 20, 15 & 10 meters. **Maximum power input:** 1200 watts P.E.P. SSB, 1000 watts CW. **Driving power required:** 70 to 100 watts, depending upon frequency. **Duty cycle:** SSB, continous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 db or better at 1000 watts P.E.P. **Output impedance:** 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. **Meter functions:** 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572-B/T-160L (in parallel). **Power requirements:** 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.) **Cabinet size:** 14⅞" W x 6⅝" H x 13¾" D. **Net weight:** 35 lbs.



1. Two heavy-duty 572B/T-160-L tubes in parallel **2.** Separate pi-network output coils for 80-20 meters & 15-10 meters. **3.** Pretuned cathode input circuits **4.** Long-life silicon high-voltage rectifiers **5.** Conservatively rated 120/240 volt power transformer **6.** High capacity (125 mfd ea.) voltage-doubler filter capacitors **7.** Two manual-reset circuit breakers for power supply protection **8.** Switched panel meter measures SWR, Rel. Pwr., plate current, grid current, & hi-voltage **9.** Fan-cooled final amplifier compartment for long tube life.

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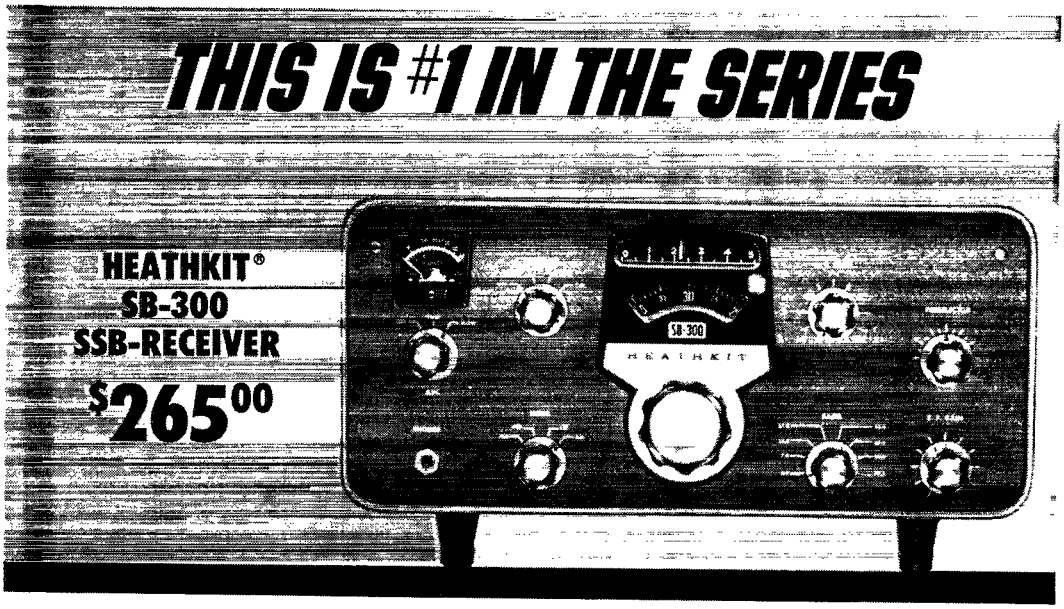

• Everything you could ask for in a deluxe receiver and more! • Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters • Crystal-controlled front-end for maximum stability on all bands • 1 kc dial calibrations—100 kc per dial revolution provides bandspread equal to 10 feet per megacycle—tuning knob to dial ratio approximately 4 to 1 • Provision for transceive operation with matching SB-400 Transmitter • Pre-built Linear Master Oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly • Professional styling and features at 60% savings

Good news travels fast! . . . especially on the amateur airwaves! Since its introduction, the Heathkit SB-300 has set the amateur world on its ear as one of the finest values in the industry! Deluxe styling and features now bring you a new dimension in quality, performance and dependability never before thought possible in kit form! . . . and by doing the easy assembly yourself you'll save 60% the cost of comparable units!

Experienced amateurs will quickly recognize the high standards to which this receiver was designed. Its many superb features include a crystal-controlled front-end for optimum stability on all bands, a pre-built Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations, a built-in crystal calibrator, hermetically-sealed 2.1 kc crystal band-pass filter, smooth non-backlash vernier dial mechanism . . . and many, many more! Order yours today!

Kit SB-300, less speaker
22 lbs., $27 dn., $22 mo.....$265.00
SBA-300-1 Optional AM crystal filter
(3.75 kc) 1 lb.....$19.95
SBA-300-2 Optional CW crystal filter
(400 cps) 1 lb.....$19.95
Export model available for 115/230 volts AC, 50-60 cps; write for prices.

SB-300 SPECIFICATIONS—Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** Less than 100 cps per hour after 20 min. warmup under normal ambient conditions. Less than 100 cps for ±10% line voltage variation. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected; LSB, USB, CW, AM. **Selectivity:** SSB: 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). AM: 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). CW: 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response:** SSB: 350 to 2450 cps nominal at 6 db. AM: 200 to 3500 cps nominal at 6 db. CW: 800 to 1200 cps nominal at 6 db. **Audio output impedance:** Unbalanced nominal 8 ohm speaker and high impedance headphone. **Audio output power:** 1 watt with less than 8% distortion. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heteradyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product Detector, BFO, BFO Amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14¼" W x 6¾" H x 13¾" D. **Net weight:** 17 lbs.

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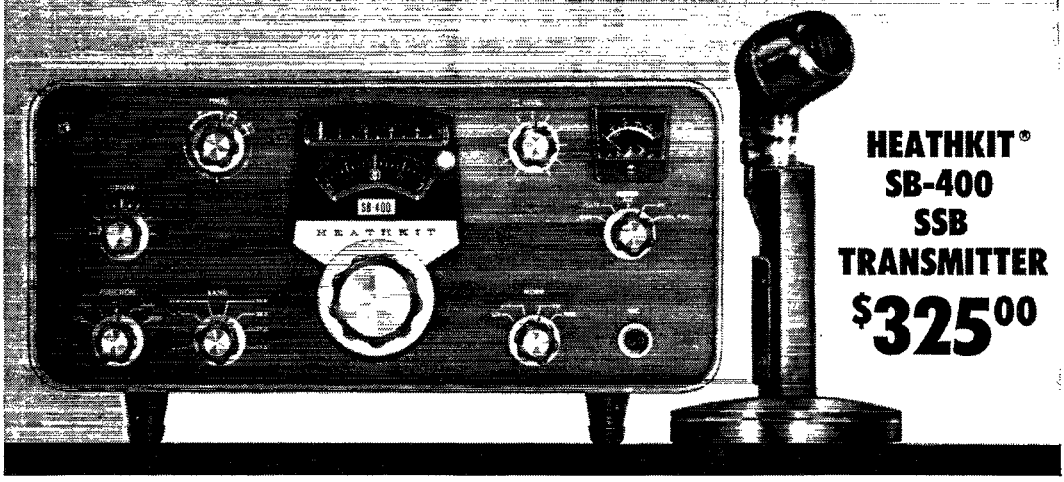

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• Built-in power supply • Complete transceive capability with SB-300 Receiver • Linear master oscillator frequency control • Built-in antenna change-over relay • All crystals supplied for complete 80-10 meter coverage • Automatic level control for higher talk power, minimum distortion • 180 watts PEP SSB, 170 watts CW • Crystal filter type SSB generation • Operates SSB (upper or lower sideband) & CW • VOX & PTT control in SSB operation, VOX operated CW break-in using CW sidetone • CW "shift" transceive operation to eliminate transceiver chasing • Crystal controlled heterodyne oscillators • 1 kc dial calibration—100 kc per dial revolution • Dial bandspread equal to 10 feet per megacycle • 500 kc coverage per bandswitch position • Switched 120 V AC for external amplifier antenna relay • Sturdy, lightweight, heavy-gauge aluminum construction throughout • Neat, modern "low-boy" styling

Here it is . . . the new Heathkit SB-400 Transmitter . . . second in the exciting new Heathkit series of Deluxe SSB Amateur gear! Following the same high standards set by the Heathkit SB-300 Receiver, the new SB-400 Transmitter now offers a matching counterpart that permits complete transceive operation with a host of advanced engineering design features for unmatched performance, versatility and operating convenience!

Unique mechanical design . . . prebuilt Linear Master Oscillator (LMO) . . . built-in heavy-duty power supply . . . sturdy chassis construction . . . beautiful modern styling . . . and power-packed performance are just a few of the many features that make the SB-400 your best buy in an SSB Transmitter! Order yours today for "Deluxe" communications at tremendous do-it-yourself savings!

Kit SB-400. . 33 lbs. . . Write for credit details. $325.00 Export model available for 115/230 volts AC, 50-60 cps; write for prices.

SB-400 SPECIFICATIONS—Emission: SSB (upper or lower sideband) and CW. **Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm—less than 2:1 SWR. **Frequency range:** (mc) 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0. **Frequency stability:** Less than 100 cps per hr. after 20 min. warmup under normal ambient conditions. Less than 100 cps for ± 10% line voltage variation. **Carrier suppression:** 55 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kc. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 cps. **ALC characteristics:** 10 db or greater @ 0.2 ma final grid current. **Noise level:** 40 db below rated carrier. **Visual dial accuracy:** Within 200 cps (all bands). **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **Backlash:** Less than 50 cps. **Oscillator feed-through/mixer products:** 55 db below rated output (except 3910 kc crossover which is 45 db). **Harmonic radiation:** 35 db below rated output. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 350 to 2450 cps ±3 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120 V AC line. **Dimensions:** 14⅞" W x 6¾" H x 13¾" D.

WATCH FOR THE NEW SB-100 ALL-BAND SSB TRANSCEIVER SOON TO BE RELEASED!

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...and for twice the power from Mobile Communications Equipment, without radical design changes, there's the new Amperex 8458

If the world renowned Amperex 6360 is—as virtually all designers of mobile communications equipment agree—a truly great tube, its new derivative, the Amperex 8458 is an even greater one! For in addition to the great performance, great low-profile convenience, and great reliability of the earlier twin tetrode, the new 8458 can be counted on to deliver 30 watts of useful power at 175 Mc from less than 1.2 watts of drive power.

To drive the 8458, Amperex has developed a second new twin tetrode, the 8457, a 13.5 volt heater version of the 6360. It is ideally suited for use as a cascaded doubler-multiplier, driving the 8458 as a straight-through amplifier in the 150-175 Mc band. This combination of new Amperex tubes provides extremely stable power output under low voltage conditions, since more than sufficient drive is available. Because the profile heights of these two new tubes are identical with the older 6360, modification of existing circuit designs can be made with resulting improved power and performance.

Both tubes incorporate a 13.5 volt center-tapped heater; are internally neutralized and have indirectly heated oxide-coated cathodes.

8458
SIGNIFICANT CHARACTERISTICS
CLASS C RF AMPLIFIER AT 175 Mc

	CCS	ICAS
DC Plate Voltage	400	450 volts
DC Grid No. 2 Voltage	155	200 volts
DC Grid No. 1 Voltage	−59	−50 volts
DC Plate Current	85	110 ma
Useful Power Output	20	30 watts
Drive Power	1.0	1.2 watts

Both the 8457 and 8458 are immediately available in production quantities from stock. For complete data on these and other Amperex tubes for mobile communications applications, write: Amperex Electronic Corp., Tube Division, Hicksville, L. I., New York 11802.

Amperex®

IN CANADA: PHILIPS ELECTRON DEVICES LTD., TORONTO 17, ONT.

(*Continued from page 108*)

K9UEO 6, WA9ELY 5. K9MAF 5, K9FPA 4, K9DHQ 3, K9GHN 3, WA9HQP 2, WA9AEL 1, WA9DVQ 1, K9HMC 1, K9SUH 1, K9WET 1. (Apr.) WA9BGI 16, W9FJI 3, K9FPA 3, WA9AEL 2, WA9DVJ 2, W9ZZR 2, W9TKK 1.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9BCC. PAMs: K9IMR, W9NRP and W9NGT. RM: W9IQW. Nets: WIN on 3535 kc. at 0045Z daily, BEN on 3950 kc. at 2300Z daily, WSBN on 3985 kc. at 2215Z daily and SWRN on 50.4 Mc. Mon. through Sat. at 0200Z. New appointee: K9WIE as OPS. Renewed appointment: K9GSC as OES. The Milwaukee AREC furnished communications for the Milwaukee Memorial Day Parade. New in Delavan are WA9JES and WA9LJL. WA9AKE, W9CXY, K9DKU, W9DYG, K9GRQ, K9GSC, WA9LCR, K9UUR and K9WIE helped Wisconsin to 100 percent representation in the 9RN for May. W9DYG is Mon. night NCS and WA9AKE is Sat. CAN representative for 9RN. WA9FXJ has his DX up to 55 countries. OESs K9FPM, K9DGY and K9DBR reported many openings on 6 meters including some XEIs heard. OOs were led by W9VSO with 16 notices sent in May. Net reports: WSBN, 588 offered, 499 cleared in 27:16 by 1307 check-ins; WIN, 120 offered, 92 cleared in 10:06 by 175 check-ins. Net certificates were sent to WA9GJV for WSBN and K9DID for BEN. K9IMR made the BPL on May traffic. W9ULK and W9ULM are on 2-meter f.m. 2-meter activity in Columbia, Sauk and Marquette County is increasing with 22 stations now on 146.94-Mc. Traffic: (May) W9DYG 300, W9CXY 291, K9IMR 254, W9FNT 61, W9AOW 59, WA9AKE 49, W9IQW 45, K9GSC 44, K9GDF 37, W9CBE 31, W9HPC 21, K9CJP 18, K9WIE 14, WA9EDZ 12, W9CCO 9, K9QKU 9, K9DGY 8, W9OTL 7, K9DBR 6, WA9AOI 5. (Apr.) K9UUT 8, K9FPM 5, W9FXA 5.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, WØHVA—SEC: WØCAQ. PAM: KØTYY. KØGGL is now an OO. WA8FRL/Ø, in Minot, is now on 6-meter s.s.b. With WØDRJ of Minot soon to follow. He is now building a sidewinder. WØGQD is now on the air with a new TR-3 and is scoring quite a few contacts. The North Dakota Fone net reports 24 sessions with 255 check-ins, max. 16 min. 7, 19 formal and 14 informal messages handled with one relay. The N.D. RACES Net reports 22 sessions with 581 check-ins, 39 for a max. and 15 for a min. and 30 formal and 125 informal messages were handled. Traffic: KØITP 94, KØGGI 14.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN—SEC: WØSCT. R.M: KØGSY. WNØIDW passed the General Class exam. KØZTV reports that five amateurs from the state attended Boy's State: KØYOB, WAØDXL, KØJHJ, KØZKJ and KØZTV. WØZKJ was elected Governor of Boy's State. KØSZJ assisted with the North Dakota balloon experiment. WØCYO, Veteran's Administration hospital, has purchased a DX-60 for the use of patients. KØBSW has a new NCX-3. the North Dakota balloon experiment. WØCYO, Veter-Traffic: KØGSY 250, WAØAOY 221, WØSCT 92, KØVYY 67, WAØCIJ 52, WØDVB 51, KØYNR 50, KØZBJ 11. KØBMQ 10, KØBSW 10, KØYJF 10, WAØFGV 6, KØKOY 6, KØTXW 3, KØZTV 3, KØHQD 2, WØWUU 2.

MINNESOTA—SCM, Mrs. Helen Mejdrich, WØOPX—Asst. SCM: Emerson Mejdrich, WØRIQ. SEC: KØKKQ. RM: WAØEPX. PAMs: WØYHR, KØVPJ. MSSB PAM: WØHEN. Appointments issued: KØZIW as OPS. Renewals: WØKJZ as OBS. Congrats to KØFLT, who has accepted the PAM appointment for the evening net. Many thanks and best wishes to retiring PAM WØYHR. A special "thank you" to retiring RM KØZRD, whose efforts reestablished MJN for the Minnesota section. Over 20 Rochester ARC and Piconet members participated in a recent simulated emergency "Operation Tornado." Two gas generators were used, plus eight 6-meter and five 75-meter a.m. mobile units. A 75-meter s.s.b. circuit also was used. Assisting were the county civil defense and Mayo clinic disaster committees. The Rochester flyer features another informative letter by ex-NCS KØSBB, now stationed in Bombay, India. Ralph enjoyed the tape recording of our Minnesota Phone Net sessions sent him by KØLWK. The Long Wire Net meets at 7 P.M. on 1805 kc. and invites all amateurs to join. WØTOF has built a 20-meter Wonder Bar antenna. WØCSC is home-brewing a DSC-500 receiver from the ARRL *Handbook*. WØTCK, WØHUU, KØKCJ and KØTZB are installing 52.525-Mc. f.m. mobile units. The severe recent storms forced many Minnesota amateurs off the air. Included were PAM WØHEN and WØJMI with lightning damage and WØGRW, whose antenna was destroyed. OBS WAØCQG reports encouraging increases in the new 6-meter section phone net. Your SCM and family enjoyed attending the annual Itasca ARC picnic and meeting. Congratulations to OPS WAØARA and ORS KØJFJ, who graduated from high school. KØICG has a new Galaxy 300. OES WAØDHN is working the Minneapolis area with a Heath Twoer. WAØFIE is building the 25-watt transistorized modulator from the '63 ARRL *Handbook*. Traffic: (May) WØYC 152, WØRIQ 93, WØKJZ 84, WAØDSH 62, KØZZR 54, KØVPJ 49, WØOPX 42, KØFTB 36, WØHEN 36, WØKYG 36, KØATO 31, KØZIW 31, WAØAAM 30, KØIJU 30, WØLIG 30, KØSRK 29, WØYHR 29, KØJFJ 28, WAØBZG 27, WAØEPX 26, WØGRW 23, KØKJS 23, KØBAD 19, WØALW 15, WAØDGW 15, WAØDXV 15. WAØEDN 15, WAØCQG 11, WAØFCJ 11, KØFLT 11, WAØEZQ 10, KØICG 10, KØZKK 10, KØJYJ 9, WØMXC 9, WAØARA 8, WAØASV 5, KØZRD 3, KØSXP 2. (Apr.) KØBAD 44, KØZRD 23, KØZRC 12.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: WA5INE. PAMs: K5IPS, WA5GPO. RM: K5TYW. New appointments: W5NIJ as EC of Craighead County and K5ABE as EC of Lee County; K5IPS as PAM- a.m.; WA5CBL as ORS. Renewed appointments: K5TCK as EC/ORS/OPS; WA5INE as ORS; WA5EKA as ORS. Cancelled appointments: K5GTN as ORS/OPS; K5GKQ as EC; K5SGG as ORS; W5WUM as OPS; WA5AID as ORS; WA5BDM as EC. A large part of the June Arkansas ARPSC Bulletin was devoted to Safety. May net reports:

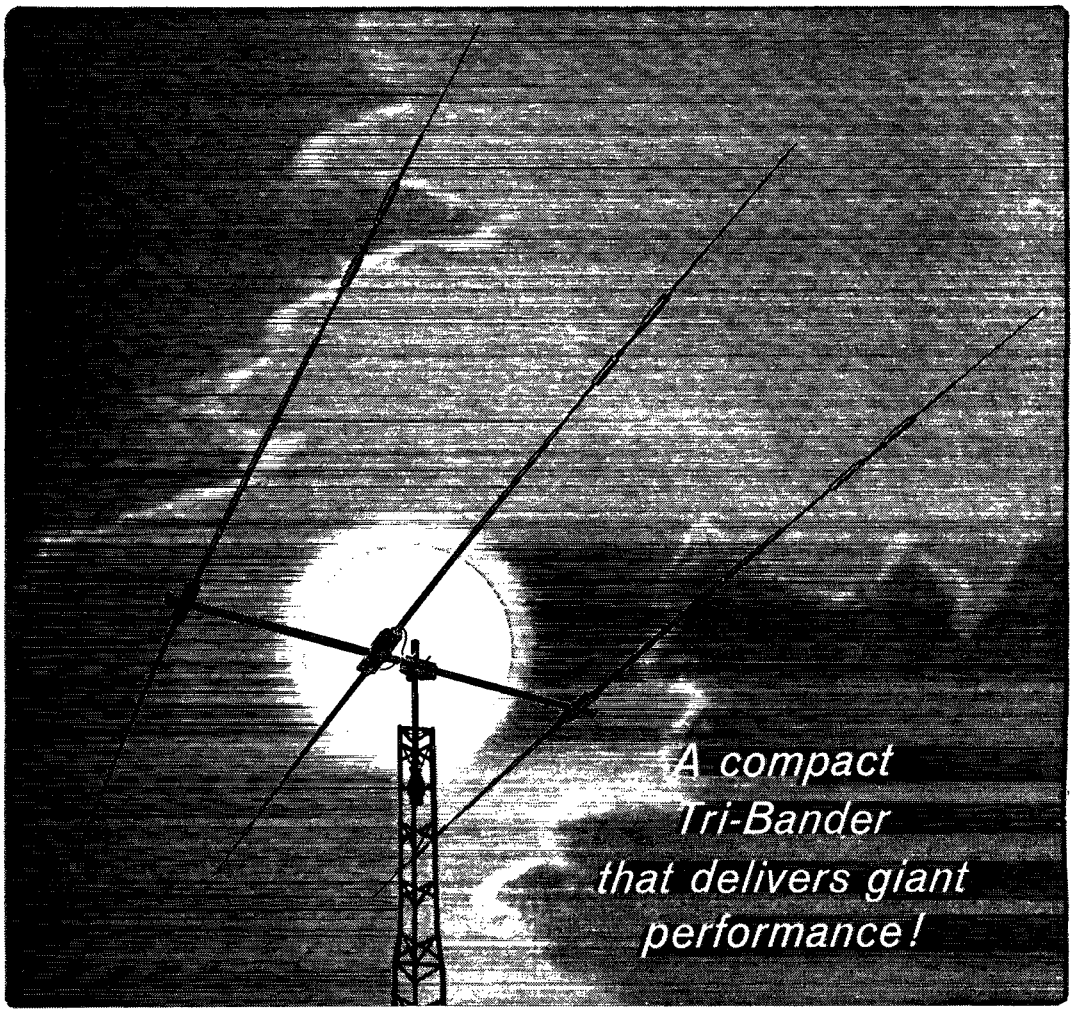
Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Avg. QNI*
OZK	3790	0100Z	Daily	31	141	285	9.2
QAN	3695	0400Z	Daily	0	0	0	0
AEPN	3885	1200Z	Mon.-Sat.	26	84	1057	40.6
RN(SB)	3815	0030Z	Daily	30	46	223	7.4

The QAN is another Arkansas c.w. net that operates as part of the National Traffic System and distributes traffic coming from the 5th Regional Net into Arkansas. Top stations on OZK were K5ABE 27, W5JWL 25, W5DTR 25, W9PHR 25, WA5AVO 24, K7RWI 24, WA5HNN 20. K5EDH reports two new hams in Gentry: WN5JKC and WN5JOO. The state ARPSC Emergency Communications Plan is printed and in the process of being distributed to all AREC members. If you are not a member of the Amateur Radio Emergency Corps, then *join now*. Traffic: (May) W5DTR 201, WA5INE 187, WA5AVO 180, W5JWL 84, WA5HNN 82, K5TYW 61, WA5CSJ 12, W5NIJ 12, K5TCK 12, K5ALU 11, WA5CBL 6, WA5BBS 3. (Apr.) KØTPM/5 4.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—As no other nominations were received on June 10, Jack Swanson, W5PM, was declared elected and will take over as Section Communications Manager for Louisiana. I want to wish the incoming SCM all the success in the world and I hope that amateurs in this section will cooperate with him in every way. RM W5CEZ made the BPL again. Carter has added an HT-45 Loudenboomer to his gear. W5MYZ has been very active in c.w. nets, especially LAN. WA5BQA has been off the air because of illness and antenna and receiver trouble. WA5BLO is busy pounding brass on LAN and RN5. WA5FNB, another LAN and RN5 man, made a nice traffic count in May. W5MXQ, our ex-SEC, is doing fine health-wise and is active on several nets including LAN, RN5 and MARS. WAPUS (worked all prefixes in U.S.) via Bossier High School has sent out over 170 awards. W5ZBC is back on after a 2-month QRT. K7FYI sends a correction about the unfinished projects found around the shack when he cleaned up. There were 7 at last count. K5KQG acquired a Galaxy III. W5TAV has been doing an FB job handling the Delta 75 Phone Net on 3900 kc. every Sun. morning. The net met on 3905 kc. for some 30 years until someone in the W5 area decided to run the net off the frequency. Traffic: (May) W5CEZ 575, WA5FNB 139, WA5BLO 137, W5MYZ 56, W5IQH 45, WA5BQA 43, W5MXQ 18, W5ZBC 7. W5EA 6, K5FYI 4. (Apr.) WA5BQA 46.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. K5RUO will be operating portable from New York City this summer. K5RIX is recuperating nicely from a broken arm. K5UBL/5 operated from a fire tower in the V.H.F. Sweepstakes and did well. W5VDA/5 is being transferred to Ohio; he has been a big help to the Miss. C.W. Net. The Gulf Coast Sideband Net meeting in Miss. City was a great success with an attendance of 92. Thanks to W5JHS and many others. We were glad to have W5LDH with us that night. New officers of the Magnolia Net are WA5GEK, mgr.; and K5MWR, secy. We are very pleased with W5JDF's work as new SEC and are looking forward to his com-

(*Continued on page 116*)



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• Excellent forward gain on all bands • Up to 25db f/b ratio
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If you're looking for a highly efficient, compact 3-element beam that delivers outstanding performance on 10, 15 and 20 meters...you'll want a Hy-Gain Thunderbird Junior. It installs almost anywhere...as a portable or maintenance-free permanent installation. It has all of the electrical and mechanical features found in the world famous full-sized Hy-Gain Thunderbirds ...exclusive Beta Match...seamless heavy gauge aluminum tubing...heavy gauge die-formed element to boom and mast to boom brackets and hardware that is iridite treated to MIL specs... injection molded cycolac plastic insulators...plus, all new Hy-Q moistureproof traps encased in ageless aluminum housings. Compact low wind load construction allows installation on a light-weight TV tower. Longest element on the 12 ft. boom is 27'6"...turning radius is 15'11". It's easily installed...quickly disassembled for high performance portable applications.

Model TH3-JR...**$69.50** Ham Net. *Get yours today from your favorite Hy-Gain Distributor or write for the name of the Distributor nearest you.*

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pletion of a manual for Novices re net training, traffic handling, etc. WA5BMC is doing a fine job with the N. Miss. Novice C.W. Net. K5SYG really is on the ball as alternate NCS for the Gulf Coast SB Net. W5IHP is active again from Natchez and W5OTD from Crystal Springs. W5IZS continues to do a good job with the Civil Defense Net. Traffic: W5JDF 188, W8VDA/5 96, WA5CAC 88, K5RIX 14, W5EMM 12, K5RUO 4.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: W4RRV. PAMs: K4WWQ, W4RMJ, WA4AIS. RM: W4MXF.

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Average*
ETPN	3980	0640E	M-Fri.	21	45	427	20.3
TSSN	3980	1830C	M-Sat.	26	95	910	35.0
TPN	3980	0645C	M-Sat.	31	141	852	27.5
TN	3635	1900C	M-Sat.	26	85	180	6.9
TPN	3980	0800C	Sun.				

WA4IBZ is the new net control on TN. WA4HRG graduated from high school and is looking forward to college in the fall. The Roane County AREC assisted the CAP in a recent drill. K4LPW visited Wilmington, Del., to attend the joint meeting of the PVRC and FRC. The Tenn. QSO Party was a big success and is looked forward to by all next year. K4KYL reports openings on 50Mc. to all sections. K4CLE is getting ready for serious work on 432 Mc. and tests with W4HHK whose 18-ft. dish is in operation. W4RRV is the new SEC for Tennessee. Monthly reports by ECs should be forwarded to him by the 4th of each month. Traffic: W4PQP 222, WA4IUM 218, W4ZJY 158, WA4HRG 100, W4KAT 75, K4WWQ 62, W4MXF 55, W4UVP 37, W4RMJ 29, W4PFP 28, W4VJW 20, W4VNU 20, W4HPN 15, WA4EWW 13, K4EWI 12, W4LLJ 10, WA4NUJ 10, K4NRZ 8, W4PJV 8, K4UMW 8, K4LPW 7, W4TYV 7, W4WBK 7, WA4AWG 5, W4VTS 5, WA4IBZ 3, W4SGI 2, W4OQG 1.

GREAT LAKES DIVISION

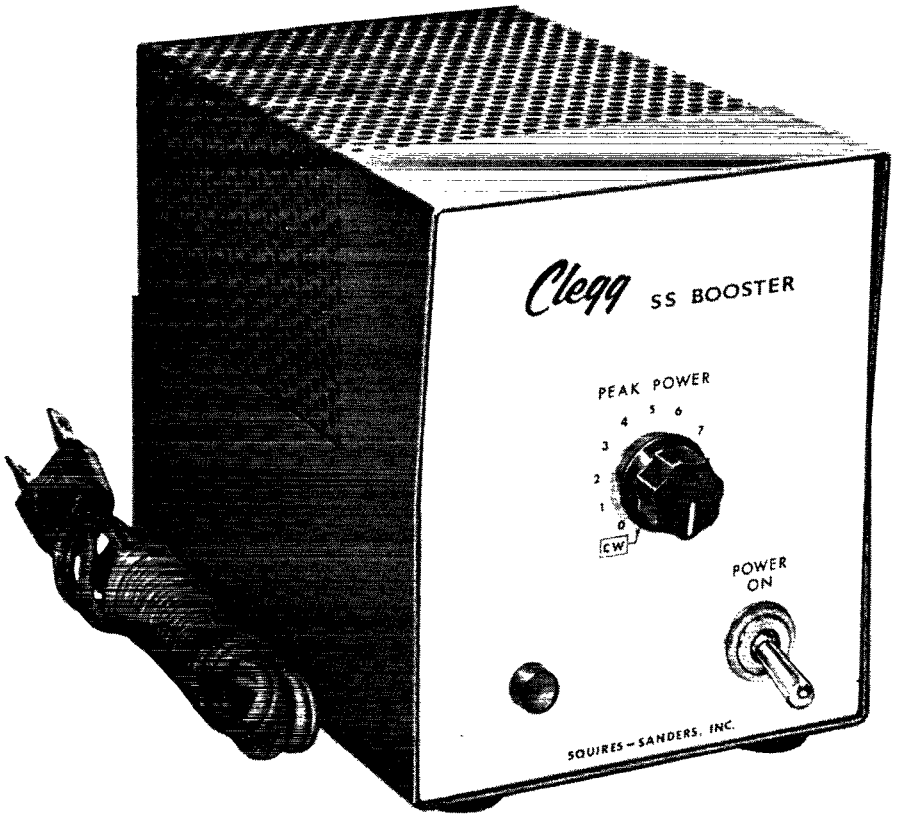
KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4QIO—SEC: K4URX. PAMs: W4BEJ, W4SZB, W4USE. V.H.F. PAM: K4KJQ. RM: WA4LCH. Appointments: K4URX as SEC, K4OQN as OO. May net reports as follows:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
EMKPN	3960	0630	M-F	21	328	42
MKPN	3960	0830 EST	Daily	30	466	58
KYN	3600	0900 & 1900	Daily	62	512	247
KPN	3960	1930 EST	M-F	21	631	64

The Louis. and Jeff. Co. 6-Meter A.M. Net Section 2 held 13 sessions with 174 QNI and QTC 19, WA4BSC has a new Valiant 2 and a new antenna. W4ISF has a new 50-ft. crank-up tower for the 6- and 2-meter beams. K4DZM was top QNI to 9RN in which Ky. was represented 93.5%. K4QHZ has moved to Lloyd, Ky. K4WVY has moved to Cincinnati, Ohio, and is mobile with a TR-3. K4DMU sports a new TH4 beam. The KYN dinner at Frankfort was a great success. The Owensboro Club had another auction to help the club kitty. A good time was had by everyone at the Mammoth Cave Hamfest in June. Don't forget the Bowling Green Hamfest in Aug. and the Henderson Hamfest in Sept. Listen around 21.150 Mc. at about 0200 GMT. A new KNN is being formed. Plans are not complete yet. Summer is in full swing but don't forget your news and station activity reports. Have happy and safe vacations. Traffic: (May) WA4LCH 330, W4BAZ 234, WA4BSC 138, WA4AGH 112, W4RHZ 104, K4DZM 88, K4HOE 37, K4TQZ 36, W4CDA 35, K4OLT 29, K4DMU 21, W4ISF 21, W4SZB 20, W4ZXV 20, K4VDO 17, WN4RVP 16, W4BEW 15, WA4HLW 12, W4PLN 12, WA4ELK 10, W4KJP 9, K4LOA 9, WA4GMA 7, WA4ENH 5, K4ZIQ 5, WA4NBX 2. (Apr.) K4YZU 100, K4ZIQ 4. (Mar.) K4YZU 280.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—RMs: W8EGI, K8QLL, W8FWQ, K8KMQ. PAMs: W8CQU, K8LQA. V.H.F. PAM: W8PT. Appointments: K8PVC as EC; WA8DCA and WA8CTC as OESs; W8CQN and K8RDE as OOs; K8GOU as OPS; K8EXE, K8IUZ and K8TDJ as ORSs. New officers: Amateur V.H.F. Assn.—W8DDO, pres.; K8NOS, vice-pres.; WA8CDR, secy.; WA8BLU, treas.; W8DX, dir. Ford ARL—K8UBV, pres.; W8PCR, vice-pres.; WA8GLY, rec. secy.; K8KJZ, corr. secy.; W8PDQ, treas.; WA8FCL and W8AOY, mgr.; WA8DTH, editor. Wayne State U. RC now is affiliated with ARRL. WN8KON got BBA from the U of M. K8IDX makes General. The Hills ARS and Hillsdale ARC now are affiliated with ARRL. WA8JVM makes General. VE3CYG/8 and VE3EYN/8 now are back in Ontario. W8BXO added an LSA-3 500-watt linear to his SBE-33 mobile with fabulous results. W8BXO's son W8TTZ is back from Europe and at the U. of M. W8COW and W8QF are out of the hospital convalescing. The Grand Rapids ARA announces its 17th Annual Michigan State Convention Oct. 16 and 17 at the Pantland Hotel, with "Swap'n'-Shop" at the Civic Auditorium, across the street. Too many hams worked in the mass-polio inoculatin to list 'em. There are two Generals and seven Novices in the

(Continued on page 118)



the Big BOOST for Sideband Signals.....

barefoot or with a linear!

The Clegg SS BOOSTER makes a barefoot VENUS sound like a "kilowatt".....and with an APOLLO 700 linear amplifier added.....WOW.....! Up to 20 db increase in average power results from this latest Squires-Sanders development (see Sideband Speech Clipping, QST, July 1964, page 11). The SS BOOSTER has other advantages, too.....it provides power level control.....it protects against "flat topping". Single panel control provides adjustment from no boost to approximately 26 db.

On-the-air test with the Clegg VENUS six meter transceiver produced the following results: 1) Until properly informed, many stations regularly worked previously (without the SS BOOSTER) were convinced a "linear" had been added. 2) Stations that previously could not be worked consistently reported solid and consistent copy when the SS BOOSTER was used. 3) Average reported signal improvement in weak-signal-path "A-B" tests indicated a gain with the SS BOOSTER equivalent to 6 to 12 db. 4) Over any weak-signal path, intelligibility was always better with the SS BOOSTER than without.

Several models of the SS BOOSTER will ultimately be available, the first of which is for use with the VENUS (as the Clegg SS BOOSTER illustrated above). Tests are currently being conducted on the application of this unit to other equipment such as the MARAUDER. Other versions include an SS BOOSTER built into the SS-1T (matching transmitter for the SS-1R receiver) and a model for use with sideband transmitters utilizing mechanical filters. The potential for application to existing equipment is broad on two conditions: 1) The SS BOOSTER must contain a filter matching that in the sideband exciter, and 2) The transmitter final amplifier (and a linear as well) must be capable of the increased average power input. With the SS BOOSTER in full BOOST, average power will approach peak power, thus tubes and power supply must be capable of operating continuously at (the equivalent of) full CW input.

Installation of the SS BOOSTER requires minor internal modifications. In the case of the Clegg SS BOOSTER for use with existing Clegg VENUS transceivers, complete instructions and an installation kit are included with the Clegg SS BOOSTER. Owners desiring factory installation will be accommodated at a nominal charge.

AMATEUR NET:

Clegg SS BOOSTER (for VENUS) $97.50. Other models priced according to specific filter required.

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475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

Michigan School for the Blind. Up to June 1 the Eye Bank Net had transferred 155 eyes. W8IWF has a new HT-44 working with his SX-117. K8YEK has a new GSB-201 1-kw. linear going. All Michigan clubs which publish bulletins should exchange bulletins on a free cooperative basis, or we should have one big bulletin, similar to Washington, D.C.'s *Auto Call!* Traffic: (May) K8NJW 415, K8KMQ 238, K8HLR 163, W8EU 110, K8GOU 110, W8ELW 108, K8BYX 92, K8WQV 88, W8GTL 82, K8LNE 76, W8BEZ 71, W8EJR 49, W8FWQ 49, K8SJQ 49, WA8DZP 47, K8PKU 47, K8QKY 44, W8FX 40, WA8FAO 32, W8MPD 31, K8QLL 28, K8JED 23, W8AUD 17, K8EXE 15, W8IHR 14, W8TBP 14, W8EGI 13, W8QQK 13, W8RHF 13, W8RTN 13, W8AHV 12, W8DSE 9, K8VFR 8, W8ZHB 6, W8HKT 5, K8VDA 5, W8FDO 4, W8WVL 3, K8ZZV 2. (Apr.) K8WQV 174, K8QKY 77, WA8DJC 20, K8TFE 17, W8ZLK 4.

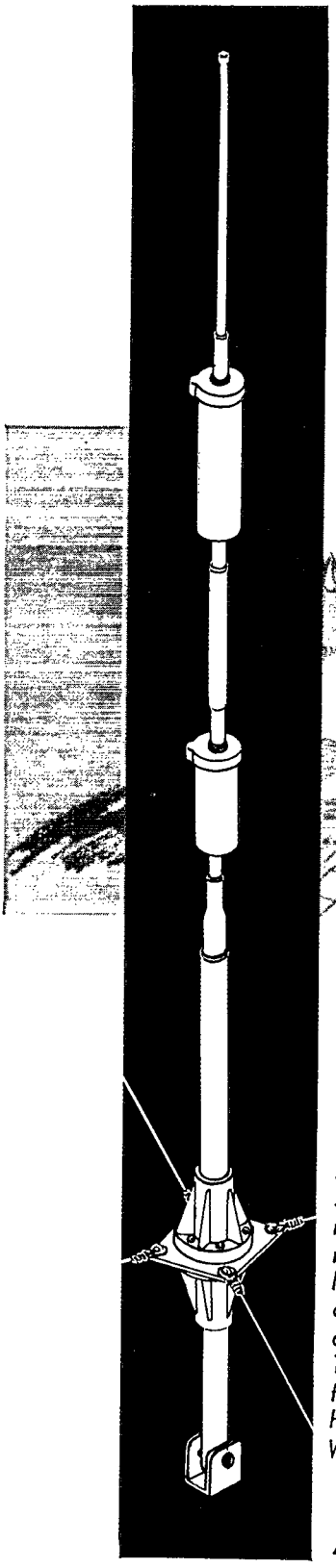
OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8UBK. After 63 years your SCM has moved from the old homestead to 1317 Logan Ave., N.W., Canton, Ohio. 44703. My shack had been in the same room 49 years. I'm late with this column, with writing it in one house and typing it in the other house. Appointments made in May were W8CUJ as OO and WA8BZR as ORS. Westpark RC 1964 officers are W8YPT, pres.; W8WUO, vice-pres.; K8GVK, secy.-treas. W8QV, W8QZH and K8LUP joined the Silent Keys. Cincinnati ARA's *The Mike and Key* saw a movie on travel and sports. Mark your calendar for Sept. 27 as the date for its big hamfest. W8ALW fell off a ladder putting his beam up and broke his wrist. Six Meter Nomads' *The Amateur Extra* reports that W8URV spoke on alternators and W8EPM is convalescing from an operation. Received Mount Vernon ARC's first edition of its *K8EEN Newsletter*, which states 1964 officers are W8OPU, pres.; K8WHZ, vice-pres.; K8LFA, secy.; W8NTP, treas. The club holds code and theory classes. WN8LSR is a new ham in Piqua. Tusco RC's *Beam* announces the club is celebrating its silver anniversary. K8RUU joined the Silent Keys. Seneca RC heard WA8BTT speak on Receiver Trouble-shooting in General. Parma RC's *P.R.C. Bulletin* says W8SUS gave a talk on the use of silicon rectifiers in existing circuits and also a talk on DX by W8BF. Columbus ARA's *Carascope* states that the club dedicated its new station W8TO; W8VHO is in the hospital. Toledo's *Ham Shack Gossip* tells us that WA8LUC and WA8LME are new amateurs in Toledo; W9ATP moved to Toledo; W8VWQ and WN8QCK have a new baby girl; and DJ1HP has made Toledo a port of call and while there he operated on 10-meter phone. Results of the 12th Ohio QSO Party are W8NBK-7280, W8ERD-5904, WA8ECE-4876, WA8DCQ-4040, K8GWK/8-3990, W8RYP-1767, W8BSR-1734, K8ANA-1566, K8YCM-1375, W8YNL-1334, W8YPT-1316, K8RXO-1200, W8JXY-1014, WA8ETX-943, W8KMF-780, K8TIE-154, W8VDF-49, K8LGB-42, W8GDQ and W8VJX. Warren ARA's *Q-Match* informs us that WA8GBB presented a program on Medicine and Electronics. W8DAE made the BPL in May. The Eastshore V.H.F. Radio Club is getting a sideband station together for both low bands and 6 meters. Traffic: (May) W8DAE 415, W8UPH 370, K8DIU 272, WA8CXY 209, K8LGB 150, W8BZX 106, W8TV 88, K8UBK 86, WA8CFJ 69, K8BAB 62, W8IEP 62, K8DDG 61, W8MGA 56, W8QCU 54, W8GRG 39, WA8JXM 39, WA8AWV 38, W8ILS 36, WA8AJZ 32, K8BAP 29, W8ERD 27, K8ONQ 25. W8DDG 22, K8VWN 16, WA8ADB 14, K8HDO 13, K8PBE 13, K8LGB 10, W8LZE 10, K8DII 8, W8WEG 8, WA8EIF 4, WA8EEW 3, K8MMZ 3, K8OBW 2, K8PJH 2, K8RFU 2, W8DIH 1, K8YWF 1. (Apr.) WA8CFJ 166, W8QCU 62, WA8BXN 36, W8DDG 16, K8ATA 5, WA8CCV 4, WA8EEW 3.

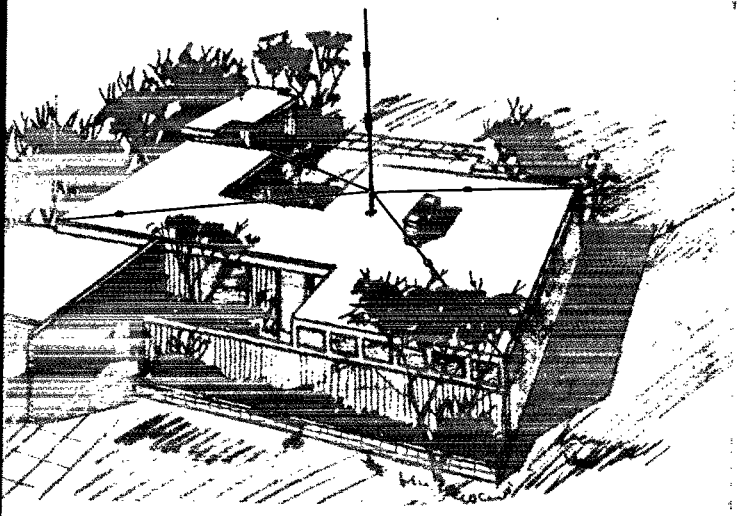
HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2200 GMT; Emergency Coordinators on 146,550 kc. Fri. at 0015 GMT. Endorsement: WA2PUM as ORS. Our congrats to K2SJN for his third BPL for May traffic. The new officers of the Schenectady Club are W2DAG, pres.; WA2CGD, vice-pres.; W2AZH, secy.; WA2TAG, treas.; K2ONF, WA2AHC and K2VCZ, directors. The Arlington H.S. Club, K2HSI, is on the air with a DX-35, sixer and twoer for all-band operation. Sorry to report as a Silent Key, W2CZN, at Ballston Lake. Your SCM was guest of the Albany Club at its May 22 meeting. K2MBF is instructor for evening classes at Hudson Valley Community College. The Westchester County clubs

(*Continued on page 120*)

What's New in Verticals ?





Setting the pace in 10, 15, 20 and 40 meters is Mosley's new RV-4 vertical antennas. These outstanding performance giving antennas can now be mounted on any roof as well as on the ground. They operate as a quarter wave vertical antenna on all four bands. The RV-4 features the Mosley slim line Trap-Master traps that have earned user acclaim through daily use in tens of thousands of installations throughout the world. These antennas have automatic band switching for 10 thru 40 meters. The RV-4 antennas are self-supporting and completely factory pre-tuned to maintain low SWR over entire range. The RV-4RK kit for roof mounting includes radial wire mast and hinged mounting. No radials required for ground mounting if a good ground connection can be provided within a few inches of the antenna base. Maximum power rating 750 watts on AM phone, 1000 watts CW and 2000 watts P. E. P. on SSB, input to final amplifier, Uses single 52 ohm coax line. Antenna height 20' 8-5/8" above insulator, with roof mount 25' 2-5/8" Weight of antenna 10 lbs., with roof mount 14½ lbs.

(In request of further information write for literature code # (8)

Mosley Electronics, Inc. 4610 N. Lindbergh Blvd. Bridgeton, Mo. 63044

are taking turns operating the World's Fair station, K2-US. A special commendation from the National Red Cross was received by the Westchester ARPSC for exceptional traffic-handling during the Alaska earthquake. Congrats, K2DEM is now a graduate of Yale Law School. A 30-w.p.m. sticker was received by WA2YHA in Albany. WA2VYS is the new manager of the Empire Slow-speed Net. K2EBX, WA2QMP, WA2USM and WB2FXB were among those handling the Memorial Day Parade in New Rochelle. Traffic: WA2VYS 330, K2SJN 144, WA2OOO 101, WA2PUM 82, WB2FXB 74, WB2FVD 61, W2PKY 44, W2URP 37, WA2VYT 37, WA2JWL 35, WA2YHA 35, WA2MHY 27, W2ANV 24, W2EFU 24, K2QJL 16, WA2ZPD 15, WA2WGS 9, WB2HZY 8, WA2-HGB 7, K2UTV 3.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN. Section nets:

NLI	3630 kc.	2315Z Nightly	W2WFL,	RM
V.H.F. Net	145.8 Mc.	0000Z TWTh	W2EW,	PAM
V.H.F. Net	146.25 Mc.	2300Z FSSnM	W2EW,	PAM
NYCLIPN	3932 kc.	2000Z Ex Sun.	WA2QJU	PAM

Coming soon! Neo-Telecommunications service! A traffic net designed around the beginning traffic-handler of the ENY, NNJ and NYC-LI sections. To be inaugurated in the Novice band for Novice and General alike, for the purpose of performing in the public interest, convenience and necessity at speeds and procedural methods convenient to all newcomers. Please apply to the SCM, RM or PAM. BPL certificates were awarded to WA2RUE, W2EW and WA2TQT. Net certificates went to WA2TKS, K2OKW, WA2VLF, WB2JHK, WB2-FXN, WB2EMO and WA2TLW as *exemplars* of the Kings County 6-Meter AREC Net. Also, net certificates went to W2SKX and W2IGH as *exemplars* of the Kings County 10-Meter AREC Net. New officers of the LI DX Assn. are W2GKZ, pres.; K2MGE, vice-pres.; and W2LJF, secy.-treas. WA2RMP now is running a new HT-32B. W2QAN is the new secy.-treas. of the Lake Success RC. WA2LJS has gone mobile with an AF-67 and a Super 12. New officers of the Wantagh RC are K2QNU, pres.; WB2DIN, vice-pres.; W2MVX, rec. Secy.; and WB2FCB, corr. secy. WB2IQG has just broken into traffic-handling using a straight key! W2DBQ is providing some liaison betwixt NLI and v.h.f. nets. W2PF has erected his first 20-meter-type beam 14 stories up after having used dipoles exclusively for over 40 years! WA2WAO reports that the Queens 6-Meter AREC is running all summer. WA2-OOL is studying at Brown U. this summer on a grant from the National Science Foundation. WA2RAQ invites all Kings 6-meter operators to join RACES on Mon. at 2030 EDST on 50.4 Mc. and AREC on Wed., same time and frequency. K2KYS is renovating the shack to make room for more gear. K2MEM reports that the Suffolk County Emergency net will handle any traffic for Suffolk. It is on Mon. at 0100Z on 29.56 Mc. WA2PCM, who is the technical advisor of the Catholic Mission Radio Assn., is back on 2 meters. K2CMJ is on 40 and 75 meters with a new KWM-2 and Cliff-Dweller. W2UWG is on 2 with the Clegg Zeus, Interceptor and eleven-element beam. W4TRU/2 was awarded a net certificate for work in the NYSPT and EN. WA2-TPM has gone mobile with a Communicator II and a Saturn 6 Halo. WB2ART homebrewed a new preamplifier for 6. WB2GND has worked 3 countries and 30 states on 6 meters with a Clegg-Thor. WA2IPC has picked up a CP-15 and is now working on CP-20. W2SEU built one each Nuvistor converter for 6, 2 and 220. New appointments: WA2PJL as ORS; WB2ART and WA2IPC as OESs. A net certificate went to W2-MMW as an *exemplar* of the Queens 10-Meter AREC Net. Traffic: WA2RUE 642, WA2VLK 350, W2MTA 336, W2EW 287, WA2PJL 156, WA2TQT 156, WA2QJU 72, WA2LJS 64, W2GKZ 62, WB2EUH 55, WB2HLM 47, W4TRU/2 46, WA2YLL 40, W2ELK 39, WB2IQG 37, W2DBQ 30, WA2VKK 16, W2EC 14, W2IAG 9, WA2-RMP 8, WA2EFN 6, WA2UYQ 6, W2PF 5, WA2WAO 5, W2GP 4, WA2OOL 3, WA2RAQ 3, W2SEU 3, WA2-IEC 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2-LQP. NNJ ARPSC Nets:

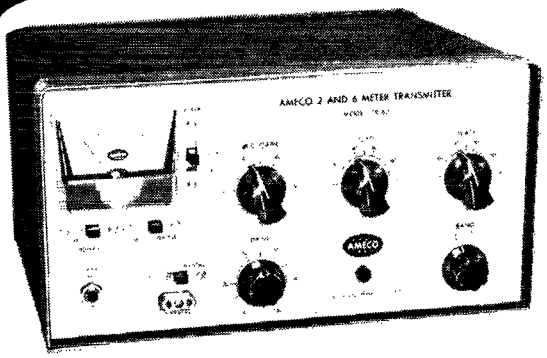
NJN	3695 kc.	7:00 P.M. Daily	W2TFM-RM
NJ Phone	3900 kc.	6:00 P.M. Ex Sun.	W2PEV-PAM
NJ Phone	3900 kc.	9:00 A.M. Sunday	W2PEV-PAM
NJ 6&2	51.150 kc.	11:00 P.M. MWSat.	K2VNL-PAM
NJ 6&2	146.700 kc.	10:00 P.M. Tue.&Sat.	K2VNL-PAM
NJNN	3725 kc.	7:20 P.M. MTWTh (Novice)	WA2SRK-RM

AREC local net schedules are available from the SEC, K2ZFI. We are now using local times above for the benefit of the newcomers. New appointments: W2TFM, W2NAK (ORS examiner) as RMs; W2WHB Newark,

(*Continued on page 122*)

AMECO *Leader in Compact, Quality Ham Gear*

NEW 2 and 6 Meter TRANSMITTER



The NEW AMECO TX-62

In response to the demand for an inexpensive compact VHF transmitter, Ameco has brought out its new 2 and 6 meter transmitter. It is easy to tune because all circuits up to the final are broadbanded. There is no other transmitter like it on the market!

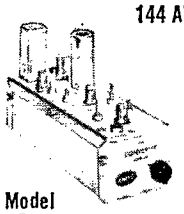
SPECIFICATIONS AND FEATURES

Power input to final: 75W. CW, 75W. peak on phone.
Tube lineup: 6GK6—osc., tripler, 6GK6 doubler, 7868 tripler (on 2 meters) 7984-Final. 12AX7 and 6GK6 modulator.
Crystal-controlled or external VFO. Crystals used are inexpensive 8 Mc type.
Meter reads final cathode current, final grid current and RF output.
Solid state power supply.
Mike/key jack and crystal socket on front panel. Push-to-talk mike jack.
Potentiometer type drive control. Audio gain control.
Additional connections in rear for key and relay.

Model TX-62 Wired and Tested only $149.95

• HAS BUILT-IN MODULATOR AND POWER SUPPLY • 75 WATTS PHONE AND CW • ATTRACTIVE LIGHT GRAY PANEL AND DARK GRAY CABINET • COMPACT SIZE 11½″ WIDE, 9½″ DEEP, 6″ HIGH.

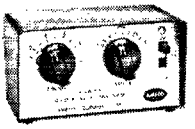
NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) **$49.95.** Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) **$34.95**

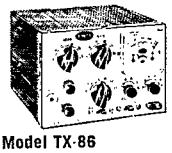
ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL, Wired, $24.95
MODEL PCLP with built-in power-supply, wired, $32.95

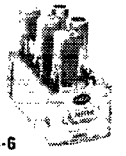
2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. —can be taken from receiver or Ameco PS-1 supply. Size: 3″x5″x3″.

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

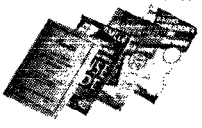
Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5″ x 7″ 7″ — ideal mobile or fixed. Can take crystal or VFO. **Model TX-86 Kit $89.95 — Wired Model TX-86W $119.95. Model PS-3 Wired $44.95. Model W612A Mobile Supply wired $54.95.**



CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix. 6J6 osc. $23.95
CB-2W — wired and tested. ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. **PS-1K — Kit ... $10 50**
PS-1W — Wired $11.50

EASY TO UNDERSTAND AMECO BOOKS



Amateur Radio Theory Course **$3.95**
Amateur License Guide ..... **.50**
Radio Operators' Lic. Guide, EL 1-2 ..... **.75**
EL 3 ..... **1.75** EL 4 ..... **1.25**
Amateur Log Book ..... **.50**
Radio Electronics Made Simple **1.95**

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4″ speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear. **Dept. Q8** **Ameco equipment at all leading ham distributors.**

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Affiliated with American Electronics Co. and Ameco Publishing Corp.

K2VNL Cranford, WA2SED Sparta as ECs; WA2UOO, WB2JCP as OESs; W2PEV as PAM. WB2ALF reports his 4000th QSO. Congratulations to WB2GJE, WB2JPR, and WB2NSV on the receipt of their General Class licenses! WA2VID has a new 75A-2. WB2DEP took honors in the CHC Party. WB2KXG, Asst. EC, has a DX-20 and an NC-270. W2PEV has a new trap antenna. WA2MXR has a new Apache and an NC-155. Jersey City RC officers: W2ECO, pres.; K2SST, secy.; W2ZAL, treas. The club net meets Tue. at 9 P.M. on 146.5 Mc. The Hudson County AREC Net meets Sat. at 3 P.M. on 28.610 Mc. The Middletown Emergency Net meets Sat. at 9 P.M. on 3.732 Mc. W2CFB is looking for hams interested in pulse on 3.5 kmc. WA2WAJ has 37 states on 6 meters. On May 23 the NNJ section held its second annual Preliminary Simulated Emergency Test, which was planned to further the cooperation between AREC and NTS under the ARPSC concept. Special effort was exercised to promote cooperation between AREC, civil defense (RACES), and other agencies so that all will work together in a smoothly operating emergency communications facility. Sixteen of the 20 ECs participated, and all of the section traffic nets held special sessions for the exercise. All Section League Officials performed yeoman service and 90 AREC members sent messages to the SEC. W2LQP, WA2GQZ, WA2SRK, WA2GQI, WA2VID and WA2TEK attended a recent traffic meeting with our neighbors in the NCY-LI section. WB2DDB received many high honors and prizes at the National Science Fair for his work in amateur television. The Union County Amateur Radio Assn. holds meetings the 2nd and 4th Fri. and code classes the first and 3rd Fri. at the Roselle C.D. Bldg. The Knights of the Round Table were instrumental in obtaining the Governor's Proclamation of June 22-29 as Amateur Radio Week in New Jersey. Traffic: (May) WB2ALF 687, K2VNL 264, WA2UOO 137, K2UCY 132, WA2MYB 123, WA2SRK 108, W2CVW 93, K2ZFI 92, WA2VID 68, WA2ZKT 66, W2LQP 64, WB2DEP 62, WB2AEJ 59, WA2GQZ 44, W2TFM 39, WA2WAJ 32, WB2HLH 28, WB2KXG 28, K2JTU 21, WA2KVQ 21, W2MZR 18, W2PEV 17, WA2CCF 13, W2DRV 11, WA2-MXR 10, WA2QPX 10, W2ZAL 9, W2CFB 8, K2SLG 8, WB2BCS 7, W2NAK 7, K2UKQ 5, K2EQP 4, WB2EZY 4, WB2GFV 2, W2NIY 2, W2EWZ 1, WA2PWI 1. (Apr.) WA2APY 1.

FIFTH NEW JERSEY QSO PARTY

August 14-16

The Garden State Amateur Radio Assn, invites all amateurs the world over to take part in the Fifth New Jersey QSO Party.

Rules: 1) The time of the contest is from 2300 GMT August 14 to 0400 GMT August 16. 2) Phone and c.w. are considered the same contest. A station may work another station twice per band, once on phone and once on c.w. The same station may be worked on other bands. New Jersey stations may work other New Jersey stations. 3) General call is "CQ New Jersey." N. J. stations are requested to identify themselves by signing "DE NJ" on c.w., and "New Jersey calling" on phone. Suggested frequencies are 1810, 3530, 3900, 7030, 7250, 14075, 14275, 21100 kc, 50-51 and 144-146 mc. 4) Exchanges consist of QSO number, RS(T), and QTH (state, province, or country), N. J. stations will send county for QTH. 5) *Scoring:* Outside stations multiply number of complete contacts times number of N. J. counties (maximum of 21). N. J. stations multiply number of complete contacts times total number of states, provinces, and countries. 6) Certificates will be awarded to the first and second place stations in each section, and lower where deemed necessary. Novice and Technician awards will be issued when two or more logs are received. 7) Logs must also show GMT time, date, band, and emission, and be postmarked no later than September 1, 1964. Logs go to GSARA. Red Cross Building, Broad Street, Shrewsbury, New Jersey.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—Asst. SCM: Ronald M. Schweppe, KØEXN. SEC: KØVBM. RMs: WØLGG, WØUSL. PAMs: KØBBL, WØLSF. New directors for the 75-Meter Noon Net are Dist. 1 WØ-TTT, Dist. 2 WØFMZ, Dist. 3 WAØDYG, Dist. 4 KØGIE, Dist. 5 WØSLC, Clum. Dist. 6 KØWVK,

(*Continued on page 124*)

INTERNATIONAL FREQUENCY METERS

designed for servicing!

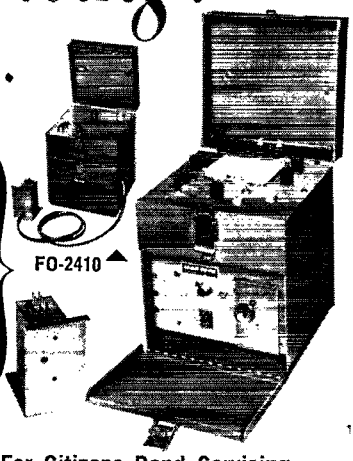
Equip your lab or service bench with the finest . . .

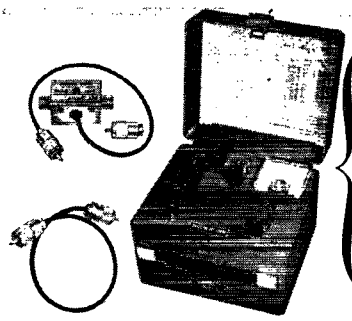
Discover new operating convenience.

FM-5000 FREQUENCY METER 25 MC to 470 MC

The FM-5000 is a beat frequency measuring device incorporating a transistor counter circuit, low RF output for receiver checking, transmitter keying circuit, audio oscillator, self contained batteries, plug-in oscillators with heating circuits covering frequencies from 100 kc to 60 mc. Stability: ± .00025% +85° to +95°F, ± .0005% +50° to +100°F, ± .001% +32° to +120°F. A separate oscillator (FO-2410) housing 24 crystals and a heater circuit is available. Dimensions: FM-5000, 10" x 8" x 7½".

FM-5000 with batteries, accessories and complete instruction manual, less oscillators, and crystals. Shipping weight: 18 lbs. Cat. No. 620-103 . . . . . $375.00
Plug-in oscillators with crystal $16.00 to $50.00





C-12B FREQUENCY METER For Citizens Band Servicing

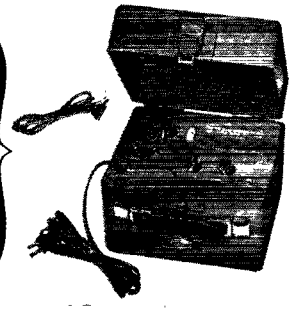
This extremely portable secondary frequency standard is a self contained unit for servicing radio transmitters and receivers used in the 27 mc Citizens Band. The meter is capable of holding 24 crystals and comes with 23 crystals installed. The 23 crystals cover Channel 1 through 23. The frequency stability of the C-12B is ± .0025% 32° to 125°F, .0015% 50° to 100°F. Other features include a transistorized frequency counter circuit, AM percentage modulation checker and power output meter.

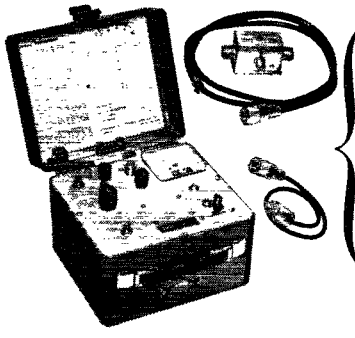
C-12B complete with PK (pick-off) box, dummy load and connecting cable, crystals and batteries. Shipping weight: 9 lbs. Cat. No. 620-101 . . . . . $300.00

C-12 CRYSTAL CONTROLLED ALIGNMENT OSCILLATOR

The International C-12 alignment oscillator provides a standard for alignment of IF and RF circuits 200 kc to 60 mc. It makes the 12 most used frequencies instantly available through 12 crystal positions 200 kc to 15,000 kc. Special oscillators are available for use at the higher frequencies to 60 mc. Maximum output .6 volt. Power requirements: 115 vac.

C-12 complete, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-100 . . $69.50





C-12M FREQUENCY METER For Marine Band Servicing

The International C-12M is a portable secondary standard for servicing radio transmitters and receivers used in the 2 mc to 15 mc range. The meter has sockets for 24 crystals. The frequency stability is ± .0025% 32° to 125°F, ± .0015% 50° to 100°F. The C-12M has a built-in transistorized frequency counter circuit, AM percentage modulation checker and modulation carrier and relative percentage field strength.

C-12M complete with PK (pick-off) box and connecting cable, batteries, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-104 . . . . . $235.00
Crystals for C-12M (specify frequency) $5.00 ea.

KEEPING YOU ON FREQUENCY IS OUR BUSINESS...

Write today for our FREE 1964 CATALOG

INTERNATIONAL CRYSTAL MFG. CO., INC.

18 NORTH LEE OKLAHOMA CITY, OKLAHOMA

S-T WØEEG. In addition to great activity on 6 meters we now have a flurry of activity on 432 Mc. We will soon be looking back on the "Good Old Days" when there was a great deal of activity below 6. I guess anyone can bounce a signal off one of the satellites or the moon. If we can get 6000 miles on 2 meters who can say what else can be done in that manner. But I am not going to junk my low-frequency gear for another year. Net activities: Interstate S.S.B., QNI 907, QTC 239, sessions 31; 75-Meter Phone Net (noon), QNI 1074, QTC 73, sessions 26; 160 Meter Net, QNI 486, QTC 1, sessions 31; Hamilton County Net, QNI 121, QTC 1, sessions 28. WØPFP is helping the Bureau of Standards again this year. We report the graduation of WØUGR. Good Luck, Gene, and I know that a certain manufacturer of ham equipment is going to profit greatly from your services. There were 73 station activities for May. Traffic: WØLGG 1579, WØBDR 1514, WAØFSW 586, WØNTB 98, WØUSL 81, KØQKD 50, KØBRE 20, WØYDV 12, KØKAQ 11, KØBBL 10, WØPTL 10, KØTDO 10, WØBKR 7, WAØGMZ 6, WØQVZ 6, WAØEYJ 5, KØYVU 5, WØNGS 3.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF. PAM: KØEFL. RM: WØSAF. V.H.F. PAMs: KØVHP, WØHAJ. EC zone areas will be revised, effective Sept. first, in the interest of a more efficient and cooperative system for emergency communication. All existing EC appointments will be terminated as of Aug. 31 and appointments under the revised area plan will become effective on Sept. 1. If the county in which you reside is reassigned to a new EC you will be notified of the change.

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Ave.*
KPN	3920	1245Z	M-W-F	18	34	366	20.3
KPN	3920	1400Z	Sun.				
NCSs: WØIFR and KØEFL							
QKS	3610	0030Z	Daily				

WAØDZI and KØGIC report lots of band activity on 6 meters. Congrats to the Air Capitol Amateur Radio Assn. and the new Pilot Knob Amateur Radio Club on their ARRL affiliation. Your SCM plans to attend the National Convention in Aug. at New York City and probably will take in a bit of the fair at the same time. Hope to bring home some new ideas that can be used in the section. Everyone else must have been on vacation. Look for you next month. Traffic: WØOHJ 412, KØGII 184, KØBXF 19, KØYTA 18, WØALA 11, WAØDZI 6, KØEFL 2.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. New appointments: K9RWK as OO; KØAEM as OPS; WAØEMS as OBS; WØRTO as EC for St. Charles Co.; KØEQY as EC for Adair and Macon Cos. Appointments renewed: WAØFLL as OES, WAØCWV as ORS; KØJWN as OBS; WØBUL as SEC. The MSM Radio Club elected WAØEMS, pres.; KØGYK, vice-pres.; K9DEJ, secy.; WAØBOL, treas.; WAØEZX, act. chmn.; KIEIU, sta. mgr. Macon ARC elected KØEQY, pres.; KØJMO, vice-pres.; WNØHHM, secy.-treas.; WØMQD, act. mgr. New on MON are WØJXI, KØAGX, WAØFBQ and WØLCW. WØJXI also is NCS on MON. Add KØKUD as NCS for MEN Wed. WNØIKQ is a new call in Springfield. The Minuteman ARC at Whiteman AFB received ARRL affiliation. WØIDF is secy.-treas. WAØFBQ got WAC and is now on 75 and 80 meters. WØOGC, EC St. Joe, has a stand-by power plant. WAØDJG is looking for 432 Mc. help in the St. Louis area. WØOUD and OM, WØDE, received a citation from the Governor for RACES work. I was happy to meet many of you at the Mo. picnic in Jeff City. We need a K.C.-St. Louis 6-meter link for traffic and emergency. See KØTCB for details. Net reports for May:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2345Z	M-W-F	13	244	76	WØBUL
MON	3580	0100Z	Tu.-Sun.	26	171	152	WØOUD
MNN	3580	1900Z	M-Sat.	26	85	31	WØOUD
SMN	3580	2200Z	Sun.	5	28	13	WØOUD
PON	3810	2100Z	M-F	20	163	148	KØBWE
MoSSB	3963	2400Z	M-Sat.	22	304	67	WØOMM

Traffic: (May) KØONK 1544, KØFPC 162, KØAEM 118, WØOUD 115, KØTGU 60, WØHVJ 51, KØBWE 39, KØTCB 39, WAØEMX 30, KØLQH 28, WØKIK 26, WØBUL 24, WØRTO 21, WAØCWV 12, WØEEE 11, KØWOP 10, KØEQY 5, WAØDJG 4, WØGQR 3, KØVIQ 3, WØBVL 2, WØOGC 2. (Apr.) WØBVL 20.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. May traffic reports: Nebr. Storm Net, QNI 913, QTC 114. Morning Phone Net, WAØCFB and WAØGRJ, NCSs, QNI 528, QTC 53. This net celebrated its 8th birthday June 1. Nebr. Emergency Phone Net, QNI 844, QTC 40. Western Nebraska Net, QNI 640, QTC 40, 100 percent check-ins WAØAES, WØAHB and WØNIK. AREC Net, QNI 79, QTC 1. The Nebr. C.W. Net, with KØYDS as NCS, meets at 0100Z daily at

(*Continued on page 126*)

SBE AGAIN!
with most for least

....SB1-LA LINEAR AMPLIFIER

Exceptional... in its compactness... in its high power... in its modest price... new 1000 watt P.E.P. four-band amplifier (80-40-20-15). **Small**... a size match for **SB-33 transceiver** and a companion unit **to make up a pair without equal** as a multi-band mobile combination. But SB1-LA will also work with any SSB transceiver... can boost its output to a full KW in fixed or mobile service.

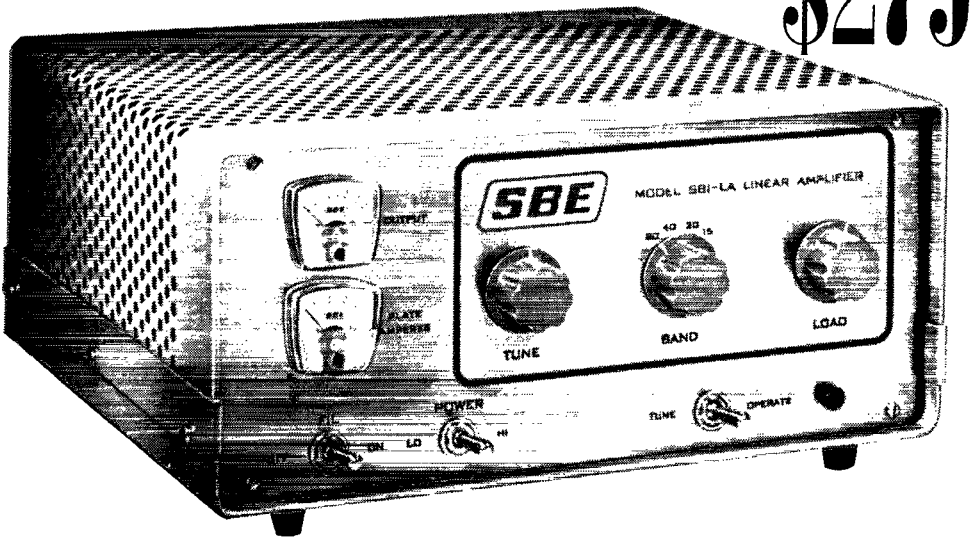
This new linear incorporates every desirable modern feature. Stable, with passive grid input, it offers a 50 ohm resistive load for SSB exciters. Operation is Class AB-1 for low distortion. Output is conventional pi network.

SB1-LA applies the desirable technique of low plate voltage (only 800 volts) and high plate current. This lower plate voltage is far easier on capacitors—diode rectifiers—transformers—insures safer operation under environmental extremes.

All-solid-state, 117V AC heavy-duty power supply is **built in.** (No rectifier tubes).

Tubes used are 6JE6's—six of them, parallel connected. These are standard, low cost types, available anywhere. (See specifications below for other features.)

$279.50



Please send full information on SB1-LA Linear and SB-33 Transceiver.

NAME

NUMBER STREET

CITY ZONE STATE

Bands: 80-40-20-15 meter amateur bands.
Power rating: 1000 watts P.E.P. input. (750 watts 15 meters).

Drive requirements: Approx. 75 watts for full rated output.
Input impedance: 50 ohms resistive.
Output impedance: (antenna) 50 ohms, unbal. VSWR 1.5 or less.
Power supply: Built-in all solid-state, 117V AC.
Primary power requirements: 115V AC @ 12A max. at peak output. (DC) **Standby:** 12.6V (nom) @ 7.5A. **Peak:** 12.6V @ 110A.
Tubes: Six, type 6JE6. (parallel connected).
Control circuits: Antenna switching relays (2) built in. Rear terminals for transceiver relay control.
Size-Weight: 5½"H, 11¾"W, 11¾"D. Weight 35 lbs. approx.

SBE SIDEBAND ENGINEERS
317 Roebling Rd. So. San Francisco, Calif. An operation of Webster Manufacturing

3525 kc. All check-ins are invited, with both fast and slow speeds. Appointments: KØYDS as RM; KØJXN as SEC. Larry Abbott, KØJXN of Almeria, has been appointed Section Emergency Coordinator and is in the process of reorganizing the AREC in Nebraska. Many ECs are needed. Check with Larry to see if you can help. Let's make Nebraska 100 per cent AREC. Traffic: WØLOD 99, WAØBID 38, WAØAES 34, WØFIG 22, KØDGW 20, WØZHV 20, WØNIK 18, WØGGP 17, WØEGQ 11, KØJXN 10, KØJFN 8, WAØCPS 7, WØNOW 6, WØVEA 6, KØCGM 5, WØBKW 3, WAØCDQ 3, WØAHB 2, KØBYK 2, KØHNW 2, WØHOP 2, KØJRH 2, WØPQP 2, WØRJA 2, KØUWK 2, WØWKP 2, WAØBIE 1, WAØCEZ 1.

NEW ENGLAND DIVISION

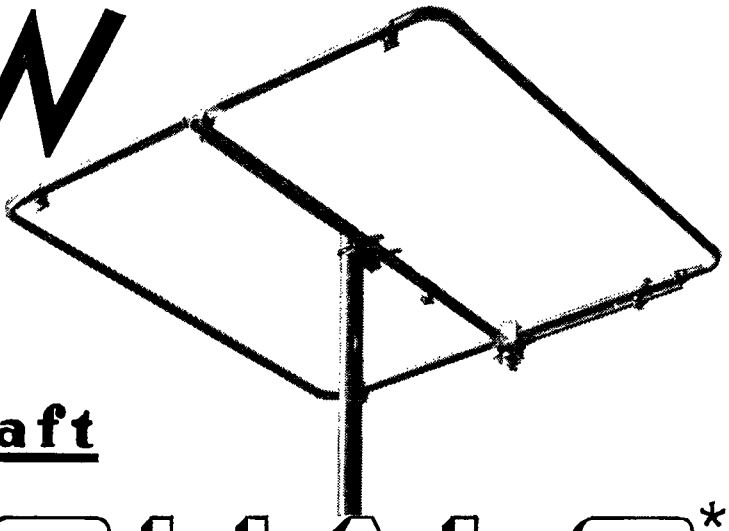
CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. PAM: W1YBH. RM: K1GGG. Traffic Nets: C.N., daily at 1845 on 3640 kc.; Conn. P.N., Mon. through Sat. at 1800, Sun. at 1000 on 3880 kc., Emergency Coordinators Net, Sun. at 0900 same frequency as Conn. P. Net. This net will hold sessions on the first Sun. of each month for the summer months. In Sept. it will resume each Sun. Net reports: CPN, 31 meetings, 159 messages, average attendance of 20 stations, high QNI K1AQE, K1NTR, W1YXB, W1LUH, K1OJZ, UQQ, EIC. CN reports 30 meetings with 485 messages, average attendance 11.6 stations, high QNI, W1ZFM, K1WXN, W1CTI. The latest Section Net Certificates are now ready, and will be issued as soon as the Net Managers forward calls, etc., to the SCM. Hope each station interested in same will request one if not already in line for such. You might also pass on your comments on your liking. The Shoreline Amateur Radio Club has been approved for affiliation. A new OPS is K1YIX, Trumbull. W1YBH's PAM certificate was endorsed. K1OJX met with an accident and will be off the air for some time but is not in bad shape. Get those Field Day logs and reports in, and don't forget the Sept. QSO Party. 20 meters is extra fine, according to the DXers, and is wide open around 2300 GMT. 50 Mc. is fine this time of year, with stations operating portable around the state, and OOs reports look good with fewer notices being sent out. Frequency Measuring activities are low and reports are not being sent in. Traffic: (May) K1WKK 501, W1EFW 253, K1UYZ 226, W1AW 201, W1NJM 167, W1RFJ 111, W1RZG 98, K1ZND 89, K1YIX 70, W1CTI 62, WA1ALZ 58, K1WXN 55, W1BDI 54, K1GGG 48, K1DQC 45, K1NTR 24, W1YBH 22, W1ZFM 20, K1AQE 12, W1BNB 4, W1CUH 4, K1QNF 4. (Apr.) K1WKK 511.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG. PAM: K1ADY. RM: K1MZB. Traffic nets: Phone—Seagull Net, 3940 kc. 1700-1800 EDT and 2000-2100 daily EDT except Sun. The Maine State C.D. Net meets Sun at 1100 EDT on 3993 kc. and Wed. on 3530 kc. at 1900 EDT with W1BYK as NCS. The AREC Net meets Sun. mornings at 0900 EDT with K1DYG as NCS. C.W.—The Pine Tree Net meets at 1900 daily Mon. through Fri. on 3596 kc. First Regional Net meets at 1815-1930 daily on 3605 kc. The PTN and the second session of the Seagull Net want more people to check in and make it even more enjoyable. Please send in all certificates that need to be endorsed. K1UXZ, working on WAS, needs Alaska and Hawaii. He should be mobile by now. W1ISO is working portable this summer and fall at Millinocket. The Kennebec County Two-Meter Net has closed down for the summer. K1NAN still is experimenting with 2 meters and the regular station seems to have trouble at this writing but we expect it to be in operation soon. New hams in the State: K1FLQ, Brewer, K1WWT Augusta, WA1BMG Sanford, WA1BQD Lewiston, WN1BVD and WN1BVE Farmington, WN1BWN Oldtown and WN1BWX Winslow. Congratulations and I hope to work you all in the near future. Traffic: (May) K4BSS/1 121, K1NAN 68, W1ISO 14, K1MDM 12, K1UXZ 2. (Apr.) K4BSS/1 107.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker Jr., W1ALP—W1AOG, our SEC, received reports from ECs W1STX, K1s PNB and ICJ. W1ALG and W1HWE are Silent Keys. W1BHY is ex-W5WPP on 6 now in E. Bridgewater. The Danvers ARA now is an ARRL affiliated club. Officers are W1ZMO, pres.; W1JLX, vice-pres.; K1TWJ, secy.-treas. The club meets on 29,660 kc. Mon. at 7 P.M. WN1BVU is W1FJJ's mother; he is in the Army at Fort Dix for 6 months. WA6CQF, formerly of Quincy, was here on a visit at my QTH. W1NF was laid up with bronchitis. EM1OMN held 11 sessions, 66 QNIs, 104 traffic. W1PEX worked NSS, AIR, WAR and NPG on cw, and made BPL. W1ZLX, K1VGM and W1LES also made it. K1OQX was in the hospital. W1HGT has the call K3FLQ in Delaware. W1RST is busy travelling. W4TFL moved back to Florida. K1BUF is busy with his sailboat. W1HKG is on 75-meter s.s.b. W1ELL has a new Valiant. The Malden Club had an auction. W1THT now is on s.s.b. K1OIC

(*Continued on page 128*)

NEW



Cush Craft

SQUALO*

6-10-11-15-20 or 40 METERS

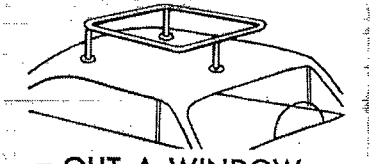
Cush Craft's continuing research produces another first —THE SQUARE HALO. Squalo is a full half wave, horizontally polarized, omnidirectional antenna. Outstanding all around performance is achieved through a 360° pattern with no deep nulls. Full size and compact dimensions provide a low Q for broad band coverage. Direct 52 ohm Reddi Match feed gives an SWR of 1.5-1 or less from 50 to 51 Mc.

The 6 and 11 meter Squalos are packaged complete with rubber suction cups for car top mounting and a horizontal support for mast or tower mounting. The 10-15-20 and 40 meter Squalos are designed for mast or tower mounting where space does not allow for larger antennas. Squalo is ideal for net control, monitoring, or general ham coverage.

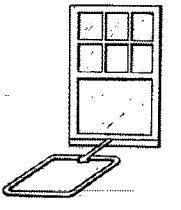
Whether you are a beginner, apartment dweller, or serious DX man the space saver Squalo is for you. You can buy one for each band and build a Squalo Tree!

Model No.	Description	Net Price
ASQ-6	6 meter 30" square	**$12.50**
ASQ-10	10 meter 50" square	**19.50**
CSQ-11	11 meter 50" square	**19.50**
ASQ-15	15 meter 65" square	**23.50**
ASQ-20	20 meter 100" square	**29.50**
ASQ-40	40 meter 192" square	**66.50**

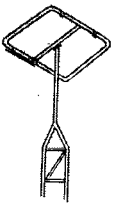
ON YOUR CAR



OUT A WINDOW



ON A MASK



*Pronounced Squaylo

Cush Craft

621 HAYWARD ST.
MANCHESTER N. H.

BUY FROM YOUR DISTRIBUTOR OR WRITE FOR FREE LITERATURE

was named "Ham of the Day" by a local station in the New Bedford program "Golden Rule" for his fine work during the Alaskan earthquake. K1PNB wants to know how you feel about having the Official Bulletins from ARRL sent at 15 w.p.m. on 3733 kc. Let him know. W1AUQ is on 75 meters in the afternoon. WN1ALM has his General Class license and is on the c.w. nets. W1QXB, RO for Melrose, is now our EC. W1HI and W1NC are both in the hospital and we wish them a speedy recovery. W1GAG now is mobile. The QRA held a business meeting. New officers of the Whitman ARC are WA1AGT, pres.; K1TZC, vice-pres.; WN1AXW, secy.; K1WNJ, treas. The club net will be on 50.70 Mc. New officers of the Yankee RC are W1MCE, pres.; K1VOM, vice-pres.; K1LFE, treas.; K1RHN, secy.; W1s GHD, ONW, K1s SMF, UVX, directors; W1TY, ham tamer. The annual banquet will be held at the Hotel Hawthorne, Salem. North Shore RA held a banquet to wind up the year. EM2MN held 21 sessions, QNIs 199, traffic 121. K1ESG worked WAR. K1DZG was in VE1- and VO1-Land on vacation. WA1ALM is in traffic nets. New Novices: WN1s BWO, BWR, BPY, BPZ, BQC, BPM, BPO, BPP, BVC, BVF, BVH, BVM, BVN, BVR, BVS, BVV, BVW, BWB, BWG. You are welcome to join our Novice Net on 3733 kc. Mon., Wed., Fri. at 6:30 P.M. K1PNB is in charge of this net. Appointments endorsed: K1WJD as OO; W1AUQ as ORS; W1DIY as OBS. New Technicians: WA1s BTB, BTC, BQE, BPL, AXX, BHG, BWU, BWV, BML, BPO. New Generals: WA1s BWI, BWJ, BWK, BSF. The 6-Meter Crossband Net held 20 sessions, 368 QNIs, 24 traffic. Heard on 75 meters: W1AEM, K1AG. Traffic: W1PEX 1352, W1ZLX 379, W1LES 284, K1ZHS 260, K1ESG 156, W1EMG 125, W1OFK 108, K1VGM 107, K1PNB 80, W1DOM 54, W1ZSS 32, W1AOG 31, K1LCQ 30, K1GKA 26, W1BJE 25, KN1FOM 21, K1VPJ 20, K1VOK 15, W1AUQ 14, K1FJM 14, W1VYS 10, K1OWK 7, K1CMS 6, K1DZG 6, K1BUF 4, K1FQY 3, WN1ALM 1, K1TKI 1.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. 75-Meter PAM: K1RYT. From the Hampden County Radio Association: Approximately 140 attended the annual banquet at which the new officers elected were K1IJU, pres.; K1RPB, vice-pres.; K1PMK, secy.; W1LRE, treas.; Bernie Goyer, Fred LaValley, George Hughes and Al Brosseau, board members. W1WPO, of ARRL Headquarters, was the speaker at the May meeting. K1IJV, W1UKR, K1PKZ, K1PIM and K1PIL were very active handling communications for the recent Women's New England Air Race. K1IJV and W1UKR also were chairmen of the YL affairs at Swampscott. Speakers at the West. Mass. section meeting at Swampscott were (in addition to yours truly) our SEC W1BYH/K1APR, our C.W. Route Mgr. K1IJV and our 75-Meter Phone Activities Mgr. K1RYT. The Hampden County 10-Meter Phone Net is going fairly well, but needs more members. This net meets on 28,700 kc. nightly. Central Massachusetts is running its traffic net on 50.4 Mc. at 6:30 P.M. nightly (check with K1VPN). K1RYT's XYL is now WA1BED and active on 6. W1ZPB is working some s.s.b. with his new HX-20 and has just gotten his 50th state. WMN (3560 kc. 7:00 P.M. daily) still is doing OK. Twenty-one different stations reported in during the month with top attendance honors going to W1BVR, K1IJV and K1SSH. Traffic: (May) K1SSH 184, W1BVR 120, K1IJV 113, K1LBB 25, W1DVW 11, K1VPN 11, W1ZPB 3, K1YMS 2. (Apr.) K1RYT 521.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI—The Granite State Phone Net meets on 3842 kc. (alt. 3845 kc.) Mon. through Fri. at 2330Z and Sun. at 1430Z. Attention C.W. traffic men: The VTN meets Tue. and Thurs. on 3520 kc. at 7 P.M. W1WFZ invites N.H. operators into this net. Congratulations to the Souhegan Amateur Radio Assn. on its League affiliation. W1TA will hold the N.H. QSO Party this year on Oct. 31 and Nov. 1. Appointment as OBS goes to W1TA also. Other clubs throughout the state should report their activities. K1BGI received ORS appointment. K1RTB is now WB2MFX. New AREC members are K1UQX and K1PQV. Endorsements: W1IQD and W1CTW as OESs. Fine scores were made by W1SWX/1 and W1TFS in the May Frequency Measuring Test. W1TFS has been endorsed as Class I OO. The missing monthly report recently was because of the holding off of preparing same caused by the lack of receipt of items for the column. As pointed out previously, news of activity is needed and should be in to your SCM by the 4th of the month.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE, RM: W1BTV, PAM: W1TXL. RISPN reports 31 sessions, 495 QNI, 100 traffic. The AREC Rag Chew Net meets Mon. at 2030 on 51.0 Mc. New officers of the Cranston Radio Assn. are W1BTV, pres.; W1JYF, vice-pres.; W1LZY, secy.; K1KCA, treas.; W1ZPG, net mgr. The W1AQ Club of Rumford issued

(Continued on page 130)

"SS-1R . . . . . in a class by itself"

DOUGLAS MICROWAVE CO., Inc.

252 EAST 3rd STREET • MOUNT VERNON, N. Y. 10550 • 914 MOunt Vernon 8-6900

CABLE – DOUGMICRO

June 3, 1964

Mr. Richard Marder, Sales Manager
Squires Sanders Inc.
475 Watchung Avenue
Watchung, New Jersey

Dear Mr. Marder:

I have now had my SS-1R (and SS-1S silencer) for a month and can now evaluate it, both from an operational as well as from a purely technical viewpoint. There is no question in my mind that the SS-1R is so outstanding that it is in a class by itself. In all my years as a radio "ham", going back to 1932, I have seen (and used) the "latest and newest", from the simplest (SW-3), to the HRO, to the Super-Pro, to the present Collins line. The SS-1R is as far ahead of them all as to be in a class by itself. This is one time when the expression "Sales is two years ahead of engineering" definitely does not apply; your engineering department is years ahead of your sales department. In my opinion you do not extoll strongly enough the real advantage of the SS-1R over anything else presently available. I am referring, of course, to the superb anti-cross-modulation front end design.

Having the good fortune (?) to be surrounded, within a radius of one mile, by at least three 20 meter, single sideband 1 Kw stations, I had been plagued by unusable wide sections in the band whenever these stations were on. I can honestly state now that the only time I am troubled with them is when I tune to within about 10 Kcs or less of their frequency.

It almost goes without saying, but, nevertheless, I must comment on the digital readout dial, the frequency stability and the ease of tuning; the receiver is superb and outstanding in all these features.

I have saved my comments on the noise silencer for the last. I recall, wayback in the late '30s, watching and hearing Jim Lamb demonstrate his I.F. noise limiter. In the twenty-odd years since then I had never seen (or heard) a noise limiter, clipper or silencer to better his original design; your SS-1R and SS-1S have now revised this opinion, but definitely! Again I feel your advertising of this feature is understated.

Being blessed with a good R.F. laboratory which makes it possible to check out equipment over the frequency range of 5 cycles to 90 Kilo megacycles (90 Kmcs), it was with a great pleasure I saw the results when I ran the receiver through its paces: signal to noise ratios were met easily; dial accuracy was exceeded (averaging 1/4 to 1/2 Kc error, but never getting close to your stated 1 Kc max. error); frequency stability, as measured with a Hewlett-Packard counter, never exceeded a maximum of 80 cycles, from a cold start over a two hour "warmup" period.

In conclusion, I leave you with this thought: If Collins is considered the "Cadillac" of receivers, your SS-1R should be considered the "Rolls-Royce".

Very truly yours,

DOUGLAS MICROWAVE CO., INC.

R. Harry Douglas
President
W2VRU

RHD:jr

P.S. Very Important-Please rush through the SS-1T transmitter; I am anxious to put it on the air.

the following WRI certificates: No. 45 to WA2CCF, No. 46 to WA2WEE, No. 47 to W1YPH, No. 48 to K9EAB and No. 49 to K1WQU. The club welcomed K1LDK and K1JYN back for the summer while on vacation from college. K1AMG, the pres.; is now on 6 meters and K1LII was elected public relations mgr. The club held a Social Evening and Dinner with the following attending: W1s YUT, BMG, WAC, K1s AMG, AGA and their XYLs and K1LII and his YL. The NCRC Club of Newport announced a C.W. Proficiency Award for members of the club. K1PTV will present certificates to qualifying members for 5 w.p.m., 15 w.p.m. and 25 w.p.m. W1BTV announces the RIN will meet at 3.540 Mc. Mon. through Fri. at 1900. K1NEF is net mgr., speed is between 10-15 w.p.m., and all c.w. hams are invited to join. K1EWL received his CHC Certificate. WA1BJS has worked 20 states on 6 meters. Traffic: W1TXL 503, W1BTV 174, K1TPK 119, WA1BJS 46, K1YEV 28, K1EWL 6.

VERMONT—SCM, E. Reginald Murray, K1MPN—The Green Mt. Net meets on 3855 kc. daily at 2130Z; the Vt. Fone Net on 3855 kc. Sun. at 1300Z: VTN on 3520 kc. Tue. and Thurs. at 2300Z; Vt. C.D. RACES Net on 3993 kc. Sun. at 1400Z. The Catamount (Bennington) Radio Club has applied for affiliation with ARRL. Officers are K1RYS, pres.; W1MEP, vice-pres.; K1URG, secy.-treas. Congrats to Sister Jeanne, K1YDS, on getting her Conditional Class license, and to new Novice WN1BUI. K1NEI has her WAS. Don't forget Int'l. FD at Cliffside Country Club in Burlington July 25-26 –a reely beeg shew for us Vermonsters. W1UXK and K1NLD are on 40-meter c.w. with 75 milliwatt rigs out-DXing each other. K1WSP is being heard with W1ZYZ's former rig. W1WFZ has been appointed RM. W1CBW and K1UZG are ORS appointees. May net check-ins: Gr. Mt. 414, Vt. Fone 132, VTN 35. Traffic: (May) W1WFZ 241, K1BQB 163, K1UZG 16, K1MPN 9, K1LLJ 6. (Apr.) W1KJG 9.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—RM: W7EMT. W7SLY still is QRL with the new home, but now has provisions for emergency communications with the Red Cross and also the Salvation Army. Conditions are improving on the FARM Net. The GEM Net still is going strong with W7EMT, K7CXG, W7KXJ and W7FGM keeping Idaho on the NTS map. This net meets on 3580 kc. at 0300Z. W7MJZ reports for the FARM Net: QNI 577, sessions 21, QTC 27. The GEM Net QTC:37. Traffic: W7EMT 95, K7CXG 26, K7HLR 18, W7GGV 11, K7OAB 7, W5FGM 6.

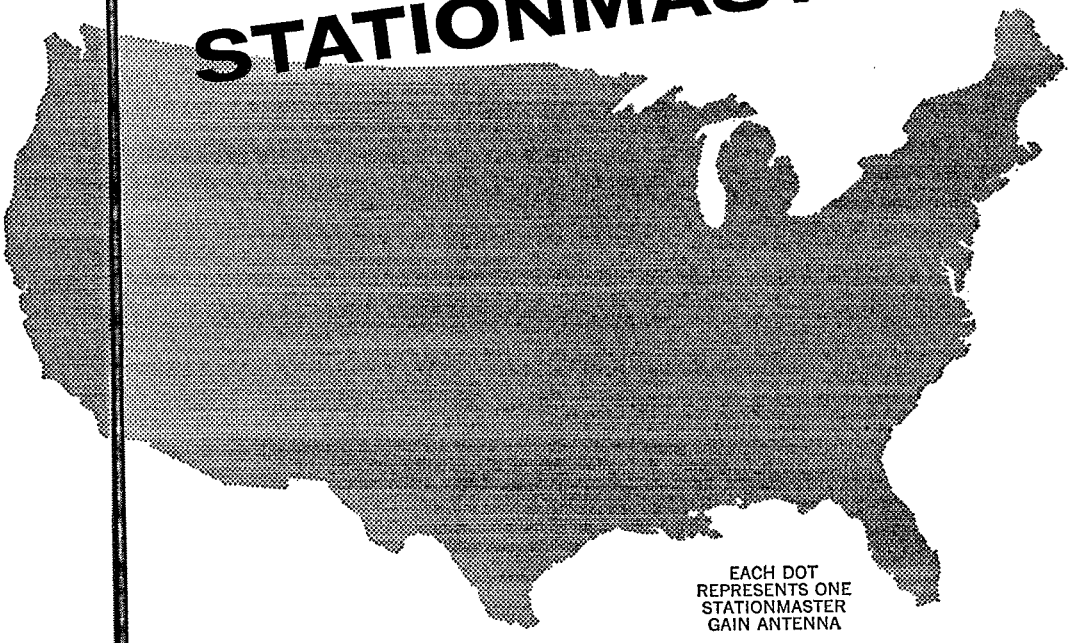
MONTANA—SCM/SEC, Walter R. Marten, W7KUH —Asst. SCM/L.F. PAM: Dr. Marvin Hash, W7YHS. V.H.F. PAM: W7TYN. RM: W7FIS. Appointment: K7-RGI as EC for Gallatin County. Excellent emergency communications was provided by amateur radio operators in Montana during the flood in seven counties on June 8, 9 and 10. A successful Montana amateur radio mobile drill was held on June 7, just one day prior to the disastrous Montana flood. KOPR, Butte radio station, now carries a regular weekly program titled "Ham Topix," reported by K7VJF, chief engineer of that station. We regret to announce the passing of W7NZV. New calls in Bozeman are WN7AJR, WN7AJS and WN7ALQ. W7DMF moved to Oregon. K7QNK moved to California. K7EVS has a new jr. operator born May 27. W7NPV has a Gonset G-50, five-element beam 30 feet above ground on 50.208 Mc. W7CJN has a home-built rig with three elements on 6 meters and holds regular schedules with W7NPV. K7IQI is active on 6 meters with a Heath Sixer to a Halo. The Big Sky Radio Club (Great Falls) holds transmitter hunts every Sun. Recent winners of this hunt were W7BOV, K7BYB, W7FGZ, K7IOA and W7KUH. K7VSS is setting up a new mobile control center in Billings. K7QLP now is operating with a TR-3. A new call in Billings is WN7AKQ, the XYL of K7WNB. K7DES is home from M.S.U. K7GHR is building a 10-meter rig. Those participating in the Nation Intercolllegiate Flying Association at Gallating Field were K7RGI, K7NIP, K7NKS, K7WOC, W7NPV and W7TQC. Montana S.S.B. Net traffic: 68. Traffic: K7EWZ 249, K7SVR 16, K7PWY 14, W7EWR 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. Appointments: W7GUH as OPS. Nets: OSN on 3585 kc. at 1830 PDT Mon. through Fri., AREC on 3875 kc. at 1900 PDT daily. Your participation is invited. OSN May report: Sessions 22, attendance 170-high 12, traffic 57-high 8, BRAT awards to W7AJN, W7BVH, W7ZFH, K7SGX and W7JHA for 100 per cent attendance. W7DEM reports: W7EF, of Grants Pass, is a Silent Key; KN7YNO now is K7-YNO; twenty local hams of Grants Pass handled communications for election returns; during the annual "Boatn'k" boat race on the Rogue River sixteen hams furnished communications using four emergency-pow-

(*Continued on page 132*)

Not 10,000... not 20,000... but over

25,000 STATIONMASTERS®



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ered stations and three mobiles covering the 25-mile round-trip race. W7JHA now is using a B&W 6100 on c.w., a.m. and s.s.b. with a Ranger as a standby. W6JKL is now K7ZRL and will be permanently located in Oregon. Traffic: (May) W7JHA 543, K7IWD 89, W7ZFH 32, W7DEM 20, W7MAO 10, W7AJN 8. (Apr.) W7GUH 23.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. There were 83 in attendance at the Huntoon meeting in Seattle on May 21 in the Chamber of Commerce building, and the No Host Banquet brought out sixteen to meet the General Manager and the Director of the League for the Northwestern Division. The Third Annual Banquet of the Puget Sound Council of Clubs was held at the Waller Road Grange in Tacoma on May 24. A total attendance of some 130 was counted, making a grand total of a little over two hundred for the two meetings. Mr. Huntoon also was guest speaker at this meeting. Those who failed to attend missed some very good information. K7s JRE, MWK, PFR and VSN all graduated from Sammamish H.S. in June. K7SRI made CP-30. The Skagit Salmon Bar-B-Q will be held the last week end of August. W7CZY Larry reports that he has added a 75S-3C to his station. The Spokane Radio Amateurs and the Fairchild AFB conducted a joint Field Day exercise from Mt. Spokane. K1RFX/7 soon will be operating from W2-Land. K7PVO, K7ZRF, K7DED and W7OEB represent Richland on WSN and RN7 regularly. W7PWA was a visitor at W7OEB's QTH during foxy vacation. K7OFW, K7KSF, K7QOM and W7s COG, OEB and YFO were active during the CHC/FHC QSO Party. K7DFS is having trouble with the DX-100 and his Johnson 500 lost the plate transformer. W7YFO sports a new TR-3 rig. K7RRM won the science award at Columbia High and will attend Whitman College in the fall. We understand that K7RSM lost "his" station. Brother K7HSA moved to Oakland, Calif. K7-PWM built himself a TO Keyer. W7JEY will be out of the section until August on a fine vacation. W7s AMC, DZX, OEB, APS and PGY renewed their ORS certificates. A new OBS in the section is W7BMG in the Tacoma area. W7ZAW is recuperating and being pieced back together in St. Marys hospital in Walla Walla. W7NSU is QRL making the boat seaworthy to sail the Mighty Columbia. K7WTA has a new SX-117 and HT-44 combo. June had a few 6-meter openings, according to W7GVC from Walla Walla to W6-Land. W7UVR still is rassling with antennas and rotators. Traffic: W7BA 829, W7DZX 688, K7CTP 224, W7APS 202, K7-JHA 107, W7OEB 87, K7SRI 48, K7JRE 42, W7AIB 27, W7GVC 27, W7AMC 18, W7EVW 8, W7JC 8, W7BTB 7, K7CHH 4, W7JEY 1.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—I received two requests of an additional hobby within a hobby of ham radio. Bill R. Long, 48 Porter Street, Yarmouth, Nova Scotia, wrote that he collects old "ham call" plates as an extra hobby. He's wondering if any Hawaiian station might have an old pair to send him. The other request came from A. R. Marcy, Col. Ret., W4-ID, 461 Third Avenue, Sea Park, Eau Gallie, Fla., requesting old copies of "Hawaiian" club news, club publications or local newsletters for his semi-historic collection celebrating our anniversary. Both of these fellows will forward postage for mailing if they are advised of the costs involved. Let's show 'em our *Aloha* spirits, guys. KH6EWB has sent in his AREC/ARPSC registration. Stan Harter and company put up a nice c.d. display for Armed Forces Day. The Army MARS, under the direction of K7GOK/KH6 and company; and the Air Force MARS, under Del Radant, KH6-EGO, had nice displays as well. *Got Your Zip Code filed with your latest address with Headquarters?* Traffic: (May) KH6NAA 12, KH6ATS 5, KH6BZF 4, K3-DIO/KH6 1. (Apr.) KM6DC 4.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. W4CJD/7 and K7SFN, the new RM, are doing very good jobs on the Nevada C.W. Net, 3660 kc. week days at 0300Z. KØCVH/7 and W7YAE are new to the Las Vegas 2-Meter Net. It was like Christmas recently at W7PBV's when the local MARS members gathered to pick up their surprises. All went away smiling with arms loaded. K7ICW, K7PYF, K7RKH and K7ZOK have been active on 6 meters. W7JU and his XYL spent a few days in Reno. W7PBV will be a candidate for reelection to the SCM position. K7ICS is moving to Phoenix, Ariz. K7AIN and K7TYE are moving to Yuma, Ariz. W7CXQ is reported on his way home from KP4-Land. W7PBV is about to get on the air with a new TR3 setup. K7BFM is trying to get some 6-meter activity going from western Nevada to eastern California. Traffic: W7CJD/7 59, W7PBV 5.

(*Continued on page 134*)

Coming to Geneva ?

International

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5th and 6th September, 1964

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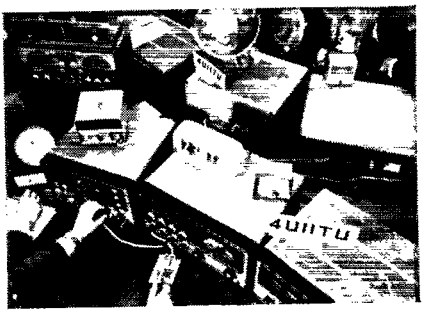

To the Secretary, International Amateur Radio Club
Geneva 20, Switzerland

☐ I intend to come to the IARC 1964 HAMVENTION.

☐ I apply for IARC membership. Please rush me information.

☐ I want a copy of the inaugural issue of the International Amateur Radio Club magazine 4U1ITU CALLING (I enclose 4 International Reply Coupons)

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(Address)

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6NVO. SEC: WA6HVN. V.H.F. PAM: WA6RXB. The Santa Clara Valley Section Net reports: Active stations 24; number of sessions 15; QNI 89, traffic 6. WA6RXB expects to see the net pick up in activity in the near future as stations in the northern part of the section check in. Anyone on 2 meters is invited to QNI on 146.7 Mc. at 8 P.M. local time. WA6DAU, mgr. of NCN, published a fine net report and bulletin and it is nice to note that S.C.V. is well represented in the net and that we are carrying our share of the load. The Santa Cruz Radio Club was very active in May with plans for Field Day. WA6YMX, new EC for Santa Clara County, has been appointed County Radio Officer and is in the process of reorganization of the program. His first county-wide meeting was held in June. The SCM and Pacific Division Director attended the May meeting of the Stanford Radio Club and gave the section a slide talk. K6DYX gave a talk to the Carmel Rotary Club with information from *200 Meters and Down* and was assisted on the air by WA6BZE and WA6LDM via 2 meters. Greetings were exchanged between the Monterey group and several nearby clubs. W6PLS is active with the San Mateo County c.d. group. W6RFF reached the QCWA age and is active on NCN. W6AUC is active as an OO. WA6UAM is off 80 meters now and active on 6 meters, preparing for college next fall. K6LFZ is active on the Hollister Emergency Net. WA6DBC is active as an OO around 7 and 14 Mc. especially for harmonics. K6HEP is now General Class. WA6RXB reports the Mission City RACES Net of Santa Clara operated K6TWX/6 on Mt. Allison on May 24 with WA6RXB, WA6TNX, WA6DHR, K6TWX, K6IKY, WB6DFC and WA6PTC taking part. Operations were on 144, 50, 14 and 7 Mc. K6MTX works Navy MARS. W6ZRJ has now taken over the K6USN code practice schedules on 3590 kc. Mon. Wed. and Fri. at 6 P.M. local time with speeds 5 through 35. Traffic: (May) W6RSY 737, K6GZ 272, W6YBV 172, W6AIT 121, K6DYX 92, W6ZRJ 53, W6PLS 48, W6RFF 34, W6AUC 24, K6EQE 8, WA6UAM 8, K6LFZ 3, W6WX 2. (Apr.) W3HC 125, K6EQE 2.

EAST BAY—SCM, Richard Wilson, K6LRN—Correction on last month's hidden transmitter results: K6JNW was first, followed by W6TYM and WB6CWA. W6FZC is moving south. The section will miss you, Nick. WN6HMH's gas station was held up May 9. K6ERM is recovering from an operation. W6EZA was SACEN/6 hidden transmitter May 15. WA6GUM was within 12 feet. WA6VXE also was close. K6SPP's OES appointment has been renewed and he will be on with a complete new station. Larry is vice-pres. of HRC, writes and publishes *The Chewed Rag* and is advertising committee co-chairman for the GBA Hamfest. If I had to depend on individual reports for this report it would end right here. I don't like to take this space which is supposed to be your station activities to editorialize, but in receiving the monthly station reports and the news stolen from the various club papers it would appear that there are about two dozen active amateurs in the East Bay section. This month I received 6 Form 1 cards and a letter. The rest of the stuff in this section is second-hand from the various club papers. If we don't use this space we will lose it. Here is the second-hand stuff: WB6HXB and Antone Perry are new members of the HRC. WA6KLL is a new OO in Livermore. WN6KGA is a new ham at Clear Lake and is the father of WB6CWA. WB6ETY is a new NCN QNI. W6LGW is waiting for an HW-12. K6IRB is operating a.m. mobile. K6DEL has a 522 on 2. WA6HGO/M was calling a WØ on 6 meters only to be answered by a W3. About 5 mobiles from the MDARC provided communication for the Fiesta Del Diablo Parade May 24. K6LRN and W6HD attended the Fresno Hamfest. As of June 15 our new SEC is Jack Palmatier, WA6OLF. WB6JGA has been transferred to Southern Calif. K6JZR and WA6DOO have a new Volks Camper and are heading East. W6NBX is waiting for the results of his Extra Class exam. With sorrow we note the passing of K6AFC, of Concord, and WA6PKG, of El Cerrito. Remember, all activity reports should be sent to me by the first of the month. Traffic: WB6JGA 285, K6JZR 15, W6NBX 10, WB6ETY 9, WB6ILH 8, K6LRN 6.

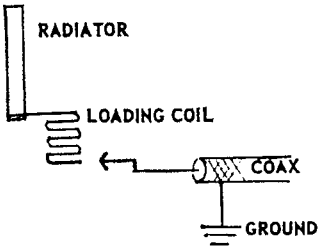
SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC: Mary Ann Eastman, WA6HYU. GEARS (Golden Empire Amateur Radio Society, Inc.) will hold its Annual Barbeque complete with prizes in Sept. WA6FWM and K6BYS say they have W6NHL's antenna, casualty of a gale-force north wind, back in better shape than ever. W6STX will be back on 160-meter mobile when he achieves delivery of his new car. W6RZW is working on c.d. gear. WN6JXU is one of the three named in the Chico Chamber of Commerce economics program. New club members: W6PJV and K6BMU. From Paradise: K6-

(*Continued on page 156*)

HISTORY - AND THE BIG SECRET

It is an historical fact that the Gotham 23' base-loaded, all-band vertical antennas have been consecutively advertised in QST for a longer time than any other antenna, and perhaps consecutively longer than any ham product.

When a product is popular and long-lived we sometimes lose sight of those newcomers who are not familiar with the 'secret' of its design. Here is the basic circuit:



A single 50 ohm coaxial feedline (either RG8/U or RG58/U) connects to the resonant point of the loading coil for operation on 80 or 40 meters, at SWRs of close to 1:1. On 20, 15, 10 and 6 meters, the loading coil is bypassed and loading is accomplished by the transmiter pi-network output or antenna tuner output.
Note that the antenna is not grounded, and that radials are not used.

We are often asked if a Gotham vertical antenna will operate on MARS, C.D., C.B., MARINE, or other non-ham frequencies. Here is a simple method of tuning to any desired frequency within the range of the antenna: The inner conductor of one end of the coax is moved up the loading coil a turn at a time while the other end is coupled to a grid dipper tuned to the desired frequency. At one point, there will be a decided dip, and this is where permanent connection is made. With an SWR indicator, this point will indicate minimum SWR. With a field strength meter, maximum radiation will be achieved. Using a transmitter, this point will permit proper loading.

GOTHAM VERTICALS DELIVER THE CONTACTS

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71
"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159
"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248
"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111
"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613
"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483
"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146
"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555
"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84
"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

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- Overall height 23 feet.
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- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

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☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS.....$14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

☐ V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... $16.95

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UHD finally has joined the s.s.b. ranks and is on the air with an HT-32. WA6BXZ is moving to Colorado. W6DSX, experimenting with his 20-meter Space Raider beam, is using 40-meter loading coils to see how it affects the 20-meter pattern. WA6SES found that higher power input with higher power voltage sadly disagreed with his 160-meter rig. MARS (McClellan Amateur Radio Society) is now an ARRL affiliated club. Many compliments and deep appreciation was accorded the RAMS (Radio Amateur Mobile Society, Inc.) for assistances during the KVIE, local TV educational station, Annual Auction. The participants were WA6YZO, WA6WNA, WB6AOJ, WA6UNL, WA6HGH, WA6THI, W6QHP, WB6FZY, WB6AOK and WB6DFO. K6GU is delighted with her new TR-3 and K6VPF with his 5-band Swan transceiver. According to the *Cookie Sheet* (El Dorado County Amateur Radio Club) the club will be, with the assistance of good friends in the Greater Bay area, sporting a wide-band f.m. repeater on 6 meters located at the hilltop residence of K6MGV —100 watts out, operating on a transmit frequency of 52.525 Mc. K6QWL has initiated a new activity called "Gavel Snatching." An invitation is extended to all radio amateur clubs in the Sacramento Area to visit in groups of 5 or more from each club, at which time a visiting club will be presented with the club's gavel. In order to regain it, K6QWL must return the visit. Should two clubs attend the same meeting, the club travelling the greater distance will be the recipient. The object—to make new friends and enjoy inter-club fellowship. W6LCI has his new 70-ft. antenna mounted in a pine tree. K1CAU/6 will be leaving this section shortly for a three-year period in Rapid City, S. Dak. and we will miss his faithful reports and activity on SJN and N. Calif. Traffic nets. W6CMA urgently needs help on the NCN Traffic Net on 3635 kc. New AREC registrants: WA6VEH, K6RPO, K6DQB, WB6HWV. Traffic: (May) W6WGO 70, K1CAU/6 45, W6CMA 30. (Apr.) K1CAU/6 1. (Mar.) K1CAU/6 35.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Fresno Amateur Radio Club held its Annual Hamfest at the Town & Country Lodge, with 450 hams and XYLs attending. WB6GML won a Swan transceiver, K6SEV a v.t. voltmeter, W6NTK a scope. W6IRV is on s.s.b., finally, with a TR-3 transceiver. W6HKV missed the hamfest because of measles. K6ROU is in Germany with the Armed Forces and will be on with a DL4 call before long. K6OZL is in Puerto Rico and will be on with a KP4 call and hopes to do some island-hopping during the DX Contest. W6NXL and K6PBL are studying for their General Class licenses. W6ZOI was a recent visitor in Fresno attending the hamfest. K6CPQ and WA6DAU are trying 10-meter s.s.b. between Stockton and Merced. WØDEO is located in Tracy and is on 6 meters. WN6JSH has a BC-348 and a DX-60 and is on 80- and 40-meter c.w. W6JXY has a Galaxy 300 and is going mobile. W6TZJ is experimenting on 1296 with a klystron and some power. W6NKZ is building a new final amplifier to take up to his cabin at Shaver Lake and will be on 40- and 75-meter s.s.b. K6LKJ was heard operating portable from the Sierras. K6GZN is an OBS in Stockton. Traffic: W6ADB 145, WA6VPN 86.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RM: WA4FJM PAM: W4AJT. V.H.F. PAM: K4MHS. W4EVN reports a going 9-station 2-meter net in Robeson County on 145.290 Mc. WA4PDS has started work on her final amplifier. K4QIF has completed a 416B preamplifier for 432 Mc. and wants skeds. Your SCM wishes to thank everyone who assisted in "Operation Election." It went off like a piece of well-oiled machinery, thanks to the organizational work done by the ASCM, SEC, RM, PAM and the section net managers, and proves again that all section nets, including the various v.h.f. nets, can be coordinated into one smooth-running communications system. I have received comments from the net managers suggesting that all who participated in the operation deserve a well-earned pat on the back, and a "well done." Station appointments completed since 1/1/64 include the following. OO—K4IGO. ORSs—WA4ICU, WA4BSJ, WA4BVF, W4EVN. ECs—WA4QNS, WA4LWE. Net traffic: CCEN 218, NCSSBN 172, NCN (L) 111, THEN 58. Traffic: (May). W4FDV 236, W4LWZ 220, W4EVN 204, WA4ICU 187, WA4PDS 181, W4IRE 155, K4CDZ 104, WA4LWE 85, W4BNU 70, WA4FJM 70, K4YYJ 67, K8MTI/4 65, WA4ANH 59, W4BAW 50, K4GNX 39, K4EO 32, WA4DKZ 31, WA4EIS 30, W4MUP 22, WA4KAC 17, W4AJT 10, K4MPE 8, WA4EYA 2. (Apr.) W4EVN 135, K4GNX 17.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ. RM: K4LND. A.M. PAM:

(*Continued on page 138*)

TELECOMMUNICATION EQUIPMENT by FREDERICK ELECTRONICS CORPORATION

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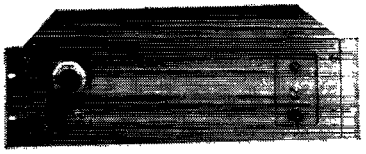

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for Simplified Morse Code Operation

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for Simplified Morse Code Operation

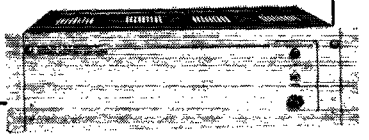
MODEL 670

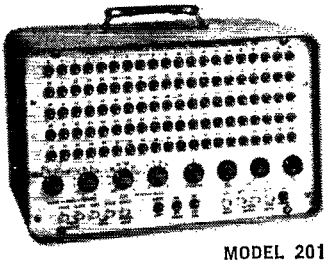
MODEL 700

5 Level to 8 Level Converter
provides interface between standard 5 level Baudot circuits and the new 8 level ASCII

8 Level to 5 Level Converter

MODEL 701





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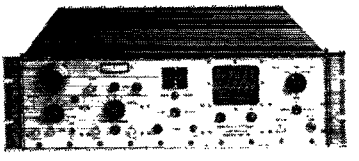
simulates virtually any Digital Data Signal



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for Wire Line, Radio and Recorded Systems

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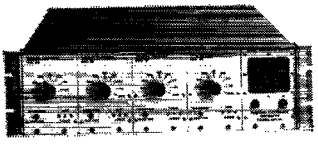
Telegraph Message Generator
replaces most Tape and "Canned" Message Transmitters

MODEL 352

Telegraph Regenerator
for restoration of distorted start-stop or synchronous telegraph signals



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provides interface between teletypewriter circuits operating at different baud rates

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K4OCU. Nets: c.w., 0000Z and 0300Z, 3795 kc.; a.m., 0000Z, 3820 kc.; s.s.b., 0100Z, 3915 kc. New appointments: K4OCU, as a.m. PAM; WA4LPX and WA4LPV, as OBSs. W4NTO, with an average error of 5.0 parts per million, was top man of the five S.C. Frequency Measuring Test participants. Our congrats to W4PED, newly-elected SCM of S.C. Charlie took office June 26 and is a most capable man for the job. The State Radio Council has withdrawn its affiliation from SCARAB for failing to abide with policies agreed to by both parties at the time of affiliation. One of the final pleasurable duties of the outgoing SCM was the awarding to the Aiken ARC of the plaque as the Field Day champions of S.C. The award, by the State Radio Council, was presented May 20 in Aiken. Check in to the new a.m. phone net on 3820 kc. and support your state AREC. Net traffic: C.W. 109. Traffic: WA4PFQ 108, K4LND 107, K4WOI 49, K4OCU 38, WA4JHD 32, WA4LPX 27, WA4LDM 26, WA4EMY 10, W4NTO 10.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ. RMs: K4MXF, WA4EUL, W4SHJ, W4QDY. PAM: W4JMA (s.s.b.), W4DKP (a.m.). K4TZF graduated from High School and is now headed for VMI. K4GRZ is trying to organize a 6-meter NTS net. K4HZS is helping. W4PTR is working on antennas at the new QTH. WA4FSC has a new LM for making frequency checks, and is sporting a new OPS appointment. WN4SGD QSOed KP4-BPH. W4DKP, the spark-plug of the VSBN and Asst. Net Mgr., has many irons in the fire and all are hot. Globe-trotter W4CVO is back from a trip to 14 countries. W4NVX just got back from some travels and is working on a homebrew s.s.b. rig. WA4KTZ, a VSBN NCS, now also is mobile. Contester W4JUJ was in the Conn., Ga. and Tenn. QSO Parties. Also caught W7-NWT in Nevada on phone and got a QSL completing WAS/YL! W4RHA is touring the Midwest. W4ZMT turned in another FB report on Operation Sugarcube. K4LJK is the new VSN NCS for Thurs. W4TE says that the trees kept breaking his antennas—now he has 3 towers. W4OWE's expedition to Goochland Co. resulted in 95 QSOs. The Roanoke Hamfest was a big success. Ye SCM provided a few rare counties to several of our amateurs on the way to the 'Fest. Asst. SCM and SEC, W4SHJ and WA4EUL, VSN Mgr., travelled together and had fun mobiling. Several very interesting traffic meetings were held at the Vinton War Memorial and Roanoke Division Director W4MWH attended the s.s.b. gathering along with the other section officials. Director Anderson and the SCM each addressed the ham gathering at large. Traffic: (May) W4DLA 427, W4-MXU 308, WA4EUL 303, K4PXY 236, W4RHA 171, WA4-FCS 150, W4OKN 80, K4FSS 77, W4TE 67, WA4KTZ 66, W4ZMT 62, W4ZM 44, W4OWE 42, W4DKP 38, WA4-FSC 29, WA4KVR 22, W4QDY 22, K4LJK 17, W4ZAU 15, W4MK 9, W4JUJ 6, W4NVX 4, K4IIP 3. (Apr.) W4NVX 17.

WEST VIRGINIA QSO PARTY

August 29-31

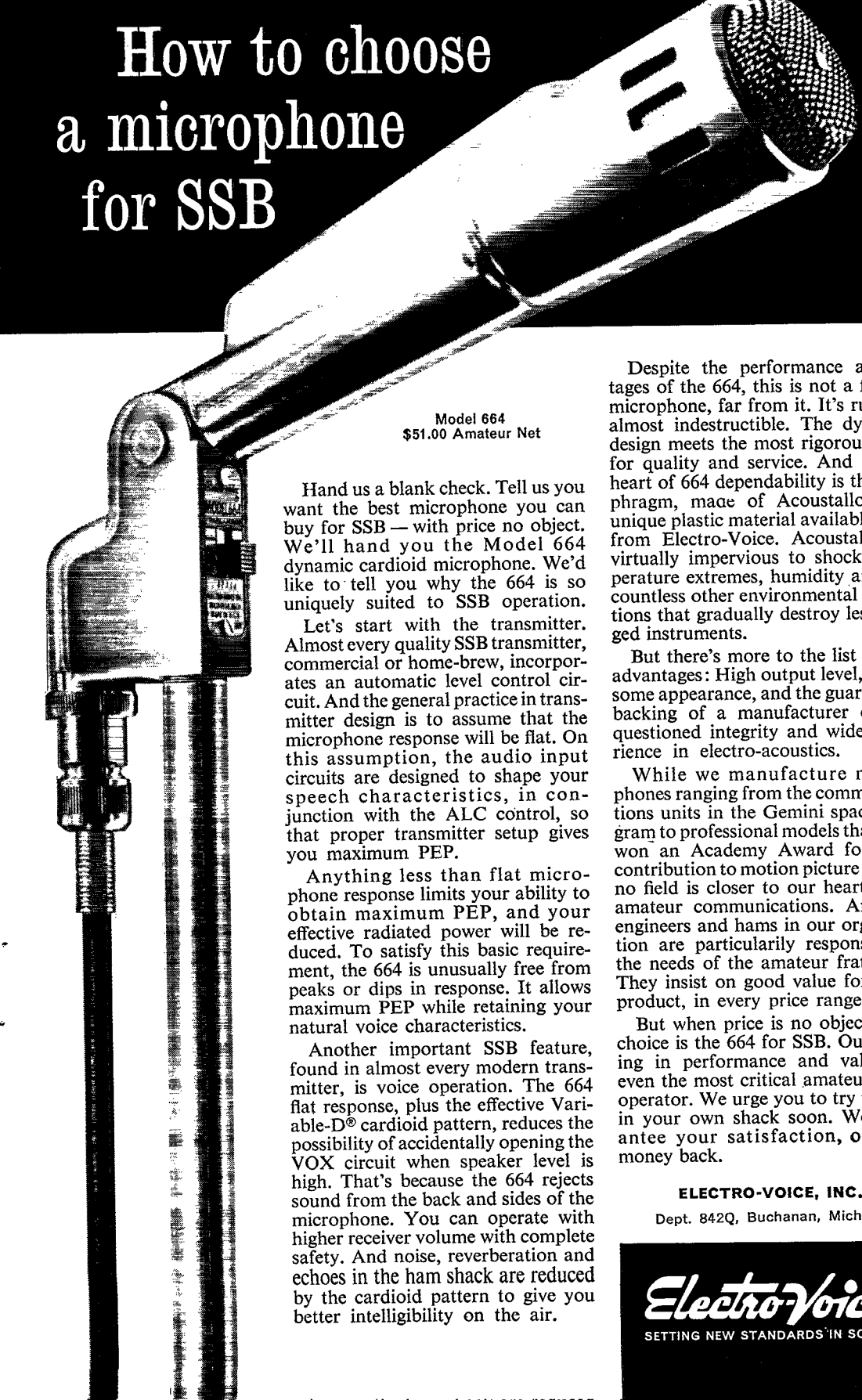
All amateurs are invited to participate in the annual West Virginia QSO Party, jointly sponsored by the Kanawha and Mountaineer Amateur Radio Clubs. The contest starts at 2300 GMT August 29 and ends at 0500 GMT August 31. Suggested frequencies are 3570 3890 3903 7050 7205 14,050 14,300 21,050 21,350 21,410 28,050 28,800 and 52,250 kc. Each station may be worked twice on each band, once by phone and once by c.w. Each complete contact counts one point. Non-West Virginia stations multiply total points by the number of West Virginia counties worked. West Virginia stations will multiply total points by the number of ARRL sections and countries worked.

Certificates will be awarded the highest phone and c.w. station in West Virginia and each ARRL section and country participating. Logs must be postmarked no later than October 1, 1964 and submitted to the contest chairman, Mr. Ross Kirk, K8YBU, 901 Sixth Avenue, St. Albans, West Virginia.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. PAM: K8EPI. RM: K8HID. West Va. Nets are on 3570, 3890, 3903 and 3905 kc. My sincere thanks to all for their support of the '64 ARRL State Radio Convention. Check the rules for the West Virginia QSO Party and make plans to participate. Through the efforts of the West Virginia State Radio Council, Governor Barron issued a Proclamation de-

(*Continued on page 140*)

How to choose a microphone for SSB



Model 664
$51.00 Amateur Net

Hand us a blank check. Tell us you want the best microphone you can buy for SSB — with price no object. We'll hand you the Model 664 dynamic cardioid microphone. We'd like to tell you why the 664 is so uniquely suited to SSB operation.

Let's start with the transmitter. Almost every quality SSB transmitter, commercial or home-brew, incorporates an automatic level control circuit. And the general practice in transmitter design is to assume that the microphone response will be flat. On this assumption, the audio input circuits are designed to shape your speech characteristics, in conjunction with the ALC control, so that proper transmitter setup gives you maximum PEP.

Anything less than flat microphone response limits your ability to obtain maximum PEP, and your effective radiated power will be reduced. To satisfy this basic requirement, the 664 is unusually free from peaks or dips in response. It allows maximum PEP while retaining your natural voice characteristics.

Another important SSB feature, found in almost every modern transmitter, is voice operation. The 664 flat response, plus the effective Variable-D® cardioid pattern, reduces the possibility of accidentally opening the VOX circuit when speaker level is high. That's because the 664 rejects sound from the back and sides of the microphone. You can operate with higher receiver volume with complete safety. And noise, reverberation and echoes in the ham shack are reduced by the cardioid pattern to give you better intelligibility on the air.

Despite the performance advantages of the 664, this is not a fragile microphone, far from it. It's rugged, almost indestructible. The dynamic design meets the most rigorous tests for quality and service. And at the heart of 664 dependability is the diaphragm, made of Acoustalloy®; a unique plastic material available only from Electro-Voice. Acoustalloy is virtually impervious to shock, temperature extremes, humidity and the countless other environmental conditions that gradually destroy less rugged instruments.

But there's more to the list of 664 advantages: High output level, handsome appearance, and the guaranteed backing of a manufacturer of unquestioned integrity and wide experience in electro-acoustics.

While we manufacture microphones ranging from the communications units in the Gemini space program to professional models that have won an Academy Award for their contribution to motion picture sound, no field is closer to our hearts than amateur communications. And the engineers and hams in our organization are particularly responsive to the needs of the amateur fraternity. They insist on good value for every product, in every price range.

But when price is no object, their choice is the 664 for SSB. Outstanding in performance and value for even the most critical amateur radio operator. We urge you to try the 664 in your own shack soon. We guarantee your satisfaction, or your money back.

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SETTING NEW STANDARDS IN SOUND

claring the week of June 28 Amateur Radio Operator's Week in West Virginia. WA8CRW reports for WVN (s.s.b.) 20 sessions, 303 stations and 15 messages. New officers of the KERA ARC are K8RXZ, pres.; WA8AUW and W8EEO, vice-pres.; WA8CTO, secy-treas. W8EEO, act. mgr.; K8JSN, station trustee. WA8JWM is active on v.h.f. and in Moonbounce work. K8EPI reports for WVN (phone) 21 sessions, 396 stations and 33 messages. For WVN (PON) K8TPF reports 188 stations and 90 messages. I regret to report the passing of W8KXD, an old-timer, who will be missed on the ham bands and MARS nets. The Tri-State ARC held a successful club picnic, with K8LUR the winner of the big prize. Remember the Black Diamond ARC Hamfest, Bluefield, Aug. 30. Traffic: WA8DGE 254, WA8FIC 175, K8TPF 82, W8CKX 40, K8ELH 21, K8CHW 9, W8HZA 6, W8JM 4, W8DUV 3.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—Let's talk about the girls first. Here in Colorado we are not only proud that we have the prettiest ones, but the smartest and the hardest-working ones, too. Take KØEPE, tops in the land on phone in the YL-OM Contest, or KØZSQ, tops in the land in c.w. in the OM-YL Contest. That's why we get that special light in our eyes when we eyeball those two. They're both living dolls. Boy, if *QST* would let us have the room, I could use the whole magazine just telling you about the Colorado YLs Club and the fine job they are doing. (Stop talking and send us the copy!—Ed.) I think it is the only club, which when something goes on, shows 100 per cent participation. I was at the Denver Radio Club meeting the other night and the YLs put on the program. You would have thought the girls had rehearsed for six months, it went so smoothly. Oh yes, we have some male hams in Colorado also, and some of them are lucky enough to be married to members of the Colorado YLs. Net traffic: High Noon Net: 504. Traffic: WØSIN 32, KØTTB 5, WØMYB 2.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: W7WKF. W7CTI's class at the University of Utah Technical Institute has built 3400-Mc. Polaplexers and has had successful communications over a 10-mile distance. The Bountiful ARC has volunteered its assistance to the Bountiful City Civil Defense. K7ERR has been appointed EC for the group. W7LQE worked Japan and Korea on 40-meter c.w. Band conditions on BUN and TWN have been terrible. Remember the annual Utah Hamfest in August. This year it will be in Millcreek Canyon near Salt Lake City. For more details see the Hamfest Calendar. Activity at W7LQE and W7VTJ has declined a bit because of increased activities in the yard. Remember to nominate and vote for the person of your choice for SCM. Traffic: W7LQE 126, W7OCX 77, W7VTJ 27.

NEW MEXICO—SCM, Newell Frank Greene, K5IQL—Asst. SCM: Kenneth D. Mills, W5WZK. SEC: K5QIN. RM: W5ZHN. Several simulated emergency tests were run by local c.d. groups. Roswell amateurs were praised for their efficiency in setting up v.h.f. and mobile links, and dispatching traffic quickly into Santa Fe and Albuquerque. Teamwork and the cooperation of amateurs in those cities placed WA5FFL/M and W5UNB/M at the front doors of c.d. and state offices within minutes. The Yale Institute for the Blind was recipient of a large box of gear and components donated by Charles Hagen, SWL. W5UAR and W5ZU are back from vacations. Both retired this year, but have trouble in finding spare time. Reports are skimpy this time of year. Traffic: W5CRF 157, W5UBW 45, W5WZK 26, WA5FFL 6.

WYOMING—SCM, Wayne M. Moore, W7CQL—RM and ORS: K7QYG. OBS: K7TAQ. Nets: Pony Express, Sun. at 0800 on 3920; YO, Mon.-Wed.-Fri. at 1830 on 3610; AREC Mon. through Sat. at 1230 on 3920. K7YFX has been enjoying the 15-meter opening, using a four-element quad. K7JED has been in Detroit for some time getting more schooling. The c.d. nets have suspended for the summer. They will be activated the first part of Sept. The Casper amateurs enjoyed a talk by Director Carl Smith June 19. Carl spoke on FCC litigation, incentive licensing and described the new Headquarters building, of which he had slide pictures. Another reminder of the Annual Wyoming Hamfest Aug. 22-23 at Cheyenne. An invitation is extended to all hams to drop your SCM a note each month telling of any news or activities in your area. Traffic: K7VTM 14, K7YPT 8, K7OVD 7, K7AHO 6, K7OWT 6, W7YWE 6, W7AEC 4, K7TCF 4, W7BKI 3, W7TZK 3, K7RFL 2, W7YWW 2, W7VJI 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: WA4EXA. PAMs: K4BTO, K4NSU and

(*Continued on page 142*)

"My Father says all soldering guns are not the same . . ."

"How many have detachable tips (fine, medium, heavy duty) that deliver heat power ranging from 25 to 450 watts?

"How many are versatile enough to do delicate printed circuitry work, T.V. and radio repair, *and* heavy duty chores (like repairing radiators and downspouts)?

"How many have ATR*?

"*None*—except the new WEN 450 (one gun, three tips, a thousand and one soldering projects)."

*Automatic Thermal Regulation, exclusive with WEN. Utilizing a high temperature magnet wire, ATR delivers the precise amount of heat power to each tip so that it may do its job—yet requires 50% less wattage input to maintain a constant heat level after initial surge. No wasted current, instantaneous heating and cooling and maximum thermal control. With ATR, dual heat is truly obsolete.

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(includes heavy duty tip)
Light duty tip $1.30
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Plastic cutting attachment .60
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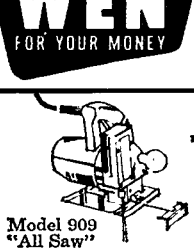
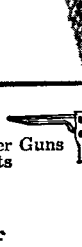

Model 909
"All Saw"


Model 808
2-Speed Drill


Model 940
Sander/Polisher


Model 930
Electric Plane


Model 910
Belt Sander


7 Solder Guns
and kits

K4WHW. Thanks to all who expressed concern during my recent illness. The Mobile Hamfest was a huge success. W4NGL won a TR-3. New officers of the HARC are WA4KMA, pres.; K4IQU, vice-pres.; K4EAO, secy.; W4USM, asst. secy. CP-15 went to W4NET, CP-25 to NML and WA4OCY. W4NML made BPL No. 3. K4WOP and BSK are c.w. instructors on ETV. A New Conditional Class licensee in Huntsville is WA4NBH. K4PXR and WA4BDV are back on the air. May net reports (times in GMT):

Net	Freq.	Time	Days	Sessions	Avg. Tfc.	Avg. QNI
AENB	3575	0100	Daily	30	7.1	11.0
AEND	3725	2200	Mon.-Sat.	11	.45	3.6
AENM	3965	0030	Daily	32	7.4	47.0
AENO	50.55	0115	T-T-Sat.	13	1.1	29.8
AENP	3955	1230	M-Sat.	26	2.0	18.0
AENP	3955	2400	Daily	35	1.91	24.0
AENT	3970	2230	Daily	36	1.25	9.92

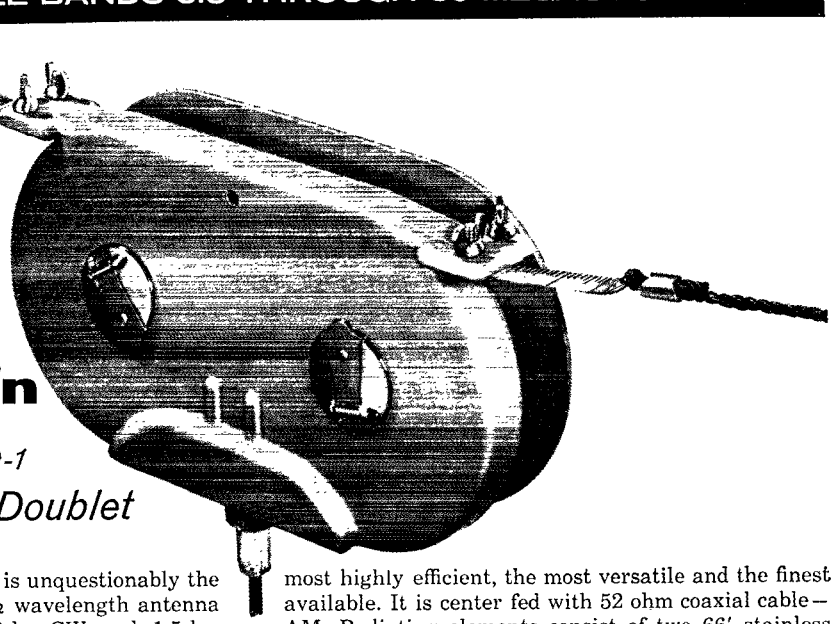
WA4AVM, AEND, net mgr. has been off because of rig trouble. New equipment: USM, Warrior and HE-45; KJD, Sixer; WA4GLX, Sixer and five-element beam, YRM, 2-meter rig; K4BFF, tower, log per and 700 watts on 6; K4MRH, HT-37 and 2B8; WA4MGI, 75-ft. tower and six-element on 6; K4HJM, all new antennas. Traffic: (May) WA4EXA 351, W4NML 336, K4KJD 151, WA4AVM 143, K4AOZ 141, K4WOP 111, K4ANB 83, K4WHW 62, W4YNG 42, K4BSK 35, WA4EXB 35, WA4GLX 30, W4YRM 27, W4TSY 17, K4BTO 14, K4CFD 14, K4NSU 11, W4CIU 10, WA4JWS 8, K4WWP 8, WA4MGI 6, K4HJM 5, K4RIL 5, K4JDA 4, K4FZQ 3, WA4HGN 3, WA4FWP 2, K4GXS 2, W4USM 2, W4WGI 2, WA4CWI 1. (Apr.) WA4OPB 16, K4VJL 5, W4TSY 2.

EASTERN FLORIDA—SCM, Guernsey Curran, W4GJI—SEC: W4IYT. A.M. PAM: W4SDR. S.S.B. PAM: W4OGX. C.W. RM: K4KDN. RTTY RM: W4RWM. V.H.F. PAM: WA4AZZ. The spring SET has gone into the record and there is little that can be said about an operation that was so well conceived and so masterfully carried out with ease of performance and generally academic technique. To the LOs, NCS and all those who gave of their time and talent to participate I simply say "Well done!" I have personally taken part in myriad tests of the sort over the years in Florida, but this was the *most*, and if it can be done with only drill as the incentive, then East Florida is operationally ready for action. It is interesting to note that an RTTY net participated in this SET for the first time and traffic was taken at the RM RTTY QTH for direct relay to Washington for civil defense and ARC. K4KXR reports that a 6-meter transmitter hunt was held in the Dade County area and WA4LHK won by using triangulation. W4BKC reports that Orlando amateurs were again used in the SOS operation communication between dispensers and the vaccine storage. Our SEC reports that the Dade ARSPC members set up K4IWT as a key c.w. station out in the boondocks—that's the Everglades to you upstate gentlemen on 2, 6, 40 and 80 meters with all units completely on emergency power and emergency conditions. All of the equipment worked like a charm and the SAR shows that they really did business. W4GPD and W4IEI are now members of the A-1 Operator Club. K4BY participated in Field Day with the Manatee Amateur Radio Club. May your tubes run cool! Traffic: W4DFU 456, WA4BMC 356, K4BY 331, WA4KJF 286, K4KDN 228, WA4LHK 198, WA4JYB 173, WA4JOF 152, WA4NBE 146, WA4BAW 145, WA4FYV 144, K4IWT 137, K4SJH 123, WA4DQE 121, WA4LBM 108, W4LUV 104, W4TUB 104, W4MIN 100, K4ODS 100, W4VWL 97, K4COO 96, W4IEI 94, WA4RSQ 90, W4GUJ 89, W4SDR 87, W4GJI 84, W4URX 84, W4GWF 79, K4YSN 78, W4OGX 76, WA1AFP/4 74, WA4GDS 74, W4BKC 72, W4AKB 67, WA4IJH 67, WA4COR 57, W4IYT 57, K4FQP 50, K4DAX 49, K4LCF 48, WA4GBM 34, K4OAP 32, K4BNE 29, WA4IYG 26, WA4KDL 26, K4EBE 25, WA4IWO 24, W4TJM 24, K4NCN 23, W4YJM 21, W4EHW 19, W4SMK 14, K4ENW 13, W4AYD 12, WA4BGW 12, W4BAV 11, K4QAY 11, WA4QAB 10, WA4OBD 9, K4MTP 8, W3DSH 7, W4NOK 2, WA4RBM 1, WA4RXG 1. (Apr.) W4KIS 633, WA4JYB 145, WA4BAW 118, WA4IXI 69, W4IAD 48, K4RDX 32, K4ILB 25, W4NOK 6. (Correction Mar.) W4YJM 245, WA4IXI 93.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. RM: W4BVE. Madison: W4RDQ is having transmitter trouble. K4KHV has moved to Crestview. Cross City: W8HKU/4 will be around for another year, thanks to USAF. Tallahassee: K4YPI is chipf op. of Area C.D. station, using KWM-2 and 30S-1. Marianna: Jackson County hams, under the direction of WA4DED, did a bang-up job in this year's SET. WA4FJF continues as our most active OO. The PCARC included message-handling for the public from

(*Continued on page 144*)

HY-GAIN PERFORMANCE PACKED PORTABLE ANTENNAS FOR ALL BANDS 3.5 THROUGH 30 MEGACYCLES



The highly efficient

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Hy-Gain's Model TD-1 is unquestionably the most highly efficient, the most versatile and the finest constructed portable ½ wavelength antenna available. It is center fed with 52 ohm coaxial cable—handles 3 kw P.E.P.; 2 kw CW; and, 1.5 kw AM. Radiating elements consist of two 66′ stainless steel tapes that conveniently reel out of and into a durable cycolac antenna housing. The elements are calibrated in meters for ready reference in establishing the exact distance each is extended from the center housing to form a full ½ wavelength doublet antenna system for any desired frequency. Anybody can install ...any place. A "frequency-to-length" conversion chart integrated in antenna housing is correlated to calibrations on the elements for quick, positive reference in determining the exact distance each element should be extended for assigned frequencies. Its efficient performance coupled with its weatherproof construction makes it suitable for permanent and semi-permanent installations as well as for portable applications. For complete details, send for free Technical Data Report. Model TD-1 **$69.95** Net.

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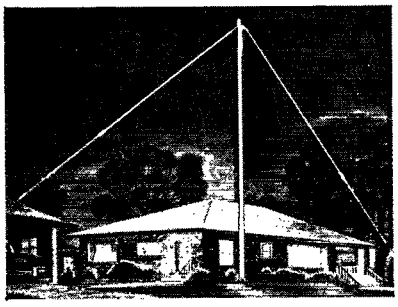

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Model	Frequency	Net
HD-1	10 or 15 Meters	$6.25
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HD-3	40 Meters	$7.50
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Rugged high impact molded cycolac plastic End Insulator. Heavily serrated to increase leakage path to approximately 12". Model EI **$2.00** Pr. Net

Miniature Center Insulator with clamp for RG-58/U coax. Molded cycolac plastic. Model MC1 **$.35** Net

Miniature End Insulator. Molded cycolac plastic. Supports 175 lbs. Model MEI **$.40** Pr. Net

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its downtown site during Field Day. K4GVV has resigned as EC because of ill health and will be succeeded by WA4NRP. Fort Walton: The new pres. of EARS is WA4DUF. The club now has a KWM-2 and handles many messages to the Eglin AFB area. W4ZGS operated mobile on 6 and 2 meters while on a vacation trip to New York. WA4THJ is a new v.h.f. ham, on 6 and 2 meters. W4RKH finally has been converted to s.s.b.! Pensacola: New EC K4SMB had the local hams well organized for the Spring SET. At least 27 local stations took part. WN4TIW is the newest ham to receive his ticket through the aid of W4AXP. Traffic: (May) K4VFY 587, WA4ABP 353, WA4ECY 190, K4SMB 109, WA4FIJ 103, W4BVE 81, WA4NRP 17, W4AXP 1, W4ZGS 1. (Apr.) WA4IMC 316.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: K4MDC. RM: W4DDY. PAMs: W4FYH, K4PKK, WA4EHT, W4AQL. The Georgia Tech. Radio Club station will be active from a new shack. WA4BVD has made WAS after working for it three years and has picked up QRP-50 and CHC-25 awards as well. She also has joined the flying hams club. The Sowega Radio Club is sponsoring code classes and a construction program. WA4MPD uses a homebrew 420-Mc. antenna constructed from copper tubing and plastic pipe fittings. K4TTJ is active again after a two-year layoff. WA4CEB joined the growing list of college students back with us for the summer. HP1GU is now a resident of Savannah. W4DDY is engaged in his usual activities promoting GSN and emergency communications. The Georgia Single Sideband Association will holds its annual meeting in Savannah the week end of Oct. 31. The Georgia State Net meets on 3595 kc. daily at 0000 and 0300 GMT. The Georgia Single Sideband Net meets daily on 3975 kc. at 0100 GMT. The Georgia Cracker Emergency Net meets on 3995 kc. Tue. and Thurs. at 2300 GMT and Sun. at 1300 GMT. Traffic: W4DDY 283, W4NSO 189, K4MCL 114, K4BAI 100, WA4BVD 33, WA4EHT 24, W4RZL 24, K4FRM 22, WA4LLI 18, WA4PSA 11, K4VHC 11, WA4GPA 6, K4FUE 3.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—The CZARA held an auction netting the club an additional $45 for the treasury. The Committee for setting up Amateur Activities for the 50th Anniversary of the Canal Zone and the Panama Canal reported the groundwork progressed very well and that QSL cards for contacts made during Anniversary Week will be provided and special certificates will be issued for amateurs contacting 5 Canal Zone amateurs during the week Aug. 8 to Aug. 16 starting at midnight EST, 0500 GMT, and ending midnight Sun., Aug. 16 at 0500 GMT, Mon. Aug. 17 for GMT times. W4NFC will be operating from the Canal Zone. KZ5JD is back on the air with his Drake transceiver. KZ5BT, KZ5KL, KZ5EO, and KZ5BO are active nightly on 15 meters. KZ5VR/KZ5RV are in the U.S. on their biannual leave. KZ5HR is on s.s.b. with his new Marauder. HP1AC reports a Central American amateur meeting in Panama for the month of November. KZ5TD will be leaving for Oklahoma City to attend the FAA Academy. KZ5OC has been appointed as the new SEC. KZ5ER will be putting up a new 10-meter beam. KZ5BI is newly-licensed and on the air with an SBE transceiver. KZ5AA relocated to Corozal.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John A. McKowen, W6FNE—Asst. SCM: Richard H. Ingham, WA6DJB. SEC: K6YCX. Asst. SEC: W1KUX/6. PAMs: K6PZM, W6ORS, WA6TWS. RMs: W6BHG, W6QAE. Traffic load is back to normal in the section with nine stations earning their BPL certificates in May. Most of the regulars did it again, and a couple of others got busy with originations. Aug. 20 is the deadline for preregistration for the Southwestern Division Convention coming up Sept. 11-12-13. The Grand Banquet will be Sat. at 7 P.M. Several breakfast meetings are scheduled for Sun. a.m. New officers of the Harmonies YL Radio Club are WB6GXI, pres.; WB6ANN, vice-pres.; WB6FKD, treas.-secy. The LERC Radio Club (W6LS) is back on all bands with a vertical. The Salvation Army Disaster Net will be at the L.A. County Fair again this year and is starting a series of drills in traffic-handling. A lesson was learned from the Alaska disaster problems. Wonder how many other "emergency" nets found traffic-handling to be strange to them. It's good to see W6BHG becoming active in traffic again after a long period of much overtime on the job. There are several new OOs in the section and some pretty sharp frequency measurements. WA6CXB has hoisted his antenna up on a new tower. W6AM is putting his phone lines to the station underground. New equipment at the K6MYK repeater (2 meters) makes automatic scheduling

(*Continued on page 146*)

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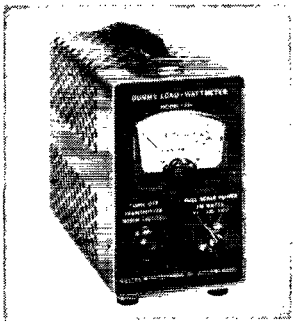

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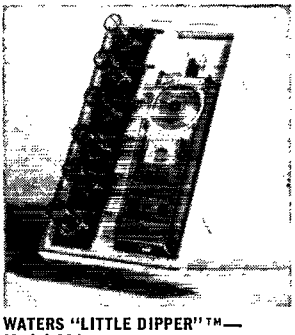

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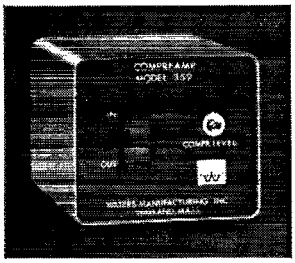

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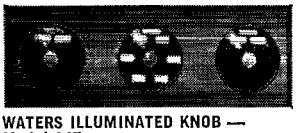

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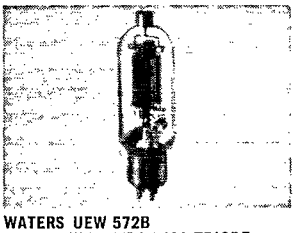

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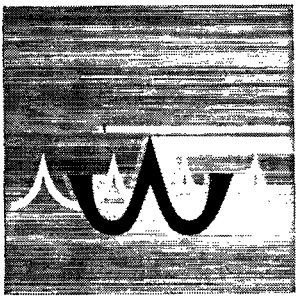

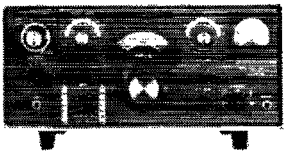

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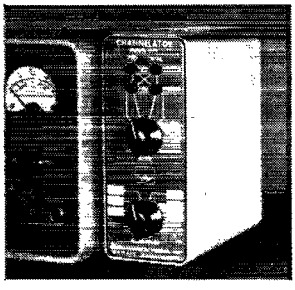
SPDT PRICE: $11.45
DUAL COAXIAL TRANSFER SWITCH — Model 351
DPDT PRICE: $12.95



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of ARRL Official Bulletins possible. It is now on Mon. through Sat. at 1200, 1830 and 2000. W6NAA reports that his activities have been confined to RACES. WA6BCZ is back on RTTY and looking for some v.h.f. contacts from Hemet. K6RYD got a home-brew four-element array in the air. K6LPJ attended the Region II Division Conference in Mexico City. The new meeting place of the Tri-County Amateur Radio Assn. is Pomona First Federal at 399 N. Garey, Pomona. Support your section nets, Southern California Net (SCN) 3600 kc. daily at 0300Z. SOCAL SIX (SCS) 50.40 Mc. at 0200Z and 1900Z daily. Contact Frank Merritt, K6YCX, at 2041 So. Benson in Ontario for information on AREC skeds. Traffic: (May) W6WPF 775, WB6BBO 714, K6IWV 618, W6GYH 523, WA6OUK 517, K6MDD 506, WA6TAW 354, W6QAE 281, WB6GZY 270, WA6USU 185, WA6GJR 131, WA6WTX 119, WA6WIZ 92, WB6BBH 78, WB6EUU 77, K6LDM 54, WA6WTX 51, WB6GXI 48, WA6YEA 31, WB6BZX 28, W6USY 25, WB6FPQ 20, WA6ZWR 20, W6BHG 18, K6SIX 18, WA6PZJ 11, W6CK 8, W6PCP 8, W6LVQ 6, WA6CXB 5, WA6FKD 4, W6AM 2, W6FB 2, K2PHF/6 1, W6SRE 1. (Apr.) WA6RTF 106, WA6BCZ 21, K6QGX 21, WA6SNK 20, WB6AJT 19, WA6PZJ 11, K6RYD 9, WA6YWS 3, WA6USQ 2. (Mar.) WA6YWS 5.

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7OIF. RM: K7TNW. The Copper State Net meets at 0200 GMT Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 1500 GMT on 3880 kc.; the Cochise County AREC Net each Sunday at 2100 GMT on 7260 kc.; the Tucson 2-Meter Net at 1700 GMT on 145.35 Mc.; the Arizona C.W. Net (ACN) Mon., Wed. and Fri. at 0200 GMT on 3575 kc. K7TNW, our RM, needs c.w. operators for the 12th Regional Net and the Arizona C.W. Net. If interested, please contact Dean on the Copper State Net or by direct correspondence to 4515 E. Montecito, Phoenix. W7JGL is the proud father of Marsha Toben who will represent Arizona in the 1964 Maid of Cotton Pageant in Memphis, Tenn., next December. We all wish Marsha the best of luck in the Pageant. K7HUJ/WØBRK is putting up a 20-meter beam. K7VUB reports fine band openings on 6 meters. K7VQI reports that K7HID is building a Flying Spot Scanner camera and expects to be on amateur TV soon. A reminder to all clubs—send copies of the club paper to the SCM for news items. Traffic: (May) K7NHL 151, K7TNW 126, W7FKK 16, K7VQI 8. (Apr.) K7TNW 175.

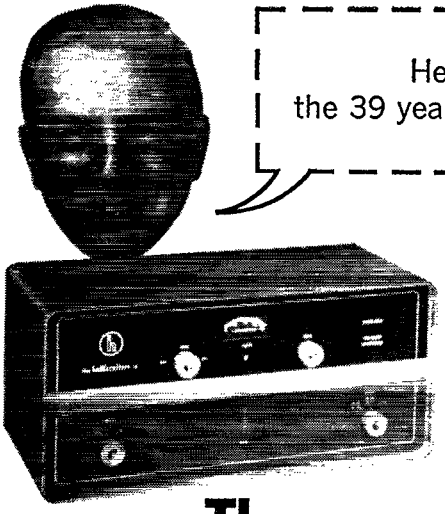
SAN DIEGO—SCM, Don Stansifer, W6LRU—President WA6VJV, of the Newport Club, showed pictures he took while living in Japan to the club at a June meeting. W1BHE/6 has a new 2-meter receiver. K6GNZ had a good program for the Anaheim Club at its May meeting on "The Fine Art of Award Hunting." This club now has begun a novel idea. It holds a monthly breakfast on the second Sat. of each month. WA6TAD reports 35 AREC members in the 2-Meter Public Service Corps Net for San Diego County. The local DX gang and many other area amateurs turned out to hear W4BPD when he was in San Diego. A new ORS is W6VNQ, of Solana Beach; a good one to keep in mind for north coast traffic. XE2PRH is now on v.h.f. just over the border. OES W6IEY reports many 6-meter openings to the Pacific Northwest and Canada during May. The following appointments are currently effective in Orange County: EC—W6VAA; ORSs—W6DGM, K6IME and WA6ROF; OESs—WA6LVS and K6RCK; OOs—K6LJA and WA6VJV; OBS—W6WRJ. Fourteen radio clubs were listed on the roster of the San Diego Council meeting in May. Only four, the DX Club, SOBARS, American Radio and Palomar Clubs let their SCM know what they are doing or what is new. Is your club secretary on the ball? Traffic: W6IAB 3437, K6BPI 3021, W6EOT 625, WB6JUH 603, WA6BRG 269, WA6ROF 201, WA6UUO 98, K6IM'E 81, W6WRJ 15, W6DGM 4.

SANTA BARBARA—SCM, William C. Shelton, K6AAK—SEC: WA6OKN. RM: W7WST/6. WB6OPV made WAS and sends in his first report. Besides traffic Jim tries DX also and reports in on three nets. Keep up the good work. Reports are very scarce. The Ventura County gang had a ham breakfast with 48 in attendance at Thousand Oaks. Hope some of the other clubs will take the hint and have another. W6BJM carried away the main prize, a fur-lined receiver. WB6BII has retired from the USN and is now with Douglas in Santa Monica and is building a new shack in Thousand Oaks. K6VBC held an auction and sold out all his goodie boxes to the Ventura gang. You will have it all back in six months, Ben. Traffic: (May) W7WST/6 348, K6AAK 37, WB6OPV 13. (Apr.) W7WST/6 513.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. PAM: W5BOO. RM: W5LR. W5DTA, present manager of the Tex. C.W. Traffic Net, will be out of this area

(*Continued on page 148*)



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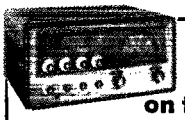

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in September and the net will need a new manager. Willie has done an excellent job and we are sorry to lose him. Anyone interested in this appointment is invited to contact W5LR. The 4th Army MARS held its annual convention in Waco June 7 with 80 MARS members and their families registered. W5BOO reports this to be the most successful meeting so far. The Permian Basin ARC held its annual Swapfest on the same date and had more than 300 registered. I think if you miss a good hamfest, you miss part of the fun of being an amateur. Field Day is a test of your preparedness for an emergency. When I see some of the elaborate installations of a Field Day site I wonder if some of us have failed to realize the object of the exercise. On arrival at the FD site it should not be necessary to send back for needed equipment or supplies. After all, the exercise is supposed to be a test of your preparedness for an emergency. The Dallas ARC has announced Aug. 15 as the date for the Big 'D' Hamboree. W5DFB is back on the air with s.s.b. mobile. W5VEZ has a new TR-3. W5NUS is a new OO. Traffic: W5DTA 609, W5UTW 287, WA5DQP 103, W5BSM 26, W5LR 17.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil Andrews, W5MFX, SEC: K5DLP. New officers of the Lawton-Ft. Sill Amateur Radio Club are W5PML, pres.; WA5CUJ, vice-pres.; WA5EXF, secy.; K5DLP, treas. Oklahoma City has two new Novices, WN5JOJ and WN5JGR. W5PAA is now adding 2-meter coverage; this will give coverage from 1.8 MHz to 148 MHz. Newcomers to the Bartlesville Amateur ranks are W8KCN from Ohio, WØRXO and WAØDJN, both from Kansas City. Welcome to Oklahoma, fellows. We are proud to report that Nina, K5TEY, is back home from a medical check-up in Tulsa. The Oklahoma Central V.H.F. Club is sponsoring the Oklahoma ARRL Convention to be held at Lake Texhoma State Lodge on Oct. 31 and Nov. 1. It looks like it will be one of the best we have had here in Oklahoma for some time. W5VCJ and the v.h.f. group are putting a lot of time and effort on this convention. By a misunderstanding on my part, I thought that my OOs were sending their reports direct and just sent me a copy, therefore I slipped and did not send W5FFW's reports in and he did not place in the standings. Harold would have been on the top of the listing if it were not for my blunder. Harold, I apologize and all 1963 and 1964 reports are up to date now. Traffic: W5QMJ 396, K5TEY 102, W5FEC 66, K5KTW 40, K5DLP 29, K5LZF 16, W5MFX 12, WA5EQP 10, W5PML 8, WA5BNG 7, K5CVA 6, W5UYQ 6, K5OCX 5, W5EHC 3, WA5FLV 3.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A. E. W. Street, VE1EK. Don't forget the Convention at Charlottetown, Labor Day week end! The *Bluenose II* will have amateur gear aboard shortly, operated by VE1AGI, ex-VO1GA. The Loyalist City Club recently held an exercise on 2 meters, providing communications for a 600-mile Sports Car Rally. Those participating included VE1s ABL, AIN, AJG, AJI, CL, CW, EE, ER, HN, IZ, MX and XN. Amateurs from the Halifax area provided emergency communications at a recent fire. Those participating included VE1s AFZ, AGH, AHO, AJF, AJX, AX, PW and UB. The Sydney Club held a series of emergency exercises recently with VE1s AAK, AHH, AKC, AKW, ANA, NT, NV, QD, ST, TC and ZO participating. Ex-VO1DC is now VE1-AGN. VE1AED has returned from the Congo. VE1GC's XYL is active on 3.5-Mc. c.w. with a new call, VE1ANX. VE1AMI passed the Advanced Class exam. VE1ADH is now located at Sackville with CBC. VE1OW has taken over the call VE1BC, formerly held by her late husband. Traffic: VE1OM 24.

ONTARIO—SCM, Richard W. Roberts, VE3NG—DJ1HP was a visitor to St. Kitts recently while his ship was at Welland. VE3ADO was his host. VE3FPG and VE3CKQ are on the way to VE1-Land for vacation. Hans Schenk, now VE3CLI/HB in Swiss-Land, says, "The DOT in Canada is the best for looking after the amateurs". Many thanks, Hans. Most clubs are closed for July and August. VE3ATB is going c.w. on 80 meters soon. The London ARC is in high gear with the convention in the offing on Oct. 2 and 3; details from VE3-CFR. The York North ARC has a new call, VE3YNA. Moon Bounce is terrific these days. The Ottawa Group (mobiles) held a social. "Ramble On" should be their theme song. Hi. Frank Lay of Ottawa, formerly VE3MB, is now 4ZK and expects to return to the Capitol City soon. The following are elected to operate the Sudbury ARC: VE3EAT, pres.; G. O'Connor, vice-pres.; H. Cavers, secy.; VE3DSX, treas. VE3ARR, VE3DVT, VE3FFE and VE2SH/3 are going RTTY, and wish to form a net. A few more and we are away. Contact VE3DSX. VE3-AQM is moving to Smiths Falls from Cornwall. The Seaway Valley Hamfest will be held Aug. 30. VE3CIX,

(Continued on page 150)

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AC Supply	69
KWM1 Speaker	17
KWM2	775
DC Supply	89
CC2 Case	49
32V3	239
KWS1 Control Spkr	39
20A & VFO	119
200V	547
DRAKE 2A	174
TR3	469
RV3 VFO	67
MS3 AC Supply	67
DC3 DC Supply	99
SX111	167
SX100	179
SX117	269
S40	44
SX43	79
S107	57
S108	77
S120	49
SX105 152-173MC	49
SR150	499
SR150 DC Supply	67
SR150 Mobile Tray	19
FPM200	1400
HT18 VFO	37
HT37	279
HT40	49
INVADER 2000	647
VALIANT	199
VALIANT II	269
RANGER	137
RANGER II	239
ADVENTURER	29
6N2 Conv	37
6N2 XMTR	99
THUNDERBOLT	$299
HQ110	127
HQ150	139
HQ170C	229
HQ180C	299
NC155	129
NC183D	179
NC190	147
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G76 Xtal Cal	14
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DX40	44
GR91	37
AR3	22
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HG10 VFO	34
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HD11 Q Mult	15
QF1 Q Mult	9
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V7A VTVM	24
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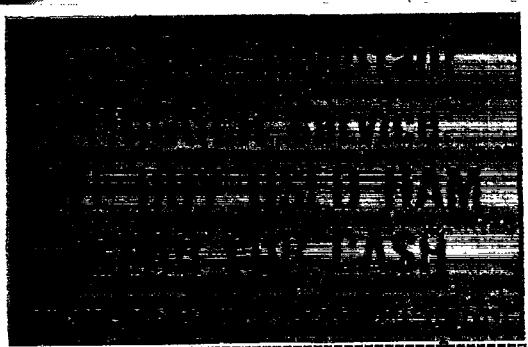
LAFAYETTE HE35	37
B & W 5100	119
T150A	89
T60	37
V44 VFO	25
PMR7	67
AMECO TX86W XMTR	47
EICO 723	34
EICO 730	47
EICO 324 Sig. Gen	24
NOVATECH AIRCRAFT	47
WATERMAN S11A Scope	47
HICKOK 533AP	79



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pres., has the dope. VE3EUV is in Room 3B, Sunnybrook Hospital, Toronto. How about QSLs, etc., to Doree? VE3CJL had some plumbing removed. Your SCM and Canadian Director were guests at the Hamilton Club Annual Dinner. An excellent affair! We welcome Syd Cole, of Skywide ARC, who is now VE3FWA. Traffic: VE3CYR 131, VE3NG 104, VE3DPO 72, VE3CFR 68, VE3AWE 67, VE3EHL 64, VE3BUR 61, VE3FGB 60, VE3DU 53, VE3AKQ 37, VE3BTN 37, VE3BZB 37, VE3EZY 32, VE3CLK 30, VE3DYE 26, VE3TT 21, VE3DUU 18, VE3GI 18, VE3BLZ 17, VE3EBC 14, VE3FEH 9, VE3WW 6.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. The first major get-together of AREC members will take place during the RAQI congress. VE2BE, VE2BK, VE2AUU, VE3CJ and VE3RX were cordially received by executives of DOT when visiting Ottawa to discuss amateur matters, especially the future of the 11-meter band. VE2AGQ handled much traffic for VE2UN/2 on survey work. VE2TA expects to secure special QSL cards featuring the '67 World's Fair. These will be distributed to those interested. We welcome VE2AGJ and VE2AOX, who are oblates YLs (lay-nuns), probably the first active nuns in Canada. The previous VE2AGJ now signs MZ. Sorry to record the passing of VE2AOM. Our sympathy to the family. VE2QE's (at Grand Ramous) telephone outage was quickly rectified by VE2CP and VE2SF. Another successful evening for members of OQN was held at Pointe Claire. Our Asst. SCM reports: Quelques clubs de Québec; VE2CAS, VE2ALH prés.; VE2AIR, vice-prés.; VE2OB secy.: ainsi que VE2CIT et VE2CDQ. L'AREC est en bonne voie de réalisation a Quebec, avec le concours de VE2ALH. VE2BKE aimerait des schédules avec Ottawa sur 2 metres. Le traffic handling semble prendre beaucoup de popularité à Mtl. Ne manquez pas les bulletins de 2CJ a 3780 kc. Samedis matins. VE2BHK nouveau prés. de CJ. Traffic: VE2AGQ 250, VE2BMS 111, VE2DR 108, VE2UN/2 90, VE2BEZ 87, VE2FY 55, VE2EC 29, VE2JJ 27, VE2BHH 20, VE2ALH 17, VE2BRT 15, VE2BCB 14, VE2HV 14, VE2ABV 9, VE2BBH 5, VE2BG 5, VE2BCK 2, VE2BQE 1.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM: VE6PV. RM: VE6AEN. ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ. OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA. OO: VE6HM. OBSs: VE6HM, VE6AKV. ORS: VE6BR. OESs: VE6DB, VE6AKV, VE6AJY, VE6MC. VE6FS, Alberta SEC, has left our fair province and moved to Trail, B.C. He left in a hurry and wishes to thank all who helped in any way with the AREC. The new SEC is VE6FK. Walter did a fine job and I think that Don will do the same so, fellows, help him out when you can. We heard by the grapevine that VE6HM and his XYL are leaving for a trip to England in Aug. and will return in late Oct. The boys up in VE8-Land will miss Charlie while he is away, as he handles a lot of traffic for them. VE6AFJ had quite a spell in the hospital and is only able to work c.w., but should be back on phone by the time you receive this report. VE6PL has moved from Calgary to Edmonton. VE6ADD now is on phone and enjoying it very much. Traffic: (May) VE6HM 211, VE6CA 6, VE6ADD 4, VE6FK 4, VE6ADS 3, VE6PV 2, VE6UH 1. (Apr.) VE6AGO 5.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —The month of May hit the bottom of the doldrums; not one bit of news happened in this Province. The Annual International Hamfest will be held July 25 and 26 at Conconully State Park, 18 miles west of Omak in the State of Washington. A very fine program again will be laid on. The British Columbia Amateur Radio Assn. Annual Picnic will be held at Bear Creek Park, Highway 99, just past the Number one and 99 junction on Sun., Aug. 23 at 1300. There will be lots of contests and hot coffee. Bring your own supper. That is all here. Traffic: VE7BDJ 927, VE7OM 56, VE7BHH 35, VE7BLA 23, VE7AMW 13, VE7BHW 10.

MANITOBA—SCM, William H. Horner, VE4HW—Plans for the Mid-Continent Hamfest at Winnipeg Sept. 5 and 6 are being finalized, according to Mgr. VE4SD and Asst. Mgr. VE4MP. VE2BK, ARRL Canadian Vice-Director, will be guest speaker. Vic Brister, our DOT Superintendent, has been promoted to Toronto. HC1JJ, from Quito, Equador, spent a month here taking lectures at the University. It's good to hear our Police Chief, VE4CE, back on the bands. VE4NS is the new pres. of the WARA. New appointees are VE4QJ as PAM for the 75-Meter Phone Net, Andy Malowanchuk as PAM of the 6-Meter Phone Net, VE4GI as OES and VE4HI, VE4CZ and VE4HB as ECs. Everyone enjoyed the ARLM July Picnic. SEC VE4OL has plans for getting the large 75-meter mobile group into emergency and public service work. VE4AB has been named chairman of the Manitoba Association of Amateur Radio Clubs. Six-meter activity is increasing with

(*Continued on page 152*)

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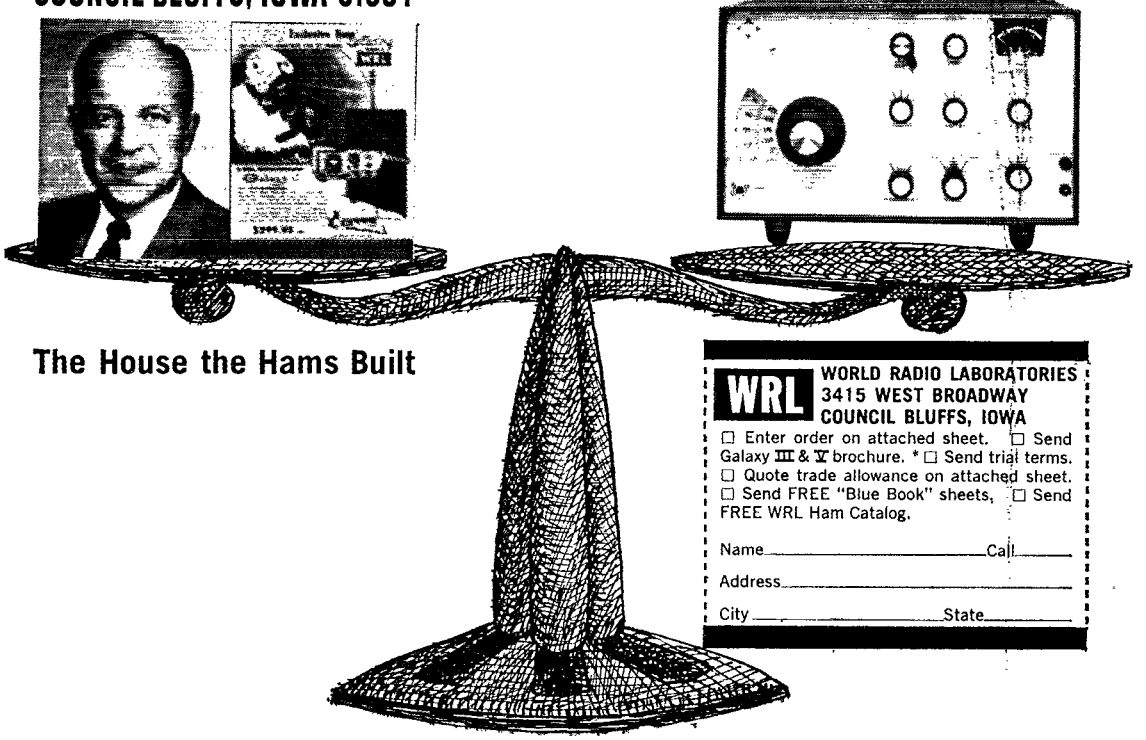

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several openings and the Sun. and Wed. net well attended. Our SEC is looking for ECs from representative points in the province other than Winnipeg and the SCM needs two more OOs and an OBS. Applications will be appreciated. We need news from all Manitoba points to make these monthly reports interesting to everyone. Traffic: VE4QD 18, VE4QJ 11, VE4JY 9, VE4AN 2, VE4JA 2, VE4SD 2, VE4SH 2, VE4VJ 2, VE4FI1.

SASKATCHEWAN—SCM, Mel Mills, VE5QC—Hats off to the Regina gang for a very FB hamfest. The amateurs in this section seem to be coming alive to emergency communications with the south leading off in June with two very FB exercises. The first was at Moose Jaw with the Sask. Hospital emergency drill with EC VE5WM, Asst. EC VE5IL, VE5AQ and VE5CG participating mobile on 75 meters. Twenty-five messages were handled between the doctors at the disaster scene and the hospital. Then the following week end there was an EMO exercise with light aircraft taking part. This one included most of the Regina gang. VE5CU, our SEC, and I are very happy to see this and the way you have responded to the new AREC setup. Now that the section is organized we are getting down to work with exercises, so polish up your message-handling techniques, chaps. Traffic: VE5HP 89, VE5LM 48, VE5HQ 5.

Members Are Saying

(Continued from page 51)

income of the Reseau Luxembourgeois to the ARRL Building Fund. The members of our club would like this to be a token of appreciation for the outstanding work the League is doing on behalf of all the radio amateurs everywhere. — *LX1DK*

Here is my check for the Building Fund. Sorry I had to wait this long for it, but the XYL has other things that take priority. — *W2SKX*

I have been much interested in the Golden Anniversary issues of *QST*, inasmuch as this year is also the Golden Anniversary of my "discovery" of amateur wireless, for it was fifty years ago that I saw a wireless receiver in the shop of a local jeweler. As a memento of "our" anniversary, please accept my contribution to the Building Fund. — *W8SSZ*

Enclosed please find another cheque which we hope will get our Canadian quota nearer the goal. Do look for the day when I will be able to drop in and see your fine new building. — *VE3IIC*

Enclosed please find check presented to the ARRL Building Fund on behalf of the Hutchinson (Minn.) Amateur Radio Club members. — *WØGPQ*

Correspondence From Members

(Continued from page 100)

K2US

¶Hearing so much about the "Voice of the World's Fair", K2US, I ran through pouring rain, to see and operate the two-meter section of it. First, I had to show my license to get into the building, and then when I got up to the station part, I was very curtly told that because I was a Novice I could not operate the station as they were running more than

(Continued on page 152)

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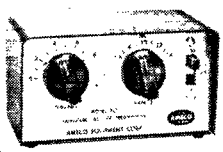

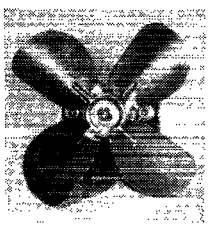

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110-115 V., 60 cps, 4 aluminum blades. Ideal for many applications. Shown approximately 1/25th of actual size. Shipping weight 3 lbs.

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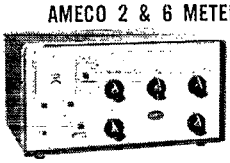

Model TX-62 complete 75 W. phone & CW transmitter has built-in power supply and modulator. Tunes easily by adjusting final plate and loading caps. 50-54 Mc. & 144-148 Mc, Xtal (8 Mc) controlled or can take VFO, Meter reads final grid or cathode current or RF out, Built-in, solid state power supply, fused, Mike, Key jack & xtal socket on front panel. Size: 11½x9½—6" high, shipping weight approx. 20 lbs.

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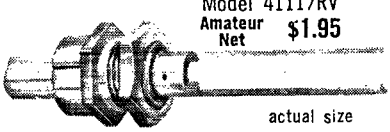

actual size

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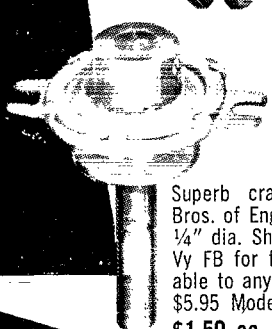

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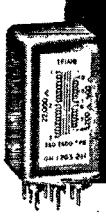

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seventy-five watts. The men in the operations room very quickly took my call, handle and QTH, and very impolitely "shooed" me out.

Thanks!! I appreciate it. I am a member of the ARRL as much as you, the holder of an Amateur Extra! I am also a person. I believe I deserve the common courtesy shown one person by another. How the ARRL can condone such action, I do not know, but I hope they do something about it! — *WN2MYU*

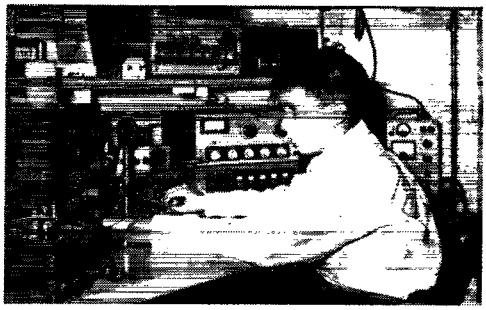
(*QST* was in error, for which our apologies, in not pointing out that because of the heavy amateur visitor load at K2US, it is not practical at present to allow operation by Novices. During peak hours there are many more visitors than can be fitted into operating time available, which has resulted in further disappointment. The problem is simply one of overload; at copy time, after only two months of operation, more than 3000 hams had registered in the guest book and more than 1000 had operated and signed the log. — EDITOR)

MAY I CUT IN?

¶I suggest that the ARRL establish a Q signal that would stand for: "Is this frequency clear?" and/or "This frequency is in use." Many times it is possible to cause unnecessary QRM by CQing on a frequency you thought was clear but actually was in use by stations both in and out of your skip zone. On fone it has proven worth the effort to check the frequency for activity but on c.w. it is difficult as there is no simple, easily recognizable Q signal to use. If the League pushed the use of this idea I believe many more pleasant QSOs would result for all of us. — *WA1GMGO*

Novice Roundup Results

(*Continued from page 58*)



13-year-old WN2KVC of Westmont New Jersey topped receiver and operated 80, 40, 15 and 2 meters.

330, WA2WIJ 319, WA2ZVJ 224, WA2PXL 198, WB2FPF 136, WA2PIA 100, WA2RGK 66, W3MSR 19,400, K3HNP 5694, K3TEJ 1260, K3ROJ 1210, K3URZ 507, K3USC 384, K3OJK 320, WA4IUM 6006, W4DR 1500, WA4HVC 1340, W4KFC 1200, WA4MKG 901, WA4HFB 900,

(*Continued on page 156*)

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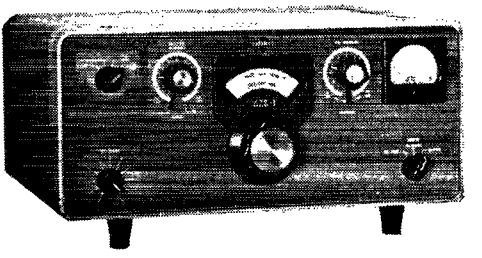

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KWM-2 Transceiver	1,150.00
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PM-2 Power Supply	150.00
30S-1 Linear Amplifier	1,795.00

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The World Above 50 Mc.

(Continued from page 95)

has been trying to scare up some 432-Mc. activity but has had little or no luck. Anyone interested get in touch with him. Al is building a 32-element colinear and it will be about 50 feet high, he has a 6CW4 Nuvistor converter "in process" and will be driving a 4X250B tripler with a 2-meter rig. Ready then to operate 432.030 Mc. c.w. at first, then a.m. and f.m. Al also tells us that there is a very good two meter wide-band f.m. net in and around Topeka with 40 to 45 stations operating and more coming on all the time. National calling frequency is 146.940 Mc. K4QIF at Salisbury, North Carolina, has completed his 416B preamp for 432 and a large colinear array is near completion. Progress on paramp for this band is slow but he is still looking for skeds. W5UKQ writes that he "got my 'M-O' valve amplifier working, running about 900 watts to a 20-element J beam 90 feet up. This morning (June 11) I worked W4TLV 5-7-9 both ways (235 miles) and then Leroy, W5AJG (375 miles). We used two meters as base frequency then moved to 432 Mc." Keep with it, John! We're with *you* all the way! We hear that out in Las Vegas K7RKH has put his antenna "way up in the air" for some serious 220-Mc. work.

VE3BVK, one of our neighbors to the north reports that on the night of May 16 and early morning of the 17th conditions were excellent on 144 Mc. at his QTH in St. Thomas, Ontario. Glen sez that a few of the stations contacted were W9BQL, WA8EPL, K9ZNK, K9EEE and K9WZB. All signals were 5/9 and over. In all, twelve contacts were made in Indiana, Illinois and Michigan by VE3BVK, who is using a Communicator III, 5 watts with a 5-element quad 23 feet above ground. Hopes to raise power to 100 watts shortly. Out in Texas WA5IKU found two-meter ground wave good on May 3 when he worked W5IRF and WA5ABV in the early morning hours; and — K5LBU will be operating 144 Mc. (145.1 and 145.2) from Bryan, Texas beginning June 12. K7ICW reports that a special meteor scatter sked with WØBFB in Mitchelville, Iowa, produced positive identification on call signs at Al's QTH, and mostly bursts heard at the other end on May 3. Al (K7ICW) and K7RKH are soon going to

(Continued on page 158)

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VALUES OF THE MONTH

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• Reduces QRM • Increases Efficiency • Dissipates 250 watts output

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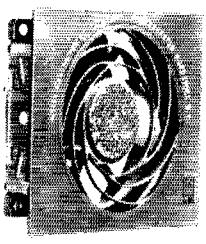
A new 50-ohm resistive dummy load that's ideal for all types of amateur service — fixed, portable or mobile. By switching the "Ham Load" into your antenna circuit, you eliminate on-the-air tuning and needless QRM. The unit also provides a dependable, non-inductive termination for testing equipment, measuring power and antenna matching.

The Carborundum "Ham Load" is supplied as a single unit with standard coax connector for easy mounting on rack or cabinet, or for designing into home-brew equipment. Although small in size, the high-temperature ceramic resistance element dissipates up to 250 watts **output** for 5 minutes! Unlike bulbs or wire-wound resistors, SWR remains essentially flat at less than 1.5:1 up to 54 Mc (with the load mounted at least 5" from metal reflecting surfaces).

SPECIFICATIONS

Resistance: 50 ohms, non-inductive. **SWR:** Less than 1.5 at 54 Mc. **Dissipation:** 250 watts (up to 5 minutes); 150 watts continuous. **Connector:** Standard coax (SO-239 type). **Size:** Approximately 13½" long by 1" diameter. **Mounting:** Any convenient location. **Caution:** Due to heating when loaded at high power, the unit should be mounted in freely circulating air.



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OUR 37th YEAR

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attempt to break down the Las Vegas-Albuquerque two meter path, about 525 miles over a difficult path. At Saginaw, Michigan W8FZ tells us of a good opening on 144 Mc. on May 16 and 17 when WN8JPS worked stations in Toronto and Charlie worked WA8HFV in Livonia, both stations using "Big Wheels." At Detroit WA8DZP also mentions the good conditions during the middle of May when he worked K2KGN in New York, K9OUR in Indiana and several Ohio stations. QST

How's DX

(*Continued from page 91*)

tive district of Libya. Not much doing in Cyrenaica, either, but plenty of action in Tripolitania. When Fezzan is finally activated, the call should have an 'F' after the numeral.

OCEANIA — VK2AAK apprises, "A group of Australian amateurs will operate 20 and 40 meters from Lord Howe island from August 18 to September 1, mostly phone. VK2s AI TX AAK AXS and families will be there. The island, 400 miles off the VK east coast, is a lovely place for a DX holiday!" . . . . Commercial duties precluded all but token ARRL Test activity by VJ1DL this year. Dave hopes to log more operating time with his Hy-Gain vertical, Viking II and NC-303 after concluding a European summer tour. Earthquakes and Hurricane Henriette battered the New Hebrides this spring . . . . K7ADL schedules New Guinean VK9GC Thursdays at 0430 GMT on 14,050-kc. c.w. Sandy sports 6146s feeding a 300-ft. long-wire and receives with an HQ-129X . . . . WA6MWG notes that severely handicapped KH6BIH has collected DXCC, BERTA, DUF and other awards on a mere 75 watts. You can't keep a good ham down . . . . Reminder: NZART (New Zealand) sponsors this year's VK/ZL/Oceania DX Contest on the 3rd-4th and 10th-11th of October. Entry details next month . . . . Pacific potpourri via DX club journalists: Norfolk isle is the base of VK9s RB, 7- and 14-Mc. c.w. daily, and RH, 14,103-kc. c.w. and a.m. VK9WP is a new nifty noted on Nauru, and VK9DR puts Christmas on 40 c.w. at 1100 GMT. . . . Delaware will clinch WAS for KS6BL (K7VAX), and near-by KS6BA keeps busy with 14,265-kc. traffic schedules. . . . Chatham's ZL3VB tries 14,055-kc. c.w. at 0400 GMT. . . . 9M2LO wants an early DX crack at VS5 and ZC5. . . . KB6EPN keeps Canton coming, 14,269-kc. sideband at 0200 GMT. . . . 9M2YY formerly signed VK9YY. . . . VK9NT and KC6BK maintain tantalizing skeds, 0630 GMT on Saturdays. 14,300-kc. s.s.b.

HEREABOUTS — WN5HZY wonders what the moaning and groaning is all about concerning poor conditions. Steve just tacked up a fancy WAC diploma, all contacts scored on 21 Mc. in the first half of '64. ARRLer W1ECH, who certified the feat, says only about fifty Novices have turned the trick, most during sunspot prosperity years ago . . . . W9IGW, vacationing southeastward with the XYL in May, scored some 200 14-Mc. contacts with a Swan sender and vertical as PJ5MG. "I had no trouble working into the U.S. on c.w. but there was difficulty on s.s.b. due to heavy QRM and my low power. Working into Europe on sideband around 14,100 kc. was very good, as was c.w. in the lower part of the band." Wayne visited personally with PJ5s SA SB and Bartholomew's FG7XT/FS7 . . . . YV8AJ will reactivate soon, according to W2GHK, perhaps for a longer run . . . . K5JVF finds PY2SO planning summer 7- and 14-Mc. DX goings-on as PY2SO/PY9 . . . . W9TQL, back at his dials after a five-year layoff, says, "Band conditions do not compare with 1959 but the availability of so many more countries has certainly added incentive. In '59 I would listen for weeks just to hear one new one." Bet Bill is having a picnic with those new tube-type prefixes . . . . WA2QLM wonders if anybody displayed serious interest in the November '63 "How's" lead-in on s.s.p. Nope, OM, no mail response from the faithful in that field, and no detectable brainwaves, either. [You're not exactly QRO, yourself, Boss.—*Jeeves*] Perhaps there's nothing to that e.s.p. blarney after all . . . . More local lore via club newshawks: XE1AE is a candidate for early Socorros (XE4/XF4) election. . . . WA6TGY is staggered by the six-element, 72-ft. boom, twirler of W6VPH. . . . Lack of time forces W6HVN to surrender editorship of NCDXC's famed *DXer* after a good show. W2FGD takes over as editor of LIDXA's *D.X Bulletin*. . . . PJ2MC (W6ITH) reports PJ2ME fighting a fierce TVI skirmish. Neighbors keep trying to watch KP4 television over a 220-mile path. Near-by PJ2MH gets on c.w. once in a while. . . . K1DFT may revive the old beer can vertical fad with his 7-Mc. quarter-wave. One-sixty (hic!), anybody? QST

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 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.

W1, K1, WA1 — G. L. DeGrenier, W1GKK, 109 Gallup St., North Adams, Mass. 01247.
W2, K2, WA2, WB2 — North Jersey DX Ass'n, P.O. Box 303, Bradley Beach, N. J. 07720.
W3, K3, WA3 — Jesse Bieberman, W3KT, P.O. Box 204, Chalfont, Pa. 18914.
W4, K4, WA4 — Thomas M. Moss, W4HYW, Box 20644, Municipal Airport Branch, Atlanta, Ga. 30320.
W5, K5, WA5 — H. L. Parrish Jr., W5PSB, P.O. Box 9915, El Paso, Texas 79989.
W6, K6, WA6, WB6 — San Diego DX Club, Box 6029 San Diego, Calif. 92106.
W7, K7, WA7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon 97301.
W8, K8, WA8 — Walter E. Musgrave, W8NGW, 1245 E. 187th St., Cleveland, Ohio 44110.
W9, K9, WA9 — Ray P. Birren, W9MSG, Box 510, Elmhurst, Illinois 60128.
WØ, KØ, WAØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn. 55921.
VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
VE2 — John Ravenscroft, VE2NV, 135 Thorn rest Ave., Dorval, Quebec.
VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ont.
VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 5, N. Edmonton, Alberta.
VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, B. C.
VE8 — George T. Kondo, VE8RX, % Dept. of Transport. P.O. Box 339, Fort Smith, N. W. T.
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.
VO2 — Douglas B. Ritcey, Dept. of Transport, Goose Bay, Labrador.
KP4 — Joseph Gonzalez, KP4YT, Box 1061, San Juan, P. R.
KH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii **96701**
KL7 — Alaska QSL Bureau, Box 6226, Airport Annex, Anchorage, Alaska.
KZ5 — Ralph E. Harvey, KZ5RV, Box 407, Balboa, C. Z.

(Cards for SWLs may be handled via Leroy Waite, 39 Hanum St., Ballston Spa, N. Y.)

Strays

W7VBT/5 had a little difficulty with his ARRL membership renewal recently — seems that his 8-month-old son ate the postcard notice! Alan is going to feed him a code record and see what happens.

—...—

Silent Keys

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

W1BIG, Frederick Best, Readfield Depot, Me.
W1BJB, S. Forrest Martin, Boston, Mass.
W1BUG, Bertrand G. Scott, Boston, Mass.
K1ECL, Alden P. Denham, Bath, Me.
W1IIWE, Albert D. Conant, Danvers, Mass.
K1JLE, Ronald B. Susman, Edgewood, R. I.
W1QJ, Harold E. Garfield, Brockton, Mass.
W2CNO, Melvin J. Stagg, Sr., Passaic, N. J.
W2CZN, Myron Gorski, Ballston Lake, N. Y.
W2FFY, George Hyde, Metuchen, N. J.
W2HNA, Edward B. Clegg, Belleville, N. J.
WA2YUU, Ansel L. Saffer, Staten Island, N. Y.
W3MPL, Eugene Phillips, Monroeville, Pa.
W3MTC, John Koval, Jr., Mahoney City, Pa.
W3TEJ, Paul L. Yackley, Lancaster, Pa.
W4RQG, A. Hunter Bahnson, Jr., Winston-Salem, N. C.
K5AET, Jacob N. Blackwell, Mineral Wells, Tex.
W5CPR, Arnold W. Stewart, Galveston, Tex.
W5JIH, Joseph L. St. Clair, Mineral Wells, Tex.
K5KQM, Robert D. Brammer, Albuquerque, N. Mex.
W5PH, James H. Lamb, Tyler, Tex.
W6BAP, Walter F. Frederick, Larkspur, Calif.
K6DN, Joseph W. Peckham, Pasadena, Calif.
W6EGK, Gordon Smith, Los Angeles, Calif.
K6HGZ, Clyde E. Bell, Burbank, Calif.
W6IXH, Howard K. Norton, Hayward, Calif.
W6PPQ, Mark J. Barlich, Monterey, Calif.
K6PQY, Lee J. McDaniel, Pasadena, Calif
WA6YSB, Walter Woestman, Altadena, Calif.
K8CEA, John J. LaRue, Bay City, Mich.
W8KXD, Alvin H. Huntsman, Glendale, W. Va.
K8LUP, Raymond L. Tucker, Cleves, Ohio
W8PQF, Arnold R. Matthews, Fairmont, W. Va.
W8QV, Ellis A. Smith, Cleveland, Ohio
K9KLW, Samuel L. Secrest, Marion, Ind.
W9KTX, Virgil H. Houser, North Liberty, Ind.
ex-9OV, Leonard E. Oldfield, San Diego, Calif.
K9YZC, Floyd E. Brattain, Bellmore, Ind.
KØDYE, Kenneth C. Ihde, Branson, Mo.
WØQV, Safford D. Thacher, Topeka, Kans.
VE7XX, Stephen M. Jones, Victoria, B. C., Canada

Strays

Looking for those rare counties in North Carolina and Tennessee? Listen for Operation Skytop, which will be operating from August 8 to August 18, using the call WA4MIV/4. C.w. frequencies will be 3510, 7010, 7074, 14070, and 21,070. Sideband on 3810, 3918, 7225, 7295, 14,335, 21,410, 21,387, and 28,645 kc. Novice c.w. on 3712, 7163, and 21,110 kc. Operating times generally will be 1400 to 0500 GMT. There'll be both a base station and a couple of mobiles in operation, and you might even find 'em on 160, 6, or 2 meters.

—···—

ZS1JD, a drummer, would like to hear from American hams in the music business.

—···—

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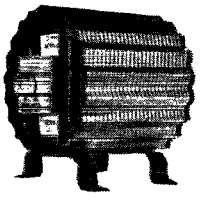

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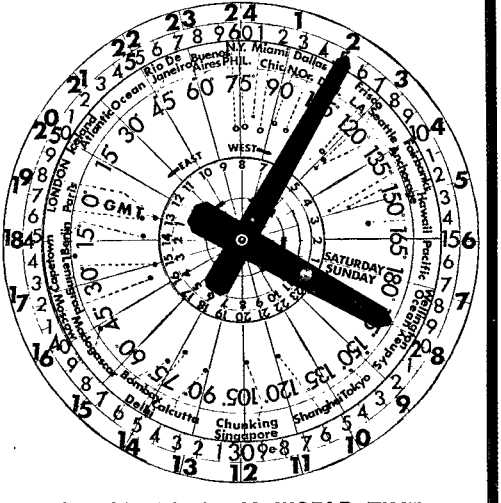

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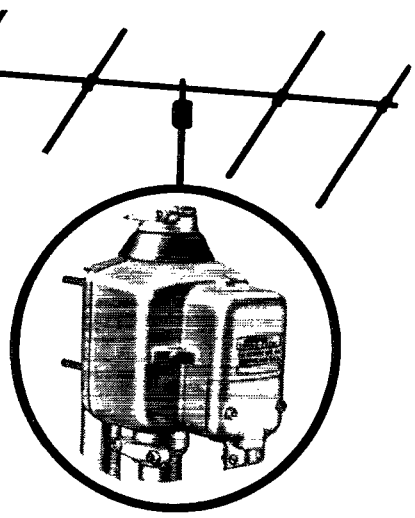

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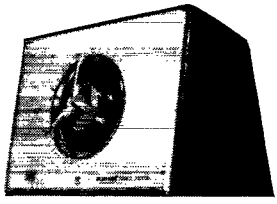

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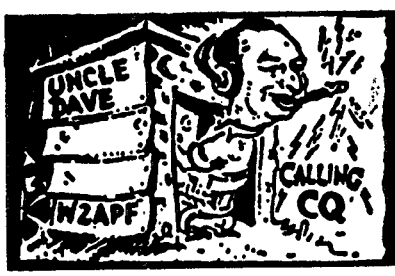

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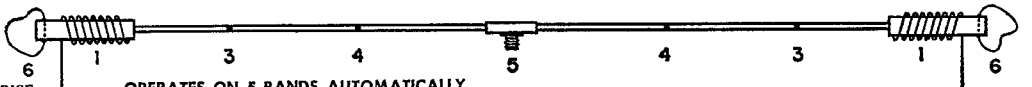

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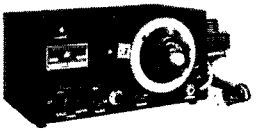

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HAM-ADS

(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 box 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. 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 issue nor more than one ad in one issue.

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.

PEORIA Hamfest September 20, Exposition Gardens, Peoria Area Amateur Radio Club, Registration $1.00 until Sept. 11. Write Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill.

10TH ANNUAL VHF Roundup will be held Saturday, October 10th, at Three Rivers Inn, Liverpool, New York. Speakers, dinner floor show, all for $6.00 advance registration; $6.50 at the door. Tickets, Dick Holbert, 1607 Stolp Avenue, Syracuse, N.Y. 13207.

BIG "D" Hamboree August 15, 1964. Goodies, family fun, swimming pool nearby. Make plans now. Pre-registration ($2.00) closes August 1st. Write Ed Youngblood, Dallas Amateur Radio Club, Box 30532, Dallas, Texas.

FOR Sale: Meissner 150B, 160 to 20 meters, with book and spare parts, $150. W1HRR, Taconic, Conn.

ANNOUNCING! The 30th Annual Hamfester Radio Club Hamfest and Picnic, Sunday, August 9, 1964, Santa Fe Park 91st and Wolf Road, Willow Springs, Illinois, near Chicago. For complete information and maps write John Chass, K9LOK, 5434 South Bishop St., Chicago, Ill. 60609.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WE buy all types of tubes for cash, especially Eimacs, subject to our test. Maritime International Co., 199 Front St. Hempstead, N.Y.

TOROIDS: Uncased 88 Mhy, like new. Dollar each. Five/$4.00. P. P. DaPaul, 309 South Ashton, Millbrae, Calif.

SOUTHERN California: Transmitters and receivers repaired, aligned. Bandwidth, frequency, harmonics measured. Used ham gear bought, sold, traded. Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel KEllogg 8-0500.

CASH For your gear! We buy, trade and sell. We stock Hammarlund, Hallicrafters, National, Johnson, RME, Hy-Gain, Mosley and many other lines of ham gear. Ask for equipment list. H. & H. Electronic Supply Inc., 506-510 Kishwaukee St., Rockford, Ill.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

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. Tel NOrmandy 8-8262.

WANTED: All types of aircraft or ground ratios. 17L 618F or S 388, 390, GRC, PRC, 51J, RVX. Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames, W2KUW, 308 Hickory, Arlington, N.J.

MUST Sell: 75A-4-500A, Globe King, Johnnie Brines, K4GGM, 16 Barbrick St., Concord, North Carolina.

SELL, swap or buy ancient radio sets and parts, magazines. Laverty, 118 N. Wycombe, Landsdowne, Penna.

SELLING Out: GSB-100, $225; HQ-170C, $200, both for $400. Heath VHF-1 $135; HB 10-6-2 rcvr, $50, both $160. Other items, write for list. F.o.b. Bob, 626, 26th St., Cairo, Ill.

QSLS?? WPES?? Personalized made-to-order one-day service! Largest variety samples 25¢, DeLuxe, 35¢. Religious, 25¢. (refunded). Sakkers, W8DED, Box 218, Holland, Mich.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elm, Hamilton, Ohio.

C. FRITZ, bringing hams greater QSL returns, over a quarter century! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona (formerly Joliet, Illinois).

QSLS: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLS "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples, 25¢.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples, 10¢.

SPECIALISTS. Distinctive Samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago 39, Ill. 60639.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkins Creative Printing, P.O. Box 787-1, Atascadero, Calif. 93422.

QSLS. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSLS-SWLs. Gorgeous rainbows, etc.! Highest quality! Fast Service! Reasonable prices! Samples 10¢ refundable. Joe Harms, (W1GET-W2JME), Mystery Hill, North Salem, N.H.

QSLS. Samples free. Blanton's, Box 7064, Akron, Ohio 44306.

QSLS. Large selection of styles and colors. 1 color, $1.50; 2-color, $2.25; 3-color, $3.00 per 100. August special, 500 2-color QSLs, $5.50. Samples 10¢. K. Kidd's RD 1, Box 254, Telford, Penna.

QSLS, See our new "Eye-Binder" cards. Extra high visibility. Samples 25¢. Dick, W8VXK, 1996 N. M-18, Gladwin, Mich.

QSLS, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184. Phoenix 17, Ariz.

QLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing; eye-catching, comic, sedate, fatabulous. DX-attracting, prototypal, snazy, unparagoned cards (Wow!), Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLS. 100 for $3.00. 28 new drawings. Samples 10¢. Brigham, Colson St., No. Billerica, Mass.

SUPERIOR QSLs, samples 10¢. Ham Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS. Samples 25¢. Rubber stamps: name, call and address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLS 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service Free samples Thomas St., Riegle Ridge, Milford, N.J.

QSLS. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals. K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

QSLS. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

QSLS. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60639.

ATTRACTIVE QSLS: Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

1½" Call QSLS $2.40/100, $2.90 (2 sides). Samples. Garicpy, 2624 Kroemer, Ft. Wayne, Ind.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

QSLS: Quality with Service. Samples Free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSL Specialists. Distinctive samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago, Ill. 60639.

GREET Ham Friends with 3-D Personalized Christmas cards. Newest holiday idea. Brilliant, sparkling desgins. Samples 10¢. 3-D QSL Co., Monson 2, Mass.

QSLS: $2.00 per 100 postpaid. New style glossy 2-colors. Free sample. Hobby Print Shop, Umatilla, Fla. 32784.

QSLS. Samples, dime. Printer, Corwith, Iowa.

QSLS—100 3-color glossy, $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64114.

QSLS. Free samples. Dave's Printing Service, Box 573 Broaddus, Branch, Philippi, W. Va.

HUNDRED QSLs: $1.00. Samples, dime. Meininger, Jesup, Iowa.

FILMCRAFTERS. Box 304, Martins Ferry, Ohio.

QSLS-SWLS 3-colors, 100 $2.00. Samples dime. Bob Garra, Lehighton, Penna.

HAM Stationery, different QSLS, $1.50-100. Samples, 5¢. Wahle, 17WO42 Indianhill, Bensenville, Ill.

RUBBER Stamps $1.00. Call and address. Clint's Radio W2UDO, 32 Cumberland Ave., Verona, N.J.

CANADIANS: Compact 1 Kw SSB station for sale. Details and photo on request. VE3CTP 2 Andirondack Ave., Agincourt, Ontario, Phone 291-0088.

QSTS for sale. Complete run from 1947 to 1962. $50.00. VE3AOA, 488 Victoria St., London, Ont., Canada.

RUBBER Stamps. 3-line. $1.00. Andrew Travis, 2002 West 8th, Austin, Texas 78703.

75A4, $475; HT-32A, $450; 30L1. Make an offer. All units are unmodified and in like-new condx. VE3AWP, 1411 Peter St., Cornwall, Ont., Canada.

QSTS from 1948 to 1958. Mae Paulette, North Troy, Vt.

WANTED: Commercial, Military, All types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URN, URM, TS, 618S-T, 17L, 51R-X, others. Ritco, P.O. Box 156, Annandale, Va.

GIGANTIC Sale, factory checked new 6883 (12V-6146) $1.29; DS501 3—$2.50; sil. rect. 600 PIV 750 Ma. 10—$2.50; meter saver diodes, $1.98. Diodes, transistors, zeners, SCR's. A-B Engineering, 2043 E. 52nd St., Brooklyn 34, N.Y.

FOR Sale: Apache $175; SB-10, $75; Mohawk, $185; Marauder, $325.00. Gordon Wright, K5EHX/W5IPA, 4515 Gloster Rd., Dallas 19, Texas.

VIKING II, $125; SB-10/PS, $80; VF-1, $15.00; Cheyenne, $60; 813 linear/PS. $90. Al Foskett, K1NTR, 800 Wolf Hill Rd., Cheshire, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mhy and 1-44 Mhy uncased like new condx. toroids: information sheet, mounting hardware and six mylar capacitors. $5.00 ppd. Toroids: specify 88 or 44, less capactrs. $1.00 each. 5/$4.00, ppd. KCM Products. Box 88, Milwaukee 13, Wis.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WAlker-5-7000.

CRYSTALS: Free Bargain List. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne. 236 Park Avenue, Bethpage, L.I., N.Y.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. Specify equipment wanted. NC-300 w/matching spkr, $150; Valiant, $150; Valiant FW, $195; Apache, $150; TR-44, sealed carton, $50; HT-44, $316; SR-150, $520; HT-45 with PS, $395. F.o.b. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

RTTY Gear for sale. Write for list. 88 or 44 Mhy Toroids five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

304TL tubes wanted. Also other xmttg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

ATTENTION! Mobileers Heavy-duty Leece-Neville 6 volt 100 amp. system, $50; 12 volt amp. system, $50; 12 volt 6 amp. system, $60; 12 volt 100 amp. system, $100. Built-in silicon rectifier alternators 12 volt 6 amps, $100; 12 volt 100 amps, $125.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 1907 Coney Island Ave., Brooklyn 30, N.Y. Tel. DEwey 6-7388.

WANTED: For personal collection: QSTs March and May 1916 W1CUT, 18 Mohawk Dr., Unionville, Conn.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GArfield Area code 201-471-2020.

CASH For callbooks. Old callbooks prior to 1925 or after 1931 wanted. W8EF, 795 Lake Shore, Grosse Pointe, Mich. 48236.

SELL: KWS-1, $650.00. In excellent condition. Dave De Armond, W6MSD, 3024 Seminary, Oakland, Calif.

SELL: HT-37, perfect condx: $250. George Gromm, WA2OGT, 1625 Rockaway Parkway, Brooklyn, N.Y. Tel: CL-1-7147.

CASH For Callbooks. Old citizens amateur callbooks before 1924. Also 1941 or 1942. U.S. Government Amateur Callbooks, any year, wanted. W8EF, 795 Lake Shore Road, Grosse Pointe 36, Mich.

FOR Sale: BC-348-P receiver, $50. W6BLZ, 528 Colima St., La Jolla, Calif.

BIRTHDAY Anniversary, Christmas Gift. Page 176 May QST, DX QSO Recorder, $2.50. Pen pencil set with gold name and call, $4.50. Viking Products, Dept. A-5, Orange, Mass.

SELL: 75A-4 and KWS-1, $1100; FT 100 Triband beam, $50; 6 mtr. mobile FM units. M. H. Klapp, W2EQV, 17 Kenosha St., Albany, N.Y. 12209.

KITS Built, rebuilt, repaired and/or calibrated. Professional wiring. Lewis Newmire, WA4GHJ, Box 777, Blacksburg, Va.

FOR Sale cheap: QST or CQ, any quantity. Send your list for quotation. Cash for call books before 1942. Want early radio gear and publications. Erv Rasmussen, Box 612, Redwood City, Calif.

PERFORATOR Tape Buff, 35¢ roll, 40 rolls to case. F.o.b. our plant. Allen Paper Co., 111 N. Canal St., Chicago 6, Ill.

FOR Sale: W6BWK estate: Clegg Zeus 331, $495.00; Clegg Interceptor and power supply, $295.00; Lettine 262 and U.F.O. supply, $150.00; RME converter 56-220 Mcs., $175.00; Hallicrafters SX-1001A, $300.00. Collins 75A2, $225.; Johnson Kilowatt desk, Ranger exciter, kilowatt Matchbox with SWR, condx as new, $1000. Many other items. Ted Brix, 5573 No. Van Ness Blvd., Fresno 5, Calif.

ATTENTION RTTY'ers: Typewriter ribbon re-inking device, $3.00 postpaid. WØAJL, Walter E. Nettles, 201 So. Eudora St., Denver, Colorado 80222.

SALE: HQ-180, Viking Valiant, in perf. Condx: $225 ea or $400 takes both. New York Call TI 2-9500 Ext. 532 (W2DRS).

WASHINGTON Amateur Radio News. Free copy. Foundation for Amateur Radio, 2509—32nd St. S.E., Washington, D.C. 20020.

SELL: 75A-4 and KWS-1. Perfect condition. Package deal only. $995 F.o.b. Add $50 if I have to crate. Phone 203-755-1121 day or 203-482-8931 nites. R. Corbett, 45 Prospect St., Torrington, Conn.

WRONG Frequency? Change crystal frequency with this crystal etching kit, supplies everything needed. $1.00; deluxe model, $2.00. Guaranteed Ham Kits. Box 175, Cranford, N.J.

COLLINS S/Line 32S-1, 75S-2 noise blanker, c.w. filter. Make offer. W5HXW, 1234 Glen Cove, Richardson, Texas.

LIKE New, late model, spinner knob, KWM-2, $729; factory installed blanker, works like a charm, $79. Collins AC supply, $79; mobile mount, $79; Topaz 260 w. mobile supply, $99; Heathkit MP-1 inverter 6/12 DC-117 AC, $25.00; Heathkit HP-20 AC supply, $25.00; Globe SS3 O multiplier, $10. F. Breidbart, 1725 Broadway, Brooklyn 7, N.Y. Tel: GL 5-2222

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

MUST Dispose: 82 copies Proceedings of the IRE, 3 vols. complete, 1926 to 1952. Real bargain for lot. Write for list. Mrs. Miriam Y. Knapp, W1ZIM, 191 Beechwood Road, West Hartford 7, Conn. Tel: 521-2055.

SELL Or swap: IBM executive mill, with or without IBM contract, like brand new (cost $700). G. Dubbs, 741 Campus St., Uniondale, N.Y. 11553.

SELL: HW-32 with HRA-10-1, 20M SSB transceiver, excit performer, getting similar all-band job. $125.00. Viking II with Johnson VFO, $135. Central Electronics 10A exciter with tubeless VFO, $75. R. W. Woodward, W1VW, 41 Middlefield Drive, West Hartford, Conn.

FOR Sale: 150 ft. Blaw-Knox self-supporting tower type UH. For supporting of the UHF antenna, base 12 ft. square. Weight 8300 lbs. Dismantled and ready for you to come and pick up. $1900 cash. W. C. Kasson, W8HRL, 4305 N. Seymour Rd., Flushing, Michigan, 48433.

DRAKE 2A,B users! Improved bandspread system for read-out to one-tenth Kc. $2.50. G. A. Guter, 543 Lesterwest Way, Glendora, Calif.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141.

YOU pay shipping charges: Like-new P-H 6-150 transverter, $140; new Hallicrafters CRX-3 108-135 Mc aircraft rcvr, $50; Marsan Vidicon closed circuit (or RF output) industrial TV camera, cost $450. New, like new, $225; new Ameco 220 Mc. cvtr, I.F. 14-19 Mc., with P/S, $22. New Fisher model FM-200-S stereo tuner, $200. All guaranteed, Money order or cashiers check only. W5KHT, 4007 N. Pennsylvania, Oklahoma City 12, Okla.

SELL Mini-Product beam, Tenna Rotor, TV projection tube, 2 in. cathode ray tube, APA-11 pulse analyzer. Peter Donneau, W1YIX, 11 Blanche Ave., Manville, R.I.

TR-3 Drake with DC-3 12-volt supply, used two months. Guarantee cards included, $560. HQ-180C, new, $300, with spkr. Apache, clean, $195. John H. Pattee, W1VHF, 60 Pleasant St., Marblehead, Mass.

SALE: KWM-2, $750; 30L-1, $350. Both in superior condx. W4BLS, Box 26, Russellville, Alabama.

COMPLETE Station: Must sell for college. Hallicrafters SX-140 and spkr; T-60 xmttr, AR-22 rotator, 5-element beam and ground plane for 6 meters; 30 ft. mast. Ameco pre-amplifier and more. All for $165. WA6UWH, 2739 Waverly Dr., Los Angeles, Calif.

HALLICRAFTERS Equipment in mint condx. SX-101A, $220 and HT-37, $275. Or both pieces $425. Bob Bevington, K5BFQ, Blytheville, Arkansas.

COLLINS Noise Blanker for 75A-4, new with instructions; model 136C-1, $59; VFO for 75A-4, 70E-24, new, $39; 12 volt supply, new 516E-1, new, $115; KWM-1 mobile mount 351D-1, new, $35; KWM-1 DX adaptor, new, $19; Collins 51#-1 general coverage S/Line receiver, like-new, $1100. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

CLOSING Shop. Best offer. New Precision E310 and E400 signal generators, new Eico 250 Audio VTVM;Dyna-Quik and Jackson tube checkers; Supreme 543 VOMs, Teletest CT355 capacitor checker. Send for complete list. Witmer, FAA King Salmon, Alaska.

SELL Or swap: IBM executive mill with or without IBM contract. Like brand new, cost $700/ G. Dubbs, 741 Campus St., Uniondale, N.Y. 11553.

BRAND new 4-400A's, $25.00. R. F. Hassing, 1834 Jefferson Ave., St. Paul, Minn. 55105.

75A2A Collins 3.1 Kc filter; 100 Kc. calibrator; plug-in product detector, $295. W2UUN, Oak Ridge, N.J. Tel: OXbow 7-4246.

SELL: 20A exciter with QT-1 and Lakeshore Bandhopper VFO, $165. P&H audio compressor, $25. Very clean condx, with manuals. R. Formica, WA2EBS, 1300 Greenbriar Lane, No. Bellmore, L.I., N.Y. Tel: CA-12404.

FOR Sale: Mint SX-101A w/spinner knob, $270 and HT-32, $325. A steal. Both for $550. WA9HRN, 580 Crooked Lane, Barrington, Illinois.

NEED Money! Best offer over stated price 75A-4, $360. Invader, $335; Warrior, $165. Will crate and ship express collect. Chuck Camo. KØIFT, Peyton, Colo.

CENTRAL Electronics, 200V transmitter, $500; 600L Linear Amplifier, $250. Both units like new. Wes Schum, W9DYV 6223 McClellan, Chicago, Illinois 60630.

ALL New: National NCX-3 transceiver, NC- A/C power supply, Microplug plus for NCX-3, manual, microphone, $425.00 Also other miscellaneous. Write: Mrs. Gordon Haddy, 2297 Hobbs Drive, Alpena, Michigan.

COAX Connectors: new commercial surplus, PL-259, $.30, SO-239, $0.25, minimum order $3.00. Jawin, Box 63, Beaverton, Oregon.

GSB-100, $225; LA-400C linear, $125; both exclnt condx. Will deliver within 100 miles. W8CUT, 1776 Walnut, Coshocton, Ohio

EICO 720, Knight VFO, Electrone modulator; all in first-class condx, $90. Going SSB. WA6SCA. 9833 Richeon Ave., Downey, Calif.

COLLINS 351D-mobile mount, 516E-1, 12VDC power supply, MM-2 mobile boom mike with earphone, 136B-2 noise blanker, Webster band-spanner antenna and car mount, all in exclnt condx, cost $590. Sell for $350, with instructions. Adam Gamon, M.D. K8ACF, 2004 Court, Saginaw, Mich.

TO Settle estate of W8TTS: Collins 75S-3, serial No. 10824, used three months: $475. Dave Dorman, W8UQW, 1867 Taylor, Cleveland 12, Ohio.

SELL: 6 in. Dynascope refl. telescope, 5 eyepieces, equat. mount, electric drive, spotting scope. Cost over $200. Make an offer. Want 2 meter transceiver. You pay shipping. W1QXT, 487 Pine Rock Ave., Hamden, Conn.

SELL Or trade: Late model HQ-180C with speaker, $278; DX-35, $35. Want HQ-110, Johnson Ranger I, Johnson Matchbox, 275-watt model. Paul Sturpe, 1207 39th N.W., Canton, Ohio, Phone 492-3392.

DRAKE TR-3 serial 1326 with AC and DC supplies complete for $625. VOX just modified by Drake to TR-3A configuration. Also Hunter Bandit 2000A serial 439, with Hunter bias modification, $475. Both units in mint condx, used less than six months. K4ZJF, Milt de Reyna, 4030 Hallmark Drive, Pensacola, Fla.

RECEIVER RME-6900. Tops for SSB, $250; ideal for C.W. and A.M. Can't tell from new. Will consider old but gud rcvr as part payment, such as HRO- Pro - NC-183D, SX-42, Collins, SX-100, etc. Cleveland or nearby vicinity only. Clayton, 2670 W. 25th, Cleveland 13, Ohio.

NC-173 receiver, $85; HF 10-20 converter, $25; Heath 5" scope and sweep generator with xtal markers, both $50; 6 ft. cabinet rack with some H.V. components and extra panels, $50; home built 150-watt rig, $75 want: vernier knob for 75A4, Al Benz, W7KWH, 13103 Palatine Ave. N., Seattle, Wash. 98133.

FOR Sale: Late model Heath Mohawk receiver with xtal calibrator, in perf. condx, $200; Collins 32V3 transmitter, late model with new extra 4D32 tube, $250 F.o.b. K8SNO, Ben W. Perks, 275 West Home Road, Springfield, Ohio. Tel: 513-322-8613.

1 KW linear amplifier, bandswitching 10-80 meters, 4-400A, vacuum capacitor, regulated power supply for SSB, Variac, 4 meters, extra 4-400A, fully shielded. Bargain $345. S. D. Cowan, 62 Woodcliff Rd., Wellesley Hills, Mass.

GO Collins: complete station: 75S-1, 32S-1, 110 AC supply, station control. All in excint condx. Only $850. W4ZSH, 8806 Overhill Rd., Richmond, Virginia.

BEST Offer takes NC-303, Valiant excint condx, accessories included. K1OJQ, 187 Phipps St., Quincy, Mass.

SELL complete station KWM-2 with PM-2 and suitcase, used only five hours. Vertical trap whip antenna, $975. E. Talley, W2IVA, 416 E. 17th St., Brooklyn 26, N.Y.

GLOBE Champion 300A, 350-watts, needs little work, $95. K3GNI, Royersford, Penna.

75S-1, $225 cash; 4CX1000A linear with power supply, $200 cash. Leo Severe, RR 2, Box 5, Wilmington, Ill.

ART-13 PTO and buffer, $13. Have other ART-13 parts. Write. WA5FTP, 1208 Lee, Norman, Okla.

SELL: Collins 2 .1 kc mech. filter for 75A-4 #F455J-21. SSB QRM Buster. Satisfaction guaranteed. $40.00. Ron Lumachi, 73 Bay 26th St., Brooklyn 14, N.Y.

SR-150, AC and DC supplies, mobile mount, like new, $650. Also immaculate Cheyenne and HP-20, $85. Take all and get D-104 with stand and other goodies free. John Norton, WA1BWY, 40 Sherman Bridge Rd, Wayland, Mass.

COLLINS 75A4 serial No. 4270, 3.1 filter. Large spinner type vernier dial, $425; Central Electronics 100-V, $425. Both are on the air and are in mint condx, perfect, including original manuals. W. H. Becker, W5EAM, 11222 Hermosa Court, Houston, Texas, 77024. Tel: HO-8-4079. Area Code 713.

SELL: Heath HR-10 rcvr w/xtal cal., $50; Heath DX-60 xmtr, $50; HA-10 speaker, $5.00; Hy-Gain 14 AVS vertical ant. with 80-meter loading coil and roof mounting kit, $25. All one year old, in excellent condx. You pay shipping costs. WA1AKL, 49 Pondview Dr., Chicopee Falls, Mass. Tel: 593-6631.

HW12-22-32 owners inexpensive Triband conversion. Complete plans, $4.00 postpaid. Plans, Box 17, West Bend, Wisconsin.

COLLEGE Bound! Sell Drake 1-A with xtal calibrator, $140 plus shipping. Bruce Hillam, WB6DOP, 634 Ora Avo Vista, Calif. 92083.

"HOUSE Of Happy Hams!" Get your new or used gear for less with cash and no trade. Make us an offer or ask for ours. H & H Electronic Supply, 506-510 Kishwaukee St., Rockford, Illinois.

200V Central Electronics. The transmitter with everything. Excellent condition: $525.00. W8PBX, 7300 E. Aracoma, Cincinnati 37, Ohio Tel 513-351-2612.

RANGER I with push-to-talk mike, $120; new unused Cushcraft 6-meter beam, $25.00; Heath Mohican receiver with AC supply, $90. Shipping collect. Dr. C. R. Crosby, W1QP, RD 1, Chatham, Mass.

FOR SALE: DX-40 in gud condx, $37.00. K2JTX, with shipping extra.

GONSET Super 12 converter, in excint condx, $30; ATR inverter (60 watts, 110 volts output, 6/12 volt input), $25.00. Mike Swink, KØVVR, 1210 Kearney, Idaho Falls, Idaho.

WANTED: HQ-170 or similar and DX-100 or similar, SSB-10 optional. Write for best cash deal. Wallace Schulz, Parkston, S. Dak.

HALLICRAFTERS HT-19 transmitter, $65; Knight R-55 receiver, $30; Heath VF-1 VFO, $10. All in gud condx. W9DET/5, 1017 Custer Road, Richardson, Texas.

TRADE E-200C signal generator BC645A, or 1927 vintage RCA radios for prewar standard gauge electric trains. Brian Howald, RD 1, South Lake, Amherst, Ohio 44001.

32S-1, 516F-2, 75S-3 with cables and manuals, $995.00. K3JZH.

SELL Or trade: SP-600 JX-28 receiver, HQ-129X with Heath Q-mult. In excint condx. KE-93 mobile rcvr with AC supply S-mtr. and 12 VDC supply (as is). Prop pitch motor with selsyns and indicator (unmodified); FL-8 audio filters, 115 VAC selsyns, tubes, parts (SSAE for list). Interested in good Sideband exciter, Johnson 500, F/W Valiant II, or what have you? W5BBV, 3808 Gingerbread Road, Alexandria, La.

SELL: HT-37, $300; in perf. condx. Seldom used. Never repaired. Deliver within 150 miles. Bill Payton, W5OGO, 4048 Hickory Dr., Montgomery, Ala.

RTTY Model 26A teletype machine plus polar relay in excint condx and homemade converter, all for $70. K2VBL, 212-GL4-0647.

WANTED: Collins KWS-1. Hallicrafters SX-42 or SX-62. VE7QI, E. 60th Vancouver, B.C., Canada.

WILL Trade, on the air, F. W. Ranger and $75 and signal generator for F.W. Valiant or sell for $150. In perf. condx. Wanted F. W. Courier. Local deal only! WA8AHG, Henry Cherney, 852 Walnut St., Elyria, Ohio Tel: PH FA3-1245.

SELL: NC-183 rcvr, $125; DX-35, $35.00; VF-1, $15.00; the whole works for $160.00. WA4SHD, 3104 Willow Rd. N. W., Roanoke, Va. 24017.

COLLINS 75A4 receiver, 2 filters and speaker, $425; Seneca 6 and 2 meter transmitter, complete with Eico 40-watt modulator, $190; Collins 32V3 transmitter, $210; Morrow MB-6 receiver, MB-565 transmitter and 12-volt power supply, $125; Gonset G-76 transceiver with transistorized 12-volt power supply, $225; Johnson 6 and 2 meter converter, $30; Tapetone model XC-50-C4 double cascode converter, $15. All in excint condx. John Powell, Royce Chemical Co. East Rutherford, N.J., Phone GE 8-5200.

SWL. Ham in 1965. Need xmtr, rcvr parts. Can't afford to pay even for shipping. Old stuff will be FB. James Hince, Box 325, Cayuga, Texas.

1960-64 copies QST-CQ, 15¢ each W2JBL, Clark, 123 Davis Ave., Hackensack, N.J.

WRITE Us for the best prices on new and reconditioned amateur equipment. Henry Radio Stores, Butler, Mo.

FIRST Buyer! Collins 32V-3; Collins low-pass 35C2, HQ-110C; Sylvania modulation meter, AC line filter. K1OIC, $350.00. George Regis, 190 Eugenia St., New Bedford, Mass.

THE Original TOOTS (CQ May) includes hour-counting meter, $35 or better. Viking Ranger, factory-wired, in excint condx, $135.00; Like-new BC221AJ frequency meter with audio modulation, calibration and instruction books, $65.00. Vibroplex $12.00. C.o.d. Best offers. Feistead, KH6CU, 1777 Ala Moana, Honolulu, Hawaii.

WANTED: Early round de Forest audion with candelabra screw base, Boonton Q-Meter, H transmitter tube, Callbooks, magazines, catalogs before 1926. Send description and prices. W9EWK, 610 Monroe Ave., River Forest, Ill. 60305.

MUST Sell entire station. Globe Chief, SM-90 modulator, Heath VFO and Heavy-duty power supply, panel control, Hammarlund HQ-129X and Ameco CB2 2-meter converter, $165.00 takes everything. K2SJC, 9012 New York Ave., North Bergen, N.J.

APACHE xmtr, $150; SB-10, $40.00; both for $180. Mohawk rcvr, $160. All in xcint condx. Will ship. First certified check. WB6ALQ, Dr. Jack McMullin, 5184 Carlingford Ave., Riverside, Calif. Tel: 684-4381.

FOR Sale: Model 14 TD brand new, $90; Model 14 reperf., brand new, $100; Model 15 printer Auto-line-feed and carriage return, $100; Heath telephone amplifier GD-7, $15; toroids, $.50 ea., K5AON, 867 Berkinshire, Dallas 18, Texas.

ONE TH-4 Thunderbird beam, like new with 75 ft. RG-8/U cable, $75; one Ham-M rotator with 75 ft. control cable, $65. W9ET, 6768 South East St., Indianapolis, Ind.

WIREWOUND Resistors for R.F. applications. Free flyer. Wizpatronics, Box 51, Candia, N.H. 03034.

MOBILE Equipment: Swan SW-175 75-meter transceiver and 800 VDC power supply. In excint condx. Both for $215.00. Bob Cosier, K8SPB, 1222 Oakes St., Grand Haven, Mich.

MINT condition: APX-6 converted for use on 1220 band. Complete with meters, calibration chart for 1180 to 1320 Mc., 50 ft. RG-17/U with connectors, corner reflector antenna, all for $100.00. Two meter 416B preamplifier with fan, less power supply, with four spare 416B's, $45.00. 75-meter 40-watt AM mobile transmitter, need work, $20. Marty Kaiser, 418 Hale St., Pennington, N.J. 08534.

VIKING II F/W with 122 VFO in mint condx, with 600 W., 250TH final, pr. 810 mods., p/ss, in cabinet, coupler, 100 ft. RG-8/U, extras, $225.00 or best offer. W9ISX, Milt Fenner, 235 Coe Rd., Clarendon Hills, Ill.

SELL: Heath HA-10 Warrior linear. Self-contained antenna relay activated by high-voltage switch for instantaneous exciter to linear operation. Also, built-in auxiliary solid-state 100v. C-bias supply, $185. Delivered free in New York City area. W2BJR East Williston, Pionger 2-2821.

INTERESTED Florida for DX and TVI free hamming? Three bedroom two-bath home on oversized corner lot, landscaped, extra carport for boat, forty feet E-Z Way tower with 5-element Tel-Rex Triband beam. Small equity, twelve miles from Tampa. Complete S/Line with 30L-1, if wanted. WA4QPR, Wolford, Box 823, Brandon, Fla.

PRINTED Circuit boards, Hams, Experimenters. Catalog, 10¢. P/M Electronics, Box 6288, Seattle, Washington 98188.

TEKTRONIX Oscilloscope with 5Mc, or better response, wanted. Give full information including serial. Dage CCTV gear for sale. List for stamp. K4GYO, 430 Island Beach, Merrit Island, Fla.

NCX-3 and AC supply, $325.00; HQ-180C, $250; Gonset G63 Hamband receiver, $100.00. All in gud condx. Philip Schwebler, W9GCG, 4536 N. 50th St., Milwaukee 18, Wis.

SAN Diego Area sale: T-4FRC transmitter, $60; M57D1 speech amplifier-compressor, $18; I-177 tube-tester, $15; four used 810's, $4 each. Unused pair 4X150As, $12; BC779A Technical Manual, $3. W8CGL/6, S. A. Pye, 2698 Escondido Ave., S.D. California, 279-3443.

SELL: Perfect Knight R-100 receiver, Crystal calib., S-Meter, $70; Heath DX-20 with modulator, $35.00; Regency mobile converter, $35; Elmac A-54, A-1, $40; mobile transistor power supply, $25.00; new RME DB-23 Preselector, $35.00; new Hallicrafters TO-1 keyer, $60; Heath VOX, $5.00. K5CNI, Cliff Westbrook 700 Upas, McAllen, Texas MU-60127.

HAM Equipment. Buy, Sell, Trade. Free listing in Ham Directory for new subscribers. Sample copy for stamp. WA2NHH, 1225 Hillside Place, North Bergen, N.J. 07047.

FOR Sale: HRO-60 receiver, 5 coils, xtal calibrator, speaker to match, perfect, $265.00 firm; S-40 receiver, perfect, $45.00; RCA television 21-in. 4-door console; sell or trade shotgun Ithaca double barrel, perf. condx, $49.00, 12 ga., excint condx $50 Call before coming. Phone Atlantic City N.J., 822-7615. W3VDP, formerly of Bristol, Penna. Marty Green, 7101 Ventnor Ave., Atlantic City, N.J.

SELL QST Magazines, 1928 to present, 25¢ each. Make an offer for large orders. Joe Lester, WA6OLQ, 97 Mount Vernon, Atherton, Calif.

ART-13 xmtr w. all pwr. Gud shape. $110 or best offer. Write Steven Haflich, 69 Channing Rd., Belmont, Mass.

WANTED: For personal collection - Benwood bakelite rotary gap. Antique gear dating back to 1915 or earlier. Spot cash. WØZB, #4 Williamsburg, St. Louis 41, Mo.

WANTED: HRO-60 coils AA, AB, AD. W5JNO, Preston, 6714 Gaston, Dallas, Texas 75214.

TRADE For U.S. coins equal value: HQ-100 with 455 Kc BFO and speaker; Monitor Radio 152-174 KCS, Air-O-Ear receiver, 3 bands, 200 to 400 Kcs. Broadcast and 109 to 129 Mcs; Heath CB1 with 12V power pak and auxiliary antenna. L. Stewart, Box 333, Melbourne, Fla.

QSTS: 243 copies, 1929 to 1959 run; also CQs, 128 copies, 1945 to 1958. To best offer for lot. W2EXX, 58 Birch Pl., Buffalo, N.Y. 14215.

WANTED: RME VHF 126 converter in gud condx. W2OQO, 2951 Pearsall Ave., Bronx 69, N.Y. Tel: OL 2-7376.

SX-101A, SN-260204. Excellent. $210. R. H. Mitchell, W5DWT, 6403 Stonewall, Greenville, Texas.

SELL: DX-100 in mint condx. All manuals. Wired by electronics engineer: $125. K2DPO, 962 Palisade Ave., Teaneck, N.J. 201-836-8610.

SIX Meter gear, latest models, like new. Sixer with xtal and mike, $38; Clegg 99'er with five xtals, mike and low-pass filter, $130. WAØHXW, High School, Pleasant Valley, Iowa.

COLLINS 51S-1, new, $1275; 75A-4, excint, $375; 75A-4 filters $35; 75S-1 with CW filter and Waters Rejection Tuning, $375; 32S-1, $400; Drake TR-3, factory checked, $450; AC supply, $60, DC supply, $100; RV-3, $65; HT-41 linear, $265; may trade. W8-WGA, 3451 Ridge Ave., Dayton 14, Ohio. Phone 513 2770409.

QUALITY! Quantity! Terms! Trials! Trades! Over 1000 used units on hand. Big discounts on most models. Write for free "Blue Book" listings. Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

COLLINS KWM-2 (#12661) A.C. supply, in original carton. In new condx: $850. WA2KQZ, Cloverdale 6-0685. Sussman, 65 Bay 19th, Brklyn 14, NY.

QST 1946-1963; CQ 1948-1963; 73 1960-1963. Missing QST February and November 1951; CQ February 1948. Best price over $80 F.o.b. K8DDB, E. M. Ringle, Rte. 1, Gallipolis, Ohio.

FOR Sale: Toroid coil-winder, 2 bobbins, winds #22 and #36 wire: $250. Electronic turns counter - $50. Richard Dunlap, 1127 Rhapsody Rd., Quincy, Ill.

MOVING! Complete station: $75: Lafayette KT-200 receiver, $50; Knight 50-watt transmitter, key, and crystal, $25, extras. Blankley, 9 Wade, Jersey City, N.J.

FOR Sale: Hy-Gain TH-4 beam, CDR Ham-M rotator, Spaulding 64 ft. tower. Geoffrey Richardson, 12325 Madonna Dr., Lansing, Michigan NA 7-2650.

BOOST Reception, 3.5-30 megacycle SK-20 Preselector kit, $18.98; boost modulation—AAA-1 clipper-filter kit, $10.99. Reduce noise—NJ-7 Noisjector, IF, wired, $4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento, California, 95822.

FOR Sale: Hickok Model 695 TV-FM alignment generator, built-in bias supply, in excint condx, $125; Lafayette HE-30 communications receiver, built-in speaker, factory wired, mint condx, $50; Dumont 'scope calibrator Type 264A, hardly used, $15; three 4-65A's, $10; 4X150D, new, $7.00; Six 10- mfd, 1,000-volt oil-filled capacitors, $1.50 ea., and two 10-mfd, 600 volt, $1.00 ea; plate transformer, 3,000 VCT, 250 Ma., oil-filled, $15; power transformer, Triad R-27A, 1,500 VCT, 400 Ma., new, boxed, $20; URC-4 walkie-talkie with battery pack, converted for 2 meters, $40. Charles Caringella, W6NJV, Box 1025, Ontario, Calif.

RARE Navy TCK-4 transmitter. Original including power rack. Sell-swap. Write for details: W6UYD, 7740 Goes Parkway, Sacramento, Calif. 95823.

FOR Sale: 1 Hammarlund SP-600 JX, 1 Panaramic Electronics SA-8B T-100, high resolution (50 CPS) Panadaptor 100 Kc sweep width 455 Kc. input. Both less than a year old. Absolutely like-new. Used only a few hours. $750 each. Need money urgently. G. Bullock, 2003 Hampton Ave., Augusta, Ga. Tel: RE-3-7937.

SALE: Late 1963 Apache and SB-10, $225; Valiant, $225. All in perf. condx. Will sked. K5OXE, 2230 West Elm, Enid, Okla.

NCX-3 with AC supply. New condition and appearance with less than 5 hours on the air. First $350.00 cash takes. Will ship in original cartons. K5WKA/Ø, 3709 E. 113th Terrace, Kansas City, Mo. Tel: SO 1-5488.

SELL: need the money for college! DX-100B, $135.00; HQ-110, $145.00; Bob Cook, K1LNP, 407 New Meadow, Barrington, R.I.

FOR Sale: Heathkit DX-60, $55.00; HR-10, complete with speaker and calibrator, $66; MT-1 and MR-1 mobile rig, 80 thru 10 meters. Complete with everything. $250. WA2PSA, RD #2, Kirkville, N.Y. Phone 315-687-9257. You pay shipping costs.

LA Area. $300 Capitol Radio Engineering Institute course in Radio and Broadcast Engineering, for modern tape recorder. Call 653-2746 evenings after six.

SELLING: KWS-1, $1048.00; 75A-4, $409.00; 35C-2 filter, $30; Elmac AF-67 12V PS, accessories, $132.00; Morrow FTR/5BRF, $93.00; dynamotors, misc. Woody Huddleston, 6471 Dana, Springfield, Va.

CE-100V, mint, $475.00; Hammarlund SP600JX-17, excint condx, $375; HB linear 650 WPEP with KW design capability, $125. F. E. Barnes, K6BMI, 2943 Molly St., Riverside, Calif.

VALIANT with 3B28 rectifiers, extra G14G's, 275 watts SSB, wired with SB-10, $300. K1OZR, LY 8-4138 evenings and LO 7-5409 days. Joe Taddonio, 40 Newton Ave., Lynn, Mass.

HT-37, $265.00; 75S-1 with 10 m xtals, $325.00; rotor, $15, Weston osc., $15.00; LP3 GR signal generator 10 Kc-50 Mc. 677-4870, 454 Druid Circle, Ormond Beach, Fla.

SALE:NC-125 receiver, $100; assembled DX-40, $60.00; assembled Heathkit VFO, $20; Heathkit balun coils, $10. Used one year, in perf. condx. Melvin Beck, 4 Henderson, Andover, Mass.

COLLINS 516E-1, DC power supply, $125; complete mobile AM transmitter and receiver Elmac A54, Gonset Super 12 and Superceiver, $75. H. Sepessy, W1YHF, Piermont, N.H.

COMANCHE and Cheyenne, AC and DC supplies, mobile ant. $175. WRL DSB 100 and 755 VFO, $60. WA2OCL, Hamburg, N.J.

TRADE: Selmer Trumpet for SSB Xmtr. Jim Hulett, WA5EPI, 3785 Scranton, Beaumont, Texas.

COLLINS KWM-2 with 516F-2 power supply, complete set "Hustler" mobile antennas, $835. Free delivery in Ohio. K8VZU.

500 Cycle Collins mechanical filter for 75A4, $35.00. L. M. Divinia, 115 S. Battin, Wichita, Kans.

DRAKE 1A, like new condx, with factory speaker in matching cabinet, xtal calibrator, instruction book: $135.00. Dave Bell, WA6SIU, 1088 Rubio, Altadena, Calif.

SELL: Briggs Stratton 4-cycle 1 cylinder generator, Wincharger 115V/115V 15A/15A 60 CPS, new condx, includes portable 2 wheel cart, $250; Comanche and Cheyenne, AC supply, mike, speaker, cables, manuals $150.00. Lysco 500 CW xmttr, $45.00; AF67, $70; PMR7, $60; ART-13, $40. Super-12 converter, $30; Super-6 converter, $15; BC-312 NL and AC supply, $50. Want Mohawk receiver. Prices F.o.b. certified check or M.O. please. F. Guyer, 301 Newton Ave., Riverhead, N.Y. Tel: 516-PA7-5614.

SELLING Complete station Apache TX-1, SB-10 Adaptor, SX-101A rcvr Johnson TR Switch all cables come extra tubes price complete $475 asking Can't deliver come see in operation bring cash take it away. Will not break up. Write or phone Gray Berry K2SJN, Callbook QTH OK phone 914 NE 6-7962.

FOR Sale: Plate transformers 3600-0-3600 VAC @ 1000 Ma. CCS, with 110V and 220 volt primaries, $35. One year guarantee. Peter W. Dahl Co., 5331 Oaklawn Ave., Minneapolis, Minn. 55424. Tel: 922-7618.

COLLINS 32S-1 xmtr, $380.00; 516F-2 PS, $80. KWM-1, 516F-1. $375. All like new. WA9KBL, 815-323-2486.

C-E 100V, vy gud, spotless, extra tubes: $395. W5KPZ, Rt. 9, Tyler, Texas.

FOR Sale: KWM-1, 5161F and heavy duty 516F1 with mount, $550; P&H distortion indicator, $75; Invader 200 watts, $450.00; 75A4 3 Kc. 1 Kc filters, spinner dial, $500 (with spkr), all gear perfect. W2STW, Newfield, N.J. OX 1-4435.

SELL: HT-37, six months new, 20 hr. operating time: $285; SX-101, $160.00. W6DNQ, 492 Anacapa St., Ventura, Calif.

FOR Sale: KWM-2 serial number 11299 with 516F-2 and 312B-4. All in mint condx and never mobile. First certified check for $990.00 takes it Fo.b. Jack Holt, K1VFQ, Ferndale Farm, Woodbury, Conn. 263-2341.

75A4 Filters for sale, 2.3 for $30 and .8 for $40.00 (212) DA-6-3279, W2MES.

MUST Sell 2-year old Knight T-60 and Heath HG-10 VFO for $60.00; NC-125, $70 or your best offer for all. Leonard Miller, WA8EFE, Box 368, Pellston, Mich.

MUST Sell: Complete SSB station: Heath Marauder, SX-100 with spkr, E-V 623 mike with PTT stand, Knight SWR meter, coax relay, dummy load. All immaculate condx, original cartons: $450.00. K1TWN, G.M. Walsh, 42 Kay St., Newport, R.I.

NATIONAL NC-155 receiver, factory new, in mint condx. Will ship in original carton for $95.00. Need the money for college. K3LIZ, Dwyer, 239 W. 21st St., Chester, Penna.

WANTED: Apache TX-1, HW-32 transceiver, HP-20 power supply. Will sell Viking Challenger. Gonset Super-12; Lincoln 6-meter transceiver. K3AGG, 27 High St., Carbondale, Penna.

ESTATE OF WA6NUB: Complete station, plus many items of test equipment. Send self-addressed stamped envelope for description and prices to: Lt. Barry M. Prentice, Co. C, 705th Maintenance Bn, Ft. Carson, Colorado.

NEW 12VDC mobile P/S Topaz 300XL, $60.00; Mini-Products C-4 coax ant., $18.00; 572A tube, $5.00; 6146A, $2.00. F. Williams, W2WZT, 64 Prospect Ave., Hackensack, N.J.

FOR Sale: RME 6900, like new conxd, w/spkr, $125.00; NCX-3 with AC and DC P/S. Used only eight months. Like-new condx, $350.00. John Bowling, Demorest, Georgia.

304TLs, $20 each; 4-400As, $25.00 each. All brand new. McIntyre, W8WOM, 3137 Mayfield Rd., Cuyahoga Falls, Ohio.

WANTED: An antenna tuner for 80-10 in excint condx. WN2LDJ, 1117 Logan Ave., Bellmawr, N.J.

BEFORE You buy receiving tubes, Industrial and Communication tubes, transistors, test equipment, hi-fi components, kits, parts, etc. send for your Giant Free Zalytron Current Catalog, featuring standard brand tubes; RCA, G-E, etc. All brand new, Premium Quality Individually Boxed, one year guarantee, all at biggest discounts in America! Also, sensational savings on new surplus Industrial and Communication tubes! We serve professional servicemen, hams, experimenters, engineers, technicians. Why pay more? Zalytron Tube Corp., 469-Q, Jericho Turnpike, Mineola, L.I., N.Y.

ART-13, $35.00; Twoer, $30.00; ARB-12V, $20; Pawnee, $130.00; Gonset II, 2M, $100.00; RME VHF-152, $15; new 110V BC-312, $49; Hallicrafters S-36, $30; SX-28, $50; SCR-522-110V, $40. Lewis, Box 25, RFD 5, Lexington, Va.

SELL: BC-312N with built-in AC P/S, $40, or will trade for 6M transceiver. SP600JX with 100 Kc cal., alum. case, not used since checked out and aligned by Hammarlund representative. $325.00. Will ship either within USA express collect. Micek, 465 Billy Mitchell, Ellsworth AFB, S.D.

WANTED: A set of soldering pliers made by International Commutator Dresser Co. W2ADD.

WILL Sell NC-300 and speaker for $150. OK operating condition. Will be shipped in original carton with instruction book. Waman S. Hassett, 22 Wellington St., Shelburne Falls, Mass. W1IVH.

SELL Viking Ranger, $125.00; BC348 receiver, $60. W3KYW, 110 Hill Street, Warren, Penna.

C-W Crystals is on vacation for the month of August. C U in Sept. Box 2065, El Monte, Calif.

SALE: Knight T150A, $110; Hallicrafters S-76, vy gud, $95. Howard Johnson, WB2ISC, 984 Waring Ave., Bronx, N.Y.

KLEINSCHMIDT TT-76 or 76A tape machine wanted immediately for cash. Ben, W9UE, 6140 N. Harding, Chicago 60645.

GONSET G-50, 4 element Telrex (6M), 100 ft. coax. Must go! Best offer. Axelrod, 1289 Commonwealth Ave., Boston, Mass.

NEW-TRONICS CD75 Cliff-Dweller antenna, brand new, in original packing; $80 or will trade for TV camera, SSB transceiver or 20A. N. Tetreault, W1KZN, 179 South St., Medfield, Mass. 359-4551.

75A-4, speaker, 6.0 Kc. 3.1 Kc, $400; MM-2 with 455 Kc adapter, $50; Want Johnson Matchbox K2HWP, 125 Amherst Ave., Syracuse, N.Y.

RTTY Channel Filters. Octal mounted, tuned. Specify frequency. $3.00 each. Zack, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

FOR Sale: New and used electronic components, meters, transformers, chokes, capacitors, etc. Reasonable prices. Write for free list. Electronic Surplus Sales, P.O. Box 11556, Philadelphia, Penna. 19116.

WANTED: Late model Collins 75A4 receiver. State serial number and price. James Kalasky, 738 Truesdale Rd., Youngstown, Ohio.

75S3 receiver, like new condition. Back to college sacrifice. Shipped prepaid, $450.00. Also 15 extra crystals, $35.00. All for $475.00. WA4QKA, 2609 Reef, Orlando, Fla.

ESTATE Of K5UXP, all equipment new with less than 5 hours actual operating time; 32S3, $550; 516F2, $85; 75S3, $475.00; LPA-1 linear, $195; HA1 keyer/paddle, $60; Heath SWR, $10; 10-D mike, $10. No trades, F.o.b. and shipped promptly upon receipt of certified check or money-order. H. L. Parrish, Jr., W5PSB, 2701 Dunoon Dr., El Paso, Texas.

APACHE With SB-10. $235.00; SX-42 receiver with speaker and Heath Q-Multiplier, $85.00; RAL-7 receiver with power supply, $45.00. K3NNA, 328 Roberts Way, Aberdeen, Md. Tel: 272-3743.

FOR Sale: HT-32A, $399; SX-101, $199; GSB-201 linear (1500 w.), $219.00; GPR-90 general-coverage receiver, $249.00. All look and work like-new. K2LAI, 427 E. 69th St. NYC. Tel: 212-TR-9-8087.

ENTIRE Station: Mint late serial. 100V. 2B. 1500 W., GG, 20M amp., 4-811A's, 4 meters, P/S, cabinet. Twoer with ant. All station with hi-fi mounting cabinet except mike. Will deliver to within 550 miles, others inquire. $675.00. KØVUR.

TR-3 with AC, $489.00; DC power, $89.00; Warrior, $189.00. In like-new condx. Don, K4DBH, 702 North Myrtle St., College Park, Ga.

SELL: Two meters, new Ameco conv. CN-144 W with p/s and extra xtal, $55. 8-el. Telrex beam, new, $14. W2OJC, 201-PR-9-0639.

COLLINS: Estate of K8PKS: 32S-3, used 10 hrs., $500; Viking Navigator 240-126-2, factory-wired, $85.00; RCA WV-98 B Senior Volt Ohmyst VTVM, $45.00; 2 new RCA 7094 tubes, $15 each. All in mint condx. R. W. Werner, K8VWX, 136 South Vine St., Columbiana, Ohio. Tel: IV 2-2711.

HOWARD Radio—75S-1—$350; SB-33, SB-1DCP & SB1-MB—$365; KWM-1 & 516F-1—$449; Invader 200 $379; NC-300—$199; SX-101 Mk III—$209; Globe 500B—$289; Globe 350 F/W—$179; Courier—$189; HT-37—$309; HT-32—$339; NC-183D—$179; 5100B & 51SB—$289; 75S-3 Demo—$630; LSA-3 & DC PS Demo—$219; GSB-100—$249; Valiant—$169; NC-270 Demo $254; 5100—$149; 20A & Bandhopper VFO—$235; 2A—$189; Loudenboomer (No PS)—$189; HQ-140XA—$159; HQ-170C—$219; DX-100—$129; DX-60—$69; HG-10 VFO—$29; Commanche-Cheyenne & AC PS—$169—Receivers, Transmitters, Power Supplies, Parts—Free List. Box 1269, Abilene, Texas 79604.

WORLD'S Fair Visitors, I have a new GPR-90 that has seen less than 10 hours' service. It can be inspected and heard while you are in NYC. Will sell for $250.00 cash and carry. Phone me for appointment, Tony, AD 4-1521. 2544 8th Ave., N.Y. N.Y. 10030.

COLLINS 75S-1, 32S-1, 516F-2, 30L-2. High serial numbers, in perf. condx. Original cartons and manuals. Will ship or deliver reasonable distance. First realistic offer makes a buy. W9DRL, 820 Chatham Rd., Glenview, Ill. Phone 724-0231.

EIMAC 4CX1000-A new, $60.00. W2QFR, 25 Cameron Place, New Rochelle, N.Y.

MERCURY Model 1000 Dynamic mutual conductance tube tester, new, $60; Heath kit lab. oscilloscope, Model 0-10, $25; sweep circuit troubleshooter Model SS-105, $15; Q-multiplier Heathkit QF-1, $5.00; VTVM Heathkit Model MM1, $20; grid dip meter model GD 1B Heathkit, $8; Viking Valiant II xmtr, $300. W. G. Davis, Box 74, Glasser, N.J. 07837.

NC-190, cal, $125. Neidich, 65 Polk, E. Northport, N.Y.

MARAUDER HX-10. In exclnt condx, $275. Will deliver within 100 miles. WA9ETJ, 75 Pearl, Clintonville, Wisc.

FOR Sale: Apache, not a scratch. Wanted: PMR-7. Local deals. K1MTM, Call 828-4271.

WANTED: Johnson KW Matchbox. W2FZJ, 1183 Wall Road, Webster, N.Y.

WANT: BC1031C Panadaptor. Trade TCS12/AC supply Collins receiver. W7RTP, 133 Las Flores, Goodyear, Ariz.

HALLICRAFTERS HT-37, year old, $395. SX-101 Mark III, $195, R-48 spkr, $12.00, new 110 VAC Dow-Key changeover relay, $10; Electro-Voice 729SR microphone, $10.00, or everything plus box full of tubes, resistors, capacitors, $600. Will ship if you pay charges. W. R. Bowen, 1124 Seneca, Pampa, Texas

PHILATELISTS: I swap U.S. mint plate blocks for ham gear. Write W2DTE, Bob Cobaugh 29-29 213 Street, Bayside, L.I., N.Y.

FOR Sale: Johnson Viking II, time sequence keying and matching VFO, $120, Adventurer with screen modulator, $30. Darell Preston, Mt. Hope, Kans. 67108.

SELL: Heath HP-13 DC supply, $50. WA8HZR, 4748 W. 97th, Cleveland 9, Ohio.

HALLICRAFTERS Transceiver SR-150, with AC and DC pwr. supplies, mobile mount, like-new, $600. Will ship for certified check or money-order. W4VWW, 111 Coleman Ct., Greenville, S.C.

SELL: Valiant F/W, $250. Cash and carry. W2DSG, 212-TA-3-3529.

DRAKE 2B receiver with xtal cal. and 2BQ, Q-multiplier, spkr. In exclnt condx, $210.00. Wanted: Mechanical filter for 75A3, also speed reduction tuning knob. K9ZOO, Gene Ruff, 2755 Reese Ave., Evanston, Ill.

COLLINS 32V3 in perf. condx with low-pass filter, $250. F.o.b. Chicago. Dick Karl, W9DHT, 2836 Leland Ave., Chicago 25, Ill.

MUST Sell entire station, (all equipment almost new, not a scratch). Hallicrafters SX-101A, $220; Viking Valiant, $220; Viking Matchbox w/coupler, $45. Write WA2QNV, 76 Orange St., Port Jervis, N.Y.

SELL-Swap: Minofon, German pocket size wire recorder used by executives, spies, etc. All accessories. Originally $650 in 1963. Latest model. Best offer over $300 accepted. Also, Drake 2B and 2BQ with calibrator $215. Ham-M Rotor, $65. F.o.b. E. Kruse, 400 S. Jennings, Ft. Worth, Texas, K1WPZ/5.

SALE Or trade for transceiver KWM-2 or TR3, new Invader 200, $457. Spaulding 48 ft. tower, TA33 SR, Beam $185. Hurley Press Iron. F. E. Coble, 251 Collier Ave., Nashville 11, Tenn.

COLLINS 75S-1, $300; 32S-1, $400; 516F-2, $75. Package, $725. George Green, K4ARK, 1914 Nanette Drive, Tallahassee, Fla.

FOR Sale: Collins 310-C exciter, $49; Millen 90800 exciter, $24; HRO-M(R), coils A,B,C,D; bandspread modification, $49; HRO supply rack mtd., $10, outrig dual HRO xtal filter, $8; receiver pkg deal, $60. R. F. Smith, W4NIX, Box 713-G, RFD 1, Pensacola, Fla.

SELL: Heath SSB HX-20, $180; HR-20, $120. Both for $275. QSTs 1951-1963, $5.00 year. L. E. Aker, 4367 Newton Dr., Memphis, Tenn.

HEATHKIT HX-30, six meter SSB, $175; Johnson 6N2 Thunderbolt, $325; 6N2 converters, one 14 Mc IF, other 28 M.C., $35; latest Centimeg 432 Mc converter, $75; 432 and 220 4CX250B amplifiers, 432 xmtr, DX converters for 6N2, new SB-33, SB-1LA, DC supply, carrying case, and much more mint gear. List for stamp. W4API, Box 4095, Arlington, Virginia, 22204.

SALE: GSB100, $200; SX-96, $119; SX-111, $139; HT-20, $129; HT-18, $29; Lysco 600S, $35; BC348, $39; BC459, $8; SW54, 22; SM90, $7; HE45A, W1HE61. VFO 6 meter xceiver, $79. 2nd Edt. ARRL Handbook 1927, like new. W3-NCX, 1005 Wyoming, Allentown, Penna.

"HOSS Trader" Ed Moory, offers demonstrator equipment at fantastic bargains on a cash and no trade deal. Swan-400, $365; Galaxy III, $299; TR-3, $465; SB-33, $319; Hunter Bandit 2000B, $439; KWM-2, $859; demo Ham-M rotor and new TH-4 beam, $169. New 75S-3, $549; SR-160, $299. New HQ-180C Hammarlund, minor freight damage, $329. Package deals; 75A-4 serial #5234 and KWS-1 and Collins supply, $1275. Used bargains: 2-B, $189; SX-111, $149; SR-150 sealed carton, $479; Heath Warrior, $169; Gonset GSB-101, $159; Johnson Ranger, $115; 32S-3, $495. Terms Cash. Ed Moory Wholesale Radio, Box 560, DeWitt, Arkansas. Phone WHitney 6-2820.

FOR Sale: HT-37, $350; SX-111, $175; Hy-Gaine Thunderbird, $75; rotor $15 or will sell all plus homebrew kilowatt. Ant. SW and tubes for $625 cash. Fred Wipperling, 7146 Bradford Ave., Highland, Calif.

FOR Sale: Collins, 75A4 serial No. 5538 immaculate with 2.1 KC. 3.1 Kc filters. A cream puff with vy little use. Price: $650.00. with spkr. Cash deal. Phillip J. Raneri, WA2LKB, 43 Croton Lake Rd., Katonah, N.Y. CE 2-3326.

PACEMAKER SSB exciter, $195; SX-71 550 Kc.-56 Mc with speaker, $80; VF-1 VFO $5; BC-458 SSB VFO, $5; 833's, new, $10 each. K8HSY, 611 Emmet, Ypsilanti, Mich.

SX28-A, TCS xmtr w/ps, speech amp, both gud condx. Make offer, all letters answered. Bob Ensminger, 712 Locust, Lodi, Calif.

CE 20A with QT-1 and 48 VFO works fine. First $100 F.o.b. Lebanon. Will crate free. W7IIY Route 2, Box 180AG, Lebanon, Oregon.

FOR Sale: Xmtr, Apache TX-1, $160; rcvr, Hammarlund HQ-180, $265, ant., Hy-Gain Hy-Tower vertical 10-80 M., $75. WA2TCP, 12 Alder Lane, Liverpool, N.Y. OL 2-2307.

HAVE moved, must sell: test bench with oscilloscope, signal generator, bariac, audio amplifier, power supply, and ten panel meters in VOM. Junk box with thousands of parts: resistors, campacitors, transformers, relays, tubes, meters, etc. DX-40, VF-1, VHF and microwave rigs. QST's, CQ's, others. K1LKR 197 Hillside Avenue, Needham Heights, Mass.

SELLING Complete rack mounted radio station: new 8 ft. relay rack (with blower and door), 19 in. mounted panels containing DX-100 (professionally wired), NC-300/CAL/Spkr (in exceptional condx); speech clipper, SWR Bridge, relays, etc. $500 or your best offer. K2QBV, Joel Kornreich, 1340 E. 86th St., Brooklyn, N.Y. CH 1-4262.

WANTED: Your military surplus equipment. Need APR-9, ARN-14C, ARN-18, ARN-21C, ARN-31, ARN-32, ARN-59; also ARC-27, ARC-34, ARC-38, ARC-44, ARC-49, ARC-52, ARC-58, ARC-65, ARC-73, ARC-84, 17L-4, 17L-6, 17L-7, 51V-2, 51V-3, 51X-2, 618S, 618T APN-70, PRC 8 to 10, AN/GRC-3, to 46, RT-66, RT-67, RT-68, RT-70/GRC. Test equipment with ARC, ARM, SG, URM, UPM, USM, prefixes. Top cash dollar paid immediately, plus shipping. Send list with description. Slep Electronics Co., Drawer 178, Ellenton, Fla.

SELL: Almost new Collins 51-S-1 receiver. Used less than two weeks: $1,500. M. N. Barwick, 767 41st St., Miami Beach, Fla.

SELL: Oscilloscope, TV alignment generator, ART-13, frequency meter, meters, tubes, transformers, etc. Send SASE for complete price listing. Casey, 435 Corona Ave., San Antonio, Texas.

DXER Beware: A real bomb. York 5000 transmitter. 1 kw. using 4-1000A, bridge power supply, vacuum tuning condenser. Size 33" wide, 24" deep, 6 ft. high. Further details. Bill Brown, WØSYK, 28 Marine Lane, Hazelwood, Mo. Tel: HEmpstead 2-6840.

SALE: Sola constant voltage xfrmr, input 95 to 135 volt, output 118V, regulated (65 watt) new—$5.50. Simpson 1 mil (3V scale) 2½" meters (new) $1.95 Silicon stud rectifiers, 15 amp, 50 PIV (new), 2 for 99¢. Power transformer, 600 VCT at 125 mills, two 12V (24 VCT) at 3½ amps, 6.3 amp. at 3½ amp. complete with 750 mil silicon rectifiers (new), $2.85. Lab relays with thumbscrew adjustments, extremely sensitive, 12,000 ohm coil (new), $1.95. Filter capacitor, 400 mfd. 75 V (new) 25¢. Superior-Racine, Inc., 1006 State St., Racine, Wisc.

200V SSB, $545; HT-32, $225; AN/FRR-21 rcvr, 14-600 Kc., $175; SP-600JX-17, $425; Collins R-390, R-390A, R-391, R-388, 51J-3, 51J-4 general coverage receivers. Alltronics-Howard Co., P.O. Box 19, Boston, Mass. 02101. Tel: 617-742-0048.

TOROIDS 88 mhy. 50¢. Salter, K5BQA. 11040 Creekmere, Dallas, Texas 75218

WANTED: HC-10 SSB Converter. Working condition. Reasonable. Howard Bell, P. O. Box 93, Cathay, Calif.

SELL: Hallicrafters receivers, SX-100, $140; S-108, $70. Like new. Dr. Charles Thompson, 103 West Main, Napoleon, Ohio.

WANTED: Used scope, RCA WO33A, Eico, 427K, Millen 90903 or similar. K5IPK.

LM-5 Frequency meter with P/S and original calibration book. In FB condx: $30. ARC-5 receiver 1.5 to 3 Mc, new, $12.50; BC-453 Q-5er, exclnt, $8.00. W6BWV, Box 142, Loleta, Calif.

FOR Sale: NC-300 w/spkr, xtal calibrator, Immaculate. CE-20 w/VFO In exclnt condx. DX-100 also. Prefer deal in So. Calif. area, but will ship if necessary. K6TUQ, 2410 Laughlin Ave., La Crescenta, Calif.

FOR Sale: HQ-180C, $225; HT-37 w/PTT, $295, factory wired Ranger w/PTT, $150; BS-221 w/power supply, $49.50; D-104 w/G-stand, $20. All in like-new condx. Heath XC-2 2 meter converter, $40. WA2LIM.

SWAN 250 transceiver, homebrew AC supply, like new condx, $240; Precise 5" oscilloscope, $35. Alliance T-10 rotator, $10. K1SCC, Boulder Circle, Glastonbury, Conn.

SALE: E-Z Way TBS-50 tower, $220; Telrex 16 ft. steel mast, $20; Telrex R-100 rotator with indicator, $140; Telrex 3-element 20-meter 20M-56-112 beam, $100. Complete system, $445. See it while it is up! PE-103-A Dynamotor 6/12 volt, $20. K2CMN, 209 Greenwood Ave., Mt. Holly, N.J. 08060.

POWER Plant, 115 AC., 4 Kw, electric starting. $250. W9ROK

COLLINS Equipment bought, sold & repaired. Paul A. Reveal, 129 Midland Ave., Glen Ridge, N.J.

SELL: 14 AVS vertical, 800V power supply, Eico 'scope; D-104 mike, 8 amp. Variac. Sry, no shipping. NYC telephone AL 5-3232.

WANTED: 0 to 1 Ma., movement or measuring element No. 424, for an Esterline Angus Model AW graphic instrument. R. L. Simmons, P.O. Box 157, Beverly, Wash.

CAN Anyone offer F500B-60 and F250Z-5 mechanical filters at a reasonable price to Allan Fletcher, 62 Moorbridge Lane, Stapleford, Notts., Eng.

CLEAN Pawnee, complete, $150.00. 6N2 converter 26 to 28 Mc. IF, $35. W5AMZ.

QRT, HX-50, all modifications, 1625 amplifier HB, neat, self-contained, 1550V, both $350; HQ-170, $265; NCX-3, Adcom 350-12, Hustler Ant., 3-band mobile, HB-1000V fixed p/s in cabinet with spkr, all cables and mic, $475. Everything is in top condx. W7BKI, Box 889, Riverton, Wyo. 82501.

S/LINE cabinets, new, $35.00; Heath Shawnee, $140; SR-160, new, $295. Melco Co., Marissa, Ill.

HX-20, $160; HP-23, $25; only 6 mos. old. Exclnt fix station SSB/CW equip. Scratch-free and in gud condx. James W. Hill, W8HKU, Box 242, Cross City, Fla.

FORTY Years of QST for sale, dollar per year. 4102 N. 57th Ave., Phoenix, Ariz.

SELL: DX-40, $40; Hammarlund HQ-150 with matching spkr, $200. K1MYQ, 25 Hatch St., New Britain, Conn. Tel: BA 31682.

PAWNEE with two meter 8-el. Telrex beam. Exclnt condx with manual, $200. W2EPZ, 80-44 259 St., Floral Park, L.I., N.Y.

COLLEGE Expenses, must sell: DX-100, new final tubes, neutralized, beautiful keying. Shipped from Southeast Minnesota. $130 or your best offer. Darrol Lockhart, KØDIE, 1402 Delaware Dr., Colorado Springs, Colo.

FOR Sale: B&W 5100, 51SB, B&W SWR bridge, original owner, clean. First $175 takes it. W2BNU, 57 Bergen Blvd., Palisades Park, N.J. 945-7432.

TRANSCEIVER: Heath HW-32 20 mtr. SSB with mike. I will be willing to ship. Mint condx: $120. WA2KVD, 4801 Country Club Rd., Binghamton, N.Y.

EICO 720, $50; Hallicrafters HA-5 VFO, $50; RME 4350, $100. All are in exclnt condx. Ronald Distler, 8219 Belair Rd., Baltimore 36, Md.

VALIANT F/W, $220. K2MMS, 3 Archer Lane, Scarsdale, N.Y. 30LI, $365. W3AFM, 5800 Hillburne, Chevy Chase, Md.

BARGAINS: Standard signal generator, model 78B, Measurements Corp., ranges 15-25 and 190-230 Mc., $50; Philco auto telephone outfit, 3 channel, with various auxiliary gear including Western Electric 107A selector set, $100; sell or trade 22 Graphic camera, kodak extar 4.5 lens, Kolart synchronized range finder and many extras, $100 value. cash and carry. W1IG, Newton Highlands, Mass.

HR-10, rcvr., $49. K3JFX, 18 W. Front St., Media, Penna.

POLYCOM 6 AC-DC. Like new, with halo. $185 postpaid. Erich Kather, 13 South Avenue, Ithaca, N.Y.

SALE: Pioneer Gen-E-motor dynamtor Pincor VS-25, 6/12 v. in 500 v. 0.16A out, $5.00 plus shipping; Gonset Super Six 10 through 75 m. converter, $5.00 incl. shipping. Both items exclnt condx. J. B. Bullock, 105 Round Hill Rd., Ashland, N.J. HA 9-3299.

SELL Station 200V, $575; HQ-170, $200; HA-10 amp, $195. Gud condx. Charles Lancaster, Rte. 1, Box 56, Clackamas, Oregon.

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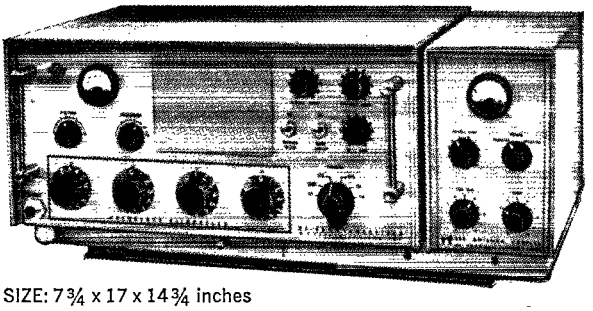
SSB COMMUNICATIONS

FOR MILITARY APPLICATIONS

TRANSCEIVER MODEL RF-301



FREQ. RANGE: 2-15 MC.
SYNTHESIZER: 1 KC Channels
STABILITY: 1 part 10^6 standard, 5 parts 10^8 available.
VFO MODE: Continuous tuning calibrated to 100 cycle increments.
POWER OUTPUT: 100 Watts p.e.p. & Average
MODES: USB, LSB, CW, AM FSK (with external tone keyer)

SIZE: 7¾ x 17 x 14¾ inches
WEIGHT: 55 pounds
POWER INPUT: 115/230 Volts, 50/60 Cycles AC & 24 Volts D.C. No external boxes required (12 V.D.C. can replace 24 V.D.C.)
FULLY TRANSISTORIZED except for PA & RF Amp.

FULL MIL SPEC AT A COMMERCIAL PRICE!

The RF-301 Transceiver is intended to be used in tactical military applications. It is **COMPATIBLE** with high-frequency SSB equipment now being used by all U.S. defense agencies. The RF-301 can be set to **ANY** channel with 1 KC spacing between 2 and 15 Mc with the built-in high-stability synthesizer. Between 1 KC steps a V.F.O. is included for **CONTINUOUS** tuning with 100 cycle calibration.

This is the only transceiver available with the advantages of BOTH a stabilized synthesizer and continuous tuning for both transmit and receive.

Providing continuous duty 100 watt power output (both p.e.p. & average), the RF-301 is ideal for **SSB, AM, CW, & FSK** operation. The transceiver is rated to operate continuously at ambient temperatures up to 65°C. It meets the vibration specifications of MIL-E-16400 and is splash-proof and resistant to humidity and fungus.

THE RF-301 CAN BE USED IN OPEN VEHICLES AND BOATS

Complete input power flexibility is provided internally in this transceiver. It can operate with 115/230 volt, 50/60 cycle A.C. power **AND** 24 volt D.C. power with no accessories or external converters. A 12 volt D.C. capability is available in place of 24 volt D.C. The RF-301 is COMPLETELY TRANSISTORIZED with the exception of the P.A. and R.F. stages.

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WRITE FOR DETAILS ON THESE AND OTHER PRODUCTS IN THE WORLD'S MOST COMPLETE LINE OF FIXED CHANNEL SSB EQUIPMENT

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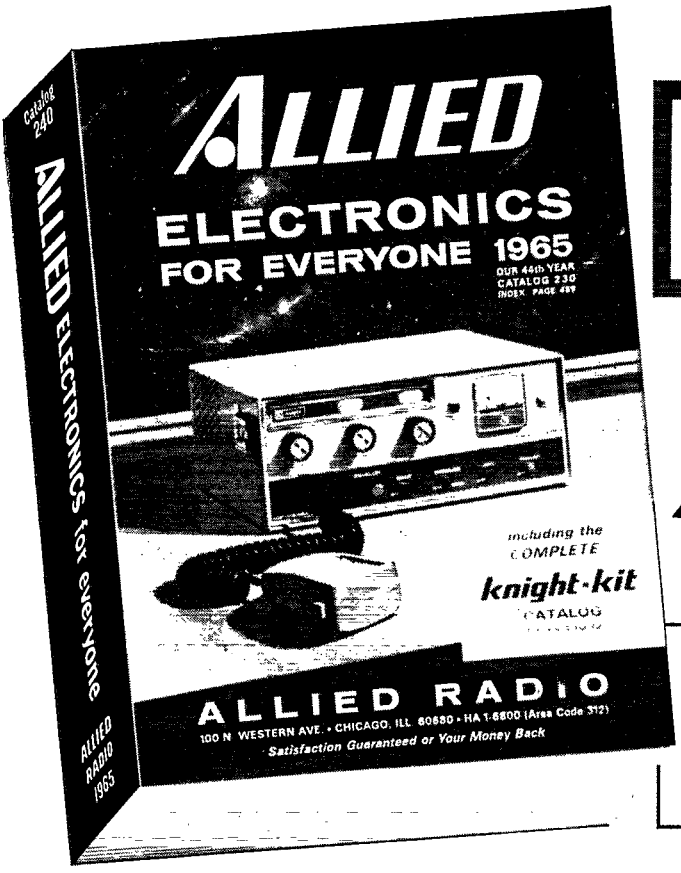

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National's new 2000 watt linear amplifier is desk-top dynamite. Every component in the NCL-2000 is rated for operation at a "DC" kilowatt. If you want to check power output you'll need a bigger wattmeter than those now available on the amateur market. On any band the '2000 will pin a meter that only reads 1000 watts full scale.

Addition of the NCL-2000 to your desk-top station allows you to run at the maximum power allowed by law. It's no half-way linear with TV components and a "Christmas tree" string of receiving tubes straining to deliver a doubtfully efficient 500 watts (average) input. The two 8122 ceramic tetrode output tubes were designed specifically for SSB, and provide 800 watts of plate dissipation to assure conservative operation — and at a replacement cost of only $31.50 each.

Not only does the NCL-2000 deliver the power, but it does it cleanly. Third and fifth order distortion products are down 30 to 45 db, hum and noise down a minimum of 40 db. Operate in areas of high humidity? Don't worry about power supply or plate circuit breakdown. The '2000 is rated for full output at 90% ambient humidity. Properly safety conscious? You would have to work to get by the lid interlock that positively breaks all power to the plate relay, or the automatic shorting bar that discharges B+ directly to ground (throwing out the overload relay) in case of the remote possibility of interlock or bleeder failure. In addition, the equipment itself is protected through a one minute time delay relay and a plate overload relay.

Very simply, no other amplifier on the market at any price gives you even half of these features: ■ 2000 watt PEP input on SSB, 1000 watt input on CW, RTTY, or AM ■ Equal power output on all bands 80 through 10 meters ■ Completely self-contained desk-top package with built-in power supply ■ Exclusive grid-controlled AB_2 operation for high efficiency and linearity ■ May be driven to full output with any exciter delivering 20 watts to 200 watts PEP ■ Passive grid with internal 50 ohm exciter dummy load and relative exciter output indication for simplest tuneup ■ All necessary relays built in for transceiver or transmitter-receiver operation ■ Instantaneous switchover to exciter-only operation when desired ■ ALC output ■ Separate precision plate and multimeters ■ Most complete safety and overload protection, including 1 minute time delay relay, overload relay, lid interlock and automatic shorting bar ■ National's exclusive One-Year Guarantee.

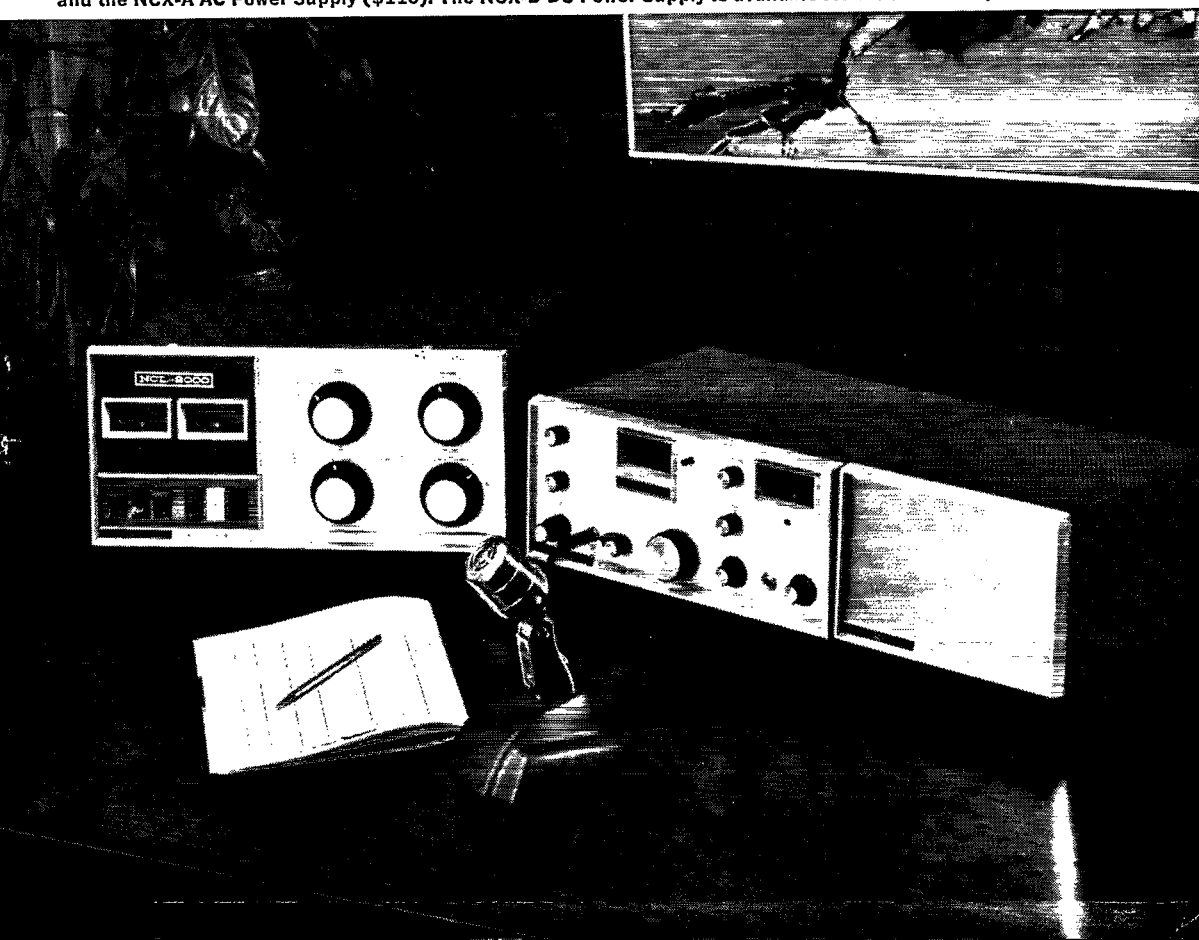
Your National dealer has the NCL-2000 in stock right now . . . at only $585, better buy one in self defense.

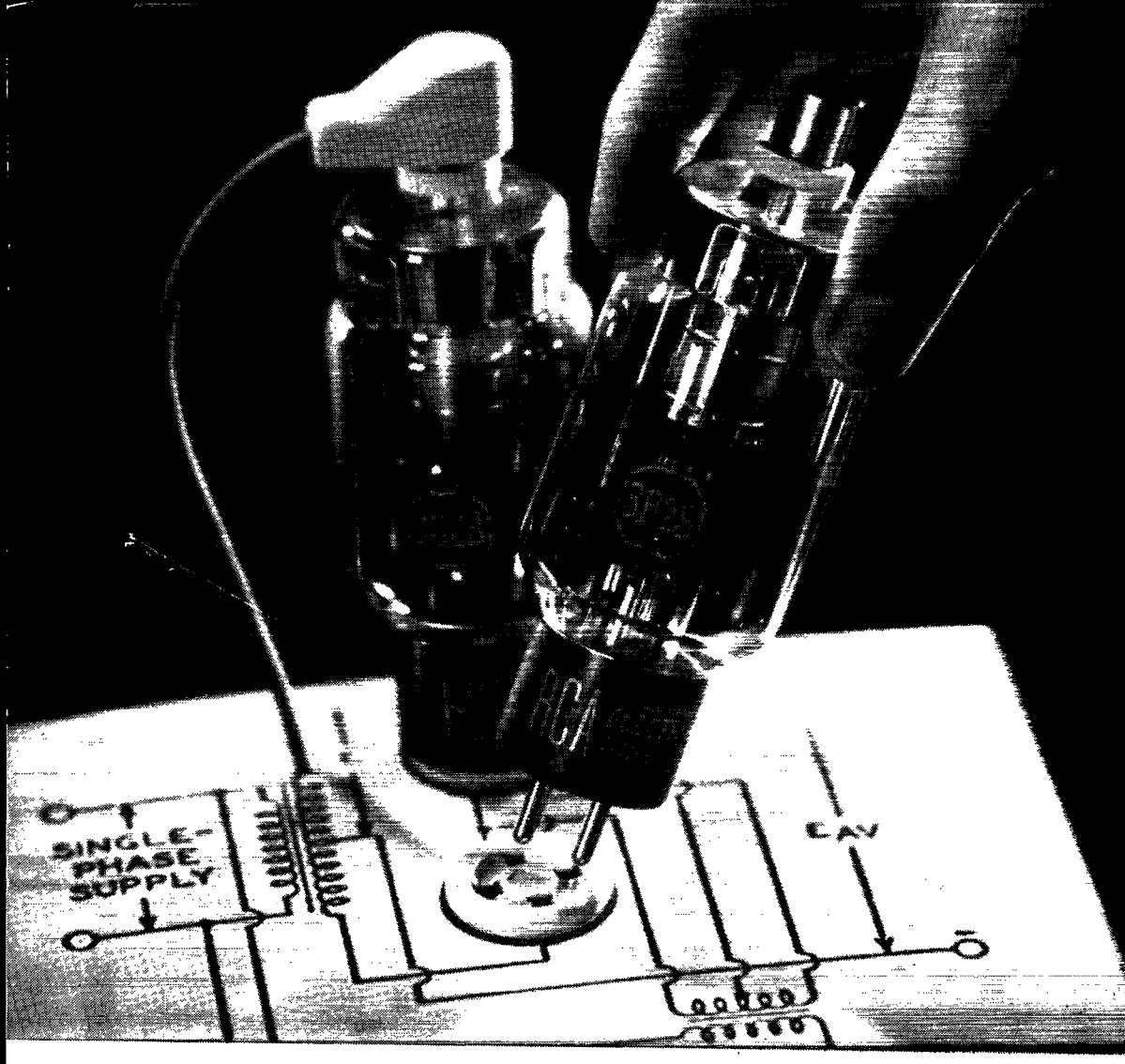
NATIONAL RADIO COMPANY, INC.

37 Washington Street, Melrose, Mass. 02176

World Wide Export Sales: Ad Aurlema Inc., 85 Broad St., N.Y.C.; Canada: Tri-Tel Associates, 81 Sheppard Ave. W., Willowdale, Ontario

This handsome desk-top station includes the NCL-2000 Amplifier ($585), the NCX-3 Triband Transceiver ($369) and the NCX-A AC Power Supply ($110). The NCX-D DC Power Supply is available for the NCX-3 at $119.95.





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Use RCA Xenon Rectifier Tubes

Do your rectifier tubes arc back, blow fuses during QSO's? Does noisy rectifier "hash" get into your receiver? Do you have trouble "firing up" when the shack is cold? If any of these problems are real to you, install RCA Xenon rectifier tubes—and forget them.

These remarkable high-voltage, half-wave rectifiers deliver maximum DC power at temperatures far below those where many power rectifier tubes won't even start. *Yet RCA Xenon rectifier tubes maintain full peak inverse voltage rating at operating temperatures far above those where ordinary rectifier tubes break down.* High overload capability of mercury-vapor types is maintained. DC output is as quiet as vacuum types—no rf filtering or shielding is needed. Tubes can be operated horizontally or vertically. Preconditioning is unnecessary.

Two RCA-3B25's handle up to 1400 watts of DC power. Two RCA-3B28's handle up to 1600 watts.

FACTS ABOUT RCA-3B25 and -3B28

RCA Type	Filament Ratings		Tube Voltage Drop	Operating Conditions, Single-Phase Full-Wave (2 tubes)			
	Volts	Amp.		Peak Inverse Volts	Max. AC Plate-to-Plate Supply Volts	Approx. DC Output Volts to Filter	Max. DC Output Amp.
3B25	2.5	5	10	4,500	3,000	1,400	1
3B28	2.5	5	10	10,000	7,000	3,200	0.5
				5,000	3,400	1,600	1

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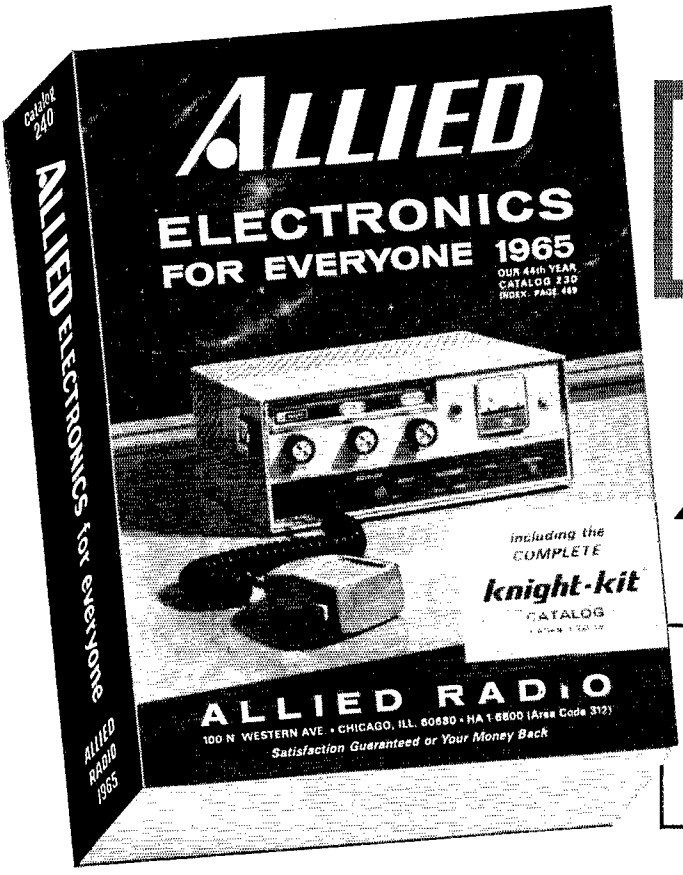

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National's new 2000 watt linear amplifier is desk-top dynamite. Every component in the NCL-2000 is rated for operation at a "DC" kilowatt. If you want to check power output you'll need a bigger wattmeter than those now available on the amateur market. On any band the '2000 will pin a meter that only reads 1000 watts *full* scale.

Addition of the NCL-2000 to your desk-top station allows you to run at the maximum power allowed by law. It's no half-way linear with TV components and a "Christmas tree" string of receiving tubes straining to deliver a doubtfully efficient 500 watts (average) input. The two 8122 ceramic tetrode output tubes were designed specifically for SSB, and provide 800 watts of plate dissipation to assure conservative operation — and at a replacement cost of only $31.50 each.

Not only does the NCL-2000 deliver the power, but it does it cleanly. Third and fifth order distortion products are down 30 to 45 db, hum and noise down a minimum of 40 db. Operate in areas of high humidity? Don't worry about power supply or plate circuit breakdown. The '2000 is rated for full output at 90% ambient humidity. Properly safety conscious? You would have to work to get by the lid interlock that positively breaks all power to the plate relay, or the automatic shorting bar that discharges B+ directly to ground (throwing out the overload relay) in case of the remote possibility of interlock or bleeder failure. In addition, the equipment itself is protected through a one minute time delay relay and a plate overload relay.

Very simply, no other amplifier on the market at any price gives you even half of these features: ■ 2000 watt PEP input on SSB, 1000 watt input on CW, RTTY, or AM ■ Equal power output on all bands 80 through 10 meters ■ Completely self-contained desk-top package with built-in power supply ■ Exclusive grid-controlled AB_2 operation for high efficiency and linearity ■ May be driven to full output with any exciter delivering 20 watts to 200 watts PEP ■ Passive grid with internal 50 ohm exciter dummy load and relative exciter output indication for simplest tuneup ■ All necessary relays built in for transceiver or transmitter-receiver operation ■ Instantaneous switchover to exciter-only operation when desired ■ ALC output ■ Separate precision plate and multimeters ■ Most complete safety and overload protection, including 1 minute time delay relay, overload relay, lid interlock and automatic shorting bar ■ National's exclusive One-Year Guarantee.

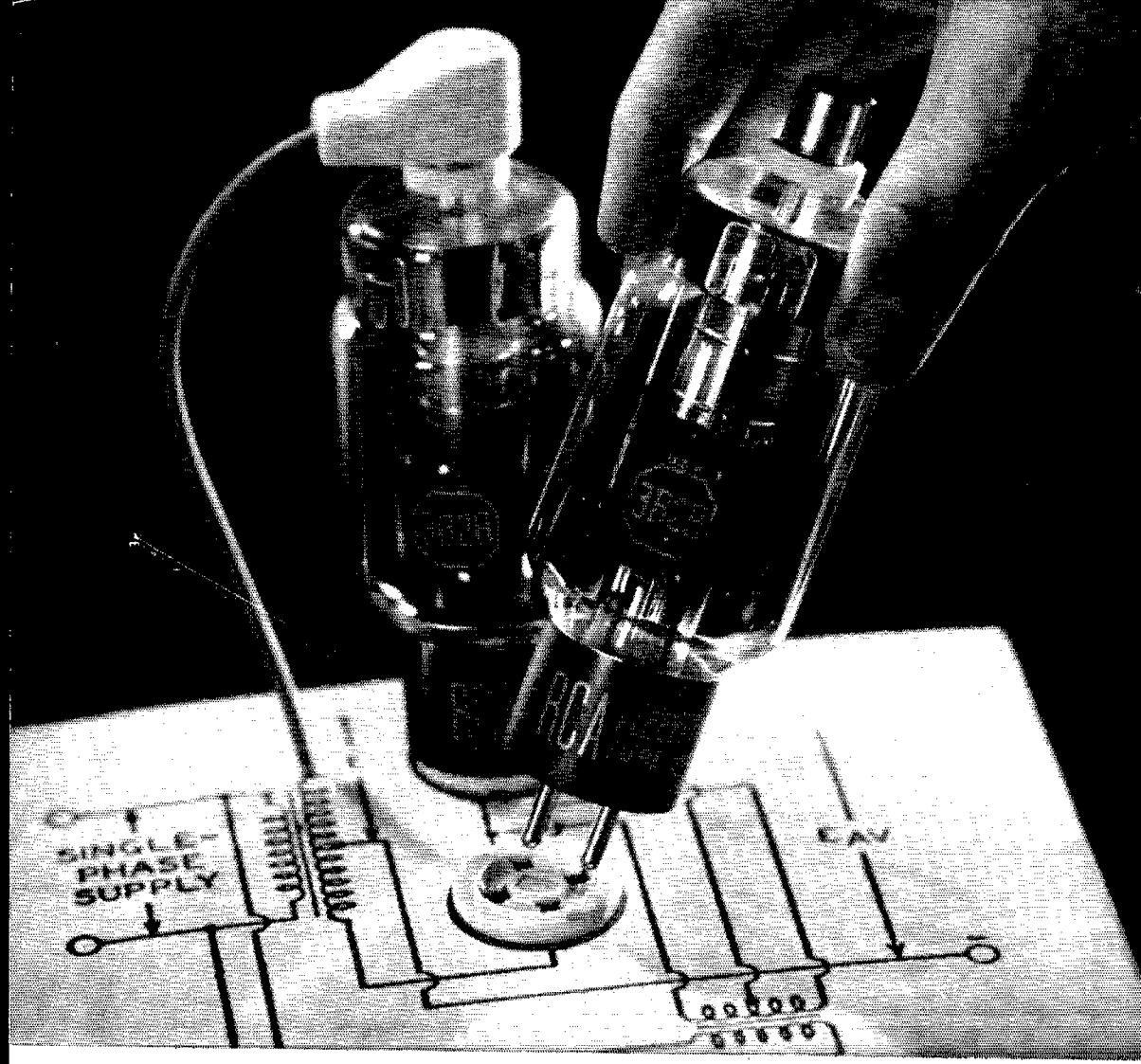
Your National dealer has the NCL-2000 in stock right now . . . at only $585, better buy one in self defense.

NATIONAL RADIO COMPANY, INC.

37 Washington Street, Melrose, Mass. 02176

World Wide Export Sales: Ad Auriema Inc., 85 Broad St., N.Y.C.; Canada: Tri-Tel Associates, 81 Sheppard Ave. W., Willowdale, Ontario

This handsome desk-top station includes the NCL-2000 Amplifier ($585), the NCX-3 Triband Transceiver ($369) and the NCX-A AC Power Supply ($110). The NCX-D DC Power Supply is available for the NCX-3 at $119.95.



Goodbye "ARC-BACK"

Use RCA Xenon Rectifier Tubes

Do your rectifier tubes arc back, blow fuses during QSO's? Does noisy rectifier "hash" get into your receiver? Do you have trouble "firing up" when the shack is cold? If any of these problems are real to you, install RCA Xenon rectifier tubes—and forget them.

These remarkable high-voltage, half-wave rectifiers deliver maximum DC power at temperatures far below those where many power rectifier tubes won't even start. *Yet RCA Xenon rectifier tubes maintain full peak inverse voltage rating at operating temperatures far above those where ordinary rectifier tubes break down.* High overload capability of mercury-vapor types is maintained. DC output is as quiet as vacuum types—no rf filtering or shielding is needed. Tubes can be operated horizontally or vertically. Preconditioning is unnecessary.

Two RCA-3B25's handle up to 1400 watts of DC power. Two RCA-3B28's handle up to 1600 watts.

FACTS ABOUT RCA-3B25 and -3B28

RCA Type	Filament Ratings		Tube Voltage Drop	Operating Conditions, Single-Phase Full-Wave (2 tubes)			
	Volts	Amp.		Peak Inverse Volts	Max. AC Plate-to-Plate Supply Volts	Approx. DC Output Volts to Filter	Max. DC Output Amp.
3B25	2.5	5	10	4,500	3,000	1,400	1
3B28	2.5	5	10	10,000	7,000	3,200	0.5
				5,000	3,400	1,600	1

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