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amateur radio

50th Anniversary

April 1964
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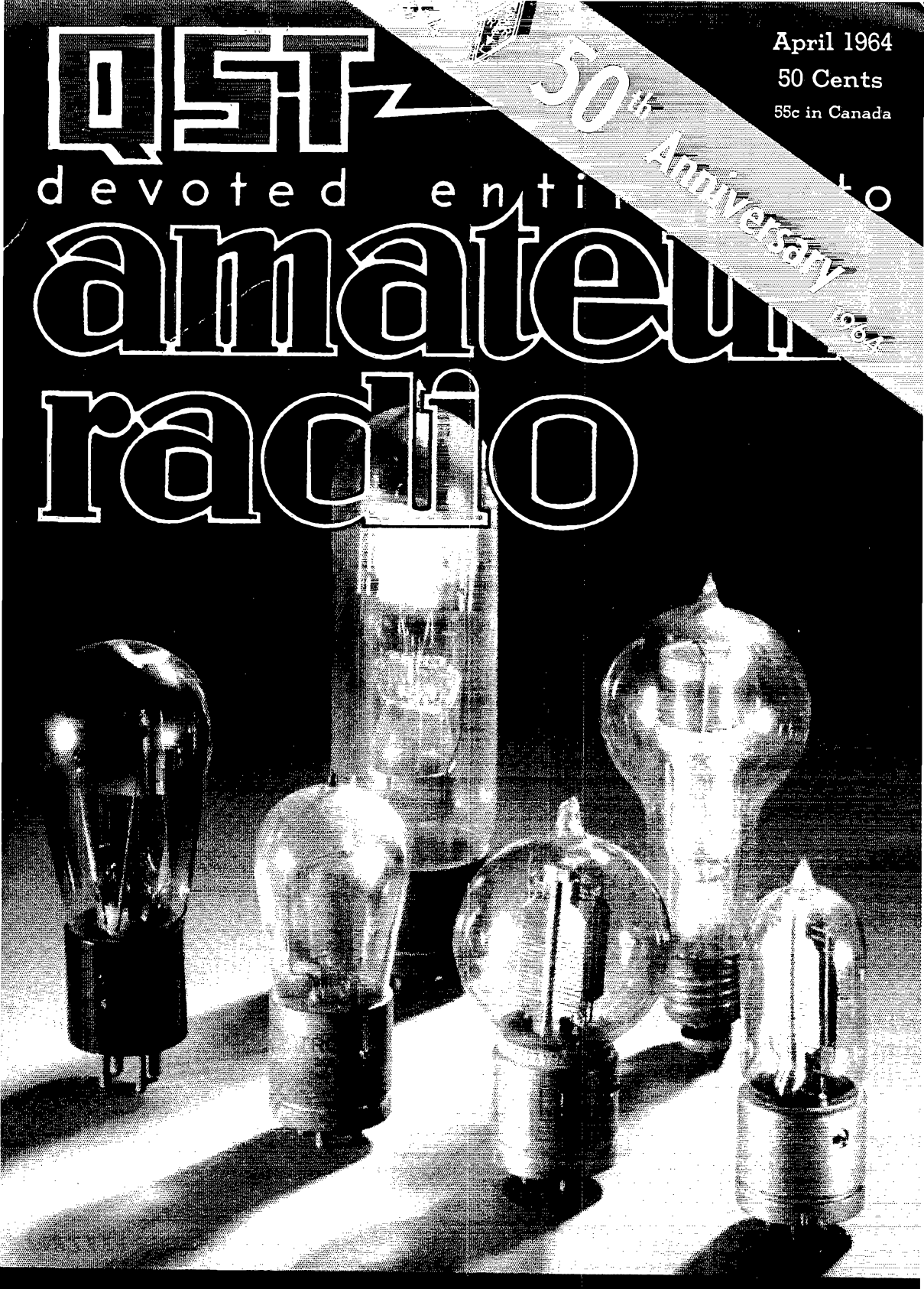


PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

UTC™ PIONEERS IN MINIATURIZATION

OUNCER™

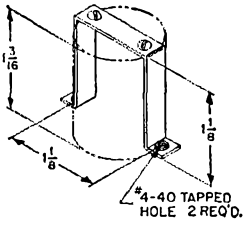
AUDIO TRANSFORMERS & INDUCTORS

FOR TRANSISTOR & TUBE APPLICATIONS

"O" Series

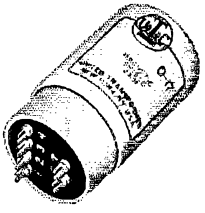
STANDARD OUNCER

Dia. .....⅞"
Ht. .....1 3/16"
Term proj. .....5/32"
Mtg. .....11/16"
Scr. 2-56
Wt. .....1 oz.



O-BR

Ouncer chassis mount bracket



Hipermalloy Shield shown fitting over ouncer unit

"P" Series

PLUG-IN OUNCER

Dia. .....1 3/32"
Ht. .....1 15/32"
Skt. .....St. Oct.
Wt. .....2 oz.

IDEAL FOR HAM, PORTABLE BROADCAST, HIGH FIDELITY, CONCEALED SERVICE, HEARING AID AND SIMILAR APPLICATIONS

For over thirty years UTC engineering and production talent has lead the industry in the development of high quality transformers, inductors, electric wave filters, magamps and high Q coils.

The UTC OUNCER series pioneered a breakthrough in the reduction of size and weight. "O" series units are fully impregnated and sealed in drawn aluminum cases. Highest quality characteristics are inherent in the conservative design. Frequency response from 30 to 20,000 cycles within ± 1 db. A hipermalloy shield providing 25 db is available.

Plug-In "P" series OUNCERS are identical to the "O" series but are sealed in bakelite housings of submersion proof design, with plug-in base to fit standard octal socket.

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From Stock

OUNCER TYPES	Pri Imp Range, Ohms	Sec Imp Range, Ohms	Level Range, mw
INPUT & MIXING TRANSFORMERS	From 7.5 to 50,000	From 50 to ½ megohm	From 6.3 to 30
INTERSTAGE TRANSFORMERS	From 25 to 100,000	From 10 to 1 megohm	From 6.3 to 1 watt
OUTPUT TRANSFORMERS	From 4 to 30,000	From 3.2 to 600	From 6.3 to 1 watt
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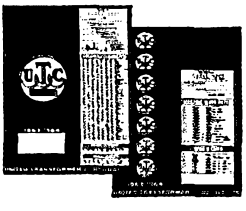

Compromise...
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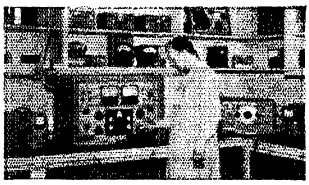

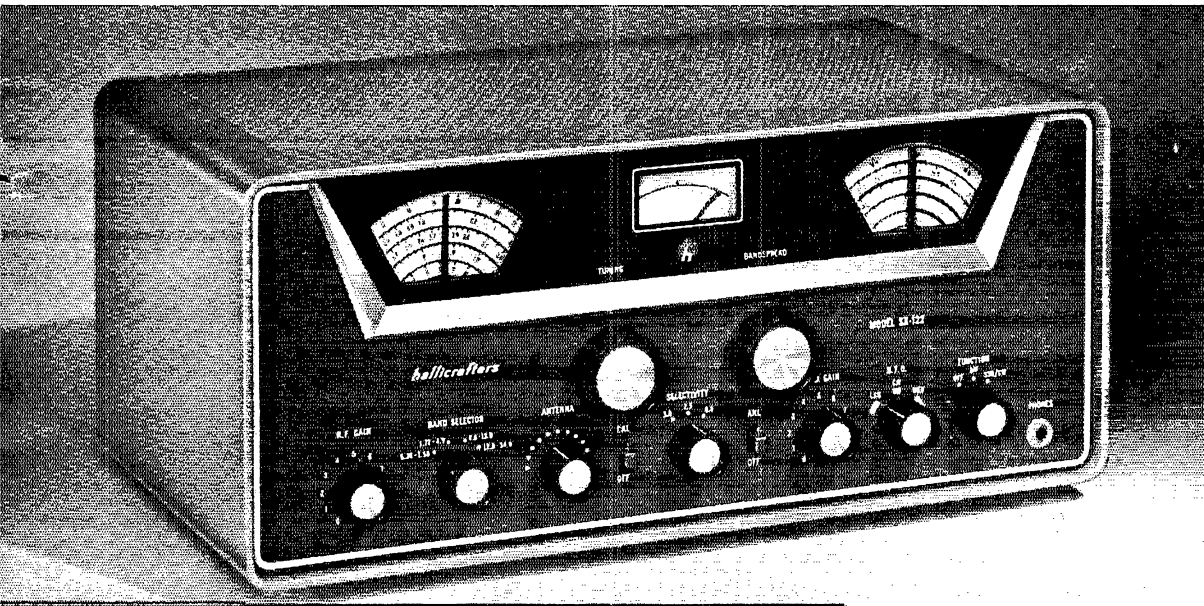

NEW SX-122 dual conversion general coverage receiver $295.00

If you operate **exclusively** on the amateur bands, we hardly need point out that an amateur-band-only receiver will give you more sophisticated features and performance for your money than **any** general coverage unit.

But if your personal interests require the versatility of a general coverage receiver, the wisest compromise you can make is the new SX-122 receiver.

For maximum flexibility consistent with the **high standards of basic performance you demand,** nothing even close to its price can touch the SX-122.

In addition to the solid value specifications listed alongside, the SX-122 brings you a major advance in stability through additional temperature compensation of the h.f. oscillator circuits and use of crystal-controlled 2nd conversion oscillator

The SX-122 is in stock, at your distributor's today.

FEATURES: Deluxe general coverage receiver. Broadcast (538-1580 kc.) plus three S/W bands (1720 kc.—34 Mc.). Dual conversion, superheterodyne over the entire frequency range. SSB/CW/AM reception. Product detector for SSB/CW. Envelope detector for AM. Series noise limiter. Heavy-duty tuning capacitor with copper plates in oscillator section for maximum electro-mechanical stability. Audio output: 1.0 watts with less than 10% distortion. Three steps of selectivity: 0.5, 2.5, 5.0 kc. at 6.0 db. down. Antenna trimmer, amplified AVC. 2nd conversion oscillator crystal-controlled. Size: 18¾″ wide, 8″ high, 9¾″ deep. Provision for 100 kc. crystal calibrator accessory (HA-7). UL approved.

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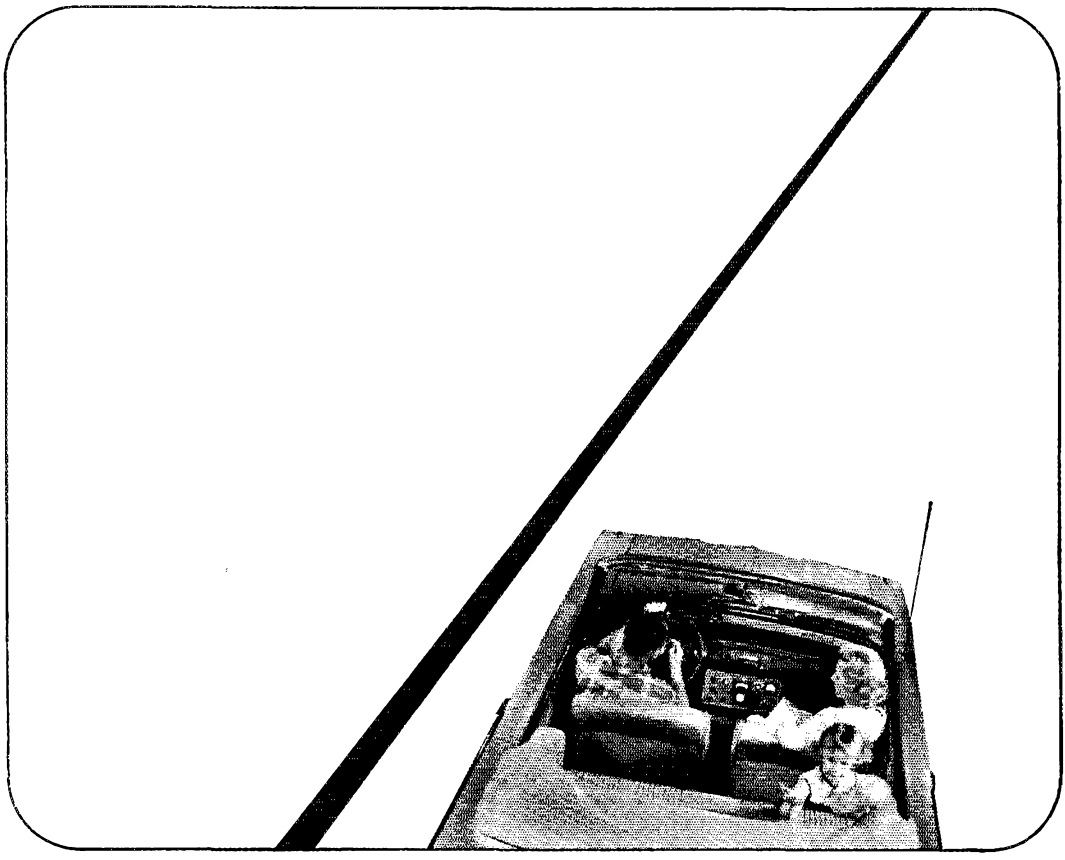
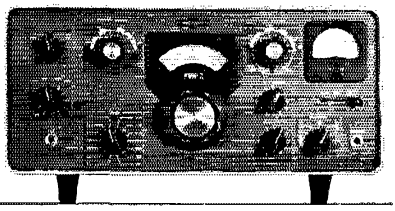


One for the road

That KWM-2 for the road is the same one you use in your ham shack. When you want to take it with you, just mount it in your car and you're ready to go with the same performance your KWM-2 gives you in your ham shack, proven in 5 years as the top performing transceiver on the market. At home or on the highway, this lightweight unit covers the popular HF ham bands. Providing ample power on 80 through 10 meters with 175 watts PEP input on SSB, or 160 watts on CW, the KWM-2 connects automatically in your car's mobile mount. So, whether you're taking a long trip this summer or just going to visit Grandma, put the KWM-2 on your vacation list. Contact your distributor today and find out how little it costs to own the finest.



P.S. If you're going through Iowa this summer, stop during working hours in Cedar Rapids and visit the plant.

COLLINS

QST

APRIL 1964

VOLUME XLVIII • NUMBER 4

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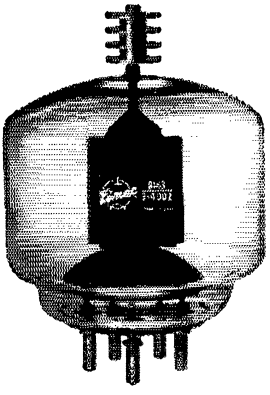
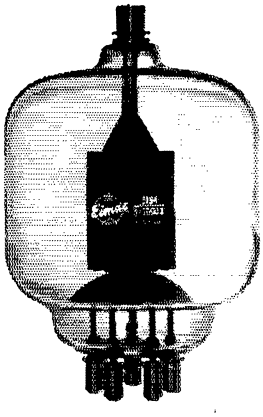
—CONTENTS—

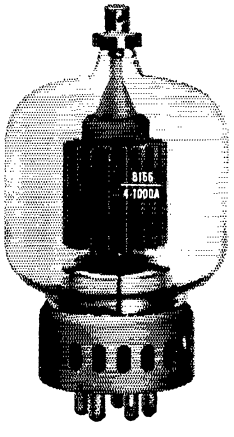
Eimac Means Leadership in SSB!

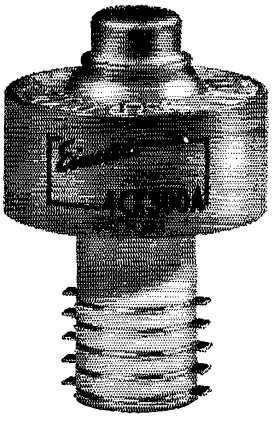
In step with the first popular use of SSB in 1938, EIMAC original-design transmitting tubes have been in the sockets of the majority of SSB equipments to the present time. Now, look to EIMAC in the years ahead for other original-design vacuum tubes to advance the state-of-the-art, and to provide enhanced performance in SSB service.

- EIMAC original-design external anode tetrodes (4CX1000A, 4CX250B, 4CX300A, 4X150A, and others) are the popular choice in SSB equipments providing high gain and low distortion with grid-driven circuitry.
- EIMAC original-design zero bias triodes (3-1000Z and 3-400Z) are the popular choice for grounded grid amplifier service, featuring economy and low intermodulation distortion at moderate cost.
- EIMAC original-design tetrodes (4-1000A, 4-400A, 4-250A and others) are the popular choice for reliable, hard glass transmitting tubes for Class AB_1 linear amplifier service.
- New EIMAC original-design products in the coming years will continue EIMAC leadership in SSB!









SSB

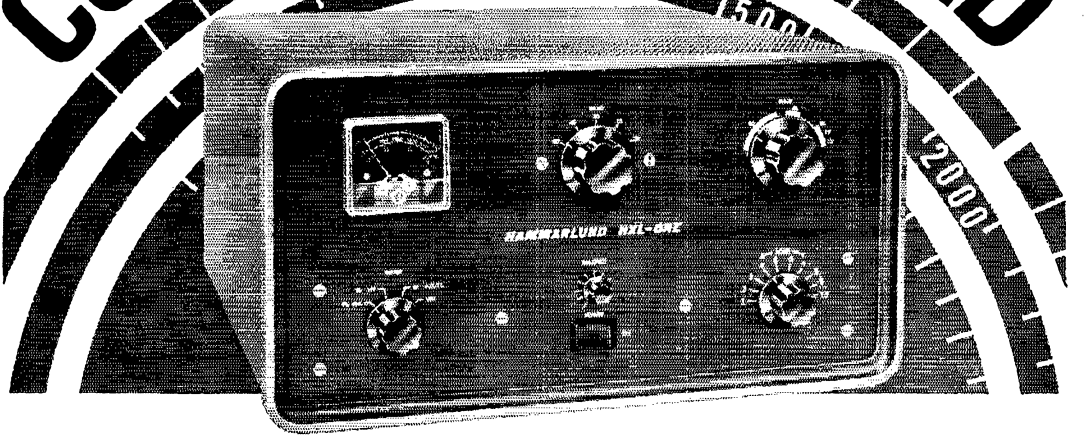
NEW!
"Single Sideband Principles and Circuits," by E. W. Pappenfus, Warren B. Bruene, and E. O. Schoenike. Published by McGraw-Hill Book Co., N. Y.

The authors of this new, definitive work on Single Sideband techniques salute the contribution of the radio amateur to SSB..."very little has been written in reference books on this subject: in fact there is a dearth of published material, other than for amateur radio, that covers the subject in depth." EIMAC's Technical Staff congratulates the authors for their great contributions to the electronics art, and recommends their outstanding book to all communications engineers and radio amateurs.

Eimac

Eitel-McCullough, Inc., San Carlos, California.

COMMAND THE BAND



with the NEW HAMMARLUND HXL-1 linear amplifier

Regardless of the exciter you are now using—the HX-50, the HX-500, or any one of a host of compatible units, you will TAKE COMMAND the moment you're hooked up to the incredible HXL-1.

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*Twice average DC

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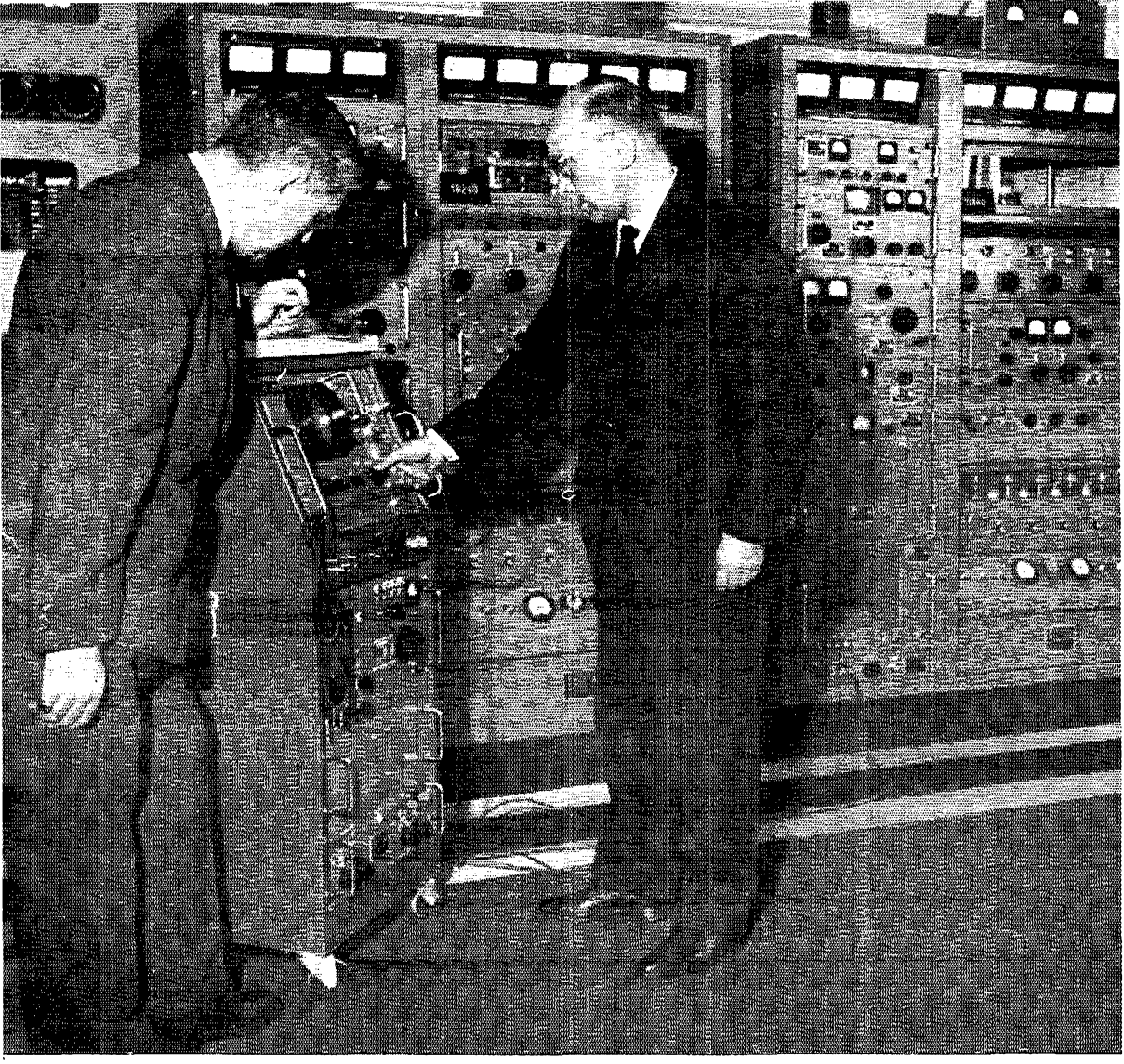

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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the 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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Vice-Director: Harry J. Dannals W2TUK
RFD 1, Arbor Lane, Dix Hills, Huntington, L. I. 11743

Midwest Division

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Vice-Director: Sumner H. Foster . . . . . WØGQ
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Vice-Director: Robert B. Thurston W7PGY
7700 31st Ave., N.E., Seattle, Wash. 98115

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Vice-Director: Ronald G. Martin W6ZF
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Vice-Director: Joseph F. Abernethy W4AKC
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Vice-Director: Charles J. Bolvin W4LVV
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Box R, San Gabriel, Calif. 91778

Vice-Director: Virgil Talbott W6GTE
1175 Longhill Way, Monterey Park, Calif. 91754

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P.O. Box 1656, Corpus Christi, Texas 78403

Vice-Director: Ray K. Bryan W5UYQ
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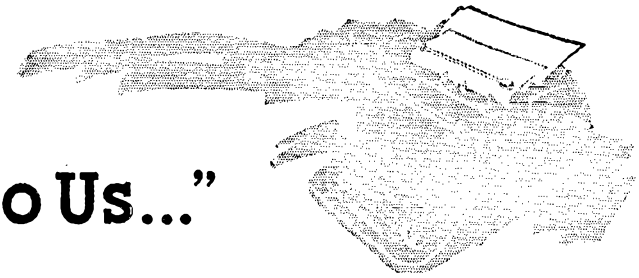


"It Seems to Us..."

GENEVA CONFERENCE

Lest members become needlessly alarmed through some irresponsible reporting in another portion of the amateur press, let us here state that no international radio conference dealing with over-all high-frequency allocations is planned during 1965. There will be a *plenipotentiary* conference in Geneva in 1965, one which has been long contemplated to coincide with the 100th anniversary of the International Telecommunications Union and its predecessors. But over-all frequency allocations are not on the agenda. As international conference proceedings are indeed complex, it is perhaps understandable that a magazine editor might not, from his editorial chair, be sufficiently informed on such matters to understand the difference between a plenipotentiary and an administrative conference.

The "plenipot" is somewhat a striped-pants affair, at a high level, and somewhat ceremonial. Its business is the organizational structure of the Union. It doesn't deal with radio allocations any more than it deals with prefixes or RTTY codes. Such matters are left to administrative conferences. Although an oversimplification, we could put it this way: the plenipotentiary conferences write and revise the *constitution* of ITU; the administrative conferences write and revise the *bylaws*, the latter including frequency allocations.

The fact is that the Swiss government has indicated it does not want to host an administrative conference in Geneva during 1965, as the plenipot is already as large a problem of accommodation as it wishes to face in communications conferences in one year. A CCIR (technical study) conference is already scheduled for 1966. Many of its results will have a useful bearing on decisions to be later taken at a full-fledged administrative conference. Thus the earliest reasonable date for a conference dealing with over-all allocations is late 1967, with the probability (as we several months ago indicated in *QST*) that it will not commence until 1968 or even later.

This is not to underestimate the importance of the eventual conference, which will indeed be a critical time for the amateur service. Our point is to prevent amateurs from being misled into sudden panic and crash programs, as some among us are apparently attempting.

ANNIVERSARY BOARD MEETING

As the Board of Directors gathers around a conference table in Hartford on May 1, the League will be just 18 days short of a half-century old. Another anniversary is being observed, too — the fortieth of representative government in our ARRL. *QST* for April, 1924 announced that ballots would be mailed to all members the first week in April. Members were urged to make a careful choice, and get their ballots back by the last day of the month. The February issue had announced the adoption of the new constitution in December, 1923, and called for nominations for director in all twelve U.S. divisions, and for nominations for Canadian General Manager. (Half of these men had to stand for election again before the end of 1924, to establish the pattern whereby half the Board is up for election each year, still in effect.) The twelve divisions were Atlantic, Central, Dakota, Delta, East Gulf, Midwest, New England, Northwestern, Pacific, Roanoke, Rocky Mountain, and West Gulf. The Hudson Division was created later that year.

Before 1924, the Board had been elected "at large," with all members voting for 17 of the candidates on the ballot. On the Board which voted itself out of existence to pave the way for the new ideas listed, geographical distribution of directors had been uneven: there were six from New England, four from the Atlantic, three from the Central, and none at all from six of the divisions.

In the forty years that our League has enjoyed representative government, there have been few decisions which have not stood the test of time, and few which have not been right in the glaring light of hindsight. The judgment of the Board as an historical entity is certainly not due to good fortune, but to the fact that many members have always been tremendously interested in their League. They have sought out the best candidate for Director in their respective divisions, they have supported and reelected him when they felt he was right, they have nagged him when they felt he was wrong, and turned him out of office when they felt he had served his usefulness. The League has had enlightened directorates because it has had informed electorates.

All this leads up to the fact that your repre-

sentatives will be meeting on May 1 in formal session, and for a day or so before that in informal session. During this time they will exchange views with other directors, check the League's financial affairs, observe the daily operations of the headquarters staff, inspect the physical plant, and otherwise insure that all phases of the League affairs are as they should be. Then they will make decisions to chart the ARRL course for the coming year. Do you have views you want your director to consider? Now is the time for you, the individual member and the local affiliated club, to stand up and speak out to your director, so he may do an even better job in the "40th ARRL Senate." QST

COMING A.R.R.L. CONVENTIONS

April 3–5 — Great Lakes Division, Detroit, Michigan
May 9–10 — New England Division, Swampscott, Massachusetts
June 12–14 — West Gulf Division, Brownwood, Texas
July 4–5 — West Virginia State, Jackson's Mill, W. Va.
August 21–23 — ARRL National, New York City
September 11–13 — Southwestern Division, Palm Springs, California
September 25–27 — Pacific Division, Sacramento, California

NEW ENGLAND DIVISION CONVENTION

Swampscott, Massachusetts — May 9 and 10

Billed as "the world's largest hamfest," the New England Division ARRL Convention will be held May 9 and 10 at the New Ocean House Hotel, Swampscott, Mass. During the convention there will be exhibits and displays by leading manufacturers and distributors, as well as a number of talks and discussions. Speakers include George Jacobs, chief of frequency division, Voice of America; Fr. Daniel Linehan, director of the Weston Observatory; Stuart Meyer, president, Hammarlund Mfg. Co.; Robert Waters, president, Waters Mfg. Co.; Nathan Hallenstein, Boston office of FCC; Walter Zarris, General Dynamics; and Col. Frank Giles, head of the Massachusetts State Police. NASA will present special demonstrations on space flight. Other features include a laser demonstration, FCC examinations, net meetings, YL meetings, ARRL forum, QSL contest, QSL Bureau, and a dinner Saturday night, followed by dancing and several night club acts. Activities wind up Sunday with a roast beef banquet at 5 P.M. The "Outstanding New England Amateur Radio Operator" award will also be presented; see page 93, March *QST* for details.

"Early-bird" registration is $3 until April 19; $4 at the door. The banquet is $5.50, including gratuity. Early-bird registration and banquet requests, together with a self-addressed stamped envelope and check for the proper amount, should be sent to: Radio Convention, c/o John McCormick, W1KCO, RFD #1, Berkley St., Taunton 1, Mass. Hotel reservations should be made at least 20 days in advance; requests should go directly to the New Ocean House Hotel, Swampscott; single rooms will be $10 and double rooms $15, payable upon checking out.

Deadline Approaching:

GOLDEN ANNIVERSARY ESSAY CONTEST

What ARRL Means To Me

As part of the commemorative program of the League's 50th anniversary year, each ARRL member is invited to submit an entry in a Golden Anniversary Essay Contest on the subject, "What ARRL Means To Me."

Through the years, the League has meant many things to many people. Perhaps to you the most impressive function of your association is its public service field organization of traffic nets and emergency preparation; perhaps it is W1AW code practice, representation of the amateur service in domestic and international regulatory affairs, training aids for clubs, division conventions, Field Day; perhaps it mostly means receiving *QST* each month. You pick the subject, but make the theme, "What ARRL Means To Me."

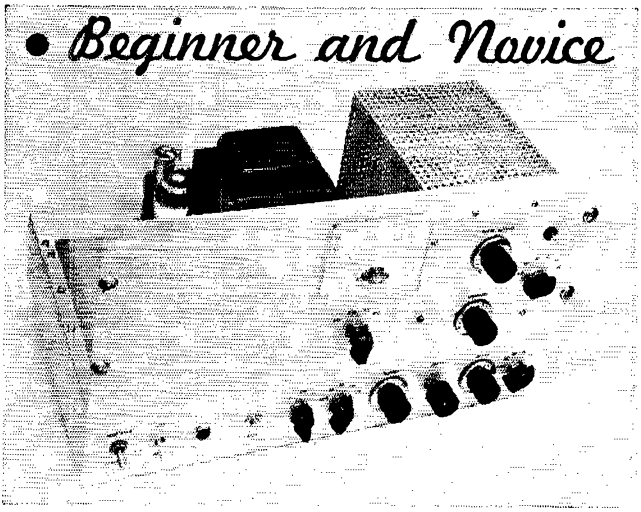
From those submitted the judges will select two which in their opinion are outstanding; the winners will receive handsome trophies and cash awards of $100 and $50, and of course the essays will be published in *QST*.

Any ARRL member, full or associate, is eligible. All entries should be typed (double space) or neatly handwritten in English on one side of unruled paper and sent to the ARRL Essay Contest Committee, 225 Main Street, Newington, Connecticut 06111, and **received by May 1, 1964.** The decisions of the judges will be final; all entries become the property of ARRL. Suggested length of entries is between 1000 and 2000 words.

Dust off your mill, or ball pen, and tell us what the League means to you! QST

Strays

The address of the Nevada State Centennial Amateur Radio Committee (Strays, page 21, January) is P.O. Box 2534, Reno, not Box 5234.



Here is a front view of the Mark II. Along the bottom front, from the left, are S_3, S_2, I_2, S_1, S_8, S_4, C_3, R_3, C_4, and S_5. The final-amplifier tuning is at the upper right and the loading control just below it. The blank panel at the left is for the future addition of a v.f.o.

The "Novice Gallon"—Mark II

75 Watts Novice—

250 Watts General

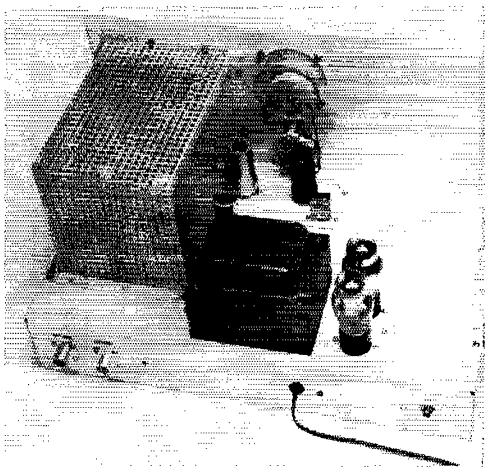
BY LEWIS G. McCOY,* W1ICP

THE ORIGINAL Novice Gallon [1] proved to be a popular transmitter for two reasons. First, it made use of parts taken from old TV sets, which kept the over-all price of the unit low; and second, it offered the Novice the maximum legal power (75 watts input) but could be stepped up to higher power when he obtained his General Class ticket. The Mark II described here also makes use of parts from an old TV set, but has several features not included in the original unit.

The Mark II covers 160 through 10 meters, the 160-meter band being an added feature. Also, the power input for General Class work has been upped to 250 watts by making use of a pair of the new 6146Bs in the final amplifier. Space has been provided in the chassis layout for the addition of a v.f.o. after the user sheds his Novice license. The power supply in the Mark II uses a rewound TV power transformer [2] to provide a low-voltage, high-current power source which, when used with a voltage-doubler circuit and low-priced silicon rectifier, provides an economical power supply. Another feature is the addition of differential keying for c.w. work.

Circuit Details

The r.f. lineup consists of a 5763 crystal oscillator, a 5763 buffer/multiplier, and a final amplifier using a pair of 6146Bs. Fig. 1 shows the circuit diagram of the Mark II. Crystals for 160 meters are used for 160-meter output, and can be used for 80 and 40 as well if their frequencies are appropriate for multiplying. Eighty-meter crystals can be used for 80-, 40-, or 20-meter work, and 40-meter crystals for 40 and the higher bands.



This photograph shows the arrangement of the components above deck. The tube nearest the front panel alongside the amplifier cage is V_1. V_2 is just to the right behind the meter switch. There is no special significance in the fact that one tube shield is black—we just happened to have one in the junk box.

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* Technical Assistant, *QST*.

[1] McCoy, "A 'Novice Gallon' or General 150-Watter," *QST*, June 1962.

[2] McCoy, "Tailor-Made Volts," *QST*, February 1964.

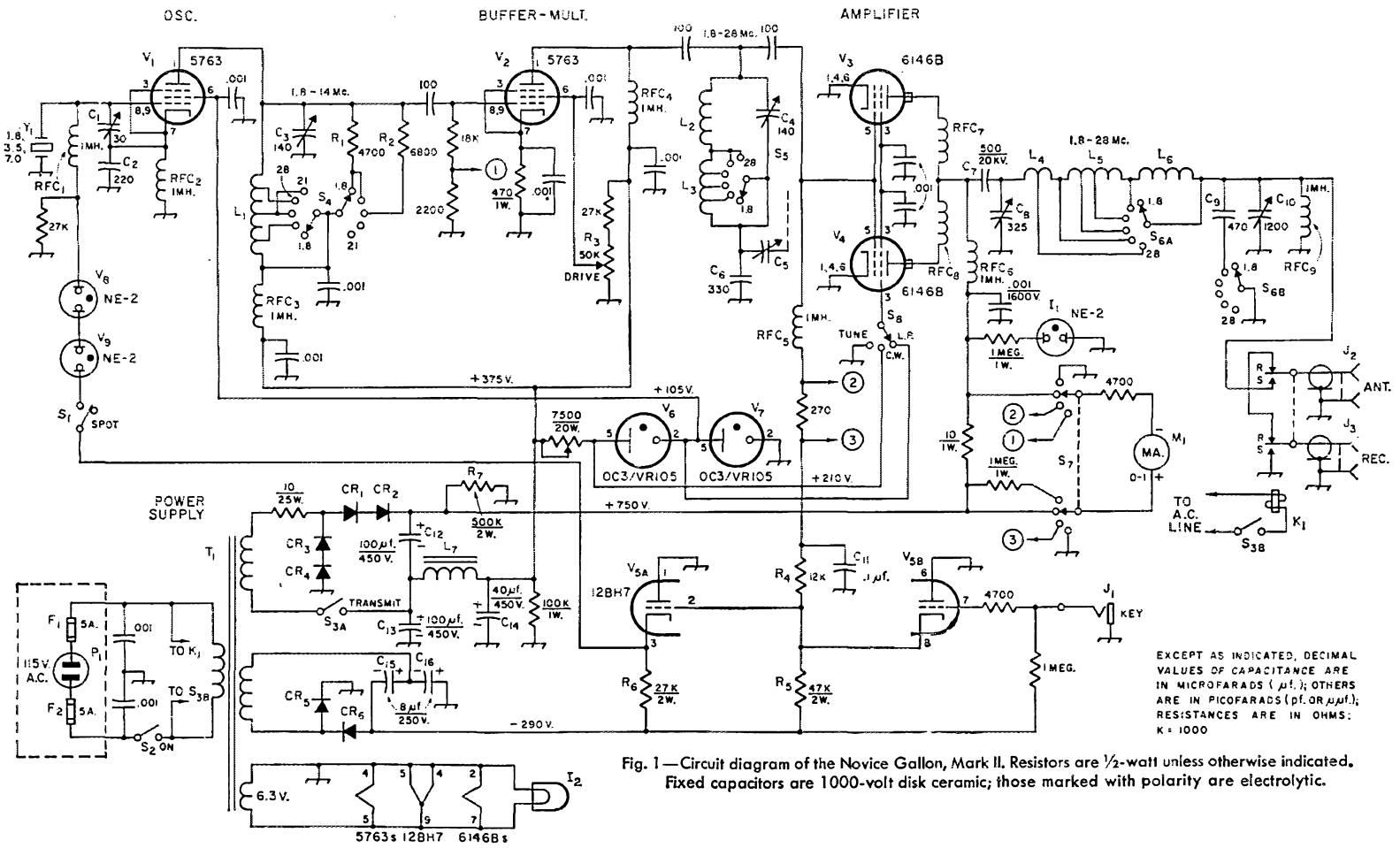


Fig. 1—Circuit diagram of the Novice Gallon, Mark II. Resistors are ½-watt unless otherwise indicated. Fixed capacitors are 1000-volt disk ceramic; those marked with polarity are electrolytic.

C_1—3-30-pf. trimmer.
C_2—220-pf. mica.
C_3, C_4—140-pf. variable (Hammarlund HF-140 or equivalent).
C_5—See text.
C_6—330-pf. mica.
C_7—500 pf., 20 kv. (from TV set), or 500 pf., 3000 volts.
C_8—325-pf. variable (Hammarlund MC-325M).
C_9—470-pf. mica.
C_{10}—3-section variable, 365-400 pf. per section with sections in parallel (broadcast r.f. type).
C_{11}—See text.
C_{12}, C_{13}—100-μf. 450-volt electrolytic.
C_{14}—40-μf. 450 v., electrolytic.
C_{15}, C_{16}—8-μf. 250-volt electrolytic.
CR_1, CR_2, CR_3, CR_4, CR_5 CR_6—600-volt p.i.v. 750-ma. silicon diodes (Barry Electronics 600/750).
F_1, F_2—5-amp. type 3AG fuses mounted in fuse-in-plug type holder (P_1).
I_1—NE-2 neon lamp.
I_2—6.3-volt dial lamp.
J_1—Key jack, open circuit.
J_2, J_3—Coax chassis connector, type SO-239.
K_1—2-pole, antenna change-over relay (Advance type AM/2C/115VA).
L_1–L_6, incl.—See coil table.
L_7—Choke from TV set, approx. 2 hy., 300 ma.
M_1—0–1 d.c. milliammeter.
P_1—A.c. line plug, fuse-in-plug type.
R_1—See text.
R_2—See text.
R_3—50,000-ohm 4-watt wire-wound control (Mallory M50MPK).
R_4—12,000 ohms, ½-watt.
R_5—47,000 ohms, ½ watt.
R_6—27,000 ohms, ½ watt.
R_7—500,000 ohms, 2 watts (two 1-meg. 1-watt resistors in parallel).
RFC_1, RFC_2, RFC_3, RFC_4, RFC_5 RFC_9—1-mh. r.f. choke (Millen 34300-1000, National R50).
RFC_6—1-mh. r.f. choke, 500 ma. (E. F. Johnson type 102-752).
RFC_7, RFC_8—See coil table.
S_1, S_2—S.p.s.t. toggle.
S_3—D.p.s.t. toggle.
S_4, S_6, S_7—2-pole 5-position rotary (actually can be connected to give six positions counting the arm terminal), (Mallory 173C).
S_5—1-pole 11-position rotary, 6 positions used (Mallory 172C).
S_8—3-pole 4-position rotary, 1 pole and 3 positions used (Mallory 3234J).
T_1—Rewound TV power transformer. The high-voltage winding should be wound to give 340 volts a.c. and the low-voltage winding 150 volts a.c. The filament requirements are 6.3 volts a.c., 6 amp.
Y_1—1.8-, 3.5-, or 7-Mc. crystal.

The plate circuit of each stage can be switched individually, which eliminates some of the problems of gang switching. Separate switching means more controls but has the advantage of better flexibility when frequency multiplying.

Drive to the final amplifier can be controlled by varying R_3, a voltage divider in the screen circuit of V_2. S_8, when switched to its first position, grounds the screens of the final stage for tune-up purposes. In the next position full screen voltage is applied, and in the third position a lower screen voltage is fed to the screens, permitting reduced input for the Novice 75-watt limit or the lower power requirements on 160 meters.

The final-amplifier tank circuit is a pi network designed to work into 50- or 70-ohm loads. RFC_9 is a "safety" choke that prevents the plus B from appearing on the antenna in the event that C_7, the plate-blocking capacitor, should short out. I_1 is a plate-voltage indicator to show that the plate voltage is on or off. Don't be concerned when you switch off the plate voltage and the neon lamp stays lit for a short time, but *do* be concerned about touching anything in the plate circuit while the lamp stays on. With the large amount of capacitance and the high value of bleeder resistor in the B supply, the plate voltage takes a little while to drop to zero when the supply is switched to standby.

We've included an antenna change-over relay, K_1, in the transmitter as an added feature. Installing a relay in the transmitter eliminates the need for a more expensive coax relay. In the transmit position of S_3 the relay is energized and the antenna is connected to the pi network, while the arm on the relay that connects to the receiver is grounded. In the standby position the antenna is connected to the receiver.

The keying is accomplished by grid-block keying the 6146B grids and the grid of the oscillator, using a differential system. V_5, a 12BH7, is used as the keyer tube. In the key-up position a negative voltage of approximately 300 volts is applied to the grids of V_3 and V_4. Part of this same voltage is applied to the grid of V_1 through two NE-2 neon lamps, providing a blocking voltage of about 20 volts with the key open. When the key is closed the neon lamps extinguish and the oscillator breaks into oscillation. At the same time, the amplifier comes on, because R_4, the grid leak, is returned to ground by the keyer tube, V_{5B}. Shaping of the "break" on the signal can be changed by increasing the value of C_{11} for a softer break, or decreasing the value for a harder break. The voltage rating for C_{11} should be 400 volts.

Metering

Metering is accomplished by using a 0–1 milliammeter as a 0–5 voltmeter, with appropriate shunt scale multipliers of various stages of the rig. In the first (lowest) position of S_7 the grid current of V_2 is measured with a full-scale reading of 2.5 ma. The second position of S_7 measures the combined grid current of V_3 and V_4 with a full-scale range of 20 ma. The next position measures the plate current of the amplifiers with a full-scale reading of 500 ma., and the last position reads plate voltage, 1000 volts full scale.

Power Supply

The power supply makes use of the rewound TV transformer mentioned earlier. It should be pointed out that there is *no* commercial substitute for this transformer. If you want to build the transmitter as described you will have to read the article mentioned earlier,[2] which describes the simple method of doing the winding job.

A voltage-doubler circuit is used to obtain a rectified and filtered d.c. voltage of 750 volts for the amplifier plates and 375 volts for the rest

of the rig. Four low-cost surplus 600-volt p.i.v. 750-ma. silicon rectifiers are used in the voltage-doubler circuit. Filtering in the 750-volt leg is accomplished with 50 μf. of capacitance across the supply (two 100-μf. 450-volt electrolytics in series). The low-voltage filter consists of one of the 100-μf. capacitors plus L_7 and a 40-μf. capacitor. Two VR-105s are used to provide regulated voltages for the screen of the oscillator and the screens of the amplifiers. The regulated voltage can be switched by S_8 to provide the full 210 volts for V_3 and V_4, or half voltage, 105 volts, in the event the amplifier is run at lower power.

Getting the Parts

It seems that hardly an article appears in *QST* without several letters being received asking where certain parts can be obtained. This is entirely understandable simply because no single parts distributor stocks every component manufacturer's complete line. We make a sincere attempt to use parts in *QST* and *Handbook* items that are readily available but even so, some items seem difficult to obtain. Our advice is to obtain all distributors' catalogs that it is possible to get. By having a complete set of catalogs your job of finding components will be much easier. In addition, ask for any sales "flyers" listing current bargains. Many times the sales flyers will list components which can be used, resulting in considerable savings. For example, the silicon rectifiers used in this rig were found in several different places at prices as low as 36 cents each.

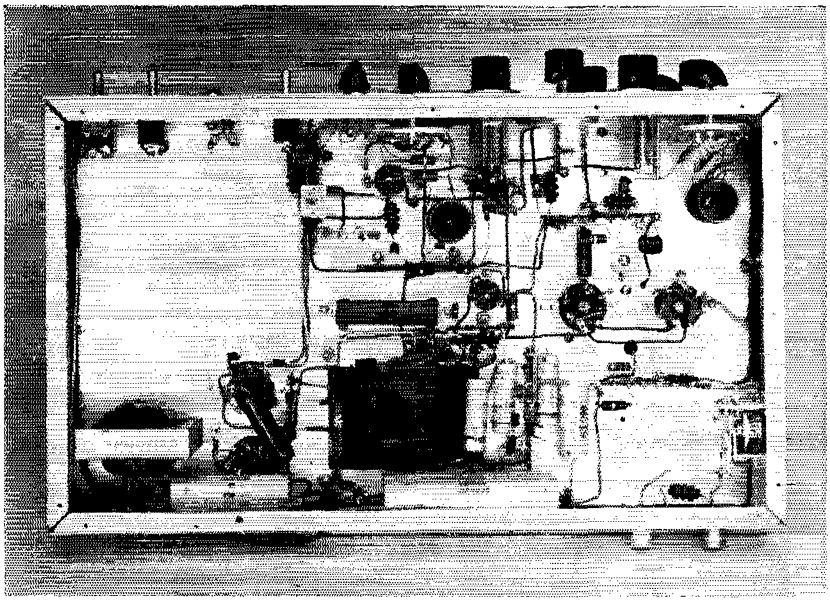
We have checked with TV repairmen from time to time and old TV sets are available for as low as a few dollars, including tubes. Many of the parts (and tubes) can be used, so it pays to do a little judicious scrounging. Another source that shouldn't be overlooked is the junk boxes of your fellow hams. Also, many surplus items that are of no use as complete units are loaded with resistors, capacitors, and r.f. chokes.

Construction Details

The entire transmitter is built on a 3 × 10 × 17-inch aluminum chassis. The front panel measures 10 by 17 inches. Before starting construction or drilling any holes, study the photographs carefully. While the arrangement of the parts isn't critical to the *n*th degree, the same general layout should be followed. The blank panel and chassis space on one side of the unit is for the future addition of a v.f.o. If you want additional chassis room you can use a chassis that is 11 or 12 inches deep. However, we found the size used to be adequate without too much crowding of parts.

Looking at the bottom view of the rig, along the front near the panel, you can see the arrangement of the r.f. lineup. At the upper left side is a terminal strip on which C_1, C_2 and other components for the oscillator circuit are mounted. To the right is the oscillator tube and crystal socket with S_4 mounted on the chassis front directly in front of the tube socket. Next to S_4 is C_3, and just behind it is the buffer tube socket. Just to one side of the buffer socket is the L_1 coil assembly. Next along the front is the control R_3, then C_4, and in the corner S_5, L_2, L_3.

The power transformer is mounted near the rear and center of the chassis. C_{12}, C_{13} and C_{14} are mounted along the rear wall of the chassis. To the right of T_1 are the electrolytic capacitors for the negative supply. Incidentally, don't be alarmed if you count two extra electrolytics in



In the lower right corner are the antenna relay and RFC$_9$. At the right center are the sockets for the final-amplifier tubes. The power-supply components are mounted around the power transformer and on the back chassis wall. L_7 is in the lower left-hand corner.

that group. When we wound T_1 we only allowed for a negative supply of about −80 or −90 volts, and this was not enough for the keyer circuit used in this rig. We used a voltage quadrupler supply to get the necessary voltage. However, it is much easier to add enough turns when winding the transformer to get 150 volts a.c., and use a voltage doubler as shown in Fig. 1.

The antenna relay comes with a single mounting screw. To reduce any relay hum that might show up we installed a rubber grommet in the chassis side and mounted the relay screw through the grommet.

The final-amplifier components, all those mounted above chassis, are shielded by a cage made of Reynolds perforated aluminum stock. The exact size of your shield will, of course, depend on your amplifier layout. We allowed ½-inch minimum clearance around all components, including the top. The perforated stock is easy to cut with tin shears and the piece can be made up in the form of a "T" and then folded to form the shield box. Allow for a ½-inch lip for attaching the shield to the chassis and panel.

Not clearly visible in the photograph of the amplifier is the neutralizing capacitor, C_5. An isolantite standoff insulator one inch high is mounted between the tubes and slightly in front of them. The neutralizing capacitor, C_5, is made from an 8-inch length of No. 14 solid wire. Mount the center of the wire under the top mounting screw on the isolantite standoff, forming a small loop in the wire to hold it in place. Dress the two sides of the wire around the glass bulb of the tubes slightly above the metal tube bases. The dotted lines from the one side of the C_5 symbol in Fig. 1 indicate that this side is "coupled" to the plates of the amplifier tubes. There is no actual physical connection.

Mount the two amplifier tube sockets with their keyways facing each other. Pins 1, 4, and 6 of the 6146Bs are the cathode leads and each of these leads, on both tubes, must be grounded separately with as short a connection as possible. This is necessary to reduce any chances of v.h.f. resonances which could cause parasitics. When we first wired the unit we connected all the cathode pins together and then to a ground lug. After considerable trouble-shooting of v.h.f. parasitics we found the cure was to ground each cathode lead separately, keeping the leads as short as possible.

The panel was attached to the chassis with corner angles to provide additional strength to the complete unit. The angles are 6½ inches high and 8 inches long, with a ½-inch lip for securing the front and bottom to the panel and chassis. Your local sheet-metal shop would be the place to obtain some heavy-duty material for these pieces.

A bottom plate is also used on the rig to provide shielding for TVI. If you happen to live in an area where there is likely to be a weak TV signal, it may also be necessary to shield the meter. A shield in the form of a box can be made up from perforated aluminum stock and mounted over the back of the meter and the switch. In such event the leads to the switch should be run in shielded wire and properly bypassed where they come up from below chassis. Details on this type of shielding can be found in the BCI-TVI chapter of *The Radio Amateur's Handbook*.

Coil Data

L_1 — 80 turns No. 28 enam., close-wound on 1-inch diam. form.
All taps are counted from the bottom end of the coil.
80-meter tap, 44 turns.
40-meter tap, 62 turns.
20-meter tap, 74 turns.
15-meter tap, same as 40 meters.

L_2 — 5 turns No. 16, ½-inch diam., ½-inch long.

L_3 — 74 turns No. 28 enam., close-wound on 1-inch diam. form.
All taps are counted from the bottom end of the coil.
80-meter tap, 31 turns.
40-meter tap, 64 turns.
20-meter tap, 70 turns.
L_2 is the 10- and 15-meter coil; the entire L_3 coil is shorted out for these bands.

L_4 — 7 turns No. 12, 1-inch diam., 1⅛ inches long. 10-meter tap is 2½ turns from junction of L_4L_5.
Entire L_4 coil is used for 15 meters.

L_5 — 31 turns No. 16, 1¼-inch diam., 8 turns per inch (B & W Miniductor 3018).
All taps counted from junction of L_5L_6.
40-meter tap, 14 turns.
20-meter tap, 23 turns.

L_6 — 35 turns No. 24 enam., close-wound on 1-inch diam. form.
L_1, L_3, and L_6 are wound on Millen 45000 coil forms.

RFC_7, RFC_8 — 7 turns No. 16 wound on 1-watt resistor, any value over 1000 ohms. The resistor is only used as a coil form.

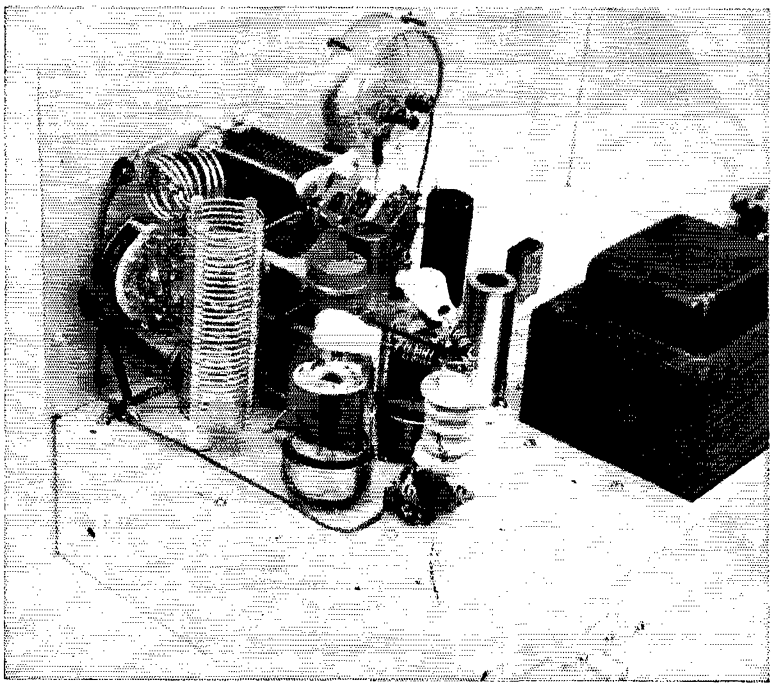
Coil Construction Information

The coil-data chart gives all the pertinent information about the coils. The coils L_1, L_3 and L_6 are wound on Millen type 45000 1-inch-diameter coil forms. These forms have a screw mounting hole in the bottom, and while it isn't visible in the bottom-view photograph, we mounted the coils approximately ½ inch from the chassis by using ½-inch spacers.

In winding L_1 and L_3 the simplest way to make the taps is first to wind on the necessary number of turns until you reach a tap point. Twist a few inches of the wire together at this point and then continue your winding until the next tap point. This gives you a pigtail lead for your tap point. (Be sure to scrape away the enamel covering before soldering any taps or leads to the switches!)

Tune-Up Procedure

The first step in tuning up is to make up a dummy load for the rig. Two 100-watt light bulbs connected in series will make a suitable load for the tests. Plug an 80-meter crystal in the crystal socket, switch S_8 to the position that grounds the screens, and turn on the a.c. with S_2. Be sure that S_3 is *not* in the transmit position. One word of caution: with this type power supply the plus-B voltages come on instantly when the a.c.



This shows the grouping of the final-amplifier components. L_6 is mounted from the front panel while L_5 is mounted on a soldering lug which is secured to an isolantite standoff. One lead of L_4 is soldered to the stator terminal of C_8 and the other lead to the switch terminal on S_{8A}. C_7 is supported by a 2-inch-high isolantite standoff, just in front of the 6146Bs.

is turned on. The transmit switch should never be thrown on until the tubes have a chance to warm up, otherwise you may damage them. After a minute or so of tube warmup, turn on the transmit switch. Switch the meter to read grid current in V_2 and then close the key. Tune C_3 for a peak or maximum grid-current reading and then switch the meter to read grid current in the final. Tune S_5 for grid-current peak. However, you'll probably find that you have too much grid drive, so reduce the grid current to no more than 5 ma. by using the drive control, R_3.

Next, switch the meter to read plate current and you'll find that you have a small reading on the meter that will be enough to show a resonance point. Set C_{10} at maximum capacitance, plates fully meshed, and then tune C_8 while looking for a dip in plate current. You may find two dips, and if so, the one to use is the one nearest the maximum-capacitance setting of C_8. The dip near minimum would mean that the amplifier would be doubling. Open the key, switch S_8 to the low-voltage position (105 volts) and close the key. Resonate the final again for a dip with C_8. Your lamp load will probably show some power by lighting up. Gradually decrease the capacitance of C_{10}, redipping C_8 as the lamps get brighter and the amplifier becomes more heavily loaded.

Open the key again and then switch S_8 for full screen voltage. Quickly dip the final as the resonance point won't be exactly the same as with the lower screen voltage. The amplifier can be loaded to about 330 ma. for full 250 watts input. For Novice inputs the amplifier should not be loaded more than 100 ma. which, since the plate voltage is 750 volts, would give 75 watts input. For Novice work the screens of the amplifier should be run at the lower voltage setting, 105 volts.

As you tune up, you will probably have to readjust your drive control to bring it up to 4 or 5 ma. The drive requirement for the 6146Bs is 4 to 5 ma., and we found that we had this and more, even on 10 meters, so the drive control must be adjusted on each band.

As stated earlier, the amplifier is designed to work into 50- to 70-ohm loads. Don't rely on the amplifier settings of C_8 and C_{10} to be the same with an antenna as with the dummy lamp load. The load is only for testing and, depending on several factors, may or may not be in the 50- to 70-ohm region.

In band-switching, the amplifier is always operated straight through. In other words, S_5 and S_6 are switched to the same band. Whenever possible, the preceding stage, S_4, should be switched so that V_2 is doubling (tripling in the case of 15 meters).

Neutralization

After you have tuned up the rig, turn off all the power and make sure the plus-B voltage has completely dropped to zero, as indicated by I_1. Disconnect the plate and screen leads from V_3

(Continued on page 158)

A Simple Low-Frequency Converter

Broadcast and V.L.F. Coverage for Amateur-Band Receivers

BY G. HOLMES WILSON,* W1LQA

If you, as I am, are one of the many who have switched from a general-coverage receiver to one covering the ham bands only, there are certain things you may miss. One of these is the convenience of broadcast-band coverage. Rather than to add another receiver to an already somewhat crowded operating position, I decided to replace this loss with a converter — one that would be transistor-operated to avoid the annoyance of having to build a power supply or to tap the receiver for the needed voltages.

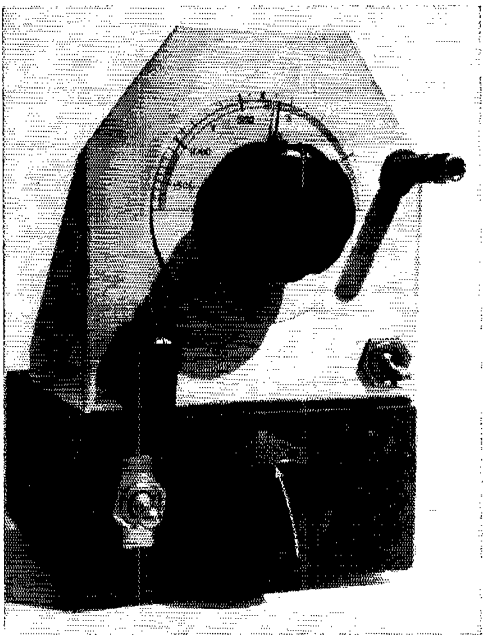
Since I was also interested in long-wave reception, I decided to look into the possibility of covering these low frequencies as well as the broadcast band. As it turned out, I was able to obtain *continuous* coverage all the way from 1600 to 10 kc.! This rather unusual range is accomplished without the need for the mammoth coils usually associated with a conventional v.l.f. receiver.

The Circuit

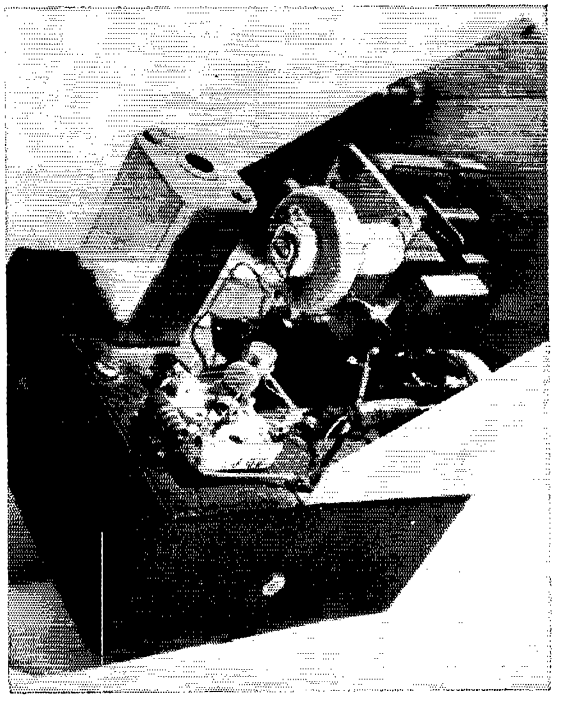
The circuit, shown in Fig. 1, is a straightforward converter circuit, consisting simply of an oscillator and mixer. Several different transistor types can be used successfully. The only requirement is that they should be suitable for r.f. or oscillator use in regular broadcast receivers. The i.f. can be anything between 1.8 and 2 Mc. I used 2 Mc. because it is the quietest frequency in the range at my location.

The oscillator portion of the converter operates over the small range of 2010 to about 3600 kc. But with a 2-Mc. i.f., this gives a signal range of

*21 Washington Road, West Barrington, R. I.



The knob with the calibrated dial controls the oscillator tuning. The uncalibrated knob below controls the input tuning capacitor, C_2. The small knob above is for the input-range switch.



Back-panel view of the low-frequency converter. The coil mounted off the frame of C_5 is L_2. The shield can to the left contains the i.f. transformer. Other coils are mounted inside the box along with C_2.

10 to 1600 kc. In the conventional receiver circuit usually used for low-frequency reception, tuning this range without changing coils would require a tuning capacitor having a maximum-minimum capacitance range of over 25,000 to 1! To be sure, some rather hefty inductance and capacitance values are needed in the mixer input circuit, but the values are not critical. A fixed capacitance may be used for the v.l.f. range, and r.f. chokes of various types will supply the needed inductance in compact form. The complete unit, batteries included, was constructed on a 4 × 4 × 2-inch utility box fitted with a small aluminum panel extending above it.

A broadcast-band tuning capacitor was used at C_5 because of its low cost, although it provides a tuning range much greater than is needed or desired. This range was reduced by inserting a fixed capacitor, C_4, in series. The coil used for the oscillator (L_5) is a broadcast-band antenna loopstick. Its wide-range slug adjustment assists greatly in trimming the circuit to cover the desired frequencies.

Keeping the r.f. input circuit peaked up over such a wide frequency range presented a problem. However, by switching smaller inductances in parallel with L_3 for the higher frequencies, the input circuit can be adjusted sufficiently close to the operating frequency to provide satisfactory reception. I used color coding on the tuning dial and an input-circuit switch for convenience.

Construction

Coils L_3 and L_4 originally comprised a two-pie r.f. choke found in a BC-375 tuning unit. The pie used for L_3 has less inductance than the other, but it is larger physically because it is wound with larger wire. This coil measures 1½ inches in diameter and ½-inch thick. The two coils are spaced ⅛-inch apart on a ceramic pillar. The ground connection is made to the lead between the two pies. A suitable substitute is a conventional three-pie choke of about 10 mh. (e.g., Miller 4672). With this choke, the ground connection should be made to the lead between the center pie and either end pie. The single pie is then used for L_3, and the remaining two pies in series constitute L_4. Other suitable coils are Miller type 640 r.f. choke (2.5 mh.) for L_3, and type 660 (7.5 mh.) for L_4. These should be mounted, back to back, as close together as possible.

L_1 and L_2 may be almost anything you can find that can be adjusted to the approximate inductance specified by removing turns or adjusting a slug. I used odd coils that I happened to have. Suitable catalog items are suggested under Fig. 1.

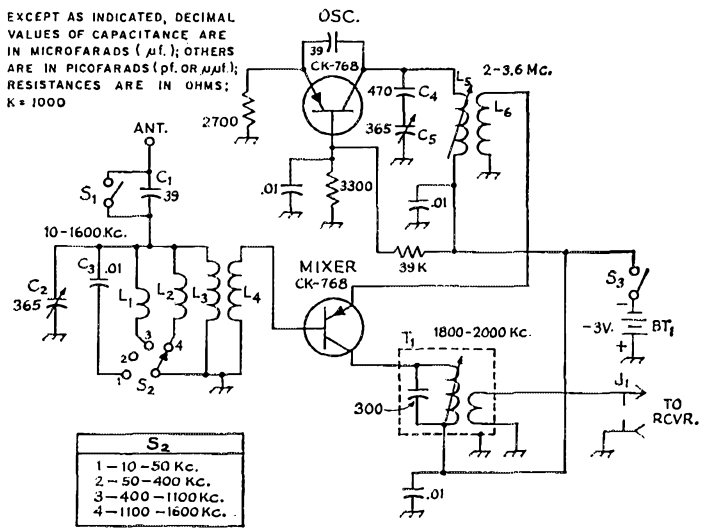


Fig. 1—Circuit of the low-frequency converter. Fixed capacitors of decimal value (excepting C_3, which is mica) are disk ceramic; other are mica or NP0 ceramic. Resistors are ¼ watt or more, composition. Component labels not found below are for text-reference purposes.

C_2, C_5—365-pf. air variable (broadcast replacement type); see text.

J_1—Phono connector or coaxial receptacle.

L_1—Approx. 730 μh. (Miller type 620 r.f. choke or type 4412 slug-tuned coil).

L_2—Approx. 70 μh. (Miller type 72F685AP r.f. choke or type 4409 slug-tuned coil.

L_3—Approx. 2.2 mh. (Miller type 640 r.f. choke, or see text).

L_4—Approx. 6.8 mh. (Miller 660 r.f. choke, or see text).

L_5—Broadcast-band loop antenna, slug-tuned (Burstein-Applebee 17B512 or equivalent).

L_6—12 turns No. 30 enam. wire wound over cold end of L_5.

S_1, S_3—S.p.s.t. toggle switch.

S_2—Single-pole 4-position rotary switch (Mallory 3215J, 1 pole not used, or equivalent).

T_1—1800–2000-kc. i.f. transformer: 51 turns No. 30 enam. close-wound on ½-inch slug-tuned form for collector winding; 24 turns same for output winding; ½-inch spacing between windings (see text).

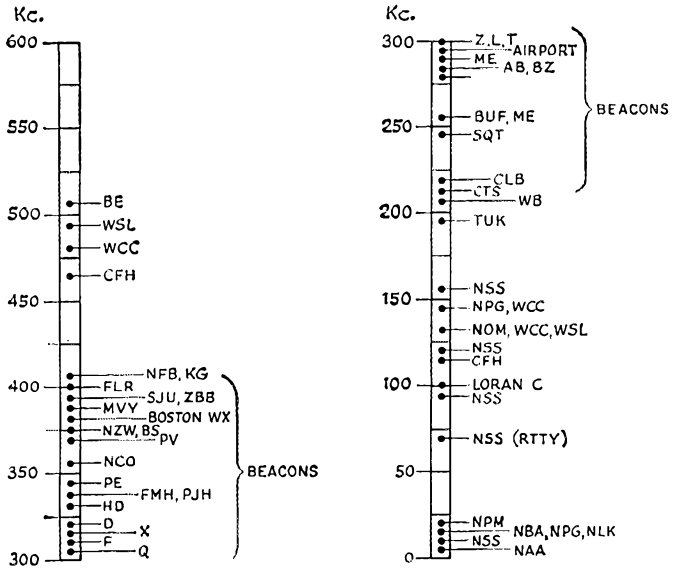


Fig. 2—Chart showing approximate frequencies of various low-frequency stations picked up by the author using the converter.

With the antenna connected directly to L_3, the range of 200 to 500 kc. suffered from broadcast-station hash. Switching in a series capacitor, C_1, provided much quieter operation and sharper peaking over this range. Above 500 kc. there's not much difference in reception with C_1 in or out of the circuit. Below 200 kc., signals are stronger with C_1 shorted out.

The 0.01-μf. capacitor, C_3, resonates the antenna circuit in the vicinity of 30 kc., which proved to be satisfactory over the v.l.f. range. The peaking capacitor C_2 has little effect on the tuning over this range, of course, because of its small value compared to the value of C_3. The fixed capacitor also works as a good bypass for higher frequencies, eliminating a number of spurious signals from strong stations in the 100- to 200-kc. region. In my location, there's a special navigation station, TUK, operating near 200 kc., which is overpowering. A strong loran station near 100 kc. is also a problem.

Don't try to use an unshielded i.f. transformer or to connect the output to the receiver with other than coaxial cable unless you're a good many miles from the nearest broadcast station. The i.f. transformer I used is Burstein-Applebee stock No. 18B120 and sells for 36 cents. This unit is listed as a "slug-tuned ceramic coil form," but it has windings as described under Fig. 1. By removing the original capacitors found inside the can, and adding a 300-pf. capacitor across the primary, you'll find that the transformer tunes nicely from 1800 to 2000 kc.

Power is supplied by two penlight cells. The drain is less than half a milliampere. Additional voltage was tried without any noticeable improvement.

The antenna isn't critical in the 1600- to 200-kc. range, but you'll want something at least 120 feet long to bring in the v.l.f. well. Using such an antenna, I receive NAA, NSS and others in the 10-kc. region about S7. The low background makes even an S4 signal as good as one that's S9 on higher frequencies.

Undoubtedly there are improvements that can be made to the version presented here. So, if you like to cut and try, there may be an opportunity to do yourself some good. However, taken as is, this converter will provide plenty of performance all the way from the broadcast band to the never-never regions where radiated waves measure 17 miles from crest to crest! And, if you don't think there's much from 500 kc. down, just take a look at Fig. 2. Good luck. QST

Strays

Our candidate for understatement of the month honors, from the February issue of the Cyprus Amateur Radio Society's *Monthly Newsletter*:

> The January meeting of the Society was cancelled because of local QRN. It has been decided to cancel the February meeting, which was to have been in Famagusta, as travel is still a little difficult after dark.

A copy of the *Newsletter* was forwarded to ARRL by *QST* author 5B4WR, who adds that his work with ZE2JV in checking propagation over the Cyprus-to-Southern Rhodesia path has been conditioned somewhat by the political climate in Cyprus. Chalky adds that "fiddling with an antenna on the roof of a tall building is rather hazardous, and, though I am not happy with the way my rhombic up there is working I have decided that, for the moment, discretion is the better part of valor."

THE American Radio Relay League and the American Red Cross, working partners in major disasters for more than two decades, have signed a new statement of understanding aimed at increased effectiveness of future operations.

Signing the agreement were Herbert Hoover Jr., W6ZH, and Gen. Alfred M. Gruenther, presidents of ARRL and Red Cross, respectively. Also on hand for the Washington, D. C., ceremonies were ARRL General Counsel Booth, W3PS, ARRL-IARU Secretary and *QST* Editor Huntoon, W1LVQ, and ARRL Vice-President and Communications Manager Handy, W1BDI.

In the renewal statement, Red Cross stressed their appreciation of the valuable aid ARRL members provide "in maintaining continuity of communications during disasters and emergencies when normal communications facilities are disrupted or overloaded."

In signing, Gen. Gruenther paid tribute to the volunteer efforts of hams throughout the U. S. in support of Red Cross disaster operations. He said it "is fitting we should sign this document during 1964, the 50th anniversary year of the American Radio Relay League."

ARRL, Red Cross Renew Agreement

Mr. Hoover took note of the common interest of the Red Cross and the ARRL in promoting voluntary service in behalf of others.

ARRL and Red Cross have had a cooperative understanding since 1940. Changes have since occurred in both organizations — in the ARRL, especially the formation of NTS and ARPSC; in Red Cross, mostly redelegation of responsibility at the national and area levels. The revised Cooperative Understanding which follows reflects these changes.

Cooperative Understanding
Between
The American Radio Relay League, Inc.
and
The American National Red Cross

I. PURPOSE

The purpose of this document is to state the terms for an understanding between the American Radio Relay League, Inc. and the American National Red Cross that will serve as a broad framework within which volunteer personnel, of the Amateur Radio Public Service Corps, sponsored by the League, may coordinate their facilities and equipment with the American Red Cross for communications in disaster relief, inclusive of any disaster except that caused by enemy action.

II. AUTHORITY

The American National Red Cross has long served as the nationwide agency through which the American people voluntarily extend assistance to individuals and families in need as a result of disasters. This responsibility was placed upon the Red Cross in its congressional charter of January 5, 1905, which provides that in addition to its services in time of war the American Red Cross shall:

> . . . continue and carry on a system of national and international relief in time of peace and apply the same in mitigating the sufferings caused by pestilence, famine, fire, floods, and other great national calamities, and to devise and carry on measures for preventing the same.

III. RECOGNITION

A) The American Red Cross recognizes that the amateur radio service, because of its excellent geographical station coverage, can render valuable aid in maintaining continuity of communications during disasters and emergencies when normal communications facilities are disrupted or overloaded.

B) The American Radio Relay League recognizes the American Red Cross as the agency chartered by Congress through which the American people voluntarily extend assistance to individuals and families in need as a result of disasters.

IV. ORGANIZATION OF THE AMERICAN RED CROSS

A) The national headquarters of the American National Red Cross is located in Washington, D. C. For administrative purposes, the continental United States is divided into four areas with each having jurisdiction over a certain number of states. Area offices are located as follows: Eastern Area, Alexandria, Virginia; Southeastern Area, Atlanta, Georgia; Midwestern Area, St. Louis, Missouri; and Western Area, San Francisco, California. Each area office has an administrative and field staff. Area offices report to national headquarters.

B) The Chapter is the local unit of the American Red Cross and is responsible for all local activities of the Red Cross within its territory, subject to the policies and regulations of the national organization. The territory assigned to a chapter is usually a single county. There are over 3500 chapters covering every county in the United States. The chapters report to the area office within whose jurisdiction they are located.

C) Each chapter is responsible for developing a special disaster preparedness and relief organization composed of the best qualified volunteers available. This committee studies the disaster hazards of the chapter territory, surveys local resources of personnel, equipment, and supplies, including transportation and emergency communication facilities, available for disaster relief. It also formulates cooperative plans and procedures with local governmental agencies and private organizations for carrying on relief operations should a disaster occur. Through the nationwide organization of local chapters, the American Red Cross is at the scene, wher-

ever disaster strikes, to extend emergency care and to assist in meeting the rehabilitation needs of individuals and families.

V. ORGANIZATION OF THE AMERICAN RADIO RELAY LEAGUE

A) The American Radio Relay League is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the handling of messages by amateur radio, working for the representation of the radio amateur in legislative matters and dedicated to objectives in the advancement of the radio art and of the public welfare.

B) Organized in 1914 and governed by a Board of Directors elected by the general membership, it has continuously been the standard bearer in amateur affairs.

C) The ARRL has a field operating organization which covers the entire country. Operating organization is administered under elected "section managers" in state and section areas. Awards, activities, and activity patterns are administered by a national headquarters, formal radio traffic handling having been a dedicated activity from the early days. Some thirteen hundred affiliated clubs distributed nationally assist in the self-training.

D) An Amateur Radio Public Service Corps, sponsored by the League, includes many thousands of amateurs with registered interest in providing emergency communications. As a part of this Corps, a National Traffic System facilitates local, regional and area handling of radiograms so that substantial services are provided in the communications field but without charge in view of the voluntary nature of the participation.

VI. METHOD OF COOPERATING

In order that the communications facilities of the amateur radio service may be coordinated and utilized to the fullest advantage during disasters and emergencies, the American National Red Cross and the American Radio Relay League have agreed to the following:

A) Through its national headquarters in Newington, Connecticut, the American Radio Relay League will maintain liaison with National Disaster Services, The American National Red Cross, Washington, D. C., so that there may be the closest possible cooperation in emergency communications planning, and the coordination of amateur radio communication facilities for disaster relief operations.

B) The American National Red Cross welcomes the cooperation and assistance of the American Radio Relay League, through its field organization, to extend emergency communications planning into the jurisdictions of the area offices, and the local and insular chapters. The area offices, local and insular chapters, may further this cooperation by requesting an American Radio Relay League Emergency Coordinator to serve as a Red Cross disaster volunteer, as appropriate, for emergency communications predisaster planning and during disaster emergencies.

C) Whenever there is a disaster or an emergency requiring the use of amateur radio communications facilities, the American National Red Cross or its chapters may request the assistance of the officials of the American Radio Relay League nearest the scene of disaster or emergency. This assistance may include:

1. The alerting and mobilization of volunteer emergency communications personnel in accordance with a prearranged plan.

2. The establishment and maintenance of fixed, mobile and portable station emergency communication facilities for local radio coverage and point to point contact between Red Cross officials and locations, as required.

3. Adequate provisions for maintaining continuity of communications for the duration of the emergency period of until substantial normal communications are restored.

D) Detailed operating plans for the full utilization of the communications facilities of the amateur radio service should be developed at the area office and local and insular chapter levels in cooperation with the ARRL Emergency Coordinator.

ARRL President Hoover and Red Cross President Gruenther discuss new Cooperative Understanding, which guarantees to continue twenty-four years' cooperation between the national organizations, in Gruenther's Washington, D. C., office.

E) The American Red Cross will recommend to its area offices and chapters that membership on disaster preparedness and relief committees include representation from the appropriate officials of the American Radio Relay League.

F) The American Red Cross will furnish, through its area offices, copies of this understanding to its chapters, and the American Radio Relay League will similarly furnish copies to its field officials.

ALFRED M. GRUENTHER
President
AMERICAN NATIONAL RED CROSS

HERBERT HOOVER, JR.
President
AMERICAN RADIO RELAY LEAGUE

February 1964 QST

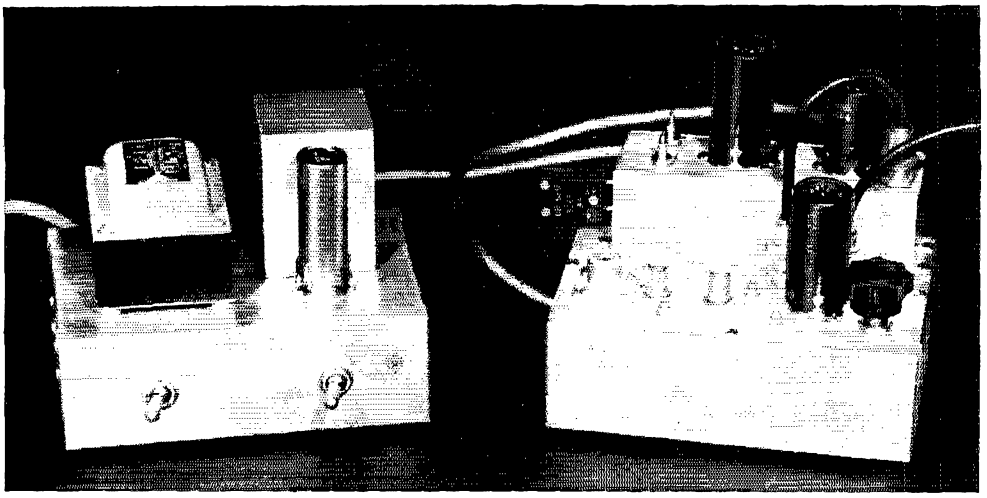


Fig. 1—The converter and its power supply are built on separate chassis. The injection chain for the converter is contained in a separate enclosure which shields it completely from the r.f.-mixer section, as shown in the view at the right.

A Low-Noise 2-Meter Converter

Crystal Control with Nuvistor Front End

BY JOEL BALOGH,* K3CFA

THE idea of building this converter originated when the 6CW4 Nuvistors were introduced almost three years ago. These tubes suggested a poor man's version of the W2AZL converter [1] which used those elusive 417A's. Enthusiasm grew as Tilton's several Nuvistor articles were published in *QST*. Some six months were spent experimenting with cascoded 6CW4s in the front end of an 88- to 108-Mc. f.m. set and many teething pains were experienced before adequate shielding, bypassing and decoupling were achieved to extract all the bugs.

This converter is similar both in the circuits employed and in chassis layout to one described by DL3FM [2]. His article is recommended as a gold mine of ideas for those who would design their own v.h.f. equipment.

A comment in one of the Tilton articles[3] on the type of bypass capacitors required to tame troublesome cases was a help. A complete article on this by K5JKX/6 [4] shows a graph for selecting bypass capacitors in a desired frequency band as a function of total lead length. That graph was used in arriving at the somewhat strange-appearing bypass values employed in this converter.

A missing link in the contemplated design was filled when the EF184/6EJ7 pentode was placed on the market. Here was a high-transconductance, sharp-cutoff pentode which would fill the mixer socket in place of the E-180-F in DL3FM's converter and the 404A in W2AZL's unit. The 6EJ7 is a low-cost tube intended for use as a 40-Mc. i.f. amplifier in TV receivers. It features a g_m of 15,000, a plate current of 10 ma. and a grid-to-plate capacitance of less than 0.006 pf. (A remote-cutoff version of this tube, the EF183/6EH7, has replaced and out-performed the 6BZ6 r.f. amplifier in my many-times-rebuilt HQ-120-X communications receiver).

* HRB-Singer, Inc., P. O. Box 60, State College, Pa.

[1] Scheideler, "A Two-Meter Converter with a Noise Figure Under 2 Db.", *QST*, Dec., 1959.

[2] Lickfeld, "A Six Tube European Style 145 Mc Converter", *CQ*, Nov., 1960.

[3] Tilton, "An Evaluation of the Nuvistor," *QST*, April, 1961.

[4] Kyle, "Tuning Bypass Capacitors," *73* Magazine, September, 1961; also, Summer, "Series-Resonant Bypassing for V.H.F. Applications", *QST*, May, 1963.

Here is a converter which started out as a general-coverage front end for the 2-meter band but was peaked up at 145 Mc. when the first Oscar satellite was placed in orbit in 1961. Excellent results were also obtained with signals from Oscar II. It can be repeaked for Oscar III reception or "unpeaked" to provide a very worthwhile low-noise converter for general 2-meter operation.

Actual construction was started in September, 1961, and the power was turned on the day after Oscar I was put in orbit the following December. A signal generator was used to peak up the circuits for 145 Mc. and a dipole antenna was constructed by soldering two 19-inch pieces of No. 14 wire to the end of a 60-foot length of RG-11 coax. The antenna was positioned on a convenient roof at 1700 GMT on December 15, 1961, and the first Oscar I signals were heard, approximately 18 db. out of the noise, from 1731 to 1740 GMT as revolution number 45 passed overhead. The antenna was later changed to a coaxial monopole in order to receive signals from any azimuth angle and a total of nine revolutions was logged as operating time permitted. Subsequently, the converter was refined to improve noise figure and stability and was used, with a dipole, to log 35 passes of Oscar II. It is currently in use with a home-brew wide-band (50 to 225 Mc.) 72-ohm log-periodic antenna which also serves a 300-watt home-brew 2-meter transmitter.

Circuit Description

The circuit of the converter is shown in Fig. 2. The antenna, through J_1, is connected to the

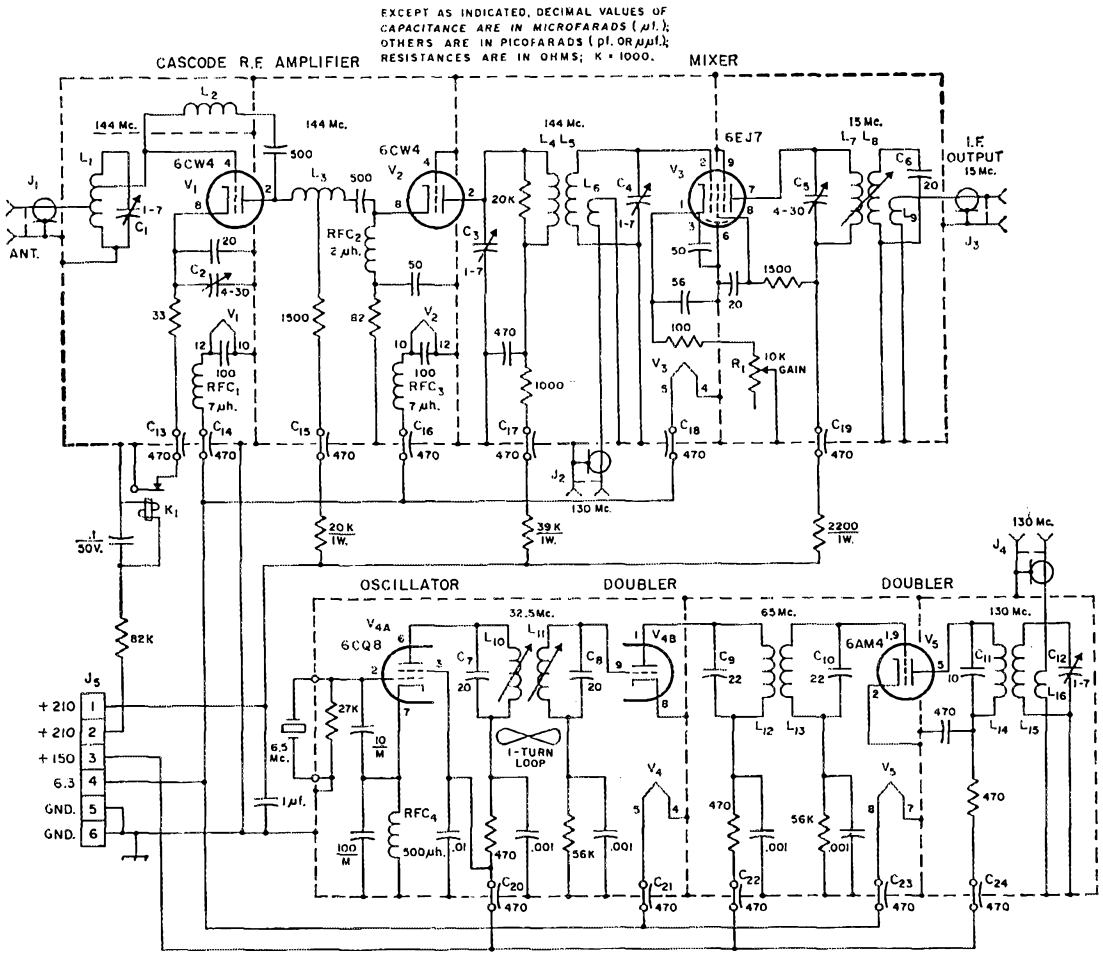


Fig. 2—Circuit diagram of the converter. Dashed lines show separately-shielded sections. Capacitors not listed below are ceramic except M indicates mica. Resistors are ½-watt composition except as indicated.

C_1, C_3, C_4, C_{12}—1–7-pf. tubular (Erie 532 or equivalent).
C_2, C_5—4–30-pf. ceramic trimmer (Erie TS-C or equivalent).
C_6–C_{11}, inc.—Silver mica.
C_{13}–C_{24}, inc.—Feedthrough type (Centralab MFT-500 or equivalent).
J_1—Coaxial chassis connector, SO-239.
J_2, J_3, J_4—Coaxial chassis connector, BNC type.
J_5—Chassis-mounting 6-prong connector, male (Cinch-Jones P-306-AB).
K_1—Sensitive relay, 10,000-ohm coil, 2.5 ma. d.c. (Potter & Brumfield RS5D).
L_1–L_{16}, inc.—See Table I.
R_1—10,000-ohm control, bias taper.
RFC_1, RFC_3—7-μh. v.h.f. choke (Ohmite Z-50).
RFC_2—App. 2 μh. (Ohmite Z-144).
RFC_4—Miniature 500-μh. pie-wound choke (Millen 34300-500 or equivalent).

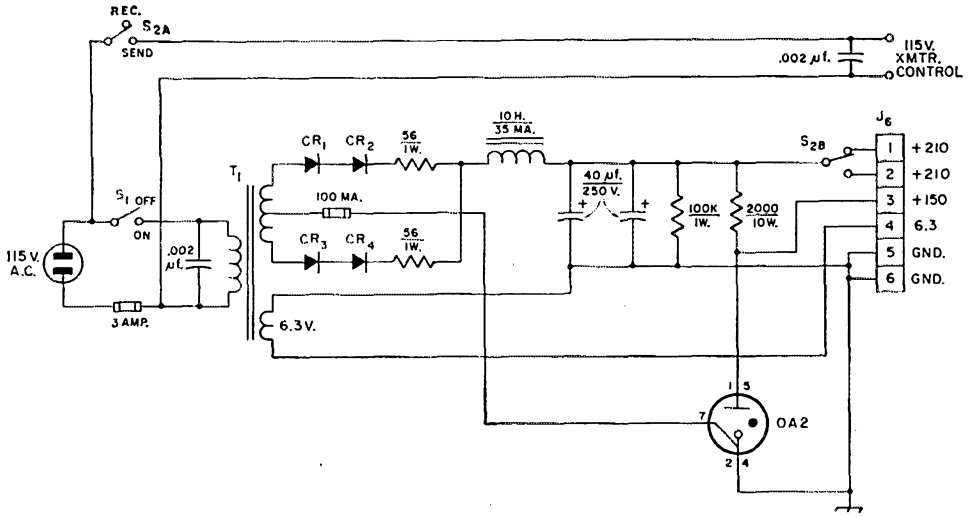


Fig. 3—Power-supply circuit. Resistances are in ohms; capacitors with polarity indicated are electrolytic; 0.002-μf capacitors may be disk ceramic suitable for a.c. use.

CR_1–CR_4, inc.—Silicon, 400 volts p.i.v., 100 ma. or more
J_6—Chassis-mounting 6-prong connector, female (Cinch-Jones S-306-AB). Cable and S-306-CCT female cable connector may be substituted.
S_1—S.p.s.t. toggle.
S_2—D.p.d.t. toggle.
T_1—500 volts c.t., at 40 ma.; 6.3 volts, 2 amp. (Knight 62 G 551 or equivalent).

first tuned circuit at the point on L_1 which provides the highest signal-to-noise ratio. The grid of the first 6CW4, V_1, is tapped down on the same inductor to reduce loading on the coil caused by the input impedance of the tube and to provide a source resistance for the tube suitable for low-noise operation. The optimum source resistance for the 6CW4 is in the order of 400 ohms at 145 Mc.

The self-inductance of the V_1 cathode lead is tuned to resonance by a 4–30-pf. ceramic trimmer, C_2, in parallel with a 20-pf. fixed capacitor, to minimize noise. Note that the d.c. ground return of this cathode is opened by a small relay to prevent excessive grid current when the converter is operated with a transmitter. The relay is controlled by a send-receive switch mounted on the power-supply chassis.

The neutralizing coil, L_2, is shielded from both the grid coil, L_1, and the plate coil, L_3. It is air-wound to avoid the stray capacitance to ground associated with slug-tuned coil forms; a slug-tuned coil for neutralizing the above-mentioned f.m. set caused severe tuning problems because of varying stray capacitance as its slug was adjusted.

The plate coil, L_3, is part of a pi network coupling the first and second stages. Adjustment of L_3 has a large effect on the noise figure, and a trimmer capacitor originally included between the plate of V_1 and ground was found to degrade performance and was removed.

The 2-μh. choke and the 50-pf. capacitor in the cathode circuit of V_2 form a series-resonant trap at the 15-Mc. i.f. frequency. This trap is employed to suppress not only the i.f. signal feedthrough but also the i.f. noise feedthrough. Noise present at the converter output comes through from the front end at the signal frequency, the image frequency and the i.f. frequency. The grid pin (4) and the heater return pin (12) of the V_2 socket are soldered directly to the shield plate which crosses the socket.

The V_2 plate coil, L_4, is swamped with a 20,000-ohm resistor to eliminate a tendency toward oscillation in this grounded-grid stage when all the circuits are peaked up at 145 Mc. The lowest noise figure occurs when L_4 and L_5 are tuned to the signal frequency. The grid circuit of V_3 tunes rather broadly because of the loading of the mixer tube. This loading could be reduced by tapping the grid lead down on L_5, but it was not considered necessary. The screen-grid lead and both cathode leads of V_3 are bypassed with capacitors chosen for series resonance in the 2-meter band. The value of the screen-grid bypass is rather small because the total lead length for the tube, the socket and the capacitor is approximately 2¼ inches.

As in the second stage, the heater return pin (4) together with the internal-shield pin (6) and the suppressor-grid pin (9) of the V_3 socket are soldered directly to the shield plate which crosses the socket. The 10,000-ohm potentiometer in the V_3 cathode return adjusts the conversion gain, which may be reduced for local 2-meter operation to prevent cross modulation in the mixer stage.

The plate circuit of the mixer is double-tuned and was peaked up at 15 Mc. when receiving Oscar signals. A usable output is obtained without readjustment for signals in the 144- to 146-Mc. range and, by moving the peak frequency up a bit and broad-tuning this circuit, the range may be extended within the 2-meter band.

Local Oscillator

A 6CQ8 triode-tetrode, V_4, is used as the oscillator and first doubler. The tetrode section operates as a Colpitts crystal oscillator with its plate coil link-coupled to the triode grid coil; both circuits are tuned to 32.5 Mc., the fifth harmonic of the 6500-kc. "surplus" crystal. The triode section doubles to 65 Mc. and the second doubler, V_5, produces the 130-Mc. local-oscillator signal. A 6AM4 was used for V_5 since it was on hand, but any good v.h.f. triode should do a decent job in this application. The V_5 output circuit is tuned to 130 Mc. and is link-coupled to the converter mixer circuit via L_{16}, J_4, J_2 and L_6. Double-tuned circuits are used throughout the oscillator chain to attenuate unwanted harmonics.

Power Supply

Fig. 3 is the diagram of the power supply built to go with this converter.[5] The choke-input filter is used to keep the output voltage below the 250-volt rating of the filter capacitors. The VR tube provides regulated 150 volts for the oscillator chain. The bleeder resistor (0.1 megohm) is included only to discharge the filter capacitors completely when the supply is turned off; it is not intended to provide a minimum load since the VR tube circuit does this.

The send-receive switch is a double-pole, double-throw toggle. One section applies power either to the converter tubes or to the relay in the first-stage cathode circuit. The other section controls 115-volt, 60-cycle relays associated with a transmitter.

Construction

Fig. 1 is a photograph of the converter and power supply. A $2 \times 4 \times 6$-inch aluminum chassis supports each unit. All other metal parts are made from silver-plated $\frac{1}{32}$-inch brass stock held together by 4-40 machine screws and solder. Plain brass or copper would serve as well, but aluminum is not suitable because many connections and feedthrough bypass capacitors must be soldered directly to the metal parts.

The power supply chassis is used in the normal manner but the converter chassis is inverted. The converter is assembled on a flat plate and fits down into the inverted chassis. Some of the chassis lip must be nibbled away to clear the components and shielding extending below the plate. Small rubber feet are installed on the bottom of both chassis near the corners. The power transformer, filter choke and VR tube are mounted on the top surface of the power supply chassis. The on-off switch and the send-receive switch are located on the chassis front. The machine screws visible on the left end of the chassis support the mounting boards for rectifiers, which are inside with the filter capacitors and remaining power supply components.

[5] Other component parts of suitable characteristics to produce the required output voltages could, of course, be used. Placing a fuse in the transformer secondary center tap circuit, as the author has done, is a very worthwhile precautionary measure. — *Ed.*

The oscillator chain is built on a piggy-back chassis which is bent from sheet stock and mounted on top of the converter base plate as shown. The crystal is located well away from heat sources, as recommended by DL3FM. On top, the 6CQ8 is on the left and the 6AM4 on the right. The two tuning-slug shafts at the left of the 6CQ8 adjust the oscillator plate and first doubler grid circuits. The trimmer (C_{12}) which peaks the 130-Mc. circuit is located out of sight behind the BNC output connector, J_4.

The r.f. signal circuits start at the left with the coaxial antenna connector, J_1. Next are the two 6CW4s, V_1 and V_2 respectively, the 6EJ7, V_3, and the mixer gain control knob. Behind V_3 and to the left is the 130-Mc. connector, J_2, and to the right, the 15-Mc. i.f. output connector, J_3. The tuning shaft just visible behind the gain-control knob is L_7 in the mixer plate circuit. The shaft near V_1 is the previously mentioned plate capacitor which was removed after the photograph was taken. The two remaining shafts, between V_2 and V_3, are those of C_3 and C_4.

These parts may also be identified in Fig. 4, which is a view of the underside of the converter base plate. The antenna coil, L_1, is in the upper left-hand corner. To its right is the cathode tuning capacitor, C_2, mounted on the shield plate which crosses the socket for V_1. A piece of finger stock was later soldered along the lower edge of this shield plate to bear on the bottom of the aluminum chassis. This helped to eliminate leakage from the V_1 plate circuit back to the antenna coil. Also, to assure firm contact of the finger stock, two additional hold-down screws were installed along the edge of the base plate. Their heads would appear in line with the J_1 mounting screws as seen in Fig. 1. Below L_1 in Fig. 4 is the

TABLE I

Coil Data

L_1 — 4½ turns No. 12, $\frac{5}{16}$-inch diam., 1 inch long; tapped at 1¼ and 3½ turns from cold end.
L_2 — 38 turns No. 24, $\frac{5}{16}$-inch diam., $\frac{5}{8}$ inch long;
L_3 — 6 turns No. 16, $\frac{5}{16}$-inch diam., $\frac{3}{8}$ inch long; tapped 2½ turns from cathode end.
L_4 — 4½ turns No. 16, $\frac{5}{16}$-inch diam., ½ inch long.
L_5 — 2¾ turns No. 16, $\frac{5}{16}$-inch diam., $\frac{3}{8}$ inch long; spaced ⅛ inch from L_4.
L_6 — 1½ turns No. 16, $\frac{5}{16}$-inch diam., ⅛ inch long; located near cold end of L_5.
L_7 — 17 turns No. 32, ½-inch diam. ¼ inch long; on slug-tuned ceramic form.
L_8 — Same as L_7, spaced $\frac{3}{8}$ inch away on same slug-tuned form.
L_9 — 4 turns No. 26, ½-inch diam., $\frac{1}{16}$ inch long, wound on cold end of L_8.
L_{10}, L_{11} — 12 turns No. 26, ¼-inch-diam., ¼ inch long, on slug-tuned ceramic form; L_{10} and L_{11} coupled by a figure-eight one-turn link.
L_{12} — 6 turns No. 20, $\frac{5}{16}$-inch diam., $\frac{5}{16}$ inch long.
L_{13} — 4½ turns No. 20, $\frac{5}{16}$-inch diam., ¼ inch long; spaced $\frac{1}{16}$ inch from L_{12}.
L_{14} — 3½ turns No. 16, $\frac{5}{16}$-inch diam., ¼ inch long.
L_{15} — 6 turns No. 16, $\frac{5}{16}$-inch diam., $\frac{5}{16}$ inch long.
L_{16} — 1 turn No. 16, $\frac{5}{16}$-inch diam., ⅛ inch long.

L_1 wound with bare wire; all other coils wound with enameled wire.

At least one inch should be allowed for each lead.

self-supported neutralizing coil, L_2, in its own shielded enclosure, the end of which is left open so as not to have a shorted turn encircling the coil. Teflon insulated feed-through tie points connect L_2 to the grid of V_1 and, through the 500-pf. blocking capacitor, to the V_1 plate.

The next compartment to the right contains the pi-network coil, L_3, and the subsequently-removed piston capacitor. The third compartment contains L_4, L_5 and L_6 with their associated trimmers and other circuit components. The right-hand compartment contains C_5 and the mixer plate coils, L_7, L_8 and L_9, along with the gain control and the remaining output circuit components.

The power-distribution compartment below the longitudinal shield plate contains the cathode relay and the plate dropping resistors. Feed-through bypass capacitors carry the hot heater leads and the plate supply leads through this shield and through the base plate to the oscillator chain. Several of these also serve as tie points. The power plug shown dangling is normally bolted in place in a clearance hole cut in the aluminum chassis.

Fig. 5 is a rear view of the converter assembly with the back panel of the oscillator chassis removed. The compartment on the right contains the oscillator and first doubler components, including the slug-tuned coils L_{10} and L_{11}. Their adjusting screws may be seen on the top of the chassis. The middle compartment contains the air-wound coils, L_{12} and L_{13}, and their associated components. The left-hand compartment contains L_{14}, L_{15}, L_{16}, C_{12}, and other 130-Mc. circuit parts.

Adjustments

The tuned circuits of the oscillator chain were pre-aligned with a grid-dip meter before power was applied. Coils L_{12}, L_{13} and L_{14} were adjusted by hand squeezing. The dipper was then used as an absorption wave meter to check and peak the circuits with the oscillator chain energized. The back plate of the piggy-back chassis was then installed, the coax connection made between J_2 and J_4, and L_{15} was peaked for maximum 130-Mc. output as monitored with the dipper near L_6.

In the converter, a 15-Mc. test signal was fed into J_2 and the mixer plate circuit adjusted for maximum 15-Mc. output at J_3 as monitored by my HQ-120-X receiver. As might be expected, the tuning slug common to L_7 and L_8 interacts with the trimmer across L_7 and these two must be adjusted simultaneously using both hands.

Next, with all circuits energized, a 145-Mc. test signal was fed into J_1 and the trimmers for L_1, L_4 and L_5 were peaked for maximum signal strength at J_3. The amplitude of the test signal must be kept very low to avoid overload. With the test signal still applied but with plate voltage removed from V_1, the neutralizing coil L_2 was then adjusted by hand squeezing for minimum signal strength at J_3. A "diddle stick" or tuning wand proved very useful for this and for other coil adjustments. The diddle stick has a powdered iron slug at one end and a brass slug at the other. When brought near a coil, the inductance in-

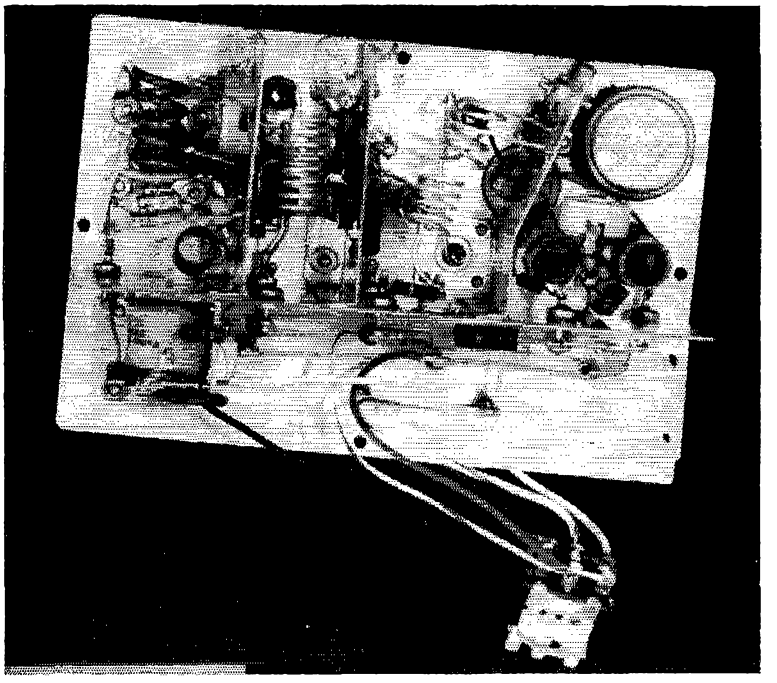


Fig. 4—Bottom view of the converter plate. R.f. stage is at the left. The relay for opening the r.f. cathode circuit while transmitting is in the lower-left corner in this view.

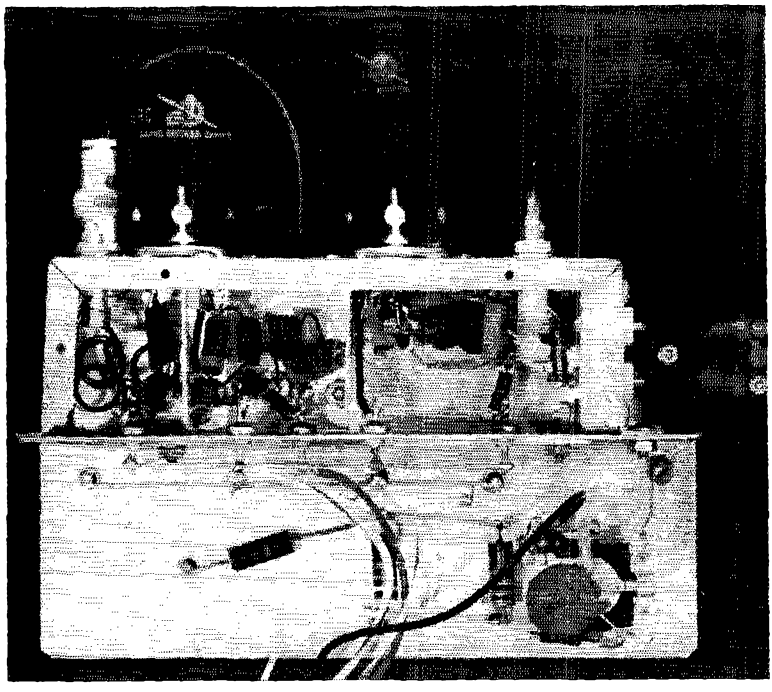


Fig. 5—Rear view of the assembly with side plate of oscillator chassis removed.

creases for the iron and decreases for the brass. This tool not only indicates which way to change a coil but also lets you know when the job is done.

Finally, a battery-operated silicon-diode noise *generator*[6] was used to set the antenna tap on L_1, to tune the first-stage cathode-bypass capacitor, and to make trimming adjustments to L_3. All of these adjustments were made for maximum noise output at J_3.

Results

The *noise figure* of this converter was measured as 3.5 db. using a commercial noise-figure meter with a 50-ohm source connected to J_1. Although this is not the theoretical 2.5 db. minimum for the 6CW4 at 145 Mc., it results in very creditable performance. Sensitivity was checked with a calibrated signal generator connected to the converter through a 50-ohm, 40-db. attenuator. The minimum readable 145-Mc. c.w. signal from the generator was 2 microvolts, which after 40-db. attenuation amounted to an input of 0.02 microvolts to J_1. The minimum readable a.m. signal (40 per cent modulated at 400 cycles) was 4 microvolts at the generator output or 0.04 microvolts at J_1. This signal was ½ S unit out of the noise on the HQ-120 receiver.

This converter has provided many months of enjoyable performance including active participation in v.h.f. contests. When locals are operating the mixer gain control is fully retarded, but this reduces only the over-all gain and has no effect on the weak-signal to noise ratio. The r.f. gain control of the HQ-120-X receiver is normally set to give an S1 reading on noise alone.

Post Scripts

The total effort involved in developing and refining this converter turned out to be much greater than was anticipated at the outset. Perhaps the unit should not be considered in the true "home-brew" class for its evolution owes much to the availability of tools and test equipment which I used at my place of employment during many lunch hours and weekends. However, by following the diagrams and photographs and exercising a little care and patience, anyone of reasonable skill and familiarity with electronic construction and testing techniques should be able to duplicate the converter, adjust it properly and enjoy its excellent performance.

A word about gain: The amplitude of the 15-Mc. output for a weak signal input may be as low as one microvolt, and the receiver following the converter must perform well at this level to realize the converter's full capability. Also the receiver input circuits must be well shielded to exclude unwanted 15-Mc. signals QST

[6] See *The Radio Amateur's Handbook* or, Tilton, "Noise Generators, Their Uses and Limitations", *QST*, July, 1953.

Strays

A cumulative index to *QST* is available for 25¢ postpaid. This 64-page booklet covers the years 1950–1962, with provision for updating it easily for the next five years. Send your order and 25¢ (no stamps, please) to ARRL, 225 Main St., Newington, Connecticut 06111.

Power A-Plenty

—for Pennies!

BY JAMES F. VAN DETTA,* WA2FQZ

IN READING through the current ham literature (as those writer fellows always seem to say), one quickly perceives an anguished air of doom over the seemingly unbearable paradox of an increasing number of hams and a decreasing spectrum of reliable radio frequencies due to the declining sunspot cycle. In response to the forlorn crepe-hangers, one may aptly quote the old Greek philosopher who wisely observed: "In times of adversity, the woodpecker gets results because he uses his head!" So, hams should *think!* And try to contribute more to ham radio than key clicks, QRM, and splatter! After a great deal of diligent effort and personal sacrifice, I believe I have come up with a refreshingly new device that will prove revolutionary to ham radio. But you be the judge. . . .

In thinking about the problem of crowded bands, I began, logically, by trying to think of a practical solution. While mulling over possible remedies, I happened to recall a fascinating article that I had read some time ago, by the eminent Japanese physicist Dr. Aisu Kuriimu (whose father-in-law, by the way, is the famous Japanese scientist who invented and gave his name to a widely used type of single-channel TV antenna). The fact that Dr. Kuriimu's article was written in the Japanese language probably accounts for his work being unfamiliar to the general public in this country.

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Amazing Research on Boulter's Principle

Writing in the journal of the Izo-Chunki University at Tokyo, Dr. Kuriimu presented the results of his painstaking research on the application of Boulter's principle to electromagnetic radiation phenomena.[1] Even though his research dealt mainly with wavelengths on the order of .000001 microns, there are extremely important implications for hams. In case you have forgotten your high school physics, look at Fig. 1, which presents a simple graphic illustration of Boulter's Principle.

Simply stated, Boulter's Principle holds that a compression or squeezing effect takes place when a radio-frequency signal moves from a larger to a smaller conductor. Naturally, this compression increases the pressure under which the electron drift flows. Electromotive pressure is more commonly called "voltage," and when you increase the voltage, other factors being constant, you increase the power. The experimental work done by Dr. Kuriimu seems to indicate that the voltage increase is logarithmic. That is, the voltage does not increase just a few times, but rather exhibits the fantastic increase of 4164×10^{10} times (i.e., $4164 \times 10{,}000{,}000{,}000$)!

"If only a sample 'accelerator' could be found to harness this logarithmic increase for ham use!" I mused, after reading Dr. Kuriimu's article.

As I took out my slide rule and my trusty old copy of *Philosophiae Naturalis Principia Mathematica*,[2] I vowed that the accelerator I would try to devise for ham use must meet certain criteria:

1) It must be very simple and foolproof to construct.
2) It must be very inexpensive.
3) It must be very effective.

With these goals in mind, I set to work.

Working in a new area with unknown parameters can be a frustrating and discouraging ex-

[1] Kuriimu, "Parametric Considerations in Designing Logarithmic Intensification Accelerators," *I.C.U. Journal*, January 1961. (Available only in the Japanese language edition.)

[2] This fine book contains a large section on acceleration and forces. Every ham should read it! Most libraries have the English language edition as well as the Latin edition.

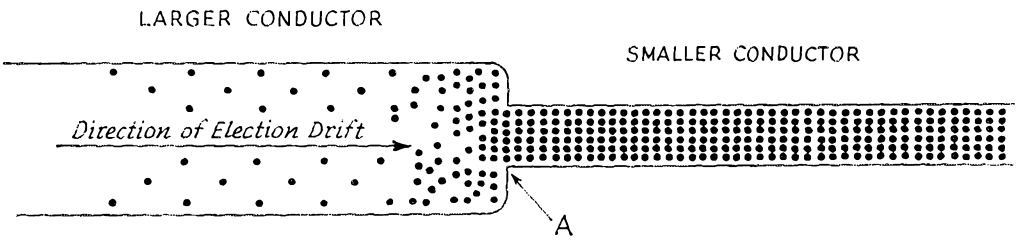

Fig. 1—Boulter's Principle as applied to electromagnetic radiation phenomena by Dr. Kuriimu. Dots represent electrons. The heavier dot density at "A" shows the compression that takes place as the electron drift is squeezed into a smaller conductor, producing increased electromotive pressure.

perience. At times, success seemed very imminent, only to be snatched away when some new and unpredictably variable factor reared its ugly head. But after all the designing, all the computing, all the construction, all the experimenting, all the synthesizing, and all the testing were finished, the joy of complete success was well worth the trials and tribulations.

A Magic Formula is Revealed

My work revealed that if you add a certain critical size and length of wire on the antenna side of your antenna tuner or transmitter, the extra wire will function perfectly as a signal "accelerator." You get a tremendous increase in e.r.p. (effective radiated power) for only a few pennies' worth of wire! The formula for finding the extra length of wire to be added is

$$L(\text{ft.}) = [(P+S) - (VC-S)] \times \frac{1}{2S} - 1$$

where L = length in feet of extra wire to be added
P = power of transmitter in watts
V = voltage used to obtain P
C = current in amperes used to obtain P
S = size of wire — must be *at least* 4 sizes larger and *not more than* 64 sizes larger than the transmission line.

As with all great discoveries, this formula seems so simple and obvious — after someone discovers it! The computations in the formula are quite easy. P is the highest power, in watts, that your transmitter operates. To put down the voltage (V) and the current (C) to show how you got this power may seem unnecessary, but remember that 1000 watts might be 2000 volts at 500 ma., or 4000 volts at 250 ma. Notice that the size of the wire added must be between 4 and 64 sizes larger than the transmission line conductors if best results are to be secured. Fig. 2 shows typical installations for both coaxial and Twin-Lead lines.

When you figure the length from the formula, the answer you get should be between .41 and .64 feet. If the answer you get is *not* in this range, you may be sure you have made an error somewhere in your computations. Go back and refigure the formula (or, better yet, have someone refigure it for you). If you do not figure the formula correctly, all of your effort will have been for nothing.

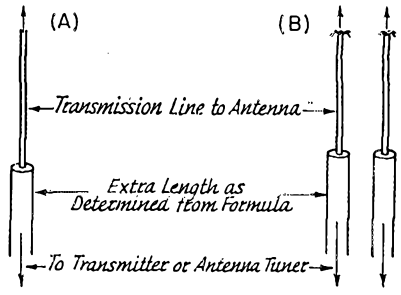

Fig. 2—Typical installations for coaxial and Twin-Lead transmission lines.

No Worries

Since the current does not increase, you need not worry about your present transmission line going up in a puff of smoke after you have installed your new accelerator. The s.w.r. on the line will not change and your transmitter will tune up the same as before. Incidentally, you need not worry about the FCC, because their regulations limit only the plate input power of the transmitter's final stage. Your input is as legal as ever; you are simply (and legally) increasing your *output*.

In Conclusion

You will probably be hearing quite a bit in the future about this new device. Therefore, as adapted for ham use, I have called this process "*L*ogarithmic *I*ncrease of *R*adiated *P*ower by *A*cceleration," which gives us the pleasant acronym (from the underlined initials) of LIRPA. Since this is the first model for ham use, let's refer to it (like they do those earth satellites) as LIRPA I.

Let me say that I am mighty proud to have been able to contribute another first for ham radio. I am very happy to be a part, however small, of the great ham tradition of fellowship and fun.

The very best of luck to you on this fine LIRPA I! QST

Strays

Staib Arctic Expedition — LI2C

The Staib expedition, a joint effort of Mr. Bjorn Staib, the National Geographic Society, and several newspapers, will be crossing the Arctic Sea and North Pole on skis during the next few months.

The explorers will be in contact with their homes in Norway only by dint of good conditions and amateur cooperation for clear frequencies. The radio gear they'll carry consists only of five-watt s.s.b. transceiver, ten-watt c.w. transmitter, both hand-generator powered, and an auxiliary transistorized receiver. They hope to work with nets established at home by the Norwegian Radio Relay League on these frequencies: 7015 7045 14,000 14,115 14,120 and 14,340 kc. They will use the calls LI2C, LI2C/2, LI2C/3, and LI2C/4.

American and Canadian amateurs are urgently requested to cooperate with the expedition and keep their frequencies clear when they are trying to work with the NRRL nets.

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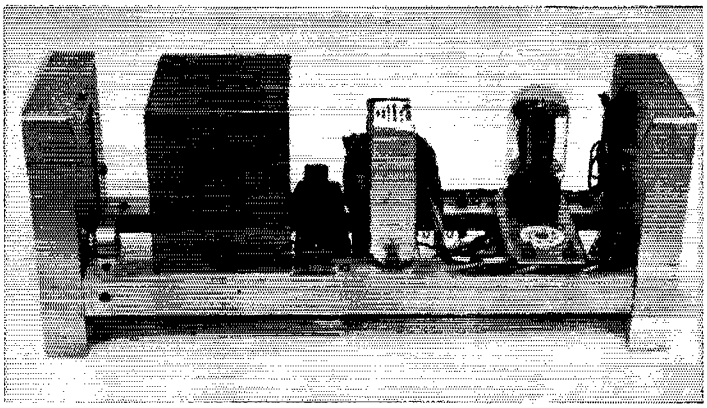
W1WL uses glassine envelopes to mount QSLs. They're sold at most photo supply stores for about 5¢. Each envelope holds two cards.



The adjustable-voltage supply. From left to right are: plate transformer, screen choke, dual-winding filament transformer and the 6L6GC. The aluminum angle on the panels makes possible easy enclosure of the unit with perforated sheet and, by recessing controls and plugs, permits the unit to be rested on any of its six sides when on the test bench. The same type of construction was used for the fixed-voltage supply.

Cathode-Follower Type Power Supplies

Adjustable- and Fixed-Voltage Units

This article describes two small general-purpose power supplies. In the first, a tetrode is used as a means of adjusting the output voltage. In the second, a similar tube is an element in a simplified voltage-regulating circuit.

BY FRED E. ELLIS,* W8PTZ

A SUBJECT the writer has always disliked is power supplies. But one is forced to consider the beasts because transmitters don't sound good with 115 volts a.c. on their plates. Happily, after necessity or curiosity gets you into the subject, you find it contains some interesting problems.

There is a large gap in performance between the usual power supply with an *LC* filter and the fully-regulated supply. The latter has everything, including: (1) immunity to both short- and long-period changes in line voltage, (2) good static regulation, and (3) continuously adjustable output voltage. The *LC*-filter type lacks some of these properties entirely (no immunity to long-period changes in line voltage) and possesses others in only a piddling way (poor static regulation). On the other hand, there is a large gap in cost and complexity between the usual capacitor-input or choke-input supply and the fully regulated supply. Here again the fully regulated supply "has everything."

By using a tetrode in a cathode-follower type circuit, most of the shortcomings of the *LC*-filter type can be avoided, while at the same time avoiding high cost and complexity. The two supplies described here are based on these considerations and strike a midpoint between the *LC*-filter type and the fully regulated electronic power supply.

* Box 6585, University Station, Baton Rouge 3, Louisiana.

An Adjustable-Voltage Supply

Getting a continuously adjustable output from an *LC*-filter supply is a particularly vexing problem; a resistive voltage divider wastes too much power, while a simple series resistor results in horrible regulation. A Variac avoids these disadvantages but is a little expensive and, furthermore, cannot be used with replacement-type power transformers because the filament voltages would also get "adjusted."

A continuously adjustable output is obtained from the supply diagrammed in Fig. 1 by using a 6L6GC as a cathode follower. It seems to have been forgotten that the cathode follower makes a good voltage divider. It does so because the value of the cathode-to-ground voltage is always close to the grid-to-ground voltage; i.e., the cathode "follows the grid." The difference between these two voltages equals the bias on the tube. The bleeder resistor is the lower resistor

of the voltage divider. The role of the upper resistor of the conventional voltage divider is played here by the plate resistance of the tube. Since this resistance automatically changes to meet load conditions, the result is a voltage divider which does not appreciably degrade the inherent regulation of the preceding circuitry.

Because the preceding circuitry of the particular supply shown in Fig. 1 contains an input capacitor, C_1, the static regulation will be poor, as is the case with a fixed-voltage supply with a pi-section filter. This situation would not exist if the grid voltage for the cathode follower came from a stiff source rather than from the potentiometer, R_1 (where the voltage decrease, when a load is put on the supply, depends on the capacitance of C_1). A further consequence of this lack of an internal reference voltage is that long-period changes on the power line show up in the output. However, this supply will swamp out short-period changes, both in line voltage and load resistance, because the capacitor at the grid of V_1 is stiff for such variations. Table I gives the static regulation and adjustment range of this supply.

A Stabilized Fixed-Voltage Supply

The circuit shown in Fig. 2 has its grid-to-ground voltage fixed by a VR-tube string. This string is effectively across the output of the supply where it acts also as a variable bleeder, drawing its least current at maximum load. Good static regulation and considerable immunity to long-period changes in power-line voltage result.

Table, I

Voltage Adjustment Range and Regulation of Circuit in Fig. 1

Load Current in Ma.		0	5	10	20	40	80	*Regulation Per cent*
Output Voltage in Volts	*Minimum Setting*	230	222	218	210	200	180	28
	Maximum Setting	435	425	420	408	385	360	21

Negative bias for the control grid comes from VR-tube current flowing through R_2. If the output voltage decreases, the VR tubes will draw less current so as to maintain their fixed operating voltage. Since R_2 is in series with the VR-tube string, its voltage drop decreases, biasing the tube less negatively. The smaller negative bias lowers the resistance of the tube and prevents any large drop in output voltage. If the output voltage increases, a sequence of changes opposite to those above occurs. In short, VR-tube current variation provides the signal bias. The full-load output voltage will always be equal to, or a few volts more than, the total VR-tube drop.

The purpose of R_1 is to extend the maximum load current that the circuit will handle, and/or increase the amount of power-line variation that the supply will tolerate. This resistor is several times larger than R_2 and does not have much effect until the tube bias is only a few volts negative. In this operating region only a few milliamperes of VR-tube current will be coming through R_2; most of it will be from R_1. Without R_1, the VR tubes will oscillate and then extinguish in

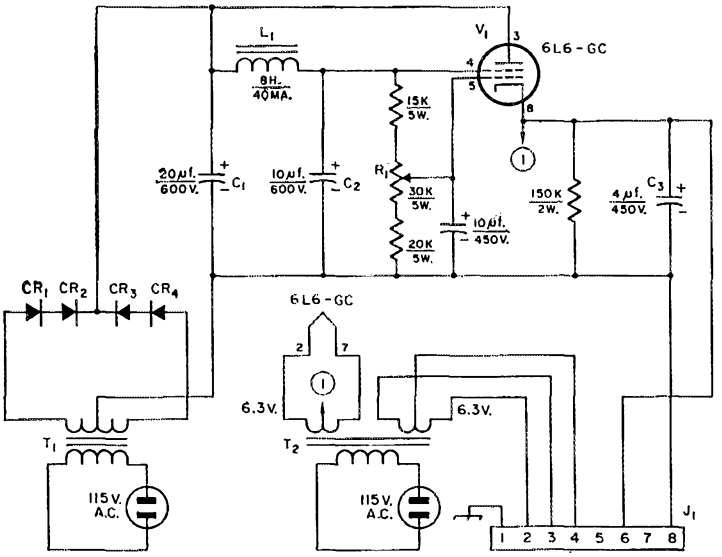


Fig. 1—Circuit of the variable-voltage supply. Resistances are in ohms. Capacitors are electrolytic. Component labels not found below are for text-reference purposes.

CR_1–CR_4 inc.—Silicon diode, 600 p.i.v. or more, 150 ma. or more (Sarkes-Tarzian 1N2489).

J_1—Octal socket.

L_1—Filter choke, 8 hy. at 40 ma. (Thordarson 20C52).

R_1—Wire-wound control.

T_1—Plate transformer 800 volts, c.t., 100 ma. or more (surplus Thordarson T-49609, or equiv.).

T_2—Filament transformer two 6.3-volt 3-ampere secondaries (Merit P-2961).

TABLE II

Necessary Conditions for Proper Operation of Stabilized Fixed-Voltage Supply

Circuit Parameter	*Operating Point to Consider When Selecting* R_1 *and* R_2	*Extreme Value of Parameter at this Point*
Maximum VR-Tube Current	No load and highest occurring power-line voltage	Less than maximum rated value. In particular, less than 30 ma. for 0A2, 0B2, etc. Less than 40 ma. for 0D3, 0C3, etc.
Minimum VR-Tube Current	Full load and lowest occurring power-line voltage	Greater than 5 ma. In particular, greater than the value at which relaxation oscillations commence.

this region. With R_1, the VR tubes will maintain reference voltage on through zero bias and slightly into the positive-bias region.

The values given in Fig. 2 were chosen for load currents up to 80 ma., with a power-line voltage from 105 to 120 volts. Over this range in line voltage, the output voltage change at full load is less than 5 volts. Static regulation, no-load to full-load, is

$$\text{Per cent regulation} = 100\,\frac{325 - 304}{304} = 7 \text{ per cent.}$$

Using a pair of 0B2s, 45,000 ohms for R_1, and 2500 ohms for R_2, the static regulation is:

$$\text{Per cent regulation} = 100\,\frac{250 - 227}{227} = 10 \text{ per cent.}$$

Approximate values for R_1 and R_2 can be found by the following procedure: with R_1 not in the circuit and no external load, find a value for R_2 which causes the VR tubes to draw about 10 ma. Next, disconnect R_2 and, with the supply at full load, find a value for R_1 which causes the VR tubes to draw about 8 ma.[1] With these trial values both in the circuit, check the VR-tube current at no load and full load.

The most suitable values for R_1 and R_2 depend on: (1) the maximum load current desired, and (2) the quality of the power line. Some of the possible VR-tube swing must be "given" to the power line to take care of variations which occur hourly *and* seasonally. If the selection of R_1 and R_2 is made during the evening hours, a VR-tube swing of 20 ma. at no load to 10 ma. at a load current of 80 ma. should be about right for the average QTH. The values shown in Fig. 2 give this swing at W5PTZ. If the values are adjusted for higher load currents, the swing with load will be greater and the circuit will tolerate less line-voltage variation. You can't get all the squirrels up the same tree.

The individual values of R_1 and R_2 are not critical; however, for a given VR-tube swing the product of the two resistors is approximately constant. Thus all pairs of resistors satisfying the equation

$$R_1 \times R_2 = \text{a constant}$$

will, when soldered in the circuit, give approximately the same VR-tube swing with the same midpoint. This approximation holds when R_1 is in the neighborhood of three times to twenty times larger than R_2. For example: in the circuit of Fig. 2, where R_1 is 20,000 ohms and R_2 is 3000 ohms, the VR-tube swing, no load to full load, is from 20 ma. to 10 ma. Now, if R_1 is decreased to 15,000 ohms and R_2 increased to 4000 ohms, the resulting swing is 22 ma. to 12 ma. Going the other way, if R_1 is increased to 30,000 ohms and R_2 made 2000 ohms, the swing is 20 ma. to 9 ma. In all three cases the R_1R_2 product is 60,000,000.

[1] Poking one's fingers into this circuit immediately after the high voltage has been turned off can be very unpleasant. At times, C_1 and C_2 are charged to almost 600 volts. After the supply has been switched off, wait a half minute and then discharge the capacitors with a wire soldered to the ground bus.

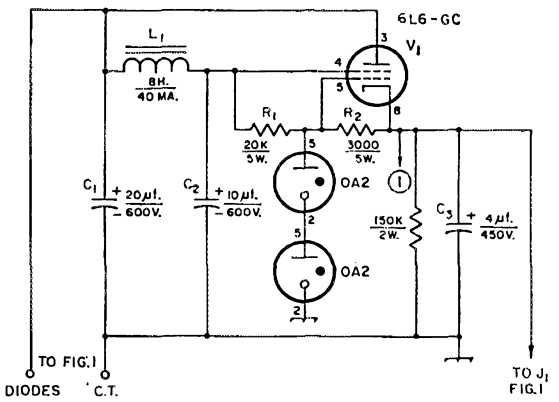
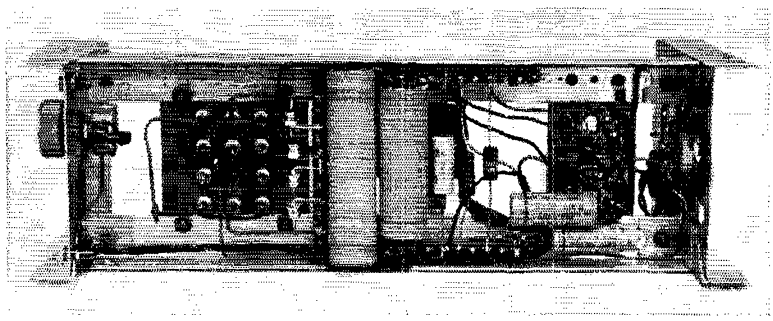


Fig. 2—Circuit of the fixed-voltage supply. Resistances are in ohms. C_1, C_2, C_3 and L_1 are the same as in Fig. 1. See text regarding selection of values for R_1 and R_2 when using different VR tubes or a transformer with a different secondary voltage.



Bottom view of the adjustable-voltage supply. In general, positive potential points are at the top in the photograph; a negative bus runs along the bottom rail. The frame is of 1 × 1 × 1/16-inch aluminum angle. This type of construction is very useful when frequent circuit-component changes are anticipated.

With different VR tubes the value of the constant which gives a suitable swing will be different. For instance, with two 0B2s, a suitable swing will result if the constant is 110,000,000. Here particular values might be 45,000 ohms for R_1 and about 2500 ohms for R_2.

With a different transformer, as long as the input capacitor is reasonably large, the R_1R_2 constant depends mainly on the screen-to-cathode voltage at full load. For 150 volts from screen to cathode, the constant is about 60,000,000. For 225 volts, it is about 110,000,000.

Low values of VR-tube current must be avoided at all times, unless you aim for a T3 signal, because the VR tubes will go into a relaxation oscillation at somewhere under 5 ma. (This danger is present in any circuit containing a VR tube and resistors and capacitors.) For proper operation of any supply like this one, it is only necessary that the conditions set forth in Table II be met.

General Considerations

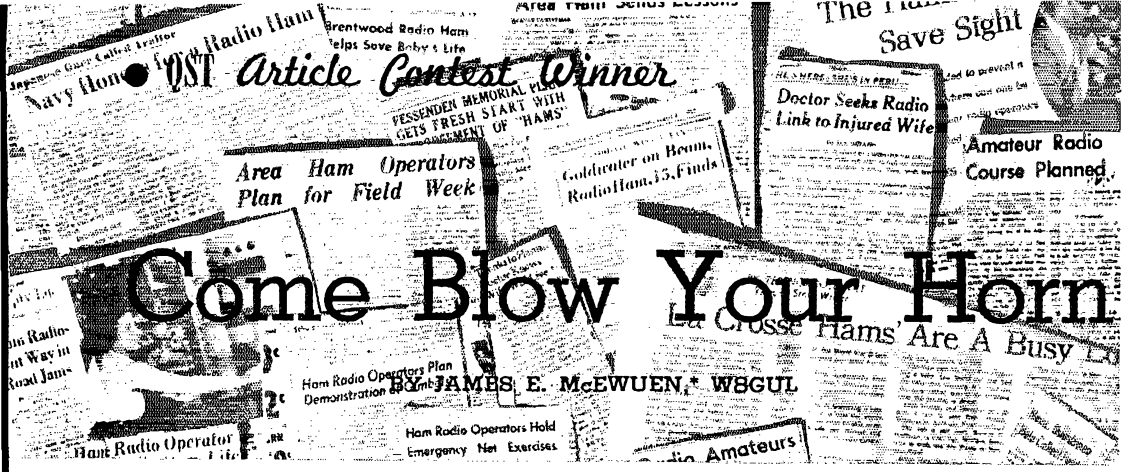
Filtering is achieved in both these circuits in the following three ways. First, the energy-storing property of C_1 does most of the filtering. Next, the tetrode contributes some filtering since it is relatively insensitive to changes in plate voltage. Last, the degeneration of the cathode follower gets rid of most of the remaining ripple. Maximum ripple of both supplies occurs at full-load at the highest output voltage. It is approximately 75 mv. peak-to-peak (not r.m.s.) and is not sinusoidal. The ripple can be decreased still further by increasing the capacitance of C_1 and/or C_3.

Table III gives the operating points where maximum tube ratings might be exceeded, and in the last column, actual values measured at these points for the adjustable-voltage supply of Fig. 1. If other tubes are substituted for the 6L6GC, care must be used to avoid exceeding the ratings of the tube used. A pair of 6V6GTAs can be used in either of these circuits with the same component values and essentially the same results, with the exception that the maximum screen-voltage rating will be exceeded for output voltages below about 250 volts. With parallel tetrodes, 100-ohm resistors must be used, or parasitic

(*Continued on page 164*)

Table III

Tube Parameter	*Operating Point Where Tube Rating May Be Exceeded*	*Value of Parameter in Circuit of Fig. 1 and/or Comment*
Maximum Plate Voltage	Minimum output voltage and no load	340 volts
Maximum Screen Voltage	Same as above	336 volts
Maximum Plate Dissipation	Minimum output voltage and full load	26 Watts (10 watts at maximum setting and full load)
Maximum Screen Dissipation	Same as above	1.7 watts
Maximum Plate Current	Full load	80 ma. (could go a little higher)
Maximum Screen Current	Full load and some intermediate output voltage	4.8 ma. at output voltage setting of 280 volts
Maximum Grid Current and Dissipation	Maximum output voltage and full load	Zero (maximum voltage setting chosen such that grid bias is zero at full load)



Come Blow Your Horn

BY JAMES E. McEWUEN,* W8GUL

"HAMS are just a bunch of lazy clods that clutter up the airwaves and interfere with television!"

This could easily be the general public opinion of amateur radio operators. This is because hams, as a group, are almost universally guilty of "hiding their light under a bushel"; that is, we make almost no effort to inform the public of our many good works. The keynote of today's living is advertising. We are besieged continually by advertising and promotions for commercial products, public services, worthy causes, etc. In this confusion of claims for attention, the amateur's voice is, for the most part, silent. It is amazing that a group so large and so active can be practically invisible!

ARRL President Herbert Hoover, Jr., in a recent address (*QST*, January 1964) pointed up the need for us as amateurs to create an impressive image of amateur radio if we are to retain our present frequencies. It is squarely up to each of us to do his part. Too often when a ham does something noteworthy he tends to be modest. Individual or group achievements should receive full credit. Every month in *QST* we read of outstanding public services by amateurs; but *QST* is read by amateurs and not by the general public. These same activities should be reported fully to newspapers, radio, and television.

Who will report it? This can best be handled by the local amateur organization. Each club should appoint a publicity officer whose duty it is to see that the public is made aware of the club, its members, and their work. This is a big job and an important one.[1] Through newspapers, radio, and TV, he keeps both amateurs and the public informed about meetings, special events, and projects. He keeps them constantly aware that the vast fellowship of radio amateurs stands ready to offer aid in an emergency. The many facets of amateur radio will provide a publicity officer with a constant source of material. Newspaper articles or panel discussions on radio or TV would serve best to explain the mysteries of RACES, AREC, and TVI. He opens up to the public such activities as Field Day, Sweepstakes, and hamfests. He offers demonstrations of amateur radio to schools, youth organizations, and civic groups. The publicity officer is the one who will convey to the public that the amateur radio operator is a valuable and useful citizen rather than merely a hobbyist who causes interference to their TV sets.

This is not to say that hams receive no publicity at all. The truth of the matter is that amateur radio does receive some credit. Through the years, the federal government has been our staunchest supporter, having shown its confidence in ham radio by authorizing frequencies under RACES for civil defense. Outstanding events are reported by the news media and some clubs do publicize their projects; but these are sporadic reports.

What is really needed is for each club throughout the United States to see that amateur radio is brought to the public attention on a regular basis, not just occasionally. It should be a very deliberate effort to let the people recognize amateur radio for what it is — a public service and pioneering leader in communications.

Perhaps a good slogan for each club is best expressed in a statement from the ARRL Emergency Communications manual: "Amateur Radio exists as a hobby because it qualifies as a service."

As in any effort to mold public opinion, publicity must be persistent and regular. By all means, announce your local club meetings through whatever media are available. This may seem a small amount of publicity, but it keeps our name before the public. It remains for the club's publicity officer to use his ingenuity to carry on from there.

The time has come to forget our traditional modesty and tell Mr. Average Citizen what amateur radio is all about. QST

* Route 7, Box 377, Morgantown, W. Va.

[1] ARRL Hq. can provide much assistance in your local public relations program. Free for the asking are a publicity handbook, *Getting Publicity for Your Club and Amateur Radio;* a typical reporter's "interview" with facts and figures; a sample speech to be delivered to local groups such as civic clubs, or films for the same purpose; a sample script for a broadcast program; and quantity reprints of articles in prominent magazines for distribution to the public at fairs, shows, etc. Just write Headquarters your needs.

The HBR-11 To Date

Corrections, Modifications and Additional Comments

BY TED CROSBY,* W6TC

***An equipment design that has real life in it is never static — ways of improving its performance are always being discovered. Here's the latest on the HBR-11, a year after its first description in* QST.**

THOSE of you who have followed the series of HBR Communications Receiver articles which have appeared in *QST* over the past several years are well aware that, in spite of utmost care, errors do creep into text and schematics. The HBR-8/11 manuscripts which appeared in March/April 1963 *QST*[1] were no exception. A partial list of corrections was published in the May 1963 issue. This list was sufficiently comprehensive so that the resultant receivers worked quite well, as my correspondence attests. A complete list of corrections, plus the inevitable modifications, will follow. But first, allow me to digress for a paragraph or two.

It was my sincere desire to keep the prototype HBR-8/11 as simple in design as humanly possible, both mechanically and electrically — but always with the thought in mind that, regardless of all else, it must retain the sensitivity, stability and selectivity reasonably to be expected from a present-day first-class communications receiver. An active amateur for more than fifty years, and in the commercial end of the business for more years than I now like to admit, I felt I would be qualified to judge the end result.

Frankly, I was, and remain, well pleased. My own HBR-11 has given an impressive account of itself in every comparative test. Here is quality merchandise at a very reasonable cost — not only for the relatively inexperienced, who have successfully copied it in sizable numbers, but also for those oldtimers who may long have had a yen to take a crack at a homebuilt communications receiver. Despite the complete absence of frills, gimmicks, and fancy doodads, a properly functioning HBR-11 will give any favorite receiver a genuine run-for-the-money workout. And, speaking of money, from a dollar-for-dollar standpoint it's strictly "no contest."

In the text to follow I will comment on some of those important details which tend to insure a properly functioning HBR-11 receiver.

Complete Correction List

1) On page 17, March 1963 *QST*, the plug-in coil "B" sketch was incorrect and should be as shown in Fig. 1 herewith.

2) In the HBR-8/11 schematics in the March and April 1963 issues, the leads between the antenna-terminal strip and the antenna-coil socket should be reversed at the coil socket proper; the lead shown to Pin 5 should go to Pin 1 instead, and vice versa.

3) The V_{3B} second-mixer screen dropping resistor (Pin 3) should have been 120K, rather than 180K.

4) The V_{2B} first-mixer cathode resistor (Pin 7) should be 2200 ohms rather than 5600 ohms.

5) The V_7 screen dropping resistor (Pin 6) should be 22K, 1 watt, rather than 33K.

6) In the HBR-11 schematic (pages 38-39, April 1963 *QST*), Pins 5 and 6 of V_6 were erroneously tied together at the primary of T_4. The actual connections should duplicate those of V_5 and the primary of T_3: i.e., T_4 should connect only to Pin 5 of V_6.

7) In McCartney's schematic, page 42 of April 1963 *QST*, the 250-pf. mica bypass capacitor was omitted from the lead between S_{7B} and R_4. Reinsert it as shown in the schematic on page 39 of the same issue.[2]

Truthfully, some of the changes in this correction list actually are modifications instead. The first-mixer cathode resistor is an example. As mentioned in the March 1963 text, the prototype HBR-8/11 receiver was designed and fabricated over a fifteen-day period of time, and from the start it worked so well that I was content to let well enough alone, especially as the *QST* publication deadline precluded any additional experimentation for the time being. Those builders still using the original resistance will find that by the simple substitution of the new value, the first-mixer conversion gain, and consequent over-all receiver gain, will show a decided change for the better.

* 28901 Crosby Drive, Sun City, California.

[1] Crosby, "The HBR-8 Communications Receiver," *QST*, March 1963; Crosby, "The HBR-8 Becomes the HBR-11," *QST*, April 1963. Feedback, *QST*, May 1963, page 19.

[2] Large-sized up-to-date schematics containing all of the above corrections are available. Inquiries to me receive a "dope sheet" in reply, giving sources of supply for the hard-to-find parts, as well as complete data on the various additional helps available to HBR-8/11 constructors, including the above-mentioned schematic. A stamped envelope with all inquiries, please, and be sure to use the address given on the first page of this article — not that given in the "Stray" in June 1963, *QST*.

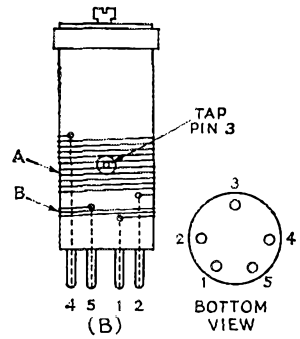


Fig. 1—Correct wiring of windings to coil-form pins. Note reversal of connection to Pins 1 and 5 as compared with drawing on page 17, March 1963 *QST*.

Silicon Rectifier

McCartney's silicon-diode rectifier modification not only eliminates the heat generated by the filament of the 5V4 rectifier tube, but insures a cooler-running power transformer, because of the elimination of the sizable filament-current load. For these reasons, this modification is a desirable one. However, there may be builders who would like to be able to use either the silicon diodes or, in an emergency, a 5V4G tube interchangeably. If the rectifier circuit is wired for a 5V4G tube according to the original schematic, it is possible to use either the 5V4G or a Sarkes-Tarzian S-5251 or International Rectifier ST-14 silicon-diode tube-replacement unit, as preferred. These units plug directly into the 5V4 socket, providing all the advantages of McCartney's modification, and are standard items, procurable from most of the larger dealers. I now use them in all of my HBR receivers with highly satisfactory results.

A.G.C. Circuit

As a matter of simplification, a single a.g.c. line was used in the original HBR-11, with the same a.g.c. bias voltage applied to the grids of the r.f. and i.f. pentodes. This works well in practice. Actually, the 6AZ8 pentode requires less grid bias for cutoff than the 6BJ6s, and a definite improvement in the gain and performance of the r.f. stage will result if the equalized a.g.c. circuit diagrammed in Fig. 2 is substituted.

This modification makes acceptable use of the original single-circuit switch. Only the r.f. stage a.g.c. bias now is switched on and off, the full a.g.c. voltage always being applied to the i.f. and S-meter tube control grids (provided, of course, that the gain controls of the receiver are sufficiently advanced to develop an a.g.c. voltage). The only effect now evidenced when the switch is thrown to the off, or grounded, position will be an increased reading of the S meter on the stronger signals. Obviously, if S_4 is changed to a d.p.s.t. type an off-on switching arrangement for both a.g.c. lines would be available and would provide complete control of the modified circuit. The second section of S_4 would be connected as shown by the dotted lines in Fig. 2.

S-Meter Tubes

A stingier-reading S meter will result if a 12AY7, or possibly a 12AU7, is substituted for the 12AT7 originally specified for V_8. Readjustment of R_6 for a zero reading is all that need be done when the tube type is changed. The 12AY7 requires a higher value of cathode resistance than the 12AT7, and the 12AU7 needs more resistance than the 12AY7. The higher the resistance required in R_6, the stingier will be the S-meter readings.

All tubes of the same type are not necessarily alike in this respect. For example, some 12AT7s will require more R_6 resistance than others, and the S-meter response will vary accordingly.

At first glance, the modified a.g.c. circuit does seem to pose a problem to those builders who used, or plan to use, McCartney's germanium-diode a.g.c. arrangement shown on page 42, April 1963 *QST*. Into which a.g.c. leg is CR_2 now to be inserted? Frankly, in neither. Recent experimentation by McCartney, and confirmed in practice by both Mac and myself, has proved that if CR_1 is one of the present-day germanium diodes possessing an exceptionally high back resistance (true of the specified 1N54), there will be no delay-voltage problem when CR_2 is eliminated from the circuit — not only from the modified a.g.c. circuit, but from McCartney's original circuit as well. Present users of the original double-diode circuit will discover that once CR_2 is removed the amplitude of the a.g.c. voltage available at the grids of the controlled tubes will be appreciably greater, because of the elimination of the voltage-divider effect which exists between the one-megohm filter resistor, in the a.g.c. line proper, and the back resistance to ground of CR_2.

Audio Amplifier

The gain of the original 6CX8 two-stage audio amplifier is so great that the pentode power-output stage is overdriven at little more than a half setting of the audio gain control, R_4. If this

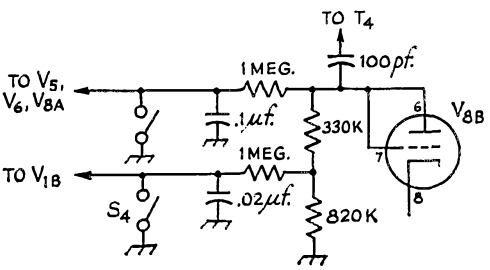


Fig. 2—Modified automatic-gain-control circuit. This reduces the a.g.c. voltage applied to the r.f. stage. Resistors are ½ watt. S_4 is the original s.p.s.t. toggle for turning the a.g.c. on and off; it now controls only the r.f.-stage a.g.c. By substituting a d.p.s.t. toggle, as shown by broken-line connections, the on-off control can be extended to the i.f. amplifier. Connections not shown are the same as in the original circuit.

control is advanced farther, the audio amplifier quite likely will go into self-oscillation, evidenced by distortion and decreased audio output as R_4 is advanced beyond approximately the three-quarters position. A 270K resistor inserted in the grid circuit of V_{9B}, as shown in Fig. 3, reduces the over-all gain of the two stages sufficiently to correct this. With the additional resistor the output of the pentode power-output section is optimum with R_4 fully advanced.

H.F. Oscillator

For some time I had suspected that the second-harmonic method of first-oscillator injection was not as effective with the HBR-8/11 6U8 first-oscillator/mixer arrangement as it is in the HBR-16, where two individual tubes are used. To check this, I recently made up a fundamental-type L_3 coil for the 14-Mc. band and tried it out in my own HBR-11. Compared to the original second-harmonic-type L_3 coil (page 18, March 1963 *QST*), the increased first-mixer conversion-gain was such that it sounded as though another tube had been added to the receiver. Subsequent similar tests by several other HBR-11 users showed identical results. The specifications for this experimental type L_3 coil are given in Table I.

When correctly compensated with an N-750 capacitor, this fundamental-type L_3 coil proved to be just as stable, from a long-time frequency-drift standpoint, as was the second-harmonic-type coil. But, from an oscillator-pulling standpoint, it was not nearly as good. In actual use, the first-oscillator pulling is of no concern if the receiver's t.r. switch has not been wired to provide for transmitter monitoring when this switch is thrown to the transmit position. So wired, S_{1B} removes the screen voltage from the first mixer when placed in the transmit position. This in turn changes the loading on the first oscillator sufficiently to pull its frequency a matter of 4 or 5 kc., and the transmitter signal cannot be heard unless the receiver dial is reset to compensate. But this is a problem for the c.w. man only, since normally the receiver will not be used for phone monitoring. The c.w. addict is, for the most part, stuck with the original second-harmonic-type 14-Mc. L_3 coil, I fear. The first-oscillator pulling is relatively nonexistent with the latter coil under the circumstances outlined above, and the local transmitter can be perfectly monitored. The receiver's 14-Mc. performance is excellent with either one of the above L_3 coils, I assure you.

For reasons similar to those outlined in the above paragraph, fundamental-type L_3 coils for the 28- and 21-Mc. bands obviously are impractical, and no data for such coils are available.

All this points up the fact that in some instances the matter of simplification can be overdone. It would have been sounder design had I used one additional tube as an electron-coupled first oscillator with a separate first-mixer tube, as was done in the HBR-16. The problem discussed above can be satisfactorily resolved by the installation of the 6BH6 electron-coupled first oscillator diagrammed in Fig. 4. This completely-isolated oscillator functions just as efficiently with the 28-, 21- and 14-Mc. second-harmonic type L_3 coils described in March 1963 *QST* as it does with the 7- and 3.5-Mc. fundamental-type L_3 coils, both as to first-mixer conversion gain and relative immunity to pulling effects.

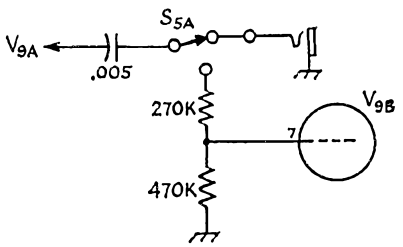


Fig. 3—Audio-amplifier circuit modification. The added resistor (270K, ½ watt) prevents overloading of the pentode section of V_9.

In my own receiver, now the HBR-*12*, the 6BH6 tube was mounted horizontally on the rear chassis wall, approximately one inch below and ¼ inch to the left of the L_3 coil socket. A 1½-inch diameter cutout in the rear cabinet wall provides clearance for the glass envelope of the tube, which protrudes approximately ¾ inch. Only the pentode first-mixer section of the 6U8 is used in this modified arrangement, its wiring remaining unchanged. This method of installation of the 6BH6 provides exceptionally short and rigid leads, and is recommended. It would be physically possible to squeeze in the two tubes atop the chassis, in which case the 6U8 should be mounted at the extreme left edge and the 6BH6 to its immediate right, just inside the front-end aluminum shield and in close proximity to the L_3 coil socket. This physical arrangement should function satisfactorily, but as it has not been proved by me, I cannot state unequivocally that such would be the case.

Layout and Wiring

For years I have been telling the amateur constructor that there is nothing mysterious or difficult about the fabrication and alignment of

Table I

14-Mc. Coil for Fundamental-Frequency Operation

A section (tuned circuit) — 5½ turns No. 22 enam., evenly spaced over 13/16-inch total length; tapped 1¼ turns from ground end.

B section (tickler) — 5⅞ turns No. 26 enam. close-wound; spaced ⅛ inch to 5/16 inch from A section.

Band-set capacitor — 50-pf. air padder.

Temp.-compensating capacitor — N-750 ceramic, 5 to 10 pf. as required.

Tuning range — 12,390 to 12,740 kc. for 14,000–14,350 kc. operating range.

an HBR receiver. This is even more true of the HBR-8/11 than its predecessors. Both electrically and mechanically the design is simple, and the performance will be excellent if sound practice is observed in building and wiring, especially in that part of the circuit between the antenna input terminals and the output of the second mixer. Here we are dealing with relatively high frquencies, and it is imperative that good engineering practice be followed. For this reason, generally speaking, I do frown upon any changes in the original mechanical layout, since successful communications-receiver design is not a hit-or-miss proposition. Many unexpected troubles and problems are directly attributable to unwise changes of this nature.

Often I have written that the front end is the very heart of any HBR receiver. Louse it up, and the over-all performance of the receiver will be loused up simultaneously. The source of the all-important signal-to-noise ratio and sensitivity of any communication receiver lies at or near the input terminals. Primarily, it is the high efficiency of the tuned front-end inductances, plus the minimal-length leads throughout the entire front end, which makes the HBR performance possible. There is much to be said in favor of plug-in-coil front ends as compared with band switching. I've built and used them both, and much prefer the performance of the first as compared with the greater convenience of the second.

Over the years a sizable number of HBR receivers built by others have appeared at my doorstep—brought there for various reasons, but usually because the builder was so proud of his accomplishment that he simply had to show off his handiwork. Obviously, some of these receivers performed better than others. Up to a certain point, this is normal, and is true of any supposedly identical electronic devices. But this was not the full explanation in many instances; instead, some HBR builders do a better job of adhering to sound practices in their wiring jobs than do others.

The schematic diagram itself can be the source of much trouble, if things are read into it that were not intended. A wiring diagram is *not* to be used as a guide to correct *physical* placement of components. Apparently many amateur constructors are not fully aware of this. For example, in the HBR-8/11 front end the various fixed resistors serve not only as voltage-dropping devices, but usually act as r.f. filters as well. To fulfill the latter function these resistors should be mounted directly to the designated tube or coil socket pin, using leads of one-half inch or less. The companion bypass capacitor should be returned to a previously established common ground for each individual tube via the shortest possible lead. The cylindrical shield in the center of every miniature tube socket should be grounded, and is the logical point from which to start the common chassis ground for each individual tube. Every tube socket should be equipped with its own soldering lug, held in place by one of the bolts and nuts securing the socket to chassis. A piece of bare wire soldered between the lug, the grounded filament socket pin and the cylindrical shield completes the job. All ground-return leads associated with the tube should be soldered to that particular common ground.

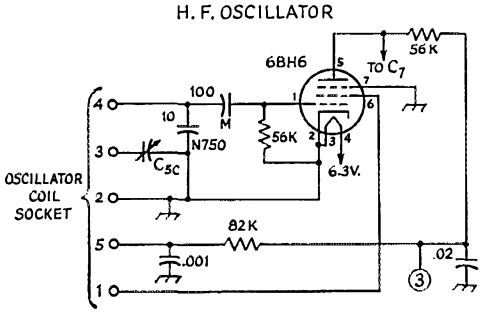


Fig. 4—Circuit for separate high-frequency oscillator. The 6BH6 substitutes for the 6U8 triode originally used in the HBR-8/11 circuit as shown in the March and April 1963 issues. The 6U8 pentode section continues as the first mixer tube. C_7 remains 2 pf. as originally specified.

An example of such a possible pitfall exists in the V_{1B} r.f. stage cathode circuit as it appears in the HBR-11 schematic on page 38, April 1963 *QST*. If the diagram is interpreted pictorially, the 220-ohm cathode resistor will be located a couple of inches from the tube socket, with the 0.02 bypass capacitor mounted directly across the connecting lugs of R_1. Truthfully, I have yet to see any HBR-11 receiver which was wired in any other way. When correctly wired, the 220-ohm resistor will be located immediately adjacent to Pin 3 of the V_{1B} tube socket, and one terminal of the 0.02 capacitor will be soldered to the bare lead of the opposite end of the resistor while the other is returned directly to the V_{1B} common ground. A similar situation exists at Pin 7 of V_{2B}. In this instance both the cathode resistor and the bypass capacitor should be connected directly between Pin 7 and the common ground via the shortest possible leads. The accumulative improved efficiency to be derived from this sort of practice can, and often does, make or break the performance of any piece of high-frequency gear, including HBR receiver front ends.

Assuming that the receiver is to be used with a reasonably efficient antenna system, and that its front end is functioning properly, the original L_{1B} coils will provide an overcoupled condition between the antenna and r.f. stage. Obviously, the cure is to reduce the number of turns in the L_{1B} winding by one or two turns.

R.F.-Mixer Coupling

Optimum L_2 primary-secondary coupling was discussed on page 41, April 1963 *QST*. Occasionally a receiver is prone to be overly regenerative in the r.f. stage, even though the primary-secondary spacing is greater than suggested. In such instances, it is further suggested that the L_2 primary be reduced by one turn.

In severe cases of r.f.-stage instability, a better approach is to reverse the leads between V_{1B} and the L_2 coil socket, connecting the 6AZ8 pentode plate to Pin 5 rather than to Pin 1 on the coil socket. In every instance, it is very important that the r.f. stage be stably regenerative if the over-all receiver gain is to be optimum.

I.F. Alignment

On page 13, March 1963 *QST*, I stated that the miniature 100-kc. transformers used in the HBR-8/11 had been especially designed for this receiver. All previously available 100-kc. transformers were too large physically to fit into the small communications-receiver design I had in mind. Our mutual good friend, Mr. Bill Courtney, K6GEK, chief engineer, J. W. Miller Co., did a fine job of cramming the maximum possible degree of selectivity and gain into the extremely small confines of a J-tran shield can — in fact, to a much greater degree than is realized with the "safety-first" positioning of the tuning slugs suggested on page 19, March 1963 *QST*.

A cutaway sketch of the interior construction of one of these transformers appears in Fig. 5. When the two slugs are at opposite ends of the shield can the resonant frequency will be approximately 135 kc., becoming progressively lower as the two slugs are moved inward. With the slugs at the centers of the coils the resonant frequency reaches its lowest figure, approximately 93 kc. If the two slugs are screwed farther than this toward the center of the shield can the resonant frequency increases again. This characteristic explains my word of caution about the "second point of apparent resonance" which appears on page 19, March 1963 *QST*.

Unfortunately, the slugs vary not only the resonant frequency but the primary-secondary coupling as well. The coupling increases progressively as the slugs are screwed closer together toward the center of the shield can — eventually to the point where overcoupling ruins the pass-band characteristics of the 100-kc. amplifier. Fear that this might happen dictated the "lower slugs 1½ turns in, upper slugs 2½ turns in" suggestion in the original text. Actually, this "safety-first" procedure results in an undercoupled adjustment at a resonant frequency of 110–120 kc., with impaired gain and slightly less selectivity as compared with the performance of these transformers when correctly aligned to the 100-kc. design-center frequency.

The design of the 1710 is such that if the transformers are tuned to 100 kc., the slugs of necessity will be at the position that results in optimum primary-secondary coupling, provided only that 100-kc. resonance occurs with the slugs toward the outer edges of the coils, as sketched in Fig. 5, rather than at the inner overcoupled position. The catch is that the 100-kc. signal source must be *accurate*. A 100-kc. crystal calibrator is fine, but many amateurs don't have one. Ordinary variable-frequency signal generators are seldom accurate enough. And unfortunately, the aluminum shield can on the transformer is not transparent, which makes it difficult to determine the correct slug positions even though a crystal-controlled 100-kc. oscillator is available. However, the solution is not nearly so difficult as it might appear.

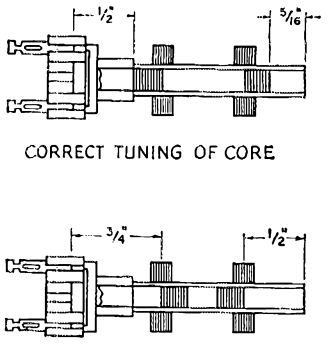


Fig. 5—Cross-section view of the 100-kc. i.f. transformer, showing correct and incorrect slug positions.

Obviously, if a crystal-controlled oscillator is available, use it. Its r.f. output should be capacitively-coupled to the *grid* of the second-mixer tube rather than to its plate, so the tube can offer the correct load to the primary of T_2. All three i.f. transformers should be tentatively prealigned by the "count-down" method, as follows. T_2 and T_3, lower slugs 5 turns in, upper slugs 6 turns in; T_4, lower slug 4 turns in, upper slug 5 turns in. The lesser number of turns in T_4 is due to the loading effect attributable to the external devices associated with the latter transformer. These initial settings will insure that, after the final vernier adjustment during the subsequent actual alignment, all six slugs will end up at the correct critically-coupled positions.

Constructors who do not have access to a crystal-controlled 100-kc. oscillator should first make the tentative "count down" prealignment adjustments to T_2, T_3 and T_4 exactly as described in the preceding paragraph, and then proceed with the final vernier alignment of the 1710s as described on page 19, March 1963 *QST*, making use of the built-in 3500-kc. crystal-controlled oscillator rather than the external 100-kc. unit. The final vernier adjustments of the T_2, T_3 and T_4 slugs will insure they will have been peaked so close to the 100-kc. design frequency that it will make no never-mind, so far as the gain and selectivity of these correctly aligned transformers is concerned.

Odds and Ends

Many times during the past year I have been asked, "Is the HBR-16 sufficiently superior to the HBR-11 to justify my building the former rather than the latter receiver?" The present availability of the improved 1731 first-i.f. coils, plus the correct alignment procedure for the 1710 transformers, plus the up-to-date modifications previously described in this article, very defi-

nitely render null and void the assertions I made in the original HBR-11 article in regard to the slight superiority of the HBR-16. Generally speaking, the situation now is reversed. In several respects the superiority of the HBR-11 could easily enough be pin pointed. In addition, the availability of the commercially manufactured first-i.f. coils, the elimination of the need for padding the second-i.f. transformers and b.f.o. coil, plus the simpler mechanical fabrication of the HBR-11, all are in favor of the latter receiver. Because of these factors, the average builder almost invariably does a better all-around job on the HBR-11 than on the HBR-16. I now do not hesitate to recommend the HBR-11 rather than the HBR-16.

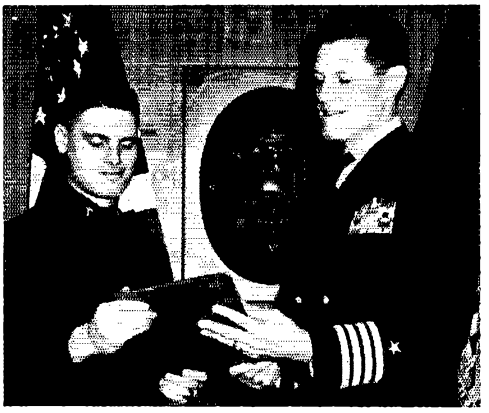
Another often-repeated question is, "How do I go about using the large No. 898 Eddystone dial on my HBR-11?" Frankly, you don't. This particular dial would be so large, both exterior and interior, that it would leave practically no room for the installation of the remaining components. However, if the larger CR-7725 Wyco cabinet and the subchassis layout originally used for the HBR-16 receiver described in the June 1961 issue of *QST* are substituted, the HBR-11 could very easily be adapted to the large dial with no particular problems, and no loss of efficiency in the transposition. The Miller 1731 first-i.f. coils would be used, rather than the home-made air-tuned inductances called for in the HBR-16, being mounted vertically at the chassis locations of the previously used APC first-i.f. capacitors. The remainder of the parts layout would be identical to the original HBR-16 layout except for the audio stages and the second-oscillator/mixer arrangements, where only one tube now would be used, rather than two. In passing, due to the adequate physical separation now present between the first and second oscillator/mixers, the HBR-11 second-oscillator/mixer shield box would now not be required.[3]

Believe it or not, at various times I have been indirectly accused of holding out in regard to the supposedly innermost secrets of what it was that might have caused my own receivers to work somewhat better than the average copy. Nothing could be farther from the truth. Instead, I have always endeavored to pass along every single helpful hint or suggestion I possibly could, but there is only so much available space in an issue of *QST*. Once the essential facts had been given, there wasn't sufficient room left for the type of manuscript this one has turned out to be. This time I had no particular receiver design to be described in meticulous detail. Instead, all of those supposedly mysterious and innermost secrets now have been revealed, for all to read who might care to do so. Surprisingly simple, too, were they not?

In any event, no longer is there any legitimate excuse for subpar results; instead, every builder can and should be able to duplicate my results — and in doing so, automatically become the avid HBR-receiver booster I obviously have been for many years. The point from which you will be able to start is the modified and up-to-date HBR-8/11 project discussed here. Happy landing! QST

[3] Drawn-to-scale panel and chassis drilling templates of this particular HBR-16 layout are still available. As usual, a stamped envelope with all inquiries, please.

Strays



Midshipman Timothy Hulick, W9MIJ (left), accepts the November QST Cover Plate Award Plaque from Annapolis Commandant of Midshipmen, Captain Sheldon H. Kinney. Hulick's article "Handi-Talkie for 7 Mc." was voted best of the November issue by ARRL Directors.

Stolen equipment: Polycom II transceiver, serial number 33A062. Contact WA6MJC or other officer of the San Diego Council of Radio Clubs.

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Stolen equipment: A KWM-2, serial number 1373, equipped with the Collins noise blanker and Waters *Q* multiplier, from the driveway of owner WØOEP, Joseph R. Pavek, Minneapolis.

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Feedback

Some readers have been uncertain about the input connections in the circuit diagram of W4JA's "Black Box" selective audio filter (p. 42, Feb. *QST*). J_1 should go to the 3.2-ohm speaker output terminals of the receiver, and J_2 to the 600-ohm output terminals. J_1 and J_2 are phono jacks; J_3 is the open-circuit headphone jack.

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In W8MTI's article, "More on the Filterless Terminal Unit", Feb. 1964 *QST*, the grid of V1c is Pin 11, not Pin 1 as shown in the circuit on p. 19. Pin 1 connects to one side of the heater of the 6D10.

The Flying Spot—II

The A. C. Sweep and Its Effect on Pattern Shape

BY GEORGE GRAMMER,* W1DF

Continuing the description of pattern forming on the cathode-ray tube face, this article takes up the case of an a.c. sweep voltage and the way it influences the pattern appearance in elementary cases.

Oscilloscope patterns generated by using a linear horizontal sweep usually seem easier to interpret than those generated by other types of sweeps. The chief reason is that the scope pictures "look natural," because we are used to having waveforms presented to us in graphs using rectangular coordinates. Also, provided two or more complete cycles are applied to the vertical plates for each cycle of horizontal sweep, the waveform that appears at say, the left of the horizontal axis looks just the same as one in the center or one at the right.[1] These reasons are enough to justify having started the discussion of oscilloscope patterns in the preceding article[2] on the basis of linear sweeps, even though the sweep itself is complicated to generate and often is far short of perfect.

The A.C. Sweep

Supplying an a.c. voltage for the reference sweep is much simpler. However, that is not the only good point. There are many cases where the a.c. sweep gives the desired information in much more readily-usable form than the linear sweep does. Such cases occur very frequently in testing amateur gear.

Nevertheless, although the equipment may be simpler, reading the patterns is not. Here it is even more essential to know how the pictures are formed on the scope-tube face. The spot does not move across the tube at a uniform rate, always in the same direction, as is the aim with a linear sweep. Hence the vertical waveform is not plotted to a rectangular graph scale. Instead, the sweep speed is always changing, and the deflection is in *both* directions.

An a.c. sweep is often, although not necessarily, a sine wave. The sine-wave sweep makes a good starting point for learning how patterns are formed, and is the basis for the present discussion. The simplest sine-wave case is where the horizontal sweep and the vertical signal are both sine waves of the same frequency. From just these two signals an infinite series of patterns, running the gamut from straight lines through ellipses to a full circle, can be generated.

Conventions

The drawings shown here make use of a number of common conventions in scope work. When the signal is going positive, the spot is assumed to be traveling upward in the case of vertical deflection and to the right in the case of horizontal deflection. "Going positive" means that in the case of the vertical plates, for example, the upper deflection plate is becoming more positive with respect to the lower plate, and since "more positive" is a relative term, it can equally well be said that the upper plate is becoming less negative with respect to the lower plate. When the reverse is true the spot moves downward. Similarly, the spot moves to the right when the right-hand horizontal deflection plate becomes more positive with respect to the left-hand plate, and vice versa.

Another convention is that the distance the spot moves on the face of the tube — the sweep amplitude — is the same for the same voltage applied to either set of plates. That is, sweep voltage and sweep amplitude are assumed to be identical. Actually, this is not so. It takes more voltage on one set of plates to give a specified deflection distance than it does on the other set. However, voltages usually are readily adjustable to give a desired deflection, and it is convenient to speak of voltage amplitude and sweep amplitude interchangeably.

In Fig. 1 and the subsequent examples, the same horizontal sweep-voltage waveshape and amplitude is assumed in every case. It is drawn only once in each figure, therefore. Its axis is rotated 90 degrees so that the instantaneous amplitude corresponds to the instantaneous horizontal deflection of the c.r. tube spot. A similar correspondence applies in the case of the vertical waveform and the vertical spot deflection. Thus the position of the spot at any instant can be found by drawing a vertical line from the horizontal waveform, and a horizontal line from the vertical waveform, at the instant selected. The point where the two lines intersect is the position of the spot at that instant. The dashed lines from the waveform peaks illustrate this.

Equal-Amplitude Signals

With an a.c. sweep the exact pattern configuration depends on the relative amplitude and phase

* Technical Director, ARRL.

[1] This is strictly true only of a perfectly linear horizontal sweep. With practical sweeps as supplied in the oscilloscopes likely to be owned by amateurs, the statement is reasonably accurate if several cycles of the vertical signal are displayed.

[2] Grammer, "The Flying Spot — 1," *QST*, March, 1964.

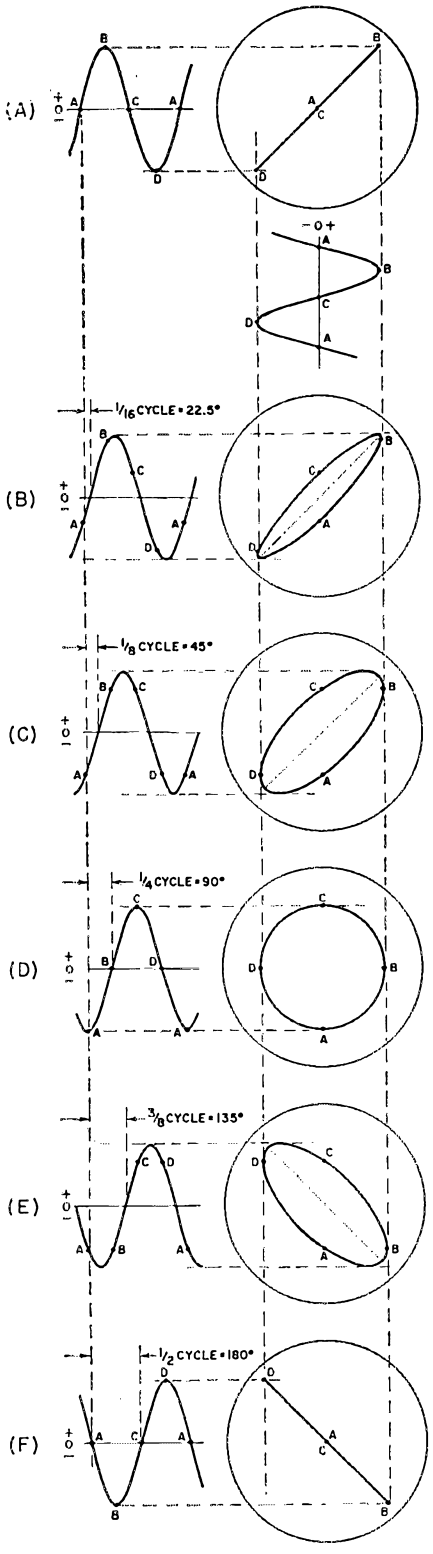

Fig. 1—Equal-amplitude, equal-frequency horizontal and vertical signals produce patterns of these types when the relative phase is varied.

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of the signals applied to the plates. In Fig. 1, the horizontal and vertical frequencies and amplitudes are respectively equal. The only possible variable is the time relationship or phase between the two. The two signals are lettered at various points to identify identical instants in time.

In Fig. 1A the two signals are in step. At every instant both signals are at exactly the same point in the cycle and each is producing exactly the same length of deflection from the center or rest point on the screen. Under such circumstances the pattern has to be a straight line, and since the two voltages are equal, the line lies exactly 45 degrees off the horizontal and vertical axes. In this figure the slope is upward to the right because the instantaneous polarities are the same in both waves and our convention assumes upward and to the right for positive-going signals, or downward and to the left for negative-going signals.

The remainder of Fig. 1 shows what happens when the vertical signal drops more and more behind the horizontal signal in time — i.e., when the vertical phase lag is made progressively larger. (The latter way of saying it is more "technical," but it means exactly the same thing.) In Fig. 1B the vertical signal is a little late in getting a cycle started, as compared with the horizontal signal — to be exact, it is 1/16 cycle late. This is usually expressed as a phase lag of 22.5 degrees, one complete cycle being 360 degrees. The angle measure of time is far more convenient in dealing with a.c., for many reasons, than expressing time in fractional parts of a cycle. It will lead to no more difficulties than reading a clock, if you simply remember that the "clock" here is the a.c. wave itself and the unit in which it measures time is the cycle, one of which equals 360 degrees.

The effect of the phase or time difference is to open up the straight line into an ellipse, as can be seen in Fig. 1B by checking the positions of the spot at the corresponding times indicated by the identical letters. As the phase difference is made greater the ellipse gets more and more bulgy (Fig. 1C) until finally, when the phase difference is 1/4 cycle or 90 degrees, the pattern becomes a circle, Fig. 1D. If the time difference is made still greater, Fig. 1E, the pattern again collapses into an ellipse, but now the principal axis of the ellipse has been rotated 90 degrees counterclockwise as compared with its earlier position. Note that except for this shift in the direction of the axis Figs. 1C and 1E are alike.

If the process of delaying the vertical signal is continued, the ellipse becomes narrower and narrower until finally, when the phase difference is exactly one half-cycle or 180 degrees, the pattern is again a straight line. But this time the

line slopes upward from right to left, just at right angles to its original in-phase position in Fig. 1A.

Note that the principal axis of each ellipse always lies on a diagonal to the horizontal and vertical axes. The position of the diagonal shifts abruptly when the pattern passes through the circle at the 90-degree phase-difference point; there is no *continuous* shift of the ellipse axis. This is easy to understand. Except for the special case when the two waves are exactly in phase, one wave has to be either ahead of or behind the other; it can't be half ahead and half behind, or any other such combination. Thus the ellipse can be in only one of two possible states — "ahead" and "behind" — and when the two signals have equal amplitudes the two states are represented by 45-degree axes.

For phase differences of more than 180 degrees, simply turn the page sidewise and consider the former horizontal signal now to be the vertical signal. The former vertical signal then becomes the horizontal sweep, but with the polarity reversed. This is equivalent to adding 180 degrees to the horizontal voltage — that is, its relative phase has been advanced by a half cycle. As the phase continues to be shifted the pattern goes through changes that are mirror images of the first series.

Signals of Different Amplitudes

If the vertical and horizontal signal amplitudes are not the same the patterns take on a different appearance, although they have basically similar characteristics. For example, if the vertical-signal amplitude is half that of the horizontal sweep, the pattern when the two are exactly in phase will still be a straight line, but it will not make a 45-degree angle with the horizontal and vertical axes (Fig. 2A). This is natural, since the vertical deflection is not sufficient to make the line become the diagonal of a square. The slope of the line, then, can be changed by changing the relative amplitudes of the horizontal and vertical signals without changing their phase.

Unequal amplitudes cause a similar modification of the elliptical patterns. For example, Fig. 2B corresponds to Fig. 1B in phase, but with the vertical signal at half the amplitude of the horizontal. The ellipse is narrower and its major axis is not at 45 degrees but rather at the same position as the line in the in-phase case, Fig. 2A. Thus the slope of the axis of the ellipse becomes quite important if you are trying to judge phase.

Figs. 2C and 2D show two cases where the phase difference is the same as in Fig. 1D — 90 degrees — but for two different vertical-signal amplitudes. In Fig. 2C the vertical voltage is one-half the horizontal, and in Fig. 2D it is $\frac{1}{5}$ the horizontal amplitude. If you have been led to expect a perfect circle when the phase

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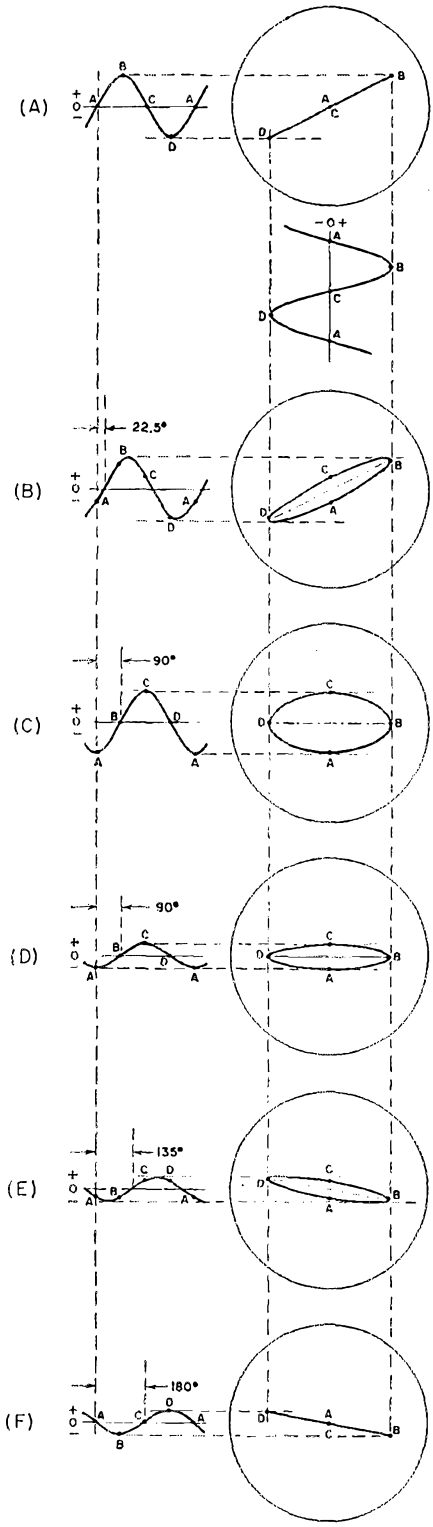


Fig. 2—The effect of varying amplitude along with phase is shown here for horizontal and vertical signals of the same frequency.

difference is 90 degrees, these two patterns should show how easy it is to be deceived by the scope — or, rather, how easy it is to deceive yourself if you don't know how the patterns are generated. Both these patterns are ellipses, not circles, and the only clue to the phase is the fact that the ellipse axes coincide with the deflection axes.

To round out these unequal-amplitude illustrations, Figs. 2E and 2F correspond in phase to Figs. 1E and 1F, but with the vertical signal only ⅓ as large as the horizontal signal. The effect of varying the horizontal amplitude, rather than the vertical, can be seen by turning the page sidewise and interchanging the sweeps. In doing this, don't forget that the horizontal polarity is reversed, thus advancing its phase 180 degrees as compared with the vertical voltage.

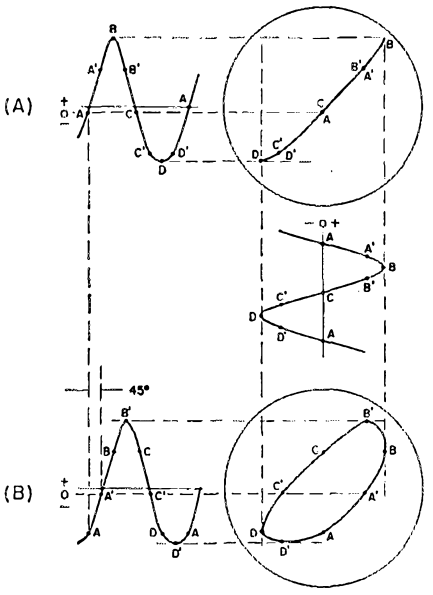


Fig. 3—Effect of distortion in the vertical signal, when peak-to-peak amplitudes are adjusted to be the same horizontally and vertically. The fundamental frequency of the vertical signal is the same as the horizontal frequency.

The Scope Alphabet

If you would become versed in interpreting oscilloscope patterns, study the way the patterns of Figs. 1 and 2 are formed, point by point. Although it might seem like mere exercise in drawing graphs, without any obvious practical application (why just put two waves of the same frequency on the tube?), this is far from the case. These same pattern shapes recur again and again in the more complex patterns used in modulation checking, for example. The interpretation of them is the same, when you recognize them. In fact, the scope "alphabet" may be said to consist of simple patterns that display the amplitude and phase relationship between two waveforms. Until you know the alphabet, it is pointless to attempt to read.

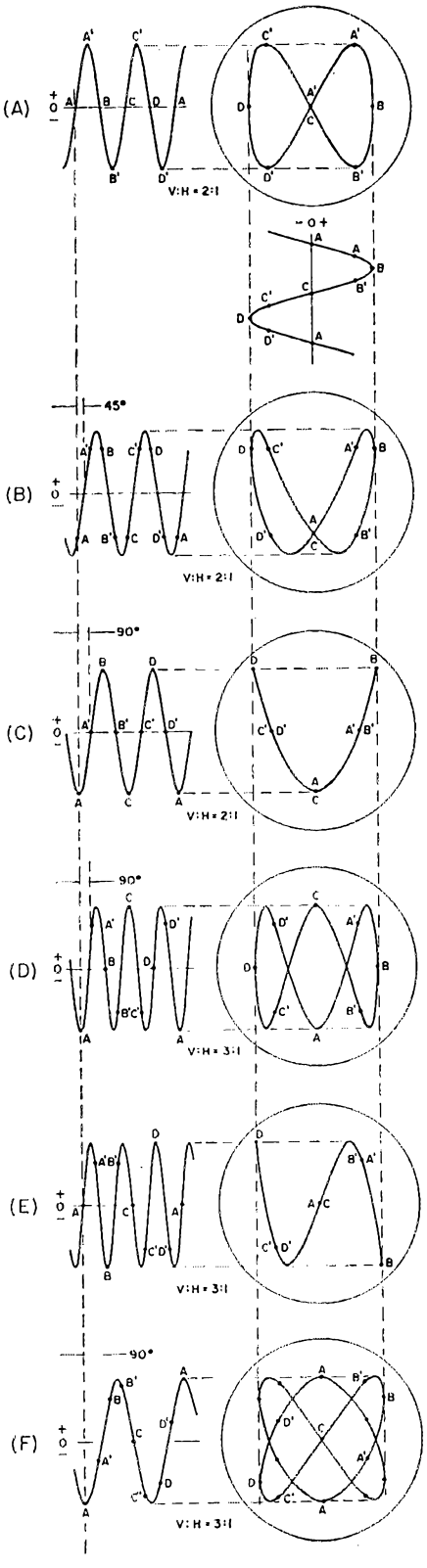
However, one does not have to go to complex patterns to look for practical uses. Testing an audio amplifier leads to patterns of the types shown in Figs. 1 and 2. A common test is to compare the signal at the input to an amplifier or stage with the signal coming out of it. By suitable adjustment of levels, the two signals can be adjusted to give the same peak-to-peak deflection on the scope tube. If the amplifier is perfect and introduces no distortion the pattern will take one of the shapes shown in Fig. 1, depending on whether or not there is phase shift in the amplifier. But if the output signal does *not* have exactly the same waveform as the input signal the shapes will not have the delightful regularity of those shown in Fig. 1. Fig. 3 shows a more-or-less typical case of a sine-wave horizontal sweep and a distorted wave (of the same fundamental frequency) on the vertical plates. The vertical signal is unsymmetrical, causing its zero axis to shift downward a little, and the lack of exact correspondence between the two waveshapes causes the resulting line pattern, in the in-phase case of Fig. 3A, to be anything but straight. In other words, distortion in an amplifier can be detected by as simple a process as placing a straightedge along the line to see if the line is actually straight. If there is curvature there is distortion, and the more the curvature the greater the distortion. If the line does not pass through the position of the undeflected spot at the center of the tube face the wave is unsymmetrical. Lack of symmetry indicates that there are even harmonics of the fundamental in the wave (but does not exclude odd harmonics). If the line does pass through the undeflected-spot position and is symmetrical about the center, although curved, only odd harmonics are present. Such simple deductions as these often point the way to the remedy for troubles.

If the two signals are not in phase — i.e., do not start simultaneously from the zero axis — the pattern will be elliptical, but the ellipse will be distorted. Fig. 3B shows what would happen with the same signal displaced 45 degrees in phase from the reference signal on the horizontal plates. The departure from the pure elliptical shape is a measure of the distortion in the signal.

Lissajous Figures

An important class of pattern is formed by a.c. signals whose frequencies have ratios that can be expressed in exact integers — i.e., 1:1, 2:1, 3:1, 4:5, 23:41, or any other such combination. Signals having this relationship will form stationary patterns ranging from the simple ones shown in Fig. 4 to intricate filigree. Their infinite variety and complicated scrollwork make them fascinating to look at, but they have a thoroughly practical aspect, too; the characteristics of the pattern permit exact determination of the frequency ratio of the two signals. Thus if the frequency of one is known, the frequency of the other can be found.

Fig. 4—Some representative Lissajous figures. The horizontal and vertical signals have equal amplitudes.



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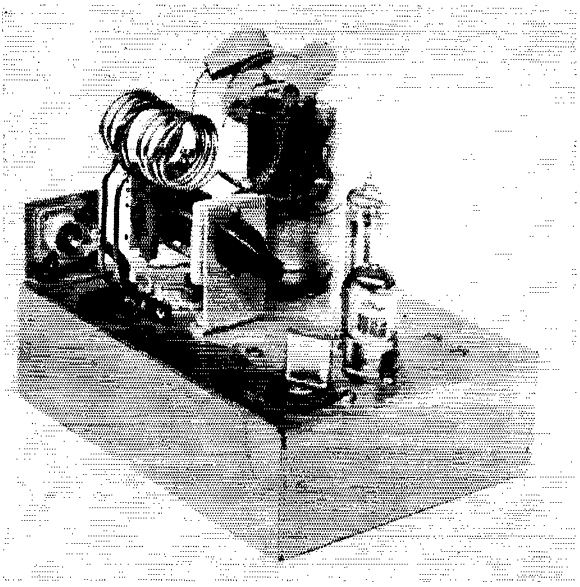
This feature of Lissajous figures, as they are called, is highly useful in frequency measurement and calibration. This, however, is a somewhat specialized field in amateur work; those who don't go in for it will find the principal value of the figures to be the fact that they represent recognizable situations when they are encountered in a scope pattern. Here, too, the exact pattern shape depends on the relative amplitude and phase of the two signals. Fig. 4 shows a number of typical patterns of the simpler variety, based on equal-amplitude signals with varying phase.

Aside from the value of the recommended exercise of tracing the pattern formation point by point, the patterns shown bring out an important characteristic of these figures — the patterns can take on markedly different shapes under different phase relationships even though the amplitudes and the frequency ratio of the two signals are unchanged. This is illustrated by Figs. 4A, 4B and 4C, for a 2:1 frequency ratio, and by Figs. 4D and 4E for a 3:1 ratio. The common feature of the first three is that there are two "turn-arounds" or loops touching the horizontal edges of the pattern (except where the pattern degenerates into a single line in Fig. 4C, where one of the loops along the bottom edge can be considered to be hidden by a similar loop on top of it) and a single loop on each vertical edge.

The 3:1 pattern of Fig. 4D has three loops on each horizontal edge and one on each vertical edge. The number of loops on the edges gives the frequency ratio directly. In Fig. 4E one of the loops again can be considered to be hidden. This is more easily seen in the actual patterns than described. If one of the two frequencies is not exactly in an integral ratio to the other, but differs from the exact ratio by a cycle or less per second, the pattern will seem to rotate slowly as it goes through all the possible shapes, including those shown in the figures. The three-dimensional illusion clearly shows one loop disappearing behind another when the waves pass through the exact phase relationship that results in the single-line pattern.

Fig. 4F shows a 3:2 frequency relationship for a selected phase difference. Only 1½ vertical cycles are shown, since the diagram as a whole uses only one horizontal cycle for the sweep, but the trace actually is generated by three vertical and two horizontal cycles. The lettered part of the trace is the first half of the pattern. The unlettered part is the trace formed by the last 1½ cycles of vertical and the second full cycle of horizontal. It is a mirror image of the first half because the phase relationship between the two signals is shifted 180 degrees in this part of the pattern. QST

(The fourth article in this series will appear in an early issue. — *Editor.*)



Two Inexpensive Tubes;

10 Watts Output

Fig. 1—Rear view of the conversion unit for 50-Mc. s.s.b. The crystal oscillator is nearest the camera. Chassis is standard 5 × 7 × 2-inch aluminum

A Simple Heterodyne Unit for 50-Mc. S.S.B.

BY HENRY A. BLODGETT,* W2UTH

NEARLY every v.h.f. sideband enthusiast has his own pet circuit for the transmitting converter, mixer, transverter, or whatever the chosen name for a device used to convert his h.f. sideband signal to a v.h.f. band. Being no exception, the writer set about arriving on 50-Mc. s.s.b. in the easiest possible manner. The mixer unit described herein is the result. Certain criteria exist in the design of a transmitting mixer for v.h.f. use. First, it must be completely stable. Second, the output should be free of spurious frequencies. The writer added a third: it had to be simple and inexpensive.

Assuming that you have a satisfactory s.s.b. signal to start with, stability is mainly a matter of the design of the heterodyning oscillator. Freedom from spurious-signal output is most readily attained by using a crystal oscillator on as high a frequency as practical. Overtone oscillators are notorious for instability, but mostly because amateurs tend to run them at too high a power level. The 36-Mc. crystal and simple triode oscillator shown provide very good stability if the input is kept low and the plate voltage is regulated.

The old reliable 6J6 is used for the crystal oscillator, V_1. The tube is an excellent oscillator, and connecting the elements in parallel allows operation well below the point at which excessive heating and resultant frequency drift would occur. Drift that might result from heating cycles can be eliminated by allowing the oscillator to run all the time, instead of removing plate voltage during standby periods. The 36-Mc. output may, in fact, be used for injection in the 50-Mc. receiving converter, if desired.

An 815, V_2, is used for the mixer. This dual tetrode may not be familiar to some newer hams, but it can be described as basically two 2E26s in one envelope, with a common screen and a common cathode. Push-pull mixer operation is desirable, as it tends to balance out unwanted frequencies that might otherwise appear in the output. Other dual tetrodes, from the 6360 to the 5894, should work equally well.

The 36-Mc. oscillator signal is fed to the grids in push-pull. Injection of the 14-Mc. sideband signal was tried at both cathode and screen of the 815, the latter giving the better results. Very little drive is required, and no mixer instability of any kind was ever encountered.

Construction and Use

The heterodyne unit is constructed on a 5 × 7 × 2-inch aluminum chassis. Layout of parts is not critical. Power can be supplied from any source giving 270 to 400 volts d.c. at 125 ma., and 6.3 volts a.c. at 2 amp.

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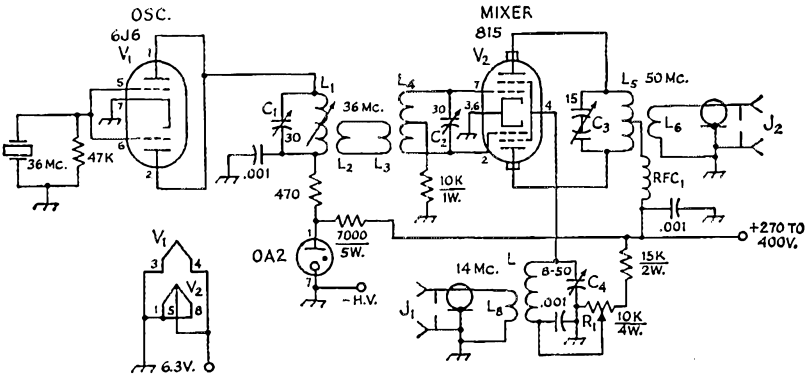

Fig. 2—Schematic diagram and parts information for the 50-Mc. sideband unit. Capacitors not described are 0.001-μf. disk ceramic or mica. Resistors are ½-watt composition unless specified otherwise.

C_1, C_2—30-pf. trimmer, any type.

C_3—15-pf. per section split-stator.

C_4—50-pf. trimmer. (Shown as 3–30 in Fig. 3.)

J_1, J_2—Coaxial receptacle.

L_1—8 turns No. 32 enam., close-wound on ¼-inch iron-slug form.

L_2—2 turns insulated hookup wire at cold end of L_1.

L_3—2 turns insulated hookup wire around center of L_4.

L_4—12 turns No. 22 tinned, ½-inch diam., 32 t.p.i., c.t. (B & W No. 3004).

L_5—8 turns No. 12 enam., 1-inch diam., center-tapped, spaced wire diam. Spread out center turns ½ inch for L_6.

L_6—2 turns No. 12 enam., 1-inch diam., at center of L_5.

L_7—12 turns No. 20 tinned, ¾-inch diam., 16 t.p.i. (B & W No. 3011).

L_8—3 turns insulated hookup wire on cold end of L_7.

R_1—10,000-ohm 4-watt control.

RFC_1—7-μh. r.f. choke (Ohmite Z-50).

Upon completion of construction, the 36-Mc. oscillator should be checked first, and the grid circuit of the mixer resonated at 36 Mc. Oscillator output should be sufficient to provide about 18 to 21 volts across the mixer grid resistor. Now apply plate and screen voltage to the 815, and set the screen control so that the plate input is no more than 20 watts, with no s.s.b. drive. A 14-Mc. s.s.b. signal of 5 to 10 watts is then coupled into the screen circuit through J_1. The level of injection is controlled by R_1, but the operator should observe the 20-watt plate-input limit when no drive is applied. With 270 volts on the 815 plates, maximum mixer output occurs with 50 to 70 volts on the screen. Use the least amount of s.s.b. drive that will give maximum mixer output.

It should be remembered that the 50-Mc. s.s.b. signal quality will never be better than that of the 14-Mc. signal. Properly operated, the mixer will deliver a useful 50-Mc. s.s.b. output of more than 10 watts. This is sufficient for use by itself, or it can be used to drive a high-powered linear amplifier. The setup has been in use at W2UTH for more than a year, first alone, and more recently as a driver for a 500-watt linear. All reports have been excellent.

The writer wishes to thank W2YPW for his photography.

QST

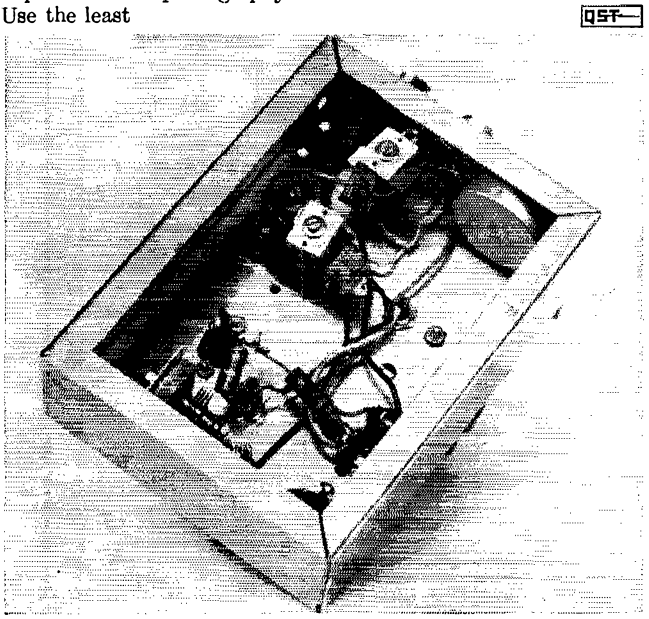

Fig. 3—Bottom view of the 50-Mc. s.s.b. mixer. Capacitor C_4, here shown as a mica trimmer, was later changed to an 8–50-pf. ceramic for greater range.

The Test-Pest

BY JOHN G. TROSTER,* W6ISQ

"HERB, did you say you were arriving on the . . ."

"Heeeellllllooooooo test . . testing . . ."

"Sorry Doug . . . QRM . . . say . . ."

"Testing . . . ahhhhhhhhhhhhhhhh"

"Will you arrive next . . ."

"Ahhhhhhhhhh — wun . . ."

"W6ZH from W6VM . . ."

"Ahhhhhhhhhh — tuh . . ."

"W6VM, this is W6ZH. Sorry Doug, we have a test-pest with us. We hope to arrive at your place on the . . ."

"Ahhhhhhhhhhhhh . . . this is W6ISQ . . . test . . . ahhhhhh"

". . . 'eenth. W6VM from W6ZH . . ."

"Herb, you say the 14th?"

"Ahhhhhh . . . W6ISQ testing. Seems ok. Anybody 'round for a check — break break break."

"W6VM from W6ZH. Arriving the 14th at . . ."

"Break break break break — break . . ."

"QRM Herb. Say again."

"Break break break — break break . . ."

"We will be at your place about . . ."

"Break break break W6ZH W6ZH — this is W6ISQ. You copy, old man? Break break break . . ."

". . . say again . . ."

"Break break break W6VM W6VM — you hear me, OM? Break break."

". . . get that OK? W6VM from W6ZH"

"Break break break — W6ZH or W6VM. W6ISQ here. Either you fellas copy? How about a quick db. report, eh? Break break."

"Shall we ignore him?"

"Can't — too strong here."

"Break break break — anybody — anybody. Anybody read me? How about a report — anybody. See if this kw. getting out. W6ISQ bye . . . ahh . . . break break break."

"QRX—maybe he'll go away . . ."

"Break break break — you fellas . . . hey . . ."

"OK, I give up. W6ISQ, this is W6ZH. What's your problem?"

"Break break break. Ya copy me, old man? Break break break."

"You're off the scale on the meter. W6ZH bye."

"Break break break. W6ZH from W6ISQ. Had me worried. Gee, I tried to break you and that other station and ya didn't come back. So, I thought I wasn't gettin' out. I mean — naturally — ya know — break break break . . ."

"W6ISQ from W6ZH. Well, you're the loudest and best test-pest I've heard in a long time . . ."

"Break break break — well, thanks for the neat report. Real good — yeah. Say OM — how many db. your meter go up to?? Break break break."

"All the way, all the way. But listen, you'd better read pages 228–230 in the *ARRL Handbook* — right away — excellent information there! . . . now Doug, we expect to arrive the 14th at about 4 — W6VM from W6ZH."

"OK Herb. Now, when you get here . . ."

—•••—

"Break break break. W6ZH from W6ISQ. Break break break."

"Break break break . . . ahhh . . . I mean . . . err . . . now what? W6ZH bye."

"Break break break. Those pages ya told me to read in the *Handbook* — they're all about power supplies. What they got to do with working out? Break break break."

"W6ISQ from W6ZH. They don't have anything to do with working out. Just good, solid information. But while you read, W6VM and I finished our sked."

"Break break break. Well, I was only trying to break break break to see if I was gettin' out, ya know. Signal check and db. over S9 plus, ya know. Usual routine — break break break."

"W6ISQ, this is W6ZH. Yes, I know, I know. Unfortunately, I know. Well, as long as you have the *Handbook* out, look over chapters 11 and 21. Some interesting fundamentals there. And oh yes — *one more thing* — suggest you *study* another book. Would *really* do you some good. You can get it at the library . . ."

"Ahhhh . . . yeah . . . real swell. What'll I ask for? Break break break."

"W6ISQ, this is W6ZH. Ask the librarian for *any* book by Emily Post." QST

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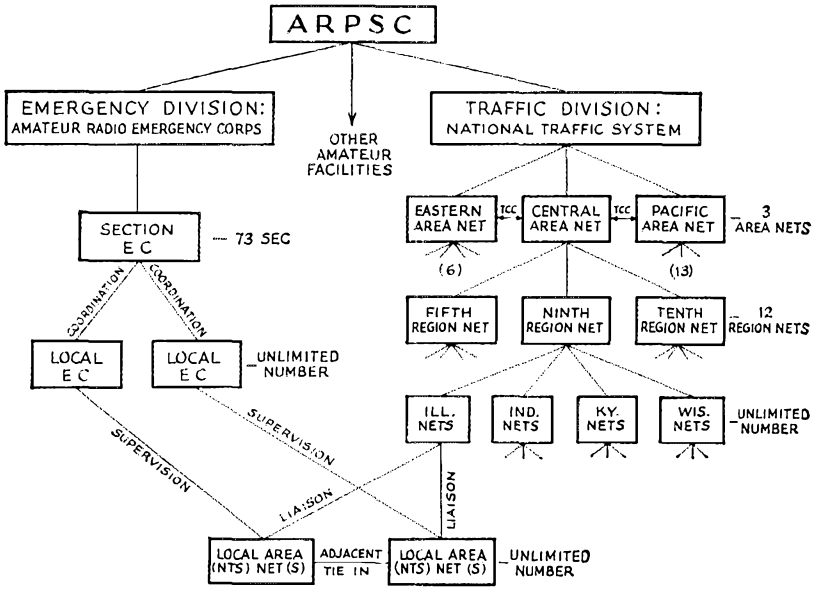


While a really graphic portrayal is difficult, the above diagram gives some idea how AREC and NTS tie together at top and bottom to form ARPSC. AREC nets exist only at local level, and are tied into NTS at section (usually state) level for integration into the national system. The two divisions are tied together at headquarters by a common administrative setup. For diagrammatical purposes, it is more convenient to portray administration of AREC, operation of NTS. Not shown in the above is the coordination that must exist among SECs, ECs, NTS net managers and other amateur officials at the various operational levels.

The Amateur Radio Public Service Corps

Closing Ranks in the Public Interest, Convenience and Necessity

BY GEORGE HART,* W1NJM

THE Amateur Radio Public Service Corps is a new name for an old concept. It represents the consolidation of two long-established operating groups whose courses have been so obviously convergent that the only astonishing thing about ARPSC is that it wasn't set up a long time ago. An Emergency and Traffic Bulletin written in 1949 first discussed the interests of both the Amateur Radio Emergency Corps (AREC) and the National Traffic System (NTS) in these words: "Every emergency net is bound to be, to some extent, a traffic net, and every traffic net should be prepared . . . to take on emergency . . . duties. Emergency-conscious and traffic-conscious amateurs have this in common: they both derive their chief pleasure in ham radio out of activities which are directly beneficial not only to ham radio but to their community and their country."

In handling third-party traffic and in preparing for and providing emergency communications, the amateur has *direct* contact with the general public, a characteristic that most other forms of amateur service do not have. For many years, we spoke of these activities as "emergency work" and "traffic handling" without taking note of any particular connection between them. What ARPSC does, in effect, is to put them under a general heading and bring them closer together.

Point Number 5 in the ARRL program for upgrading the amateur service reads as follows: "Combining the Amateur Radio Emergency Corps and the National Traffic System to constitute an Amateur Radio Public Service Corps for maximum effectiveness in the public interest." This is a verbal portrayal of the principles of consolidation. Operational details will be discussed in later articles.

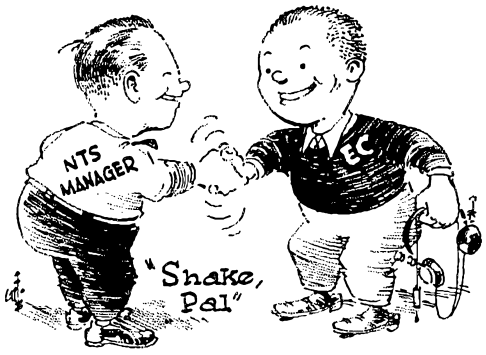
Basic Functions

Usually, emergency operation is initiated at

* National Emergency Coordinator, ARRL.

local level and is the business of the SCM-appointed emergency coordinator. Even if the emergency situation transcends local and becomes of statewide, or regional, or even national concern, the emergency situation and what to do about it is primarily the concern of AREC officials. Communications concerning it would be generated by civic and welfare officials, or at their behest, and resulting problems handed to the AREC for solution. The National Traffic System would have the task of getting the *written* traffic promptly and accurately to its destination.

Our primary concern in the present instance is that part of the setup which couples together



the AREC and the NTS. The details of the internal workings and administration of each are not changed and will come in for further discussion at another time. This should dispel all anxiety on the part of stalwarts of either organization that we are dispensing with the one in which they are primarily interested in order that it might be absorbed by the other. This is *not* to be done. What *is* to be done is to set up definite and planned liaison between the two so that in both normal times and during emergencies there can be a singleness of operation and purpose — the AREC primarily at local level, the NTS primarily for communication over medium and long distances. Thus the AREC, which previously operated mainly during emergencies, now takes on some regular-operation duties while the NTS, which usually operated only routinely, now takes on some emergency-operation duties.

In some sections, this sort of arrangement is already an established part of the section operating plan. Also, an emergency plan has existed for some time within NTS which provides for systematic activation of nets, but not systematic liaison with AREC units. The new ARPSC concept will operate under two different situations — first, normal every-day operation, and second, operation during a communications emergency.

Normal Operation

During normal times (whatever that means), NTS commences operation (typically) in the early evening with a section net meeting. The cycle then goes from section to region to area, thence back down through region and section the same evening, encompassing a period of about four hours. Also during the evening or at other hours the Transcontinental Corps busily shuttles traffic among the three area nets. This system operates *every* day, including week end days and holidays, one complete cycle per day. Traffic handled is entirely of the "routine" variety; traffic of higher precedence does not belong on amateur circuits during normal times, unless there is no commercial service available.

An innovation in the last couple of years has been the establishment of a new "local" echelon of NTS nets. Such nets include those organized at city, community or county level for the purpose of handling and delivering traffic within such areas, even though in many cases such traffic could be delivered by land-line without charge. While to hardheaded traffic men this may seem a waste of time, effort and efficiency, it is an essential part of the new and very important emergency training function of NTS, just as vital as the delivery of the messages (but not more so). Ordinarily, a message is delivered by the first station within delivery range (toll-free telephone, if possible); where local nets are available, however, such as in large cities, it is often possible to effect "neighborhood" delivery by this means, which would be a useful procedure in a local communications emergency. The establishment of this local net echelon of NTS brings into the picture hundreds of AREC nets which have operated on this basis for many years. Those which do so on a regular basis (once per week or more) may now be considered part of NTS *provided* they maintain regular and systematic liaison with their NTS section net. This requires a certain amount of versatility on the part of someone, because most section nets operate on 80 or 75 meters while most local nets are on the v.h.f.'s.

Thus, in normal times the tendency will be for AREC nets to take on much more of a regular traffic-handling aspect than they have heretofore. Those which operate regularly are being urged to seek liaison with their NTS section nets, and to keep up their training in the handling of record traffic in standard ARRL form. Those which operate only on special occasions are urged to take on regular operation, but *in any case* seek an understanding with NTS at section level so that any traffic they originate in an emergency can be cleared promptly and systematically.

Emergency Operation

We are concerned here only with peacetime disasters, when wire and power lines are down or a situation exists which requires amateurs to be activated for the purpose of supplying emergency, supplementary of back-up communications. Plans for operation during wartime come under the Radio Amateur Civil Emergency Service, which will be discussed later.

For the AREC, the emergency is the culmination of all its preparatory efforts; for NTS, it is an intensive interlude in its daily operations.

AREC has had its *modus operandi* for many years, under which a to-be-served agency (e.g., the Red Cross) notifies a representative of the amateur service (usually a local emergency coordinator or section EC) of the requirement for emergency communication in a given situation. This official then alerts the local EC or AREC crew via whatever prearrangements they have made and sets up the required circuits. Such a system has worked adequately in the past for local communications purposes, but medium and long distance requirements, when needed, have usually been set up spontaneously and have shown the need for advance planning. The requirement for a national plan of emergency communication was greatly felt in a number of widespread emergencies which brought great quantities of personal traffic in addition to that of an official nature.

Under the ARPSC concept, the National Traffic System takes on an emergency-operation complexion for the express purpose of handling medium and long distance traffic for the AREC. This is done by activation of certain NTS nets, as required, at section, region or area level, along with the TCC, depending on the extent of the emergency and the needs for communication. Such activation is accomplished primarily on the initiative of the AREC official concerned, who is the man on the scene who perceives the need. In the case of a local-type emergency, the EC has ready access to the NTS section net and, if it is needed, he can request its activation on an emergency basis. Via this net he can also request activation of adjacent AREC nets or their participation with his group to extend local coverage if this seems indicated. On recommendation of an SEC or at the request of a section net manager, the NTS region net might also be activated; and when or if interregional traffic exists, an NTS area net might be activated at the request of any region net manager. In the final analysis, which nets are activated, to what extent and on what basis, are matters determined by the various ARPSC (AREC and NTS) officials acting together to set up the system to be used for that particular emergency. In order that this kind of coordination will work with a minimum of confusion and conflict, these ARPSC officials must keep in touch with and be known to each other in the normal course. Come the need, they will contact each other by radio in accordance with a pre-arranged system for doing so. This may be on an established net, on one of the National Calling and Emergency Frequencies, or by some other mutually-agreed-upon means.

There remains the need for occasional "hot line" circuits between large cities or heavy population areas. In several section AREC plans, a system of "key city" nets is set up in the expectation that there will be particular need for communications within and among metropolitan areas — and this is a *good* plan, because in a statewide emergency this often is exactly what arises. The plan has a national application also in that in some types of emergencies occupying wide areas (say a half dozen states or more) the same sort of situation might obtain — that is, a need develop for prompt communication from one large city to another, or from outlying points into a large city representing the hub of to-be-served agency administration. If the former, a special "hot line" circuit may be set up between the two cities, strictly on the basis of need and not unless or until the circuit can be kept busy with traffic of emergency precedence; otherwise, such traffic can be given extraordinary handling by net controls in accordance with the already-established rules for handling it. In the latter (i.e., from numerous outlying points into a large city), one or more stations located in the required metropolitan area may be established on a specified frequency and monitor it so that net controls may direct stations to them with their emergency traffic.

The above may seem like pretty cloudy general principles that leave out a lot of crucial details. There is good reason for this. All emergencies and emergency situations are not predictable from a national standpoint — in fact, very few of them are. ARPSC officials must have freedom

of movement and action within a set of general principles, the latter being for the purpose of guiding them, not restricting them. What nets should be activated, how often the NTS cycle should operate, what special circuits need to be set up and how this can best be done — all these are things that have to be decided as the emergency situation develops, by SECs, ECs and NTS net managers on the scene best qualified to decide them.

The general principles are these: (1) NTS nets will be activated in accordance with the emergency situation by their respective managers at the request of AREC officials, and (2) special inter-section circuits will be set up by NTS net managers to handle emergency-precedence traffic as or if the need for them develops. Within these somewhat broad guidelines, ARPSC officials have wide latitude of action to do what is

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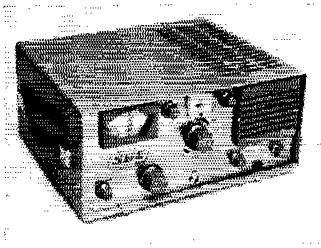
• Recent Equipment —



SB-33 Single-Sideband Transceiver

THE SB-33 is a four-band (80, 40, 20 and 15 meters) upper-or-lower-sideband transceiver, rated at 70 watts p.e.p. output on 80, 40, and 20 meters, and 50 watts on 15 meters. It is designed for push-to-talk operation, although a VOX unit is available from the manufacturer as an accessory.

Usually, the first comment when the SB-33 is seen out of its cabinet is, "Where are the tubes?" The fact is that there are only three tubes in the entire transceiver — the two r.f. power amplifiers and the driver. The rest of the circuit is completely transistorized. The equipment is full of unusual ideas, both mechanical and electrical, and all of it is contained in a box which takes up only about ½ cubic foot of space and weighs but 15 pounds. These figures include the built-in power supply and speaker.

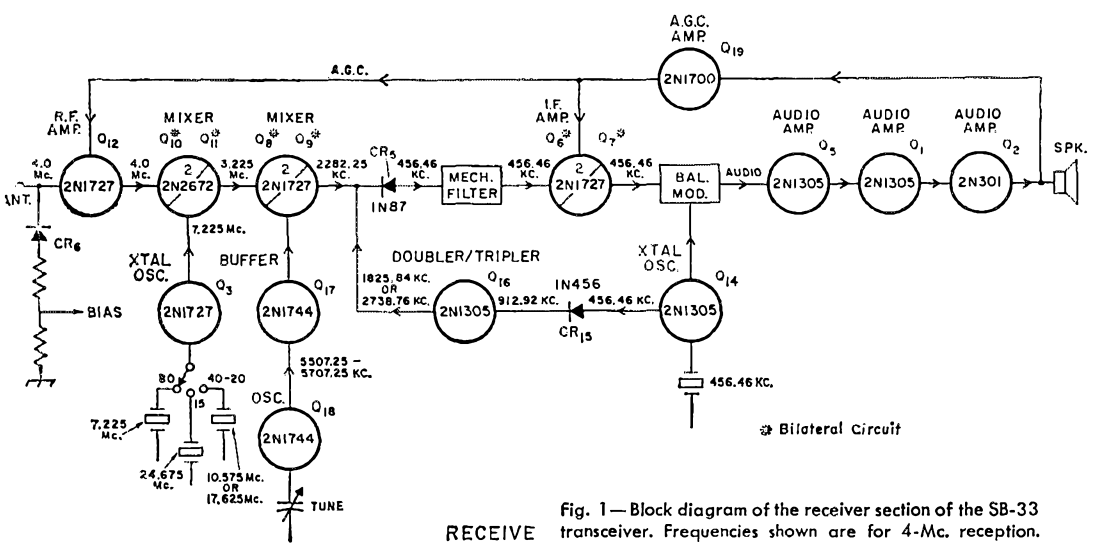
To simplify the description of the workings of the SB-33, the receive and transmit functions will be discussed separately, although some of the circuits in the equipment are bilateral — that is, they work in either direction using common components. More on the bilateral circuits later.

Receiving

Incoming signals are applied to the r.f. amplifier transistor, Q_{12}, as shown in Fig. 1. A point-contact germanium diode, CR_6, connected across the antenna coil, will conduct when the signal strength is extremely high, thus protecting Q_{12} from damage. When transmitting, the diode is biased for continuous conduction and effectively shorts the antenna input circuit. Q_{12} is protected from overload in the normal-signal-level range by a.g.c., which is developed farther down the line in the receiver.

Output from Q_{12} is injected, along with output from a crystal-controlled oscillator, into a bilateral mixer, $Q_{10}Q_{11}$. The crystal oscillator, Q_3, is controlled by one of three crystals, selected according to the band in use. On 80 meters a 7.225-Mc. crystal is used, and the frequency for 15 meters is 24.675 Mc. On 40 meters a crystal operating on its third overtone, 10.575 Mc., is used, and for 20 meters the same crystal is worked at its fifth overtone, 17.625 Mc. These frequencies result in a useful output range of 3225 to 3425 kc. from the first mixer.

The output of the first mixer is combined with the output of the v.f.o., Q_{18} (which is the frequency control for both receiving and transmitting), in a second bilateral mixer, Q_8Q_9, to give 2282.25 kc. output from the desired signal. The v.f.o. frequency range is 5507.25 to 5707.25 kc., and there is a buffer stage, Q_{17}, between the v.f.o. and the mixer to help isolate the two. Other techniques for insuring good stability are also used in the SB-33; for example, placing the heat-generating components as far away from the v.f.o. components as possible, using temperature compensation in the oscillator circuit,



RECEIVE

Fig. 1 — Block diagram of the receiver section of the SB-33 transceiver. Frequencies shown are for 4-Mc. reception.

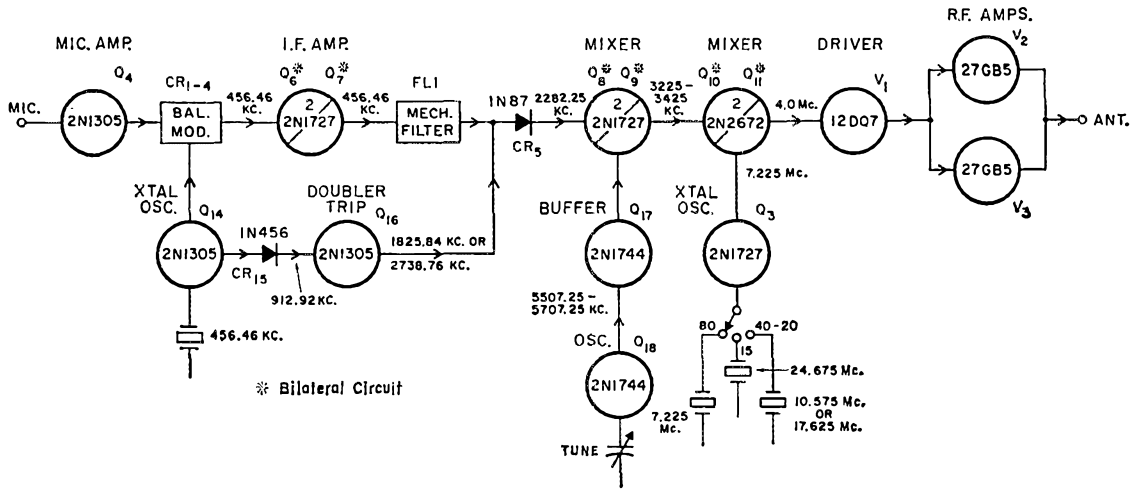


Fig. 2—This is the lineup of tubes and transistors when the SB-33 is transmitting on 4 Mc.

and running all injection oscillators continuously.

Output from Q_8Q_9 is combined with 1826- or 2739-kc. output from Q_{16} in a crystal diode mixer, CR_5, to give an i.f. of 456 kc. Injection frequencies for the conversion process result from multiplying a crystal-controlled signal generated by Q_{14}, which operates at 456 kc. The frequency is doubled to 913 kc. by the crystal diode, CR_{15}, and then either doubled to 1826 kc. or tripled to 2739 kc. by Q_{16} to give the proper injection frequency for either lower- or upper-sideband selection. The 1826-kc. output gives lower-sideband operation and the 2739-kc. frequency selects the upper sideband. This technique is familiar from the W6TEU "Sideband Package." [1]

The output from CR_5 goes into a mechanical filter, FL_1, having a selectivity rating of 2.1 kc. at 6 db. down and 4.5 kc. at 60 db.

Signals leaving the filter are amplified in the bilateral amplifier, Q_6Q_7, and then applied to a semiconductor ring-type balanced modulator. The carrier frequency for the balanced modulator is 456 kc., obtained from the same oscillator, Q_{14}, that originated injection voltage for CR_5. The output from the balanced modulator (actually a demodulator when receiving) is audio which is subsequently amplified by Q_5, Q_1, and Q_2. Transistor Q_2, a power amplifier, provides plenty of audio — up to 2 watts at 10 per cent distortion — to run the built-in speaker.

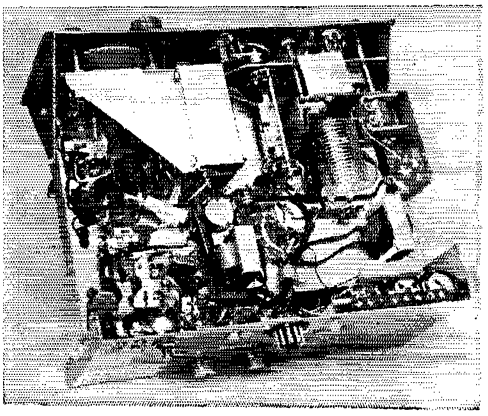
The panel VOLUME control adjusts the gain of the bilateral mixer, $Q_{10}Q_{11}$, the bilateral amplifier, Q_6Q_7, and the first audio amplifier, Q_5. Other stages, as shown in Fig. 1, are protected from overload by an a.g.c. voltage originating in the audio stages of the receiver. A strong audio signal at the output stage of the receiver causes the a.g.c. amplifier, Q_{19}, to conduct heavily, reducing its collector voltage and thus the voltage on the a.g.c. line. As the voltage falls the gain of Q_{12} and Q_6Q_7 decreases until the audio output becomes stabilized. There is a built-in time constant to shape the a.g.c. action, which is fast attack, slow decay. A diode (not shown in Fig. 1) in the base circuit of Q_{19} begins to limit a.g.c. action as the panel VOLUME control is turned up. A.g.c. control dominates until the control reaches the normal room volume setting, and from this point until the control is about three fourths advanced, the volume remains almost constant. With further rotation of the control the volume rises rapidly until full output is reached.

The receiver sensitivity is rated at 1 microvolt for a 10-db. signal-to-noise ratio.

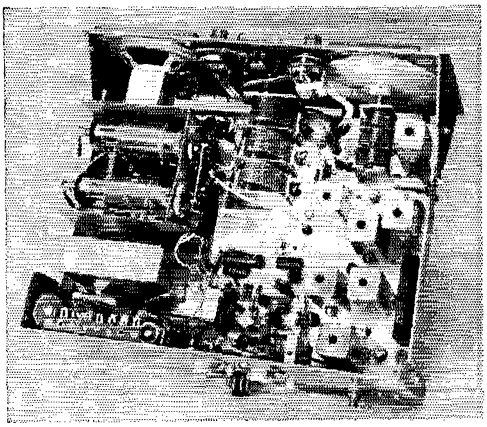
Transmitting

Because of the bilateral circuits used in the SB-33, the transmitting process actually reverses the direction of signal travel through the amplifiers and mixers. In Fig. 2, audio from a high-impedance microphone is amplified and applied to the balanced modulator, CR_{1-4}, as is energy from the 456-kc. crystal oscillator, Q_{14}. The

[1] Bigler, "A Sideband Package," *QST*, June 1958.



The cabinet and several cover plates have been removed in this view of the SB-33 transceiver. The final amplifier tank coil and capacitor are at the upper right of the photograph.



Top view of the SB-33 transceiver. The two 27GB5 r.f. amplifier tubes are nested in a compartment at the left side of the photograph. The only other tube used in the transceiver is the 12BY7 driver, not visible in the photograph, but located between and below the two amplifier tubes. The components in the foreground are mounted atop a printed-circuit board. The rear-apron power polarizing lamp, power and accessory plug, phono-connector antenna jack, and the carrier-balance potentiometer are visible in this photograph. Located just to the right of the potentiometer shaft are four miniature phone jacks for earphones (or extension speaker), auxiliary speaker, push-to-talk, and microphone or VOX.

carrier is eliminated (suppression is rated at 50 db.) and the double-sideband signal is amplified in the bilateral amplifier, Q_6Q_7. It then goes through the mechanical filter, FL_1, which suppresses the upper sideband by about 40 db. at 300 cycles.

Depending on whether u.s.b. or l.s.b. is to be transmitted, the doubled or tripled signal from Q_{16} is mixed with the s.s.b. signal from FL_1 in the diode mixer, CR_5. Output from CR_5 is either u.s.b. or l.s.b. at 2282 kc. Heterodyning this by the v.f.o. in bilateral mixer, Q_8Q_9 puts the signal in the 3225-3425-kc. range from which it is converted to the desired amateur frequency in bilateral mixer $Q_{10}Q_{11}$. Output from the mixer is coupled to the driver tube, V_1, and then on to the 27GB5 TV sweep-tube linear amplifiers.

The final-amplifier plate circuit is a pi network with panel PA TUNE and PA LOAD controls. The pi circuit can be adjusted to match loads of 40 to 100 ohms if the s.w.r. doesn't exceed 2 to 1.

Bilateral Circuits

Mention has been made throughout the discussion here of the transistor bilateral circuits. Fig. 3 shows the 456-kc. bilateral amplifier, Q_6Q_7, used in the SB-33. When receiving, the circuit works from right to left, as indicated by the "R." arrow. Transistor Q_6 has a positive bias of ten volts applied to its base through contacts of the send-receive relay (not shown in Fig. 3), and since Q_6's emitter is also returned to +10 volts, the transistor is cut off and nothing happens in the circuit associated with Q_6. However, transistor Q_7 has its base returned to −10 volts through the volume control. As this biases the stage for conduction, signals from the mechanical filter, FL_1, at the base of Q_7, are amplified and applied to the primary of the i.f. transformer, T_1.

When transmitting, the process is reversed. Signals from T_1 are amplified in Q_6, which is now working as an amplifier since the send-receive relay has returned the 18,000-ohm base resistor to ground. Q_7 is now biased off and is effectively out of the circuit. The signal at the base of Q_6 is amplified and passed on to the mechanical filter.

Other bilateral circuits in the transceiver work in more or less the same way, and are switched for signal flow one way or the other by bias applied through the send-receive relay.

Power Supply

"High voltage" in the SB-33 receiver section is only 10 volts. Of course, the tubes in the transmitter require something slightly higher than this — about 480 volts. A voltage tripler, using semiconductor diodes and operating directly from the 117-volt line, gives the high voltage required for the tubes. All components in the transmitter associated with the 480-volt supply are isolated from the SB-33 chassis to eliminate shock hazard. For added safety, a neon bulb on the rear apron indicates the right way to plug the line cord in the a.c. mains. If the lamp lights, the

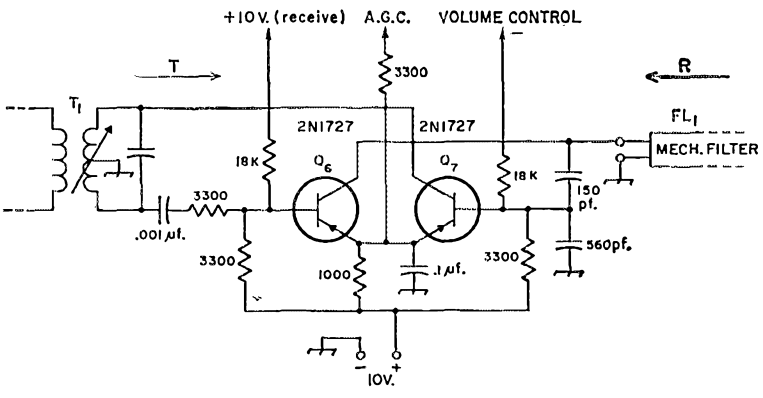


Fig. 3—Transistor bilateral circuit used in the SB-33 transceiver. This circuit will amplify in either direction. Explanation of how the circuit works is given in the text.

plug should be reversed in the line-voltage socket, to connect the grounded side of the line to the proper side of the supply.

The low-voltage d.c. used for the transistor circuits and for r.f. amplifier bias is obtained from a transformer-rectifier system using semiconductor rectifiers, and incorporating a Zener diode for voltage regulation.

Power-supply problems usually associated with mobile equipment without 117-volt power supplies do not exist with the SB-33 since the mobile power supply can be a d.c. to a.c. inverter — one that steps the car low-voltage d.c. up to 117 volts a.c. Transmitter output will be reduced slightly because of the square waveform of the voltage from most inverters. However, an inverter designed especially for the SB-33 is available from the manufacturer, as is a mobile mounting base for the transceiver.

Other Features

The foregoing comments have been concerned with the electrical nature of the SB-33, but there are some interesting mechanical ideas in it, too. Because the transceiver package is relatively small, all the available space is filled with components, shields, shafts, and wiring, as a look at the photographs will testify. You may wonder how Sideband Engineers came up with such a simple, clean-looking front panel. One answer is the unusual band switch, which actually performs two jobs.

When the band-switch knob is fully clockwise, the transceiver is set on 80 meters. When the control is moved counterclockwise through an arc labeled "80" on the front panel, several circuits are tuned at once, through mechanical coupling between the band-switch shaft and a variable capacitor and slug-tuned coils. Continued rotation throws the band switch to 40 meters, introducing another area of tuning, this time for 40 meters. This is repeated for 20 and 15 meters with further c.c.w. rotation. Use of this Geneva movement with bracketed tuning allows for optimum L/C ratios and Q on all bands and eliminates the necessity for providing a panel space for two or three separate controls. The band-switch operation is the same for both transmitting and receiving.

SBE SB-33 Transceiver

Height: 5½ inches.
Width: 11¾ inches.
Depth: 10¼ inches.
Weight: 15 pounds.
Power Requirements: 117 volts a.c., receive 35 watts; transmit (single tone) 165 watts.
Price Class: $390.
Manufacturer: Sideband Engineers, 317 Roebling Rd., South San Francisco, California.

The precise operating-frequency range of the SB-33 is 3.8 to 4.0 Mc., 7.15 to 7.35 Mc., 14.2 to 14.4 Mc., and 21.25 to 21.45 Mc. The dial, which is calibrated in 10-kc. increments on 80 and 40 meters and 5-kc. increments on 10 and 15 meters, is set behind a 1¾ × 2½-inch window in the upper left-hand corner of the panel. Just below the dial is the tuning knob, which gives about 30 kc. per rotation on 80 and 40 meters, and 15 kc. per rotation on 20 and 15 meters. The tuning knob seemed a bit too small for this writer, but of course it has to be small to fit in the dimensions of the package.

Other panel controls are a VOLUME control, which also doubles as the power ON-OFF switch, the MIC GAIN, function switch (U.S.B., L.S.B., and TUNE), PA TUNE and PA LOAD, and the METER switch. The meter indicates either relative output or plate current. Also located on the front panel are the speaker and the microphone jack, the latter taking the military 3-conductor plug, PL-68. The SB-33 cabinet is finished in gray. The front panel is satin chrome with light blue knobs and trim. A suitcase handle is attached to one end of the cabinet for easy toting.

—*E. L. C.*

Strays

Through the efforts of the Single Sideband Amateur Radio Association, a complete amateur station was recently donated to the St. Albans Naval Hospital in Queens, N. Y., one of the largest Navy medical installations in the country. During the presentation ceremonies (above), CAPT Joseph L. Yon and LCDR A. R. Peteletti accepted the equipment from W2TUK, SSBARA vice-president, while WB2GMZ, chief op at St. Albans, looks on. This gift follows a similar donation by SSBARA to the Braille Technical Press.

Hints and Kinks For the Experimenter

ANOTHER WEATHERPROOFING COMPOUND

A NEW waterproofing and corrosion-proofing compound that is excellent for treating antenna connectors and has other outdoor applications is made by Dow Corning and is called Silastic RTV 732. The material is a self-adhering rubber compound that acts as a grommet, a seal, or an adhesive. Silastic RTV 732 is available in two- or five-ounce single tubes through most of the large mail-order radio houses. — *E. L. C.*

NO-SCAR EQUIPMENT MODIFICATION

MANY times a simple one- or two-tube modification can make a vast improvement in the performance of a piece of equipment. However, there are some equipment owners who would like to make such modifications, but the prospect of drilling holes in their gear discourages them when they think of the resale value of the equipment.

One way to get around the problem is to use breadboard-type sockets, such as the Eby Above Chassis type 12, which are available from most of the large mail-order houses. These sockets are top-of-the-chassis mounted and require only a couple of tiny holes for mounting. If the prospective modifier is particularly squeamish about drilling holes in the store-bought equipment, he can fasten the sockets to the chassis with glue!

The wiring to and from the socket is routed through existing holes or slots in the chassis, or a small hole can be drilled in some out-of-the-way place to bring wires to the top side of the chassis.

The photograph in Fig. 1 shows part of a modulator in the Johnson Navigator. Notice that terminal strips have been mounted on existing screws that holds one of the tube socket to the chassis. The two tubes are mounted horizontally with respect to the chassis, just above the driver tube. Only two $\frac{5}{64}$-inch holes were required to mount the two tubes, since the other two were already part of the original construction.

When it is time to swap or sell the modified equipment, the extra circuits can be removed very easily. There will be little or no evidence of modifications left behind. The technique outlined here is particularly suitable for audio and power-supply circuits, but care should be exercised when trying to do extensive modifications involving r.f. circuitry. Some applications will require particular attention to shielding and lead dress. — *Richard C. Kelly, K5SOD*

FINDING V.H.F. BALUN LENGTHS

THE grid-dip oscillator provides a handy means for finding the exact length of a half-wave coax balun. Starting with a piece longer than calculated, short one end with a short loop and couple to the g.d.o. which has been set at half the desired frequency. Unravel the braid at the unshorted end of the balun a little at a time until a "dip" is indicated on the g.d.o. The second harmonic of the g.d.o. can be monitored on the station receiver for super accuracy. This method is useable up to the 432-Mc. band, since most g.d.o.s go up to at least 216 Mc. Since the Q of the balun is high, coupling is easy and provides a positive indication on the g.d.o.

— *Henry H. Brundage, KØHEI*

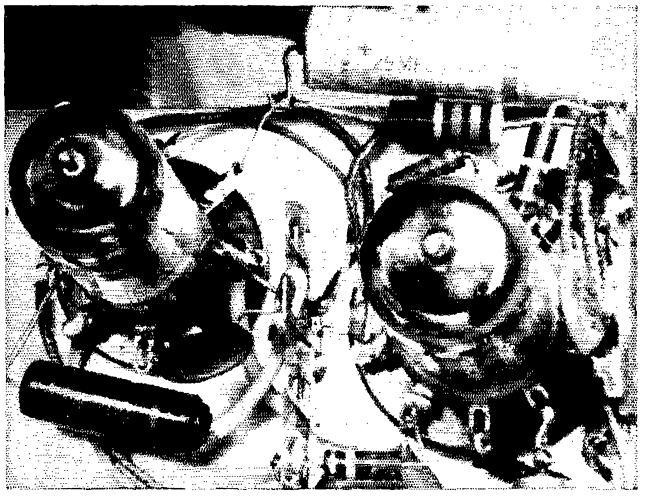


Fig. 1 — No-scar modifications can be made to existing equipment by using the above-chassis tube sockets shown in the photograph.

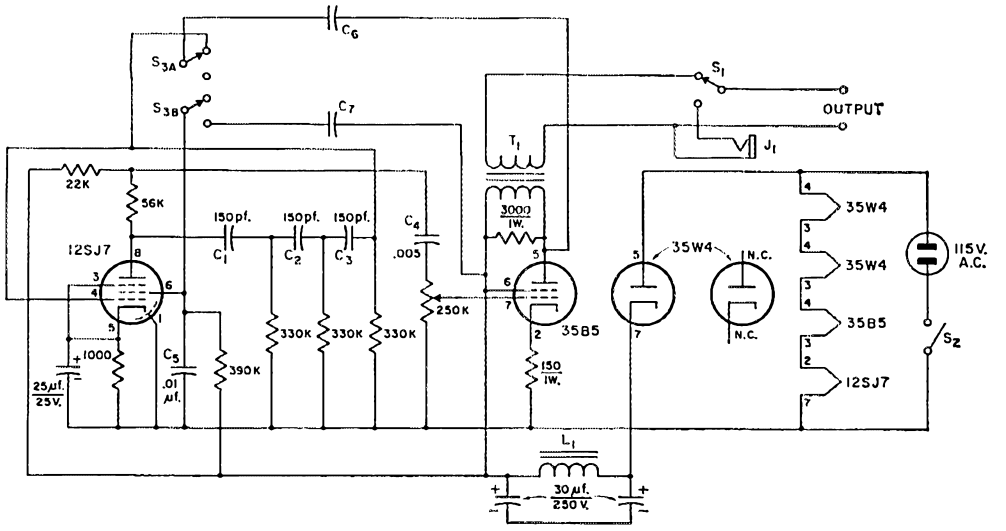


Fig. 2—K3DKE's group code-practice oscillator. Unless specified otherwise, resistors are ½ watt. See the text for components not listed below.

C_6—0.001- to 0.01-µf. mica capacitor.
C_7—0.1- to 10-µf. paper or molded plastic capacitor.
J_1—¼-inch phone jack.
S_1—S.p.d.t. switch.
S_3—D.p.d.t. switch.

GROUP CODE-PRACTICE OSCILLATOR

SOME months ago, armed with an old copy of *Learning the Radiotelegraph Code*, I took on the chore of teaching my son's Boy Scout troop members a smattering of the code. It soon became apparent that the first desirable requirement was a good group code-practice oscillator to substitute for the three or four bad-sounding buzzers the Scouts were using.

The above manual had the perfect answer, an excellent switching setup and an oscillator to match. The only difficulty came when I couldn't find a 220-ohm line cord or the 70L6GT amplifier-rectifier tube, which has entered the realm of the high-priced obsoletes. So I revised the circuit, substituting a 35B5 and a 35W4 for the 70L6GT, and a 35W4 for the dropping resistor line cord The diagram of the revised oscillator is shown in Fig. 2.

I did not have a universal adjustable-ratio output transformer called for in the original circuit so I substituted an output transformer, T_1, with a 14,000-ohm primary and a 3.2-ohm secondary.

The frequency of the oscillator wasn't just right and, after some experimenting, capacitors C_6 and C_7 in Fig. 2 were put into the circuit as shown. This gives a high or low tone which can be selected by switch S_3. Switch S_1 was changed from the original circuit to an s.p.d.t. unit so that J_1 could be added. This jack is used when it is desired to feed a signal through the student's earphones from a tape recorder, ham receiver, or from another oscillator. In order for this new input signal to be heard, the instructor's key must be closed. For safety's sake, the complete code-practice circuit must be isolated from the metal chassis. The chassis must be connected to an earth ground. — *Jack Davis, K3DKE*

400-CYCLE TRANSFORMERS

FOUR-HUNDRED-CYCLE transformers may be used on 60-cycle current by dividing all the voltage ratings by 6.66.

— *Frederick Cunningham, K1AJZ*

NEW BALANCED-MODULATOR TRANSFORMER DESIGN

DICK STEVENS, W1QWJ of Springfield, Mass., one of the pioneers of v.h.f. single-sideband work on the east coast, reports excellent results with a balanced modulator at 432 Mc. using a new transformer design. The sketch in Fig. 3 gives the dimensions of the core, which are somewhat close but necessary, since they contribute

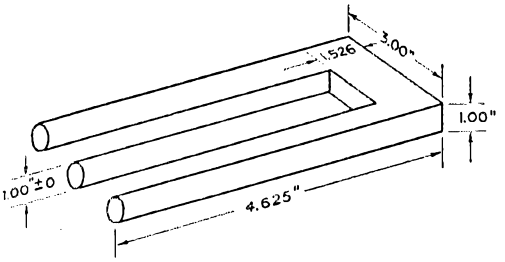


Fig. 3—Unusual core design is secret of balanced modulator capable of —80 db. carrier suppression, a performance heretofore obtainable only through cascaded balanced modulators and elaborate shielding. Litz wire is recommended at frequencies below five megacycles.

so much to the transformer's success. The same core has been used at frequencies as low as 4 Mc., with proportionately more turns and Litz wire. Mr. Stevens, an unusually modest radio amateur, does not claim the design is original with him.

— *B. G.*

25 Years Ago this month

April 1939

KBW ruefully wrote about the impending invasion of forty meters by DX broadcast stations, and said defiantly that we intend to keep 7000–7300 kc. for hams only on this side of the water! ("Cairo Regulations" permitting BC operation in the 40-meter ham band were to take effect in September 1939).

. . . "Feedback" first appeared in this issue of *QST*, as a result of a suggestion by W6QQE.

. . . Technical articles included "A DX Man's Superhet" receiver for 7, 14 and 28 Mc.; coupling for close-spaced beams; a 6L6 three-band forty-watt c.w. transmitter, and an orthographeximaniac-disappointer called "A Double-Barrelled Antenna System."

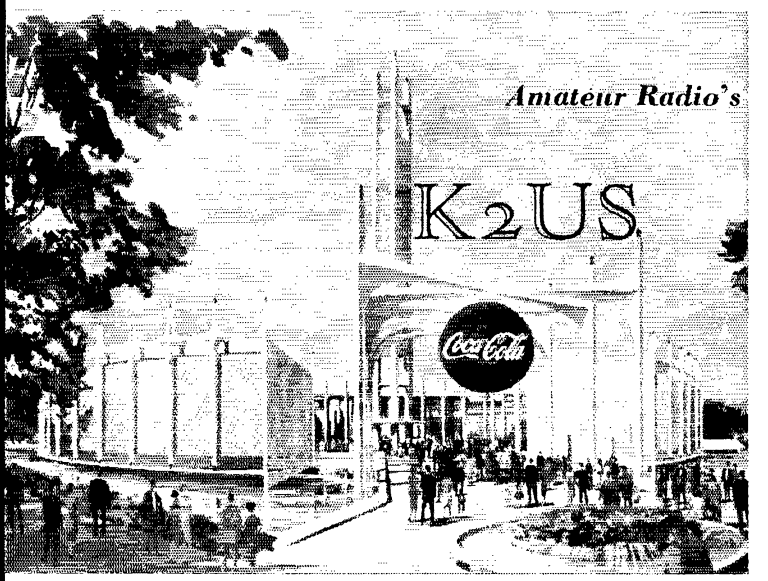
. . . FCC was squelching rumors about suspension of amateur radio license renewals caused by the European war threats. The U.S. amateur population had passed 51,000 in February 1939.

. . . New regs called for any operator other than the licensee to sign a station log, and banned duplex (A9) working on amateur bands.

. . . Among the new tubes reviewed that month which are now old, but served us many years: 6X5GT, 6V6GT, 6K7GT, 6F5GT, 6J5GT, 35L6GT, and 50L6GT. The 6SA7 was a new pentagrid converter.

. . . Other technical articles also described a superhet converter for 5 and 10 meters, checking beam antennas with an S-meter, a peak-limiting audio amplifier for ham use, a frequency-checking superhet, a diode a.c.-d.c. electronic voltmeter, a hurricane emergency receiver, and a multivibrator.

. . . Nontechnical features were "Safety Devices for Amateur Transmitters," "OQ5ZZ [Congo Expedition] Calling 'CQ USA'", and results of the Ninth ARRL Sweepstakes. QST



Amateur Radio's Voice at the Fair

THE NEW YORK WORLD'S FAIR, opening April 22 for the first of two seasons of operation, will have an added attraction for amateurs through the installation of a completely equipped ham station in the Coca-Cola Company pavilion, operating under the specially assigned call K2US.

Plans for a station at the Fair have been hopefully under discussion for several years, and something more than a year ago came to fruition through the assistance of a number of interested amateurs and organizations. To name a few: Ralph Charbeneau, W8OLJ; Bill Leonard, W2SKE; the Hudson Amateur Radio Council; the Hallicrafters Company; and the makers of Coca-Cola.

K2US will be located on a second-floor terrace of the pavilion, overlooking the main area. A glass window will permit the public to observe operating activity. Exhibit material and "handout" literature will show the importance of amateur radio in the nation's communication picture. Message traffic will be accepted. Any visiting U.S. amateur showing his license will be welcome to operate the station; there are three complete equipment installations.

The station is licensed to and will be supervised by the Hudson Amateur Radio Council. Volunteer hams will keep the station on the air on all bands 80 through 2 meters. Distinctive QSL cards are in preparation.

A 120-foot tower, housing the world's largest carillon, is a centerpoint of the Coca-Cola exhibit and was hungrily eyed by amateurs as an ideal skyhook; it was decided, however, that radio interference might become a serious problem and therefore the ham antennas will be located to the rear of the building.

K2US will be amateur radio's voice at the Fair. The existence of this station is another good opportunity to enhance the amateur image in the public mind. Be sure to visit it this year. QST

An Antenna Relay for the Beginner

BY ROBERT HANES,* K3OMY

SWITCHING the antenna between receiver and transmitter may be a problem to the beginner. The convenient toggle switch is not suitable for r.f. switching, and rotary switches sometimes do not stand up well under the repeated use which an antenna change-over switch must suffer. In any event, the switch must be placed in a spot where it can be operated conveniently. This requirement usually means that the feed line must be detoured to reach the switch, and that bulk is added to the switch by the various feed-line connectors needed.

How A Relay Operates

These are a few of the factors that make an antenna relay desirable. A relay, as most readers know, is simply a switch that can be controlled remotely by electrical means. A relay may take any one of a variety of physical forms, although all of them work on the same basic principle. The sketch of Fig. 1 shows the essentials of one common type. The arm of the relay switching mechanism (often called the armature) is hinged so that it can move up and down. The armature is held in one of its two positions by a spring, as shown in Fig. 1A, when no voltage is applied to the coil. When voltage is applied to the coil, the magnetic field of the coil pulls the armature down into its second position where it will remain until voltage is removed from the coil. To operate the relay, all that is needed is a source of voltage and a simple toggle switch to turn the voltage on and off. The relay can be placed in the most desirable point in the feed line, such as at the rear of the transmitter, near the coax output connector. The switch can be located in a convenient position on the operating table — several feet from the relay, if necessary. Since no bulky connectors are needed, only a minimum of space need be found at the operating position for the switch.

Magnetic Coils

Relays are made with magnetic coils designed to operate at some specific voltage. There are, for instance, relays for mobile use which are designed to operate from a 6- or 12-volt car battery (d.c.). But the ones most suitable for home use have coils designed to operate from the 115-volt a.c. line. These are particularly convenient, since many of the manufactured transmitters now on the market have an a.c. outlet into which the relay control line may be plugged. The internal wiring of these transmitters is such that the antenna relay is switched by the receive-transmit switch, or the final-power switch on the panel of the transmitter.

Relay Switching Elements

The switching parts of relays are also made in different forms according to the use for which they are intended. There are types designed specifically for switching coaxial antenna feed lines, but these are relatively expensive. At least for coax-cable switching at 3.5 through 28 Mc., a satisfactory substitute may be made by placing a much cheaper relay in a metal box, and fitting the box with suitable connectors. This

* 1855 Irving St. NW., Washington 10, D. C.

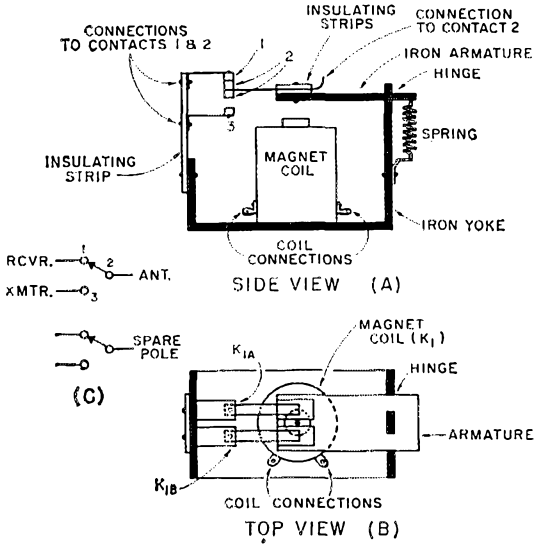


Fig. 1—A and B show side and top views of a typical relay. Terminal arrangement varies from one specific type to another, but terminals corresponding to those shown here may be determined by inspection of the relay. Notice that all electrical-circuit parts are insulated from the relay frame. Detail C at the left is a switch symbol to which the relay switching circuit corresponds.

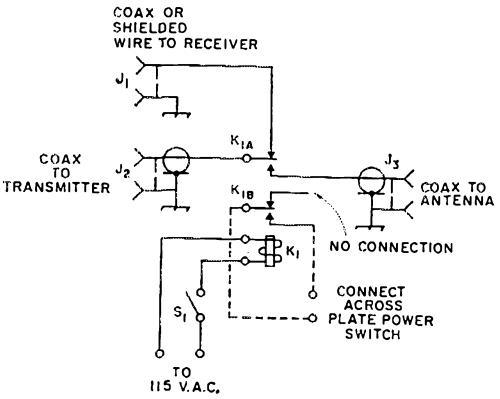


Fig. 2—This is a wiring diagram of the relay box. In this instance, J_1 is a phono jack (single-hole mount). J_2 and J_3 are SO-239 chassis-mounting coaxial receptacles. S_1, if used, may be an s.p.s.t. toggle switch (see text). The dotted lines indicate connection to the spare pole of the relay if simultaneous power control is desired as described in the text.

relay can be of almost any type that you happen to have, or can swap for or buy second-hand, provided that its coil is designed for 115 volts a.c. If you have to purchase a new relay, you can get one that is designed for 300-ohm antenna-line switching. This type has a little better r.f. insulation than types designed to switch power circuits, although it usually costs no more than a power-switching relay.

The switching parts of relays may have from one to several "poles." These poles correspond to the "arms" of a switch. The relays that you are most likely to encounter will have two poles, and will correspond in application to that of a double-pole double-throw switch. See Figs. 1B and C. Only one pole is needed in switching a coaxial line; the two poles may be connected in parallel, or the extra pole may be used for some other purpose.

Relay Connections

In normal operation, the antenna is connected to the receiver for longer periods than it is to the transmitter. For this reason, the unenergized position of the relay is used to connect the antenna to the receiver. These connections are shown in Fig. 2. This diagram also shows the connection of the relay coil through the control switch, S_1, to the a.c. line. If your transmitter does not have a relay-control outlet, and you know where the *primary* terminals of your high-voltage transformer are located, the switch can be eliminated, and the coil leads connected across the primary. Then the antenna will be switched to the transmitter when plate power is applied.

Another possibility is to locate the switch that turns on the high-voltage supply in your transmitter, and connect the spare pole of the relay across the switch terminals, as indicated by the dotted lines in Fig. 2. Then, if the high-voltage switch in the transmitter is left open, S_1 will control both antenna and power switching, eliminating one operation.

Construction

The enclosure for the relay can be any of the small separable metal boxes available in various sizes and styles from radio stores, or one can be made from sheet aluminum or No. 22 galvanized steel sheet. Fig. 3 indicates how the metal may be cut, while Fig. 4 shows how the box is formed. The height, width and length of the box (dimensions A, B and C in Fig. 3) will depend upon the size of the relay used. Be sure to allow sufficient

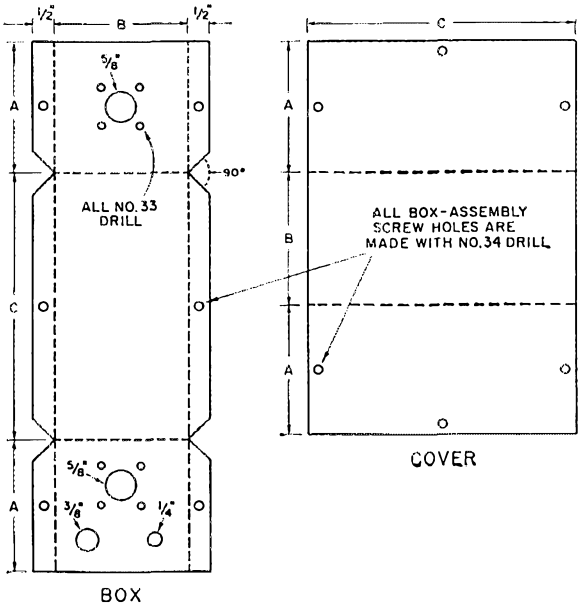


Fig. 3—Sketch showing how the sheet metal is laid out to form the relay box. Dimension A will be the height, B the width, and C the length desired for the finished box. All bends (along the dotted lines) are made upward (away from the page). Connector-mounting holes should suit the connectors used.

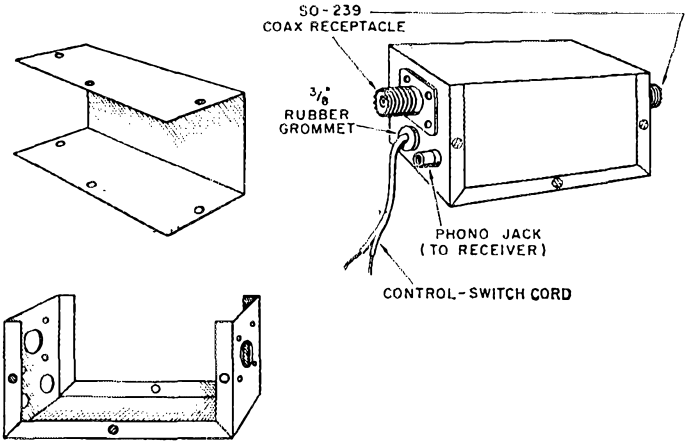


Fig. 4—This sketch shows the box and its cover at the left, and the finished unit at the right. The box should be grounded as described in the text.

space for the connectors and wiring. A box measuring 3 inches for dimension A, 4 inches for dimension B, and 5 inches for dimension C will take care of most relays. No. 6 sheet-metal screws, ¼-inch long, are used to fasten the cover in place.

A chassis-mounting receptacle to fit the kind of plug you use on your coax feed line should be mounted at each end of the box. The sketch of Fig. 4 shows SO-239 receptacles. If you use phono connectors, or some other type of connector, a suitable receptacle should replace the SO-239. A phono jack is shown for the receiver-input connection. A line of small coax fitted with a phono plug can be used between the receiver input and this jack. Here again, the phono jack may be replaced by another connector of your choice. The control line to the relay coil consists of rubber or plastic lamp cord. This cord is brought out through a ⅜-inch (mounting-hole size) rubber grommet. The free ends of the cord are connected in one of the ways described previously.

In making connections to the relay terminals, do a careful job so that no shorts will occur, or the a.c. line come in contact with any part of the feed-line wiring. To avoid a dangerous situation should the a.c. line come in contact with the box, a wire should be run from one of the box-assembly screws back to the ground terminal on the transmitter which, in all cases, should be connected to a water pipe or other good earth ground connection. It should not be necessary to remind readers that no work should be done on transmitter wiring until the unit has been completely disconnected from the a.c. line. Coaxial cables already fitted with connectors may be obtained in the short length needed to connect the relay box to the transmitter. If you have to make this short section of line yourself, you will find a description of the proper method of attaching the coaxial plugs in the workshop chapter of the ARRL *Handbook*. The short line from the transmitter plugs into one coax receptacle on the box (it doesn't make any difference which one), and the antenna feed line plugs into the other. QST

Strays

FEEDBACK

W4DFR advises us that some who have built his "Junk-box Frequency Standard" described in the January issue are having difficulty in re-zeroing the circuit when the multivibrator is switched in. He states that it may be necessary to use a capacitor with a lower minimum capacitance at C_5. He suggests a Centralab type 829-10 which has a range of 1.5 to 10 pf., and which he used in his original model. It also appears that care should be used in mounting the capacitor well away from grounded metal, and connecting it with the shortest possible leads to reduce stray capacitance. The author also offers to supply copies of his original manuscript, which goes into the adjustment in greater detail, on receipt of a self-addressed envelope and 15¢ postage.

More About the W6SAI-W6KEV Six-Meter Half-Kilowatt

A good many readers must be interested in high-power 50-Mc. transmitters these days. Quite a number read the article by W6SAI and W6KEV in January *QST* closely enough to note an error regarding adjustment of the bias supply.

Under "Transmitter Operation" on page 28, the instructions say "Adjust the series resistor to pass maximum current (40 ma.) when the supply is disconnected from the transmitter." Obviously, this would result in excessive VR-tube current when the transmitter draws grid current. It should say ". . . to pass minimum current (about 10 ma.) when the supply is disconnected from the transmitter."

Author W6SAI also adds that builders worried about TVI caused by harmonics of the exciter frequency need not worry. The loose link coupling between the doubler plate and final grid minimize this problem. Such a tuned circuit, or a low-pass filter in the antenna circuit (desirable in any weak-signal TV area), should take care of the most difficult circumstances. Since a high percentage of 50-Mc. TVI results from overloading of the receiver on the low channels, especially Ch. 2, the very small amount of energy radiated on other than the transmitter output frequency is seldom a contributing factor. Nearly all 50-Mc. TVI has to be cured *at the receiver*. — *E.P.T.*

Hamfest Calendar

Alabama — The Montgomery Hamfest will be held April 19 at Normandale Shopping City, Montgomery. Banquet Saturday night, April 18. Contact WA4KEN, secretary-treasurer of MARC, P.O. Box 6187, Montgomery.

Alabama — The Birminghamfest is scheduled for the first week end in May, the location to be announced. Lillian Bankston, K4DSO, can provide more information.

Florida — The Orlando hamfest has been rescheduled for April 18 and 19 since its announcement in this column in March. Georgia Denman, K4ZXS, has the details.

Illinois — The Kishwaukee Radio Club will hold its annual swapfest May 3 at the Hopkins Park Shelter House on Ill. Rt. 23 north of DeKalb. A dollar donation to get in, no commission or other charge to swap or sell your gear. Contact Al Brand, 415 E. Sycamore St., Sycamore, Ill.

Illinois — Old Timers Night of the Egyptian Radio Club, Inc., will be held at the clubhouse south of the Chain of Rocks Bridge at 8 P.M. April 16. Old-time licensees, especially of the St. Louis area, are invited to fraternize and reminisce; non-old timers are cordially welcome, too. A movie made of ham stations by WØYRX in the 1930s will be shown. For further information, contact Bill DuBord, WØQDF, or Joe Russo, K9TCU, co-chairmen.

Illinois — The Moultrie Amateur Radio Klub is having its third annual hamfest and auction April 26. More than one thousand are expected to attend. Lunches served, free coffee and donuts 7-7:30 and 9:30-10 A.M. Playground and picnic facilities. Movies, free, for kids, after 2 P.M. At the American Legion Hall, Wyman Park, Sullivan, Ill. Contact W9PHD for preregistration, details.

Kansas — The Neosho Valley Radio Club (Emporia) hamfest will be Sunday, May 3, at the National Guard Armory on K-99 in northern Emporia, rain or shine. Covered-dish picnic at noon. Registration fifty cents. For more information, contact WØZGB, 420 Neosho St., Emporia, Kansas.

Maine — The Portland Amateur Wireless Association will hold its annual hamfest and supper in Portland April 25. For further details and tickets, contact K1GAX, K1JKT or K1OYB.

Maryland — The B&ORR ARC will hold its annual banquet and hamfest at Waverly Presbyterian Church hall, Baltimore, April 11. Registration at 6 P.M., dinner at 7. Tickets available from W3BVL, Activities Manager, B&ORR Amateur Radio Club, Box 7388, B&O Bldg., Baltimore 1, Md.

Mexico — The National Convention sponsored by the Club of Radioexperimentadores del Occidente will be held in Guadalajara May 14, 15 and 16. The convention manager will process applications by U. S. amateurs for mobile permits.

Michigan — The Grand Rapids Hamfest is scheduled for May 9 at the Pantalind Hotel. Details not available.

New Jersey — The Delaware Valley Radio Association presents its Old Timers Nite roundup and hamfest May 2 at the Stacy Trent Hotel in downtown Trenton. Tributes of the day will go to New Jersey, 300 years old in 1964; ARRL, 50 years old; and the host club, 35 years old. And to the old timers. Festivities start at 3 P.M. in the Terrace Room. Contact W2CCO for more information.

Ohio — The Dayton Hamvention April 24-25 will be bigger and better than ever. New larger quarters, all under one roof. Saturday, all day. XYL programs. Location is Wampler's Arena on Shiloh Springs Road; free parking available and shuttle bus service to downtown Dayton and all accommodations. Detailed brochure and accommodation list on request from P.O. Box 426, Dayton, Ohio.

Pennsylvania — The Lancaster Radio Transmitting Society, Inc., celebrates its 25th anniversary at the annual banquet Saturday, May 9. Festivities begin at 6:30 P.M. at Hotstetter's Banquet Hall in Mt. Joy. Advance registration from W3OY, 136 Springhouse Road, Lancaster; phone 717-392-6093.

Pennsylvania — The annual banquet of the Reading Radio Club is scheduled for April 18 in the Anniversary Room of the Crystal Restaurant on Penn Square in Reading. Advance tickets are $5.00; after April 14 they will cost $7.50. Dancing, dinner, orchestra, all the trimmings. Write banquet chairman W3EYN, 121 South 11th Street, Reading, for reservations.

South Carolina — The fifth annual hamfest sponsored by the Blue Ridge Radio Society, Inc., will be held Sunday, May 3, in Greenville. Swap shop, dinner and more. Inquiries to WA4KLU, 4 Blackstone Dr., Greenville, So. Car. 29609.

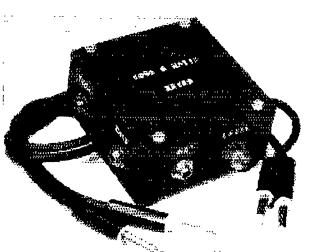
Texas — The Panhandle ARC is holding its annual Golden Spread Hamfest May 2 and 3 at the National Guard Armory in Amarillo. Contact W5AAB for details.

Wisconsin — The annual Southeastern Wisconsin Hamfest, sponsored by the Racine Megacycle Club is slated for April 11 at Dania Hall, 1019 State St., Racine. Registration begins at 1 P.M., dinner at 6 P.M. Reservations on or before April 7 only, from W9KZZ, 2610 No. Main Street, Racine.

QST would like to help publicize *your* hamfests, swapfests, auctions, picnics, and banquets. Send full information, including date, time, place, and ticket information, to "Hamfest Calendar", in care of League Headquarters. The deadline for each month's column is the twentieth of the second month preceding publication (April 20 for the June Calendar). If the event will be held in the first week or ten days of a month, send it in in time for the preceding issue (July 1–10 events will appear in the June issue).

• New Apparatus

Code-O-Matic Keyer



THE keyer shown in the photograph is designed to convert a tape-recorded keyed audio tone into direct relay keying of a transmitter. This means that CQs, station identification or any prerecorded information can be transmitted automatically by inserting the Code-O-Matic between the station c.w. transmitter and a tape recorder containing the information as keyed tones on a tape. Also, a receiver or any source of a keyed tone such as a code practice oscillator can also be used to key the transmitter via the Code-O-Matic.

About 1 watt of audio at low impedance (3 to 8 ohms), between the frequency range of 200 to 2000 cycles, is necessary to drive the Code-O-Matic. There are three jacks mounted on the unit, TAPE, XMTR, and KEY, that are used for making connections between the external equipment and the Code-O-Matic. Patch cords for connecting existing equipment to the Code-O-Matic are available as accessories.

The Code-O-Matic circuit consists mainly of a rectifier and relay combination. Audio tones from the tape recorder are rectified, and the resulting d.c. signal powers a relay whose contacts key the transmitter. A neon bulb is in the circuit across the relay coil to permit visual adjustment of the input level to the proper value.

Dimensions of the unit are 4 inches wide by 4 inches deep by 2 inches high. Weight is a little over one pound. The keying relay is rated at 500 volts breakdown and has a maximum keying speed of 30 w.p.m. or better. Relay contacts are rated at 5 amperes. The Code-O-Matic is manufactured by the H & M Engineering Lab., 2606 Immanuel Rd., Greensboro, N. C. — *E. L. C.*

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When *(cont'd)*:

A subject constantly fills my thoughts. . . . I mean the transmission of intelligible signals to any distance without the use of wires.

— NIKOLA TESLA, 1894

Those two weeks of DXing that shook the short-wave world in 1939 were, as we pointed out last month, the high-water mark of a sudden DX Renaissance, a sort of amateur Athens of Pericles. The Big One is its Mona Lisa, its Parthenon, immortalized for ham posterity through the pages of *QST*. There will be bigger DX contests some day, for records are made to be broken, but never again will so many work so much with so little.

They were giants in those days, to pin a worn huzzah on DX men of the 1930s. Masters of improvisation and the unconventional, they thrived on junkboxes, haywire and asymmetry. The amateur tradition of technical ingenuity was their trademark. They skimmed their beat-up breadboards through seas of midnight oil, squeezing out the last watt and dragging in the last microvolt. They perfected a rugged communications competence that would soon be calling signals in the roughest, toughest contest of them all, WW II.

They got along without electronic keyers, single sideband, multiconversion receivers, transistors, poly insulation, pi-network tanks, mech filters, t.r. switches, product detectors, s.w.r. bridges, *Q* multipliers, VOX, coaxial cable, ceramic components, differential keying, cubical quads, CRPL forecasts and a host of other boons we take for granted. When something blew up it went back to the factory, all right; the factory was their own well-scarred collective workbench. Armed with dog-eared ARRL *Handbooks* and *QST*s, how they relished their "rebuildings"!

But old timers had freedom from the menace of TVI, you say. Hah — no neighbors ever got any huffier than those whose Amos 'n' Andy was loused up by key clicks or stray audio. In Depression days broadcast sets, like some ham gear, often were holdovers from the Atwater-Kent era, wide-open junkbins hooked to loose-jointed chunks of oxidized wire draped over housetops. BCI! They sucked in clean 7-, 14- and 28-Mc. signals and panicked whole neighborhoods.

Propagation conditions were undoubtedly better then, much better than those we face today. But the prewar ham worked with generally lower power levels, less signal stability (you should have heard those yoops and drifts on 10!), much less receiver selectivity and a minimum of flexible directive antenna gain. No wonder the adage became common that getting DX results was 90 per cent operator.

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

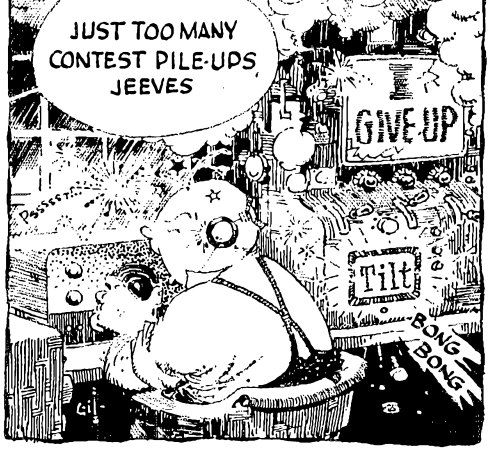
Do we imply that the DX man of a quarter century ago was somehow naturally superior to the DXer of today? Not at all, although if *you* think the shoe fits you're welcome to try it on. 'Twould be like comparing apples with oranges, anyway, for our whole technical and economic environment has changed. The average 1930s ham in pursuit of DX knew his apparatus more intimately and performed at a relatively higher technical level merely because he had to. There was no easier alternative route to his objective, no 1960s primrose path of paraphernalian plentitude.

His goal, of course, was exactly the same as ours today. It's the constant *k* in amateur radio, a basic incentive that urged Marconi and Maxim to prodigious feats and still motivates us all. Simply this: QSOs, more and better QSOs.

What:

The ARRL DX Contest, braving heavy ionospheric odds, was just what the doctor ordered to get the 1964 DX ball really rolling. And rolling it is! After a rather slow mid-winter start, it looks as though this year is out to beat 1963's surprising performance in the long-haul line. If we're to squeeze in a sample of recent DX results reported by the "How's" grapevine we had better get with it. Let's start with

160 c.w. where DX, and *good* DX, is now collected in cool matter-of-fact fashion by the stay-up-lates. It used to be that only U.S. seacoast stations had solid shots at 1.8-Mc. transoceanic stuff, but K5HRR (K5ABV at the pump) collected DL1FF, G3s GRL PU, GI6TK, GM3IGW/a, HK4EB, HR3HH, KH6s EPW PI, KZ5FC, 6YAs CZ and XG, and Oklahoman K5JVF got some of those plus VP7s NS and NY. W6YKS made it to KH6, and W1BB reached the 76-country mark on 160 thanks to 9A1VU (DL1VU). W6ML two-wayed with G3PU and VS1LP in January fireworks. Other DX stations getting their shares of 1.8-Mc. thrills are DJ3VC, DLs 7AA 9KRA, EA2CB, EI9J, dozens of Gs, GC3EML, GMs 2BUD



3NYY 3PBA, GW3s CBY FSP JI LDB, HB9s CM EO T, OHs 2HK 2NB 2TH ØNH ØNI, OKs 1ACC 1AMS 1FP 2KGV 3BA, PAØs CD PN, VK5KO, VPs 7NU 8GQ, ZB1BX, ZB2A, ZL3OX, 3A2BZ and 5N2JKO, almost all congregated in the lower U.S. band segment. Spring static is moving in now up W/K way but don't let it chase you off the band too soon, for you may miss some choice southern hemisphere stuff where things are quieting down.

75 phone is peppy, indeed, with W6YKS, K1VWL, DARC and ISWL diggers coming up with **CT1s** AY *1 GMT*, 8Q 0, **DL5CF**, **EA9AZ**, F9RY/**FC**, **FG7XT**, **Gs** 3DO 8PO, **GI6TK**, **HC2JT**, **HK4EB**, **HR3HH**, **HZ1AT**, **IIs** BFI DFD JZ, **KP4s** AWH CO, **KZ5FC**, **LX3BW**, **MP4BBW**, **OH0NI**, **OKs** 1ADP 2OP, **OX3s** JV KW, **OY7ML**, **PAØBWM**, **PZ1AX** 4, **SL6BH**, **SMs** 5BOU 7DSC, **TF3RM**, **TI2s** JAC PI, **UQ2FX**, **UW9AF** (*3598 kc.*), VO1s CM DI, **VPs** 7CC 7CW 7NS 9BN 9FE, **VSIs** GZ LP, **XE2ET**, **YVs** 5AGD 5ANS 5AVH 5BAR 5BPJ 6DO, **ZB2AH**, **ZLs** 1AIX 1AMO 1ANX 2BE 3UN 4LM 4LT, **3A2s** CT CV, **4U1ITU** 0, **4X4s** AS DK 0, IX, **5As** 1TW 3CJ, **5N2JKO**, **7X2VX**, **9Q5s** AB and RK, all single sideband. **CT1JH**, **DL7HK**, **Gs** 2XY 3DKJ 3RVX 6FU 6LX, **GC3KAV**, **GD3FRK**, **GM3OTF**, **HB9ADV**, **PYVPR** (3798), **XE1PFF**, **4X4AX** and **OHØNF** are straight-a.m. candidates mentioned.

80 c.w. rises to the occasion when 40 wearies. **Ws** 1SWX/1 6YKS 7DJU, **Ks** 4TWJ and 5JVF write about **CT1DJ** (*3506*) 8, many DJ/DLs, **DM3MSF**, F9UC/-**FC**, scads of **Gs**, **GI3SKH**, **GM3KBZ** (5) 9, **HA1KSA**, **HKs** 4DP (3), 7ZT (7) 10, **HV1CN**, **JAs** 1CRT/mm in the Atlantic, 1ELX 1HGY 2WB (5) 10, 3ALO 6AK 7ACM/-mm 7LK, **KV4CI**, **LA9FG/p** (1), **LU1ACF**, **LZ1KPZ**, **MP4BBE**, **OD5LX**, lots of **OKs**, **PAØDC**, **PY1BTX**, **SMs** 5BCE 5BRF 7BYL, **UAs** 3DA 9KSA ØAB, **UB5FM**, **UC2OM**, **UH8s** DX NR, **UP2KNP**, **UQ2KCC**, **VK3DQ**, **VR2DK** (13) 9, **VS1LP**, **YU1BCD**, **YV3FB**, **ZB1s** BX RM, **ZK1BW**, a hatful of **ZLs**, **ZS1A** (1) 2-5, **4X4WF**, **5N2JKO**, **7X2NJ** and **9Q5AB**.

40 phone shows some spunk, too, and **Ks** 1VWL 5HRR and ØJPL, with DARC and ISWL assisting, give us the scoop on s.s.b. items like **CX2CO**, **DL6UN**, G2PU, **HK7YB**, **JAs** 1FSL 2BAY, **KC4USV**, **KV4AA**, **KW6ED**, **KZ5s** AW BO, **MP4BBW**, PJ5MC, **PZ1s** AE AX, **TC3ZA** of Turkey, **TG9MP**, **TI2s** CHV JIC, **UP2KOP**, **VKs** 2AVA 3ANR 3ATN, **VS9AAA**, **XEs** 1CCW 1DDM 1GJ 2IG, YV5s ANG BPJ, **ZL1s** ABD AIX, **ZSs** ICG (91) 5, 2HI 3E (96) 5, 6AOW, **4X4DK** and **5N2JKO**.

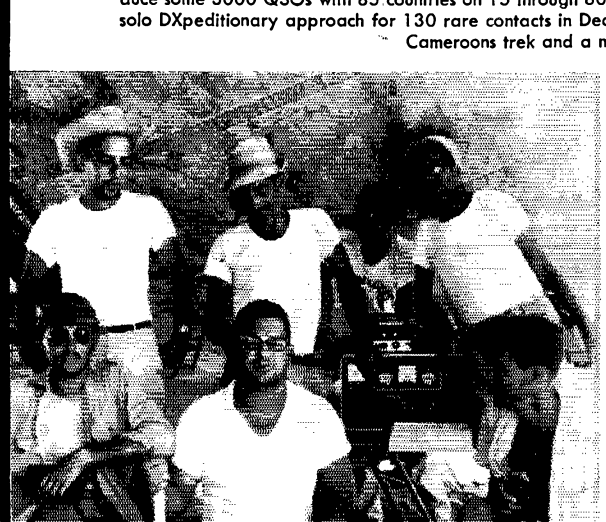
40 c.w. continues its DX rampage. **Ws** 1ECH 5KNE 6YKS 7DJU, **Ks** 1VWL 3MNJ 4TWJ 5HRR 5JVF 5YPS ØJPL, **WAs** 2WIJ 6KHK 6TGH, **WBs** 2FMK 6DEJ and 6FWW track down **BY1PK** (15) 1, **CEs** 2BM (1) 4, 3ZK 8FC (32) 6, **CMs** 1AR (13) 4, 2QN (27) 3, 3PC 5EG (6) 4, **CN8s** FN FW GB, **COs** 2BB 2JB 2VQ 3AG 7RM 8OU, **CR6AI** (3) 22, **EA8BF**, **EI6AK**, **EL2AD**, **ET3MEN** 19, F2CB/**FC**, **FB8XX**, **FM7WB**, **GC3FLJ**, **HC2RT**, **HIs** 3PC 8NPI, **HKs** galore, **HM1BV** (12) 15, **HZ1AB**, **HP1IB** (8) 11, **ISIs** FIC MM 15, **IT1s** AGA LOP, **JAs** 1BFW 1CFD 1CG 1CJN 1CRT/mm 1DDR 1FGW 1GO 1HGY 1HLR 1IBX 1JCE 1KFU 1OIO 2CUY 2DCN 2DKN 3BHO 3BQH 3DDG 3FIL 3GBH/mm 5ACD 5ADR 5VB 5YAP 6AK 6CMM 7AGO 7BN ØBBB, **KC4USK** (15) 2, **KG4AM** (5) 4, **KR6s** BQ (1) 14, DJ NG (13), SB, **KV4s** AA (3) 10-11, CI, **KZ5s** BO FC KW 4, **KX6AJ** (3) 13, **LU3ZI**, **LX1KA**, **LZ1KPZ**, **MP4s** BEE (12) 21-2, BEJ TAS 19, **OA8D/3** (7) 2, **OD5LX**, **OH0NF**, **OX3AY**, **OY7CN** (1) 1, oodles of PYs, SL8AY/mm, SM5BKK/**9Q5** (those Swedes get around), **SV1AB**, **TFs** 3AB 3KB 5TP, **TG9SC** (13) 6, **TL8SW** (3) 0, **TU2AU** (8) 3, **UA1KAE/1** of Antarctica, **UAØs** FF KAB 14, KCU KIB 15, KZD MX 11-12, NG, **UG6GG**, **UJ8AH**, **UH8AE**, **UL7s** BF KFB LV, **UW4HY** (like UA4), VE8s DL RG RN, mucho **VKs** including 9GL, VO1BD, **VPs** 2KD (6) 12, 2KJ 2MV (6) 12, 6PJ 7BG (15) 0, 7BQ 7NQ 8GQ (4) 3, 8HF/mm 8HJ (18) 4, **VQ2s** BC FC WR (4) 18, **VSs** 1JW (12) 16, 1LJ 1LP (10) 16, 1LU 1LV (4) 15, 6EY 6FF (7) 16, **VU2PF**, a batch of XEs, **YNs** 1FR 3KM, **YUs** 3EHI 4JOP, a dozen YVs, **ZB1CR**, **ZEs** 1BL (18) 4, 3JJ (3), ten ZSs, more ZLs, **4S7WP** (10) 20-21, **4X4s** DI MN NPW QA RO SW TT, **5As** 1TW 3CJ, **5B4TX**, **5H3HD**, **5Z4IV**, **6N5X** (5) 16 who is W2AYN in Korea, **6W8AC**, **6YAMIJ**, **7X2NJ** (9) 21, **9G1FE** (6) 22, **9L1TL** 23, **9M2GJ** (7) 17, **9Q5AB** (2) 23 and **9X5MH** (1) 23 . . . . . They're even catching the fever on our **40 Novice** range. **WNs** 5HUT and 6FHH coming through with **KG4AM**, **WH6FIL**, **WL7ETH** and XE2MD around 7170 kc.

15 phone finds **Ks** 4JSZ 5YPS 7VMO 8LNL 9CZV ØJPL, **WAs** 2ZVJ 4DZU 5AER and **WB6FWW** cleaning up on non-s.s.b. a.m. to the tune of **CE3XP**, **CO8RA**, **CRs** 4AY **5SP** 6CA 6GC 6JA 6JL 15, CX4BI, **EA8s** CK CR DM, EL5D, **HC2s** SB WG, **HKs** 1OK 6AEB, **HP2MR**, **HR3JZ** (300) 18, 1T1PST, JA1DVN/mm, **KG4AA**, **KV4s** DE CQ 15, **KX6DB**, **KZ5UN**, **LUs** 5ED 5HG 8FAO, **M1B**, **OAs** 1W 4GP 4KC 5AH 5C, **PJs** 2CU 2CY 3AJ 3CD, sundry PYs, **PZ1s** BA BX (320) 15, SV1AD, **TG9s** KJ SC SM, **TT8AN**, **TU2AU**, **UW3BV**, VE3BGV/-**SU**, **VPs** 1AB 2DAA (260) 19, **2LA**/p (300) 19, 2LS (340) 18, **2SY** 6AG 6AQ (300) 15, **7NC** 8EW 9BO, **VQs** 2JC 8AV (254) 15, VS9AE, **XE3s** CPL L, **YNs** 1TP 4CWH 6RD (250) 17, 8OK, YS1LA, **YVs** 5AGD 5AGM 6AX 6EN 17-18, **ZB1s** BX CR RM, **ZEs** 2JA 6JS 6JR 7JR, **ZK1AR**, **ZPs** 5CG 5EB 5JE (350), 6BB, **ZSs** 1AB 1DV 6BFI, **5As** 1TK (260) 14, 2CX 2TG 3AJ 3CI 3TV 5TW, **5B4s** AK HK, **5H3RW**, **5N2FEL**, **5U7AC**, **6W8AE** 16-19, **6YAs** AH (230) 20, LT, **9G1s** DM EC EE EZ, **9Q5s** HF III (252) 19, **9U5s** BB and BH. Sidebanders generally don't fool around with 21 Mc. but some exceptions are **KC6BO**, **KV4CF** 15, **PZ1AX**, **TL8SW**, UAØEH, **VK2s** BK NN, **VPs** 2KI 2KJ 18, 2KZ 15, 5NK, YS1FQM 19, ZE4JN, **ZB1A**, **ZS7S**, 4U1SU, **5B4CZ**, **5N2JKO**, and **7X2VK**. Yes, strange as it may seem, if you're after phone DX on 15 you'd better jab with old-style a.m.

15 c.w. looks toward a prosperous springtime, and so do 21-Mc. code hounds **Ks** 3SLP 4JSZ 5YPS 8LNL ØJPL, **WA6KHK** and **WB6FWW**, mainly because of **CE3ZK**, **CRs** 6DX 6JJ 7LU, **EA5AF** (30) 17, **ET3s** GC USA, **FB8XX**, **FR7ZD** 17, HK3LX, JA3GBH/mm, **KR6s** BQ DP, **KZ5FC**, **MP4QBF**, ON4CD, OH8QJ/mm near Crete, **PYs** 1MCC 5ASN, **TG9s** AD FA, **SVØWAA**, assorted VKs plus **VK7SM**, **VPs** 2KJ (140) 17, 7NT 8GQ 8HF/mm, **VQ2s** IE JG WR, **VU2SO**, WN9KLO/**KG6**, **YV5BTK**, **ZD6OL**, **ZEs** 1AS 1BA 1BK 8JN, **ZK1AR** (50) 21, **ZL2GH**, **ZSs** 1O (60) 17, 2CB 2GF 5OT 5UB 6CR (70) 19, 6DL 6MIM, **4S7NE** 11, **4X4s** MR NY, **5B4CG**, **5H3HZ**, **5N2RSB**, **5R8AB**, **5Z4IV**, **6W8s** AC DD, 9G1EO, **9Q5s** AB AV and TJ (50) 19 . . . . . Things on the **15 Novice** range could be livelier, but **WNs** 5HUT 6FHH and 9AVT do okay with **KH6EHR**, **VR2DK** (141), **WP4s** BPD BPH BPR and **YV4FX**. Ah for the good old DXy 21-Mc. days of the late '50s!

10 phone still has a following, especially **WØTRF**, **Ks** 1WJL 4SWN 6TAX ØJPL, **WAs** 4CJP and 5AER who catch occasional 28-Mc. openings for **CO2s** OM RM, **CR6GO**, **CXs** 2CO 9PP, **DU1s** EA* (580) 0-1, JC* (580) 0-1, **ET3USA**, **FG7XL**, GB3MBP of England, **HCs** 1AH 1MC 2CL, **HKs** 1OI 4PX ØAI, **HP1JC**, **KC6BO*** (620) 0, **KH6EJY**, **KP4BLS**, **KZ5s** BL CL EZ, **LUs** 1DAB 1FU 2ER 4DFL 4DM 9AW 9HCG, OA1W, PJ2CR, **PYs** 1CK 2BGI 3VA, **PZ1BK** (560) 18-19, **UA3LBE**, **UP2MBG**, **VPs** 2AZ 2SY 8EM, **VQ2s** AT* WM WZ, XEs IIT 1KE 1SC 1XI 2FV, YN1JK, **YVs** 1LP 2GM, **ZEs** 1JZ 2JF 2JZ

YVØAA was reactivated on Aves island last November by DXpeditioning (front, l. to r.) YV5s AQC HG ANS, (rear) YV5s BBU AES FI and EL. YVs 4FU 5BNW and 5EQ also were on the scene to help the joint RCV-Hammarlund venture produce some 3000 QSOs with 85 countries on 15 through 80 meters. (Photo via W2GHK) . . . . . 5N2RSB/TJ8 used the solo DXpeditionary approach for 130 rare contacts in December. The equipment was loaned by Hallicrafters for Jim's Cameroons trek and a more recent Dahomey visit.



7JZ 8JZ, ZS6s AJF ARX, 5As 4TC and 5TW, the asterisks representing lonely s.s.b.ers . . . . Ten c.w.'s most recent returns have **WØTRF**, K3PIE, WA6VAT and WB2ERM reporting CX1OP 23, DM3IGY, HK7ZT 20, KZ5EH, LU1BA 22, PY2HT, VQ2s BC WZ, ZS1BK and 9Q5AB, by golly. Don't DX men *ever* give up?

* * *

Gee, we've got a flock of QTHs and a month of coming DX contests to hit the printer with, so we'll just have to skip 20 meters again. But, with the aid of **Ws** 1ECH 2GT 7DJU 8YGR, Ks 1TCE 3MNJ 3SLP 4JSZ 5YPS 8LNL 9CZV ØAID ØJPL, **WAs** 2WIJ 2ZVJ 4CZM 5AER 6KHK 6TGH, **WBs** 2FMK 6DEJ 6FWW and **KL7CYS** on c.w., and **Ws** 2GT 8EGR, Ks 4JSZ 5HRR 8LNL 9CZV ØAID, **WAs** 2WIJ 2ZVJ 4CZM 4KLT 5AER 6KHK, **WBs** 2FMK and 6FWW on phone, plus subsequent reporters, we'll take a close squint at good old 14 Mc. next month. April and May are usually scrumptious on 20 — good fishin'!

Where:

OCEANIA — "I will have duplicate records of all c.w. contacts I make at KX6DB," notifies WA6HRS, expecting to operate from Kwajalein through the middle of this month. "These QSOs will be confirmed through my home address, self-addressed stamped envelopes appreciated. Greenwich Mean Time on QSLs is almost a must, for KX6 is on the other side of the Date Line." . . . . Ex-JZØPH, now signing PAØHES, tells W8BIE he believes all his 1200 New Guinea QSOs have been confirmed . . . . QSLs for this month's Lord Howe isle action by VK2AGH go to Graham's home address . . . . WA6AYU takes over WA6MAZ's QSL tasks in behalf of operator Martin's QSOs from VR3s O and S, s.a.s.e., or s.a.e. plus International Reply Coupons necessary for direct reply. Dan emphasizes that he holds no logs for other VR3 activity . . . . "Ex-VR3A-VK9GP is most anxious to clear up outstanding QSL matters," declares VK3AOM. "All cards sent to me for his activity have been forwarded to Ray at VK2ANB." . . . . "I have answered all QSLs received for my KL7DBG/KS6 operation," asserts KG1CX. "Further inquiries should be sent through my current address." See the catalog to follow . . . . "K4LRA, becoming very busy, has asked me to take over his ZK1AR QSL chores," writes K4SIIB. "Cards not accompanied by s.a.s.e. must be answered via bureaus, and use of GMT will greatly speed the job."

EUROPE — GD3GMH tells WA1KLT he does not QSL, and no exceptions. He's forthright, anyway, compared with DX operators who *say* they'll QSL but never come through. Jeff lets you save your postage . . . . DL2OX, RSGB QSL manager in Germany, tells W1WPO of the ARRL DXCC Desk that DL2DV handles no FP8 QSLs. In fact, there is no DL2DV . . . . FDXC and LIDXA indicate that cards for ZD7BW's 7100 QSOs with 154 countries began emanating from G3PEU in mid-January.

ASIA — The Laos General Post Office has authorized XW8 suffixes AA through AW and does not reissue calls. "There are many pirate stations using the XW8 prefix," writes XW8AL to W1WPO, specifying XW8DD as an especially prolific prevaricator . . . . EP2DM tells QSL aide WB2FMK that he's more interested in making friends than collecting QSLs, so you'll get Javad's wallpaper whether you ask for it or not. WB2FMK has logs for most EP2DM QSOs made through mid-November . . . . Ex-KR6LJ says, "I've tried to QSL 100 per cent for all calls I have held, including KG1AQ, and I still have logs dating back to 1950. I'm the only one to hold the call KR6LJ although many other Okinawan suffixes have been reissued more than once." Frank's new Oklahoma address appears in the list to follow, but he urges you check your local ARRL QSL Bureau for pending deliveries before reapplying . . . . Ex-KAs 2AL 2DO 2DX 2JM 2LG 2LM 2MB 2MC 2MM 2RW 2SC 2VT 7CP 7CS 7FT 7HB 8CK 8CS 8DM 9BP 9JD and 9RP should contact FEARL secretary KA2CM to claim QSLs on file . . . . "It's been four months since I've received a QSL shipment from the local bureau," laments HL9KR. "So if the boys wonder why they've received no replies from me it's because their cards have not arrived." Ed recommends the address in the roster to follow . . . . Ex-HL9KE writes, "I've QSLed 100 per cent for my activity from November 1962 to October, '63, but if anyone has not received a deserved card he should try my new address [to follow]." . . . . W8KIT suggests G3GPE for VQ4IN/VS9H QSL inquiries . . . . According to LIDXA, K8VDV may be of assistance in garnering VS1LV pasteboards . . . . HZ2AMS QSLs began to flow in February, reports W2GHK via WGDXC.

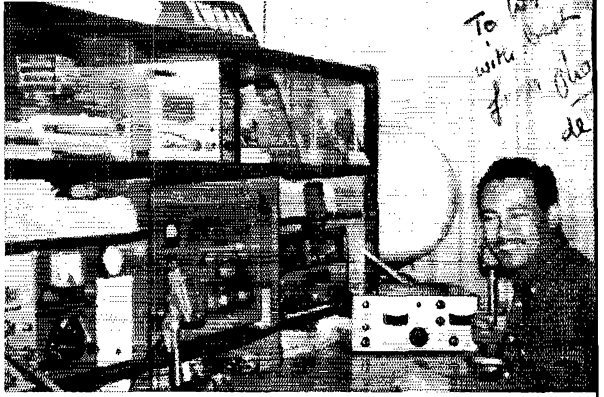
AFRICA — 3V8IR (VE7IR) moves around a lot but guarantees a thorough QSL policy nevertheless . . . . Ex-5N2RSB should be back in the U.K. by now, wrapping up QSL matters for recent TJ8 and TY2 maneuvers. K3MNJ stands ready to help with Jim's clerical work . . . . "As of January 1, 1964, I am QSL manager for CR7GF," informs VE4OX. Self-addressed envelopes and convertible (loose) U.S. postage are requisite. Ed offered to assist TU2s AQ and AU with QSL matters for projected XT2 doings last month . . . . W2DEC of *CQ* tells WB2ERM he has no EA9 QSL arrangements . . . . ZE3JO's ZS8JO cards began getting around in mid-January, according to WA4DZU . . . . Most FA stations were quickly and completely confiscated in the summer of 1962, FA9RW's QSL bureau has been defunct since '61, and a prominent ex-FA8 writes that chances of obtaining Algerian QSLs for past FA contacts are slim, indeed . . . . W8GIU requests the usual self-addressed-stamped-envelope and GMT-only courtesy concerning his CR6FW QSL franchise which dates from January 10, 1964 . . . . "I'm QSL manager here," writes ET3CC to LIDXA's *DX Bulletin*. "For my own operation I normally QSL on receipt. I don't go in for much DX myself, but I'm always glad to help somebody out." George affirms that the ET2 prefix is no longer legitimate.

SOUTH AMERICA — Don't panic if you should happen to hear CE0ZI/mm apparently talking to himself. That same call, once used DXpeditionarily by W4QVJ, now is signed by two ships, *Presidente Pinto* and USS *Ellanin*, according to FDXC informants . . . . QSLs for last month's VP8HF output can go via Hammarlund DXpedition, Box 7388, GPO, New York, N. Y. . . . . W3EIS tells W1WPO he's standing by at the home QTH for QSL inquiries regarding his DXtensive doings at HC1s AGI and DC.

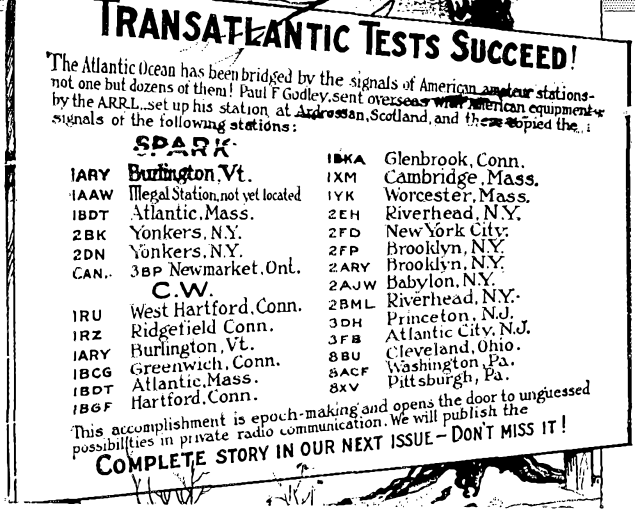
HEREABOUTS — This month's "QSLers of the Month" include FB8XX, FS7MB, G3HCL, HI8XPM, HK3RQ, KV4CI, LU2BD, OE1RZ, OK1FF, PY5HJ, TG9SC, VK9BH, VPs 2KJ 2MM 5BB 7NQ 7NT 7NY, W2PCJ/KJ6, XE2DL, YS1RES, ZE3JJ, ZS8SY and 4U1ITU, plus QSL representatives Ws 2CTN 3ZQ, Ks 8ONV ØBLT and 5R8BC, all nominated for quick QSL results in correspondence from W1SWX/1, Ks 4TWJ 5JVF, WAs 4CZM 6KHK and 9ICQ. Any fast QSLers you think should be saluted in this "How's" segment? Just ship us the word . . . . Halp! W8BIE hungers for a 1959 F9QV/FC contact confirmation; K5YPS wants tips on coaxing QSLs from FG7XI, VQ9A/7, VJ1AA; K9CZV likewise re 4U1ITU worked on March 23, 1963; WA6KHK needs a nudge on CP3ZK, JA6BBB, KC6BK; WA9AVT desires data on LUØFN; and VE3ADV hunts a hint on JTIAC QSL production . . . . K3SLP, WA9s GAR and ICQ offer their services as QSL managers for overseas operators in bona-fide need, and the rarer the better . . . . 6YARD hardly ever works c.w. despite spurious indications to the contrary . . . . If you're still shy VP2KJ's confirmation, FDXC suggests s.a.s.e. to W4SSU . . . . NCDXC's *DXer* lists CT3AV, VP2AR, VU2RM, 4S7WP, 9L1CM and 9N1MM as active stations whose QSLs are available through W3KVQ/2, 2308 Branch Pike, Riverton, N.J. Ed also knows the QSL score on extinct FF4AL, TF2WFF, TT8AG, TU2AL, VS9AAC, ZD1s AW and CM, s.a.s.e. of course . . . . A last-minute report from Jamaica's PMG via VE3CJ is that 6YABP became 6Y5BP April 1 . . . . Conclusion of this year's ARRL DX Contest is a good time to remind you to keep an adequate supply of large s.a.s.e. on file with your local ARRL QSL Bureau proprietor. Now let's check the mailbag for individual specifications, realizing that the recommendations are necessarily neither "official," complete nor accurate:

CE0ZI/mm, Correo Naval, Valparaiso, Chile
COs 2FM 3BUH (via FARAC)
CR6FW (via W8GIU)
CR7GF (via VE4OX)

(*Continued on page 160*)



XW8AL, abetted by neighbor XW8s AU and AV, sprays lots of 20-meter s.s.b. Statesward from Laos these days. When this photo was snapped Phanh was looking forward to a visit from globetrotting W4BPD as XW8AW. (Photo via W1WPO)



TRANSATLANTIC TESTS SUCCEED!

The Atlantic Ocean has been bridged by the signals of American amateur stations—not one but dozens of them! Paul F Godley, sent overseas with American equipment by the ARRL, set up his station at Andreossan, Scotland, and there copied the signals of the following stations:

SPARK

1ARY	Burlington, Vt.	1BKA	Glenbrook, Conn.
1AAW	Illegal Station, not yet located	1XM	Cambridge, Mass.
1BDT	Atlantic, Mass.	1YK	Worcester, Mass.
2BK	Yonkers, N.Y.	2EH	Riverhead, N.Y.
2DN	Yonkers, N.Y.	2FD	New York City.
CAN.	3BP Newmarket, Ont.	2FP	Brooklyn, N.Y.
	C.W.	2ARY	Brooklyn, N.Y.
1RU	West Hartford, Conn.	2AJW	Babylon, N.Y.
1RZ	Ridgefield Conn.	2BML	Riverhead, N.Y.
1ARY	Burlington, Vt.	3DH	Princeton, N.J.
1BCG	Greenwich, Conn.	3FB	Atlantic City, N.J.
1BDT	Atlantic, Mass.	8BU	Cleveland, Ohio.
1BGF	Hartford, Conn.	8ACF	Washington, Pa.
		8XV	Pittsburgh, Pa.

This accomplishment is epoch-making and opens the door to unguessed possibilities in private radio communication. We will publish the

COMPLETE STORY IN OUR NEXT ISSUE—DON'T MISS IT!

ARRL: The Exciting Years

← From the cover of January 1922 *QST*.

NOVEMBER, 1919. Congress, at the League's request, had directed the Navy to lift the ban on amateur transmitting. The Department of Commerce had slashed red tape, assigning calls and allowing amateurs to resume transmitting without waiting for actual licenses to clear through the overburdened administrative machinery. Finally, after two and one half years of silence, amateur radio was back.

The next five years are extremely fascinating, in every department. Spark transmission reached its height and then faded away: when the legal death of amateur spark finally came in 1927, there was nothing left to bury. One of the factors which speeded up the transition from spark to c.w. is familiar to present-day amateurs: continuous waves caused far less interference to early broadcast receiving than did the spark; thus, with c.w. you might be able to operate even before your neighbors went to bed!

Operating achievements ranged from the spectacular to the impossible. As early as March 1922, the editor of *QST* speculated that the day wasn't far off when amateurs would have to send out expeditions on ships to break any additional records!

The quality, first of spark outfits, then of receivers, then of c.w. and phone transmitters, went up at a rapid pace, led by articles in *QST*, some of them the cream of the crop originally presented to the meetings of IRE and the Radio Club of America.

But among the most fascinating facets of this period was the growth and rapid maturing of ARRL as a cooperative effort by radio amateurs. In the early days on the air, sets of initials were nearly as common as official call letters in *QST* and the League's list of members. Postwar, however, *QST* chided the clod who was too lazy or too ignorant to get a license. Radio clubs had sprung up all over the country, most of them quickly becoming affiliated with the League. These clubs were urged to smoke out the "little boy with the spark coil" and induce him to join the club. Then he could be made to get a license, and to cooperate with his fellow amateurs.

Most clubs soon adopted some form of the "Chicago Plan" [1] whereby the evening was split up by local agreement: local work (most of it by youngsters with spark coils) and testing took place in the early evening, say from seven until ten, and then the long distance traffic men took over for the remainder of the night. In Chicago the plan was drawn up and administered by the Chicago Executive Council, a union of all the neighborhood clubs which had sprung up. The members of the Council policed the plan, and there were fines for violation, not on the violator but on the club within whose territory he resided! Later, the schemes were generally modified to provide for the man with the powerful rig interested in DX but not particularly in traffic. Still, traffic work within ARRL Trunk Lines was considered the most important reason for the existence of the amateur.

Another cause of QRM in those days, in addition to the spark coil operators, was the lack of tuning in spark transmitters. *QST* urged each club to maintain a wavemeter and decremeter for the use of members. There were a number of editorials, T.O.M. stories, cartoons, and letters to the editor stressing the need to get one's decrement down to the legal level. Decrement was approximately a measure of the bandwidth of spark stations. The term went out with spark, since "c.w." (which initially was used to include phone) had a theoretical decrement of zero.

The next major ARRL project was to get everybody down to a wavelength of 200 meters or nearly so. This campaign was perhaps half-hearted at first, since many of the achievements about which amateurs — including those at the ARRL headquarters — wanted to boast took place on longer waves. Undoubtedly, some hams were shocked into legality when one of the top ham stations had its license suspended for a variety of illegal acts, including operation on 800 meters, as reported in *QST* for June 1921. What finally put this wavelength campaign across was the coming of broadcasting which settled first on a wavelength of 360 meters, and then spread out to 200–500 meters. The closer you were to 200

[1] Perhaps it should be called "The Toronto Plan." A cooperative arrangement was in effect there in 1911.

meters the less likely you were to get a squawk from your neighbors. Shortly thereafter the issue became moot, for amateurs discovered the tremendous value of short waves for DX and by then had the tube equipment to operate on the high frequencies.

Cooperation was the theme of the day. For one project after another, the League requested that ragchewing and testing be abandoned on certain nights for certain hours. Transcons, fading tests, Governors-to-President relays, the police chiefs relay, then the transatlantic tests; all were occasions for silence by the majority of stations so that outstanding work could be logged by the top group. Fortunately for the history of amateur radio, this cooperation was forthcoming more often than not.

Then broadcasting came along. Its first noises were made by amateurs, using their radiotelephone equipment over distances of a few miles. Victrola records were added shortly after, and some of these stations had a fair local following. Apparently, serious amateurs — the kind that populated the ARRL in those days — quickly left off this work, for later on there were strong attacks by League staff and members alike about the "radio phone men who have forgotten the code and continually play their squeaky, squawky jazz records." By March 1922, broadcasting by amateurs was "temporarily" prohibited.

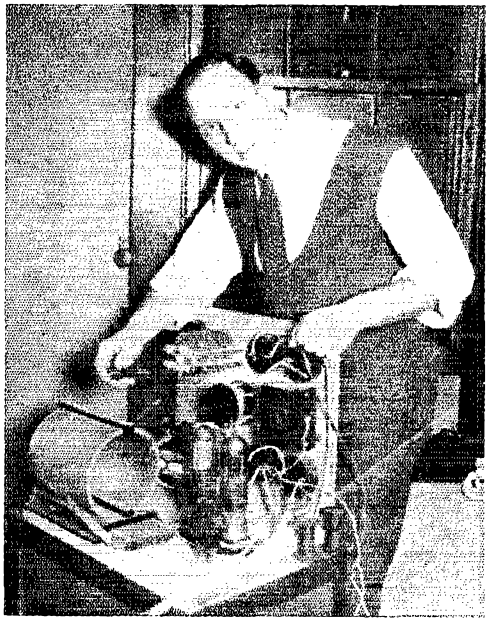
At first, those who listened to radio phone were considered to be amateurs. For about a year, in 1921–1922, *QST* pushed the use of the term "Citizen Radio" rather than amateur, and proclaimed on its cover that it was "Devoted entirely to Citizen Wireless." In December of 1921, *QST* started a column, "With the Radio Phone Folks", later called "With our Radio Phone Listeners." The two groups started drifting apart in early 1922. Many radio magazines which had catered to the transmitting amateur swung away from him, one even so far as to run an editorial attacking the "selfish amateur" for "causing interference", another prophesying the end of amateur radio.

But the ARRL tossed away the quick dollar, and in June 1922 announced that *QST* would not "go popular." The "Citizen" on the cover was quietly changed back to "Amateur", the name of the phone column was changed to "The Junior Operator" and its emphasis shifted accordingly. Phone people became "novices" or "BCLs", and an editorial declared that "novices were *not* amateurs, as the press seems to think."

Nevertheless, the League urged that amateurs extend their voluntary cooperative arrangements to include the listeners, and thus quiet hours were born. This got to be rather one-sided, this cooperation with the BCLs, so as time went on *QST* shifted its advice to an attitude of "Cooperate — but operate!" In July '22, readers were urged to observe reasonable silent hours, but let their neighbors understand that after ten-thirty or so they had work to do and would be on.

Then as now the League was deeply concerned with the long-term protection of amateur privilege. In the first ten years or so after World War I there were something like 45 separate radio bills introduced into Congress, most of them making inadequate provision for amateurs. The criterion was: Were amateurs mentioned in the proposed law itself and guaranteed frequency space? The amateurs had great fear that a bill which put everything into the hands of bureaucrats, especially those of the armed forces, would spell the end of amateur radio. But with the advent of broadcasting, not covered at all by the Wireless Act of 1912, some new legislation was desperately needed. Accordingly, in early 1922, Secretary of Commerce Herbert Hoover (later U. S. President; father of our ARRL President Hoover) called a special radio commission together to write a new bill. The ARRL was on hand representing the amateur. The conference recommended 150 to 275 meters for amateurs, part of it shared with experimental and school stations. It also revived the 1917 ARRL suggestion that there should be Deputy Radio Inspectors elected by their fellows and serving without pay but with all necessary authority to assist the government's R. I.s, of which there have never been enough, then or now. The resultant bill cleared the House, but died at adjournment before being acted upon by the Senate. Nevertheless, the agreements reached by the users of radio in preparing the bill became *de facto* regulations,* the absolute need recognized by all users of radio for agreement being the primary enforcement tool. The next year, and each year

* Except that part which would have set up the Deputy R.I.s; this proposal has never been adopted.



John Reinartz (now K6BJ) and the rig at 1QP-1XAM. Responsible for many pioneering technical developments, John designed the transmitting circuit used by all three stations (1MO, 1XAM, 8AB) in the first two-way short-wave transatlantic contact.

thereafter until a new radio law finally was adopted, there was another Hoover Conference renewing or revising as necessary the arrangements made the previous year. In 1923, the pressure from broadcasting was great enough that the top wavelength was reduced to 220 meters, but the idea of having all amateur wavelengths open to all amateurs (instead of having wavelengths specified in the license, as things had been since 1912) was sold to the Department. The band from 200 to 220 meters was held aside for the new Extra First Class amateur licensees, who had to be licensed for two years, take a test similar to the commercial first of the day, copy twenty per, and have a clean record. Only pure c.w. could be used here.

The lower edge of the broadcast band was only 3 meters away, at 1350 kc., and consequently interference was still a problem. Thus, the Department of Commerce wrote compulsory quiet hours into the rules, from 8 to 10.30 P.M., for all amateurs. *QST* pointed out that those who had failed to observe voluntary quiet hours had brought this restriction into being.

The outstanding achievement of the amateur world in 1923 was the first two-way work across the Atlantic between 1MO and 1XAM in Connecticut and 8AB in France on approximately 100 meters. This led directly to a complete change in amateur radio — and indeed in the art as a whole. There followed a mad scramble for short-wave frequencies by most users of radio. Careful negotiations between ARRL and the Department of Commerce resulted in our getting for the first time a family of bands, harmonically related to each other: 150–200 meters remained, of course, and was the only place where spark and the wilder forms of modulation, such as mechanical chopping of continuous waves, could continue to be used. The new bands were 75 to 80, 40 to 43, 20 to 22 and 4 to 5 meters. The best part of the new regulations, perhaps, was that the compulsory quiet hours adopted a year earlier went by the board for 80 meters and the shorter wavelengths. Henceforth, the quiet hours were to be imposed only when interference could be laid at the feet of the amateur! The bands negotiated with the Department were largely confirmed by the third Hoover Conference, meeting in the fall of 1924, but the 80-meter band was extended to cover 75 to 85.6 meters. Spark was all but outlawed. It was believed that less than 1 per cent of amateurs were still using spark, and both the Department and the League urged their prompt discontinuance.

The internal growth and increasing maturity of the League paralleled its external activity. Almost immediately after reopening, the League, at the request of Canadian operators, expanded its operations to include Canada. Four operating divisions were created, and soon after a fifth was added. A Canadian was named to the Board of Directors.

In 1922, a new Board of Directors was elected.

Mr. Fred H. Schnell
c/o American Radio Relay League
My dear Fred,

Forty years ago! . . .

In a few days forty years will have passed since we established the first short-waves transatlantic contact!

How time flies!

I remember those exciting experiments as if they had taken place yesterday.

I suppose you do, too.

That cable you sent saying "copied solid congratulations." How happy it made me!

And two days later, when you had tuned your transmitter on 100 meters, our two-way contact! It lasted until daybreak in Nice.

That was the great demonstration of what short waves *could do*.

How widely they have been used since then!

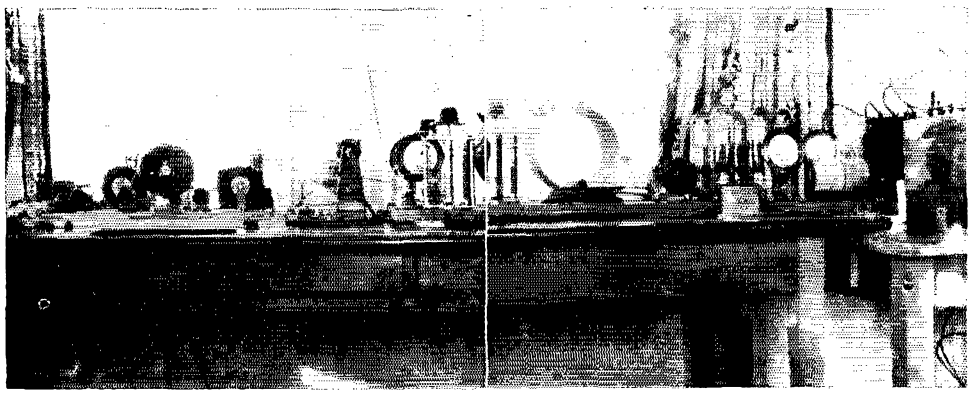
My dear Fred, I hope you are well. I did not want to let this fortieth anniversary pass without sending you a word of greetings.

As far as I am concerned, my health remains good in spite of the fact that I will be 70 shortly. It seems incredible!

Best 73, my dear friend, and hope we celebrate the fiftieth anniversary in 1973!

As ever,

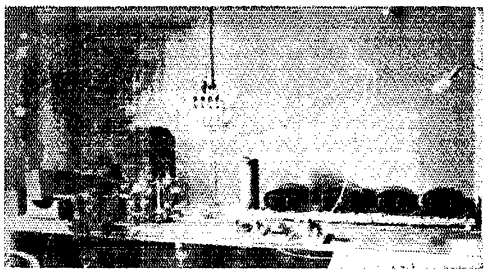
Leon Deloy, Ex-F8AB



Schnell's 1923 station, 1MO, pictured shortly after the historic transatlantic QSO. Now W4CF, Fred recently received from Leon DeLoy, ex-F8AB, the letter reprinted in the box on this page.

Sidelights, 1920-1922

The editor invited artistic members to sharpen up their pencils and get to work on a League emblem. Six months later, the emblem we all know so well was adopted, no one man getting credit for the design. — *QST, January and July, 1920.* . . . The League advocated reducing power and using a wavelength shorter than 200 meters for local work. — *February, 1920.* . . Membership and subscription to *QST* henceforth would be inseparable. Consolidated dues were set at $2.00, with newsstand copies at 20¢. — *March, 1920.* . . . 1AW, 1TS and 1FQ teamed up for "diversity" reception of DX stations being worked by 1AW. — *April, 1920.* . . . *QST* articles were regarded as a contribution by one member to his fellow members; there was no pay for these articles (a policy still in effect in 1964). — *July, 1920.* . . . Ford coils used for modulation transformers — *October, 1920.* . . . Radio very important part of the Scouting program in San Diego. — *November, 1920.* . . . A 17-year-old named Haddaway had built his entire station from absolute scratch, including the making of his own vacuum tubes! — *February, 1921.* . . . A crippled ham had a rig at his bedside — *February, 1921.* . . . 1FBF relays ship's SOS to Boston Navy Yard. — *February, 1921.* . . . CQ Party, everybody within a call area to transmit at the same time, on April 1! Purpose was to get CQing out of the system. — *March, 1921.* . . . QRR chosen by Detroit clubs to mean "Cut out the rag chewing". — *March, 1921.* . . . The little pussycat used to illustrate "Strays" appeared. — *April, 1921.* . . . Radio fraternity *Alpha Delta Alpha* started at Coe College. — *July, 1921.* . . . Robert Garcia, of Los Angeles, passed amateur exam with grade of 92% at age 7. — *September, 1921.* . . . Lively discussion in the Letters section on a graded license scheme (much like today's discussions on incentive licensing). — *November, 1921, January and March, 1922.* . . . Use low power for local work. — *November, 1921.* . . . A Westinghouse engineer stated flatly that aurora doesn't affect radio waves. — *April, 1922.* . . . Possibility of phone work from moving trains was explored. — *June, 1922.* . . . New department in *QST* called International Amateur Radio. The ARRL Board rejected idea of foreign branches of ARRL. — *June, 1922.* . . . Mail arrived addressed to "Q Street Magazine". — *June, 1922.* . . . Chicago city fathers tried to put over a license inspection and fee for amateur stations. — *July, 1922.* . . . GMT should be used for amateur work, a reader said, — *September, 1922.* . . . And transatlantic schedules were announced in GMT. — *December, 1922.* . . . Why not use aluminum panels in receivers? — *October, 1922.* . . . Phonetic alphabets for French and English. — *December, 1922.* . . . How we grew — there were five employees at headquarters (January, 1921); then there were 13, enjoying a dinner together (July, 1922) and then 19 posed for a "wiring diagram" of headquarters (January, 1924).



French 8AB, Nice, used by Leon Deloy to span the Atlantic in 1923. Deloy jubilantly reported during that first QSO that 1MO was "QRK, very QSA a foot from the phones!" Imagine the excitement of that contact, Young Squirt!

Like its predecessors since 1917, this election was held "at large", with all members voting for 17 of the 22 on the ballot. This 1922 Board goes down in history as the one to put itself out of business, for during their term, the directors drew up a new democratic constitution, under which each of twelve U. S. divisions chose a director to represent it on the board. Any ten members could nominate a member not engaged in commercial radio as a candidate. The then-new constitution, differing only in detail from the League's present Articles of Association, was adopted in December 1923, and the new directors were elected in 1924.

Not only was the League as a corporate body going through a period of great achievement and growth, but so also its individual members. We have already talked about the dawn of cooperation as a governing force in amateur radio. Members were pushing out on all fronts. Several emergencies were reported in *QST*, in which amateurs had carried on when the wire lines were torn out or rendered inoperative. Amateurs investigated fading and other propagation phenomena. Skip was observed and reported upon, though full understanding was to come later. Power factor and other points of theory were hotly debated both at conventions and in the correspondence section of *QST*. Portable work was going on; the marvelous shack of portable 3OI which could be carried around on a truck formed the most outstanding example of this field. Amateurs received marketing reports from government agricultural broadcasts and saw to it that these reached the farmers in their areas. The beginnings of mobile work took place as early as 1921. Break-in operation came under discussion in *QST*, as a real boon to the c.w. traffic hound. In the better traffic stations, message totals often exceeded 500 per month.

Individual achievement was spurred on by a variety of contests and prizes. The outstanding one perhaps was the Hoover Cup, launched by the Secretary of Commerce to recognize amateur technical achievement. During Hoover's administration of the Department it was granted each year to the amateur having the best station principally built by himself. Louis Falconi, 5ZA, took the Cup for 1921. In 1922 the winner

was F. B. Ostman, 2OM. Donald C. Wallace, 9ZT-9XAX (not unheard of today as W6AM!), won the award in 1923. The Hartford *Courant* offered a Smith Cup in 1921; the League used it to encourage summer work from July to November. It was presented to the Chicago Executive Council for its development of the Chicago Plan. There were also contests, with cash or equipment prizes, for the best relay spark station, for the best ham superregenerative receiver, for the highest number of subscriptions garnered for *QST*, and several other noble aims.

This was also the period when tubes *versus* spark and code *versus* phone always could raise an argument. Such arguments, and the achievements mentioned earlier, needed a forum: it was found in the local club banquet, the state, call-area, division and national radio conventions which had sprung up like crocuses in the spring during this era. The lectures and discussions went on the evening as well as the daytime at these affairs, and the amateur who did not fill up his notebook during a convention simply wasted his money. Social aims certainly were served by these conventions, but largely in the Owl-Boiling hours; civilized hours were devoted to learning about the radio art from the experts, most of whom were still classifiable as amateurs.

More than any other perhaps, this was the period during which amateur radio as we know it today assumed its basic shape. Yes, it was a great period to be an amateur. Serious problems and challenges abounded, but so did excitement, learning and accomplishment.

Operating Achievements

WITH AMATEURS BACK ON THE AIR after a 2½-year hiatus, activity increased by leaps and bounds. We began an era in which there were, besides the routines of traffic handling, such projects as fading tests, transcontinental relays, transatlantics, and communications with expeditions.

ARRL membership was required for trunk-line appointments, and such posts were quickly filled. The Operating Department of those days had Division Managers, Assistant Division Managers, District Superintendents, and City Managers. A member's traffic report had quite a chain of command to climb before it reached *QST* for publication. Relaying techniques and station ranges were improved, and by November, 1922, the monthly message count had climbed to 50,000. Before long Official Relay Stations had to certify that they would deliver or mail every message within 24 hours.

Fading Tests

The summer of 1920 found the amateur world agog over the ARRL-Bureau of Standards fading or "QSS" tests. Starting on June 1, a selected group of six transmitting stations sent signals at intervals on a specially assigned wavelength of 250 meters which were to be regularly recorded in terms of signal strength levels by observing stations throughout the country. The resultant data were correlated by the Bureau with weather, magnetic and other effects, with the intention of establishing whatever relationships might be found to exist between radio and other natural phenomena. As a result of this investigation, a comprehensive theory on propagation and fading effects on the 250-meter wavelength was evolved and presented as a Bureau of Standards report.

Transcons

The League continued to grow and with the addition of Fred Schnell, 1MO, as a full-time traffic manager, the staff was up to five. The rivalry between spark and c.w. continued apace, but the majority of traffic was still handled by spark stations.

In middle January, 1921, the first official postwar transcontinental relay tests were held, following three months of careful planning and organization. Test messages were sent for four nights. On the final night five messages were transmitted. The third—Message "C"—made a record that established amateur radio as the fastest cross-country channel of public communication—six and one-half minutes round-trip elapsed time!

Centrally located stations succeeded in hearing stations on both coasts, and there was speculation that stations on the two coasts would someday be able to communicate directly without relays.

Transatlantics

The idea of transmitting American amateur signals across the Atlantic ocean was not a new one when 1921 rolled around. Hiram Percy Maxim had dared to envision the possibility a short time after the founding of the ARRL. Just before the war, Louis Pacent presented a project for such transmissions to the Board of Directors of the Radio Club of America. In 1919, M. B. Sleeper, editor of Everyday Engineering, *originated an elaborate plan in this connection. The year 1920 found* Everyday Engineering *faced with the necessity for suspending publication, however, so Sleeper turned the plan over to the ARRL with the request that they carry on.*

In consequence, some two dozen American amateurs transmitted prearranged signals on February 1, 3, and 5, 1921

Portions of this story, in contrasting type, are from "*Two Hundred Meters and Down*" by Clinton B. DeSoto.

which were listened for by about two hundred and fifty British experimenters with prizes offered by manufacturers on both sides to the amateurs turning in the best performances. The results were negative. So large was the number of English listeners on the 200-meter wavelength, all using regenerative or self-radiating receivers, that they jammed each other by emanations from their own receivers! Added to this difficulty was the interference from commercial station harmonics, high local electrical noise levels, and some uncertainty as to frequency calibration. All in all, there were plenty of reasons for the failure of these tests—reasons which it was hoped would be obliterated by the next series of tests, to be run late in 1921.

At a meeting of the ARRL Board of Direction during the first national convention that year, Traffic Manager Fred H. Schnell presented a plan to ensure that any possible deficiencies in British receiving technique would not imperil the possibility of amateur signals being heard across the Atlantic on these tests. He proposed that a qualified American amateur be sent overseas with the best available amateur receiving gear to supplement the efforts of the British listeners. Not that the ability of the British was doubted, but—well, they had not succeeded before, and every possible chance of success should be provided.

Paul F. Godley, 2XE, probably the foremost receiving expert in America at that time, one of the ARRL's Advisory Technical Committee, members of the Institute of Radio Engineers and the Radio Club of America was selected for the job. On November 15th he sailed on the Aquitania, *following a testimonial banquet in his honor at New York, attended by what the editor of* QST *termed "a hamfest of oldtimers, most of whom had known Godley for years", all expressing utmost confidence in the famous designer of the Paragon receiver. Major Edwin H. Armstrong said, "I'll stake my scientific reputation on Paul Godley," and was echoed by so many others that Major J. Andrew White finally commented, "Paul, it looks like a cinch!"*

A month, lacking only a few days, went by. Paul Godley had reached England, was royally feted in London, set up his apparatus for preliminary tests, travelled to Scotland; and there, at the very edge of the sea, on bleak Androssan moor, amid fog and wet, a tent was erected in which the transatlantic receiving station was located. By midnight of December 7 the installation had been completed, and long-wave stations were coming in. "At 1:33 A.M.," reads Godley's log, "picked up a 60-cycle synchronous spark at about 270 meters, chewing rag. Adjusted for him, and was able to hear him say 'CUL' and sign off what we took to be '1AEP'; but atmospherics made sign doubtful; . . . That this was an American ham there was no doubt! . . . His signal had doubled in strength, and he was booming through the heavy static and signed off clearly 1AAW, at 1:42 A.M.! . . ."

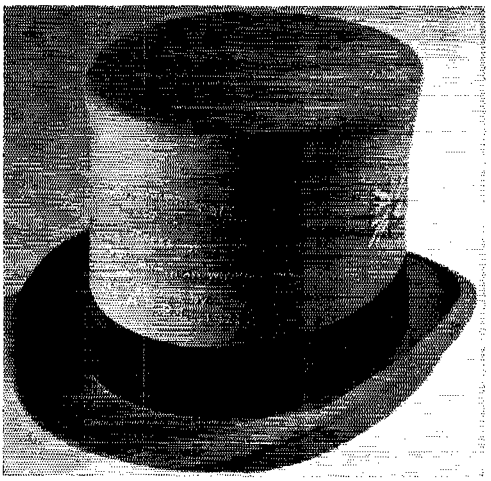
After that? Well—

"Oh, Mr. Printer, how many exclamation points have you got? Trot 'em all out, as we're going to need them badly, because WE GOT ACROSS!!!!!!" ran the lead in QST.

Records Galore

The next three years were to see the most concentrated activity and achievement of amateur radio's entire period of existence. New records, new accomplishments, new additions to amateur radio's Hall of Fame were constantly being made. The Governors–President Relay of 1922 was the first of these new accomplishments. Upon the first anniversary of the inauguration of President Harding, messages of congratulation and fealty were started from the governors of forty-three states. Five refused to participate; there were still a few staunch Democrats. Unusually bad conditions made operating difficult, but by March 8 forty messages had been handed to the President, a highly capable performance and one most opportune in the face of the existing legislative situation. . . .

On April 13th the first transpacific two-way amateur communication was established between 6ZAC, Maui, and 6ZQ and 6ZAF, in California. On that night and on the night following reliable communication was maintained for long periods of time and a quantity of message traffic was handled.



The "Trans-Atlantic Derby" won by ARRL Secretary K. B. Warner, who bet "a new spring hat" that American signals would be heard in Europe by Godley in 1921. British hatmakers didn't know what a derby was (it's called a "bowler" there), so sent this topper, traditional headwear at the Derby races.

On the same days, Atlantic Coast amateurs were successful in copying Pacific Coast amateurs direct for the first time. The coincidence of these dates indicates the important part that atmospheric conditions played in the results obtained during these early days when great distances were first being spanned. . . .

The general character of amateur radio began to experience a subtle change in 1922. It commenced to lose its insularity. It slowly but steadily approached the cosmolitan international characteristics that were to achieve dominance before two years had elapsed. The most apparent outward manifestation of this was the department on international amateur radio, begun in the June, 1922, issue of QST. . . .

It was in an atmosphere of expectation that big things were due to break in international amateur radio, then, that the amateur world turned to the transatlantic tests of 1922. Unparalleled enthusiasm prevailed. Practically every amateur in the United States, even in the far West was brimming over with eagerness. During the preliminary tests, in which amateurs were required to demonstrate their ability to cover 1200 miles in order to qualify, some 91 calls were logged in England!

The keen edge of surprise at the actual results was therefore somewhat dulled, but even so they were staggering enough. When the outcome was finally tabulated it was learned that 316 American stations had been heard in Europe! *The British, organized by the Radio Society of Great Britain under the leadership of Philip R. Coursey, heard a total of 161 stations. The French, the members of several societies having been formed into a joint Transatlantic Test Committee by Dr. Pierre Côrret, together with the Swiss, heard a total of 239 American calls, while 85 stations were heard on both the British Isles and the continent.*

Perhaps the most significant result of the 1922 tests was the fact that every United States district got across the Atlantic. The summary showed 78 first district stations reported, 81 second, 53 third, 11 fourth, 7 fifth, 8 sixth, 1 seventh, 63 eighth, 12 ninth, and 1 Canadian (probably there were more Canadians which could not be distinguished from U. S. stations). These stations actually covered almost the entire country.

The really startling news, however, was about the "westbound" tests. A total of about 20 different American amateurs heard European amateur signals, principally from French 8AB and British 5WS and 2FZ! The first signal across was from 5WS, a special station erected by the Radio Society of Great Britain, at Wandsworth. This was indeed news. Two-way communication with Europe now loomed as a definite possibility.

Two-Way Across the Atlantic

To tell the story of the first contact across the Atlantic ocean, let us set the scene by recalling the second transatlantics. Then, it will be remembered, one of the three European stations reliably reported heard in the United States was French 8AB, at Nice, France. In January, 1923, a preliminary attempt at two-way transatlantic communication failed. The European station on that occasion was also French 8AB.

*The owner of 8AB was Leon Deloy. During the summer of 1923 Deloy visited the United States to study American amateur methods, with the avowed determination to be the first to span the Atlantic. He went to the ARRL's national convention in Chicago; he bought American radio gear; he consulted with John L. Reinartz, 1QP-1XAM, concerning his new station. He lived, thought, acted and worked with one objective—*to work across the Atlantic. *Returning home to France in early autumn, he applied all the information he had received, completed his new station and tested with British 2OD in October, and in November cabled ARRL Traffic Manager Schnell that he would transmit on 100 meters from 9 to 10 P.M., starting November 25th.*

Over the traffic routes of the ARRL flashed the electrifying news. Many a station commenced listening. From the very first, 8AB and the identifying cypher group "GSJTP" were audible in Hartford. The next night, the 26th, Deloy transmitted again and, having been advised by cable that he was being heard, sent two messages, which were copied not only by Schnell and K. B. Warner at 1MO, but also by Reinartz at 1XAM. One was a message of greetings from French to American amateur radio; the other made a schedule for an attempt at two-way work the following night.

The night of November 27, 1923. Both Schnell and Reinartz were on the air. Schnell had secured special permission from the Supervisor of Radio at Boston to use the 100-meter wavelength, and everything was in readiness. At the stroke of 9:30 the strangely-stirring 25-cycle gargle from 8AB came on the air. For an hour he called America, then sent two more messages. At 10:30 he signed off, asking for an acknowledgment. Long calls from 1MO and 1XAM and then . . . there he was, asking Reinartz to stand by, and saying to Schnell, "R R QRK UR SIGS QSA VY ONE FOOT FROM PHONES ON GREBE FB OM HEARTY CONGRATULATIONS THIS IS FINE DAY MIM PSE QSL NR 12" . . . American and European amateurs were working for the first time, with strong signals, and to Deloy, after a year's constant and unremitting effort, it was a fine day!

He then called Reinartz, 1XAM, whose

transmitting circuit was in use at all three stations, and they also worked with similar ease. A message was sent via 1MO to the renowned General Ferrié, France's grand old man of radio. Further schedules were arranged. Signals were coming through on loudspeakers. A key and buzzer, actuated by the neighbor lad next door, would have been no louder; yet a mighty ocean, four thousand miles of trackless distance, separated these pleasantly chatting friends, separating innumerable friends to chat in countless days to come.

It was indeed a fine day.

Expedition Work

It was also in 1923 that amateur cooperation with international exploring began. ARRL member Don Mix, 1TS (now an assistant technical editor of *QST*), accompanied Donald B. MacMillan to the Arctic with amateur equipment aboard the schooner *Bowdoin*. WNP (Wireless North Pole) brought an end to the lonely isolation which had haunted MacMillan on each of his previous eight trips to the arctic. Operating on 200 meters, the station provided fairly reliable contact all through the winter of 1923–24, leading MacMillan to predict that no polar expedition would ever go north again without radio.

And Now Another New Era

But when Mix returned from the Arctic in the fall of 1924, he found an entirely new world of amateur radio, for by then the short waves had been discovered and transoceanic work was commonplace. The short waves had been discovered, 200 meters was obsolete.

In 1924 amateur radio stood at the gateway to its greatest achievement—traveling the road downward from 200 meters.

Early Emergency Communications

THE HISTORY of emergency communication by amateurs begins in 1913, when amateurs at the University of Michigan and Ohio State University, in conjunction with numerous individual amateurs in and around the region, successfully bridged the communications gap surrounding a large isolated area left by a severe windstorm in the Midwest. In these early days, such emergency work was spontaneous and without previous organization of any kind. The need existed, the amateurs were available, so they went to work with whatever they had. This included very little in the way of what was then modern equipment, but a great deal in skill, ingenuity and enthusiasm. These latter attributes carried us through a "proving" period. Amateurs gradually, without realizing it, attained a reputation for being able to supply communications, somehow, even under the most difficult circumstances

Undoubtedly, there are any number of incidents which were never reported or publicized. Early issues of *QST* contained only brief occasional mentions of this kind of work by amateurs. Following the above-mentioned midwest storm there is no further chronicle until 1919, when a tropical storm disrupted communications in the Port Aransas, Texas, area, and one Clifford W. Vick of Houston handled newspaper dispatches and other general communications, despite the fact that the wartime transmitting ban had not yet been lifted. Subsequently, amateurs were reported as having served in 1921, when 1AW handled news dispatches during an auroral disturbance; in February, 1922, when a snow and ice storm isolated Minneapolis-St. Paul (9XI, 9ZT and 9AJP); in November, 1922, when heavy snow blanketed Wyoming and Colorado, stalling two trains in the mountains (7ZO).

In 1923, more reports were received. In March, 9ZN, 9APW, 9AZA, 9BHD and 9ALG organized a net to relay communications into and out of a part of the upper Mississippi Valley isolated by a storm. That summer the Arkansas River flooded in Oklahoma; 5XBF, 5GJ, 5GA, 5SG and 5WX operated three days and nights. In November, 1ARY and c2CG (Canadian) provided contact between Burlington, Vt. and Montreal when a snowstorm took down railroad telegraph lines. In December, a storm in Neah Bay, Wash., isolated some canneries; relief was brought by 7IP and 7GI.

Among the earliest users of amateur services in emergencies were the nation's railroads. Consequently, in 1923 the first signs of amateur emergency organization were manifested as ARRL considered plans for a railroad emergency committee, under the supervision of one A. L. Budlong. The plan was completed in 1924 and tests over the Pennsylvania Railroad proved eminently successful. During the two or three ensuing years this organization acted with good effect in numerous emergencies.

The earliest really widespread emergency situation in which amateurs participated was in February, 1924, when a raging blizzard swept the northern half of the U.S., paralyzing wire communication in the Middle West and isolating many large cities. Hundreds of amateur stations were active, handling messages for the railroads, press, officials and individuals, saving innumerable lives and much valuable property. Says *QST* of this operation: "It may be seen that many stations did fine work. There were many failures, however, and we are in no position to pat ourselves on the back insofar as the net results were concerned. Not enough stations were on the job. . . ." Today, with our comparatively high state of organization, we can *still* use more stations on the job.

Also during the early months of 1924, 8WR operated 8XAP during a Western Penna. sleet

storm that tore down wire lines, and 9DOW supplied communications service for ice-locked lake steamers near Duluth, Minn. In April, Canadian amateurs 1BQ and 1DD transmitted a request for press information from England on behalf of a Nova Scotia receiving station supplying several large American newspapers.

During the year, as a result of the work of amateurs in this field, the Commissioner of Navigation announced that thenceforth amateur stations would be permitted to use their own discretion during times of emergency regarding strict observance of the regulations — the beginning of our present understanding to do what is necessary in an emergency, worry about the regulations afterward.

From these early stirrings, emergency communication became one of the most important functions of amateur radio in years to follow, as we shall see in subsequent issues.

Technical Achievements

AMATEUR RADIO contributed its share — maybe more than its share — to the din of the Roaring Twenties. The launching of a major phenomenon of the era, radio broadcasting, was facilitated by the fact that amateur radio was in being, offering a ready-made audience able and willing to spread the word of the new scientific marvel. And thanks to amateur radio, there were technically-knowledgeable men in every major community — men who could do the jobs that had to be done to put broadcast stations on the air and keep them running; men who could handle the problems of receiver installation and maintenance.

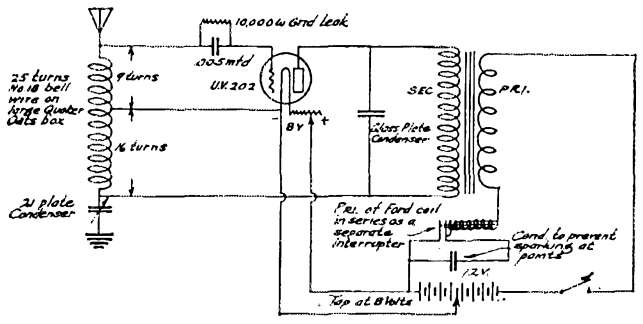
Broadcasting later was to assume the proportions of a menace. An activity of such tremendous interest to the public could not help but have an effect on radio communication at large. The amateur, being in the front line, so to speak, was among the first to feel it. But in 1921 this was a year or so in the future. Meantime, exciting things were happening.

Change was swift. Starting, in 1915, from a thirty-mile radius as the reliable range of a kilowatt transmitter, amateur radio had worked up such steam that signals had been heard coast to coast before the war. Now, in November 1921, everything was set to try to get 200-meter signals across the Atlantic — with the serious expectation of success. A first effort, in December 1920, had been a failure. But this was not so much a disappointment as a challenge. To meet it, Paul Godley was on his way to the British Isles to set up a receiving station for the transatlantic tests to be held the following month.

1921 Transatlantics

Godley took with him two receivers, one a standard variometer regenerative set with two steps of audio amplification, the other a 10-tube superheterodyne built especially for the tests. A superhet would occasion no comment today on a similar expedition — except for the small number of tubes — but in 1921 the circuit was an extreme novelty in amateur work; so far as the record shows, Godley's was the first to be so used. It would be highly interesting to listen in on it today, if it were still in existence, because from the brief details available it seems likely that it would have been capable of rather good single-signal reception of c.w. signals. There was no r.f. amplification, the antenna being coupled to a regenerative first detector, with a separate oscillator whose frequency was adjusted to heterodyne the signal to 100 kc. The intermediate-frequency amplifier had five stages, resistance coupled, the final one coupled to the detector through a transformer tuned to 100 kc. Godley's description of the set says that feedback from the plate of the last i.f. stage to an earlier one made the amplifier regenerative. A separate beat-frequency oscillator was used for c.w. reception, tuned about 1000 cycles off 100 kc. A single stage of a.f. amplification followed the second detector.

With this receiver and a Beverage wave antenna Godley heard seven spark and nineteen c.w. signals from North America during the test period in December 1921. Fittingly, perhaps, in view of its past accomplishments, spark was the first to get across; less fittingly, the honor went to a station to this day unknown. But spark's minority share of the total glory only emphasized the superiority of c.w., especially since nearly all of those c.w. signals had been generated by transmitters running much less than a kilowatt. In the very act of reaching the summit, spark was slipping over the precipice.



The spark-to-c.w. transition was helped along by using parts of the obsolescent spark equipment in c.w. hookups. This is a c.w. transmitting circuit using a spark coil to furnish plate power, described by 9DDY in March 1922 *QST*. It gave a modulated signal that could be copied on non-oscillating detectors.

Struggles With C.W.

Developments during 1922 only served to ram the c.w.-*vs.*-spark lesson home more unmistakably. With clocklike regularity — but with nothing monotonous about it to the amateurs of the time — c.w. was hanging up new records for distance and power. The superiority of c.w. performance, a growing conviction that spark operation was selfish in its use of the crowded spectrum, the impossibility of living with one's BCL neighbors with a spark transmitter in the shack, and the beginnings of an interest in waves still shorter than 200 meters — all these combined to hasten the day when spark would disappear from the amateur air.

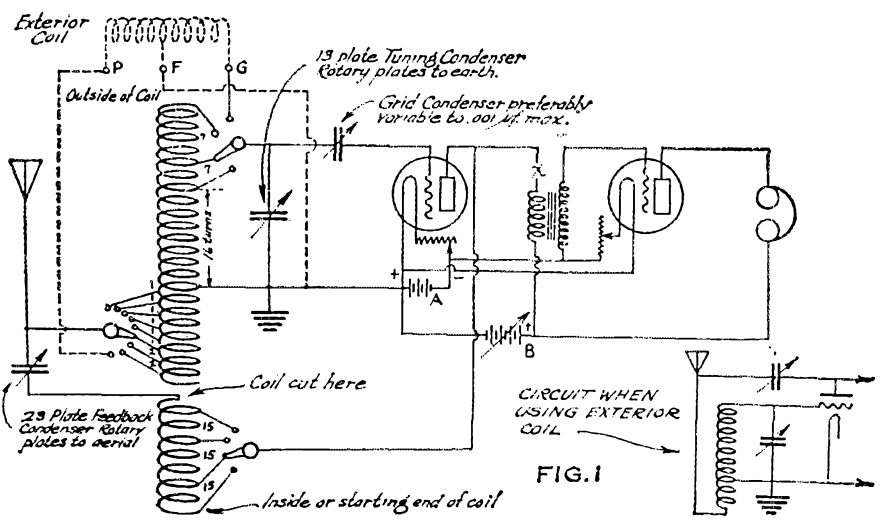
Not that c.w. was free from problems! Nearly all transmitting circuits used the antenna-ground system as the frequency-determining element in what today we would call the oscillator tank circuit. The effort on frequency stability, especially in windy weather, is not hard to imagine. Superficially, it might seem strange that a generation used to spark techniques, where great emphasis was placed on the necessity for using loose inductive coupling to the antenna, should have given almost no consideration to using the same type of coupling with c.w. To the amateur of the time there was no anomaly. In spark, the antenna system *was* the oscillating circuit; the primary circuit was there just to deliver a large chunk of energy in a hurry and then get out of the way, letting the oscillations be set up by the antenna. With c.w. there was no such sudden bang, since the tubes supplied energy continuously, but it was merely logical to continue to look on the antenna as the oscillator.

The necessity for better transmitter stability was of course recognized. The outstanding c.w. station of the December 1921 tests, 1BCG, had attained a steady signal by using a master oscillator-power amplifier circuit, an arrangement that was conceded to have the necessary attributes, but which was seldom found in the general run of amateur stations. Successful operation depended on using just as big a tube in the oscillator circuit as in the amplifier — and what amateur would willingly sacrifice the extra punch he could get from making *all* of his precious tubes pump power into the antenna? Stability wasn't that important — yet. Another reason was that while the theory was fine, the practice was something else again. There were only triode tubes, and "amplifier" circuits were little more than tuned-grid tuned-plate oscillators. If amplification was achieved at all it must have been in the form of an oscillation locked in frequency by the master oscillator, rather than straight amplification as we now know it. Whatever the reason, the m.o.p.a. did not catch on to any extent.

But in spite of shortcomings, c.w. was getting out. A repeat of the transatlantic tests was held in December 1922, this time with only European amateurs doing the receiving. Over 300 c.w. stations in Canada and all U. S. districts were logged — but no sparks. There were hardly any sparks left; the lessons of the previous year had been well learned. And now, for the first time, European amateur signals were heard in America — two British, one French. A meagre performance, but enough to show that it could be done. Preparations were begun for yet another series of tests, this time with the determination to work two-way across the pond. But here the whole course of amateur radio took a swerve toward a wholly new road.

The Short Waves

Ever since the reopening there had been rumblings about waves below 200 meters. It was known that work had been done in the lower regions during the war, and short-wave experi-



The second version of the Reinartz tuner used this circuit, reprinted from March 1922 QST. Many an old timer will recognize it as one he used in the early c.w. days.

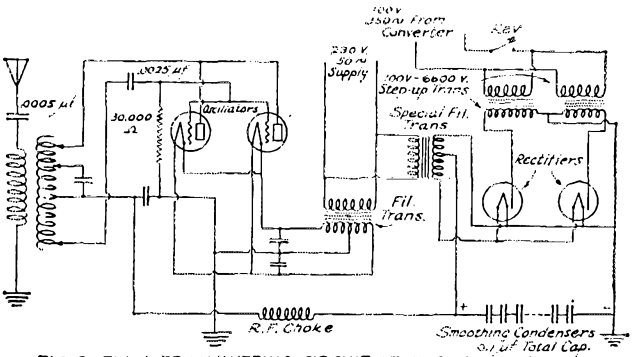


FIG. 3 FINAL TRANSMITTING CIRCUIT AT *ENGLISH 5WS*

British 5WS, a star station of the 1922 transatlantic tests, used the inductively coupled Hartley circuit shown above. Inductive coupling was rather rare on this side of the water at the time.

menting was continuing, particularly in France. A handful of amateurs on this side were plugging away in the vicinity of 150 meters, finding communication more reliable than at 200 and above, largely because of lack of QRM. But it was difficult. Receiving equipment then available didn't go that low, so contacts were few. The situation was summed up in a letter by S. Kruse of Bustands-ARRL Fading Tests fame, published in January 1922 *QST*: "Is there not some manufacturer (*sic*) who will produce a tuner . . . whose normal range is from 100 to 200 meters . . . ? Certain stations to our knowledge have done excellent work on waves as low as 150 meters . . . but . . . all these stations have abandoned the short wave . . . because no one else could tune down to them. . . . No one within their range had been able to buy a tuner that was made for amateur wavelengths."

Broadcasting and the success of the 1921 transatlantics had temporarily diverted attention from the shorter waves, except for a few persistent experimenters who wanted to get down below the mob where they could work in comfort. To their surprise, and in contradiction of accepted theory, they found that the transmitting range was not lessened at the shorter wavelength, even after allowing for the lack of QRM. Thus encouraged, a small group centered in Washington, Chicago and New England, determined to go still farther down. Eventually they reached 100 meters, finding things still better as they went. As reported by Kruse in March 1923 *QST*, in every test better signals were heard at some wavelength *below 170 meters* than at 200.

Making equipment function at 100 meters was no simple feat at the time, and Kruse's report was accompanied by a short article by Boyd Phelps on making receivers work at that wavelength. A description of three transmitting circuits followed in April *QST*, the one used by Reinartz, 1QP, being particularly interesting because it seems to be the first time that a counterpoise was used as the other half of a balanced antenna system, rather than as a capacity ground. A feature of this circuit was the establishment of a nodal point, or point of zero r.f. potential, at the filament tap on the oscillating circuit. The method of adjusting the circuit to accomplish this was described by Reinartz in a later issue. Getting the nodal point to come where it should subsequently became an important part of the technique of transmitter tuning.

While this was going on, Deloy of French 8AB had been involved in some short-wave tests with the government communication authorities in France. In a letter to *QST*, published in the October 1923 issue, he reported enthusiastically that strong signals were received at his station, 435 miles from the transmitter, on 45 meters *day and night*. Such performance was unheard of at 200 meters. With the evidence of superiority now piling up, there was only one thing to do — put the short waves to the acid test of transatlantic two-way work. Arrangements were made with Reinartz and Schnell, and the rest is history: November 1923 saw the first two-way intercontinental amateur contact, and the wavelength was 100, not 200, meters. The previously scheduled December tests, although highly successful, were anticlimax; from now on, international amateur communication would grow to be about as routine as interstate work had been on spark a scant two years earlier.

Receiving Developments

Manufacturers naturally like to cultivate the fields promising the most profit, and in 1922 broadcasting was beginning to be just such a field. Professional designers were concentrating on broadcast reception (and would continue to do so for at least another decade), leaving the amateur pretty much on his own. Although no longer a prime market of radio manufacturers, the amateur did benefit by the shower of components aimed at the BCL. And developments in broadcast reception were of technical interest, occasionally even proving useful in amateur communication. But for the most part the increasing importance of broadcasting to manufacturers forced the amateur into constructing his own apparatus, as developments in 200-meter communication made the older factory-built equipment less and less satisfactory.

Thus in March 1922 *QST* we find a remodeled Reinartz tuner described, incorporating improvements that gave it a still greater edge over the variometer set for c.w. reception. It featured an untuned inductively coupled antenna circuit and a fixed tickler coil with capacitive control of regeneration, making for ease of tuning and, comparatively, freedom from tuning effects on the part of the regeneration control. Easy to build, the tuner became even more popular than the original model had been.

But while developments of this sort moved in the direction of greater simplicity, there was no lack of interest in more complicated methods, even if there was no great disposition to put them into practice. It was generally admitted that the ideal thing would be r.f. amplification, increasing the signal strength *before* detection, since detectors were square-law devices favoring strong signals at the expense of the weaker ones. But the problems of r.f. amplification at 200 meters seemed almost insurmountable.

The villain here was the capacity between elements of the triode tube. Although the input and output capacities could be circumvented by absorbing them into tuned circuits, this merely gave the grid-plate capacity the opportunity to get in its dirty work and set the amplifier into oscillation. The only stabilizing method known to the amateur world at the time was the simple one of loading the circuit by putting a positive bias on the grid. This could kill off self-oscillation, but it killed off the amplification, too. Consequently, attempts were made at various types of untuned interstage coupling. There is no evidence that anything but indifferent success attended these efforts.

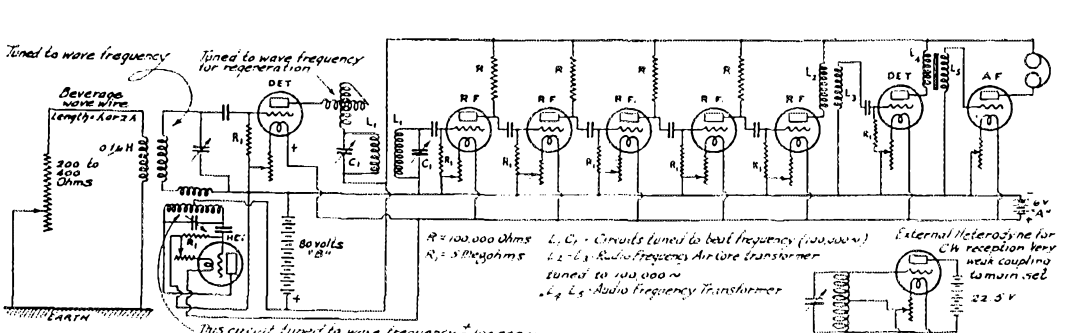
Superregeneration, announced in mid-1922, started a mild furor. After six months or so any further references to it disappeared from the pages of *QST*; it had shown no advantages over the plain regenerator for 200-meter work.

The superhet had a small share of attention, but it too was passed by for amateur work — too complicated, perhaps, for the ordinary amateur, and too hoggish when it came to A and B power consumption. (Remember that batteries had to be used for filament and plate supply in this era. With a heavy drain, B batteries went dead in a hurry, and A batteries likewise.)

But possibly the most potent factor of all in discouraging the use of these more complicated receiving methods was Ballantine's "Radiotelephony for Amateurs," the amateur's Bible of the period. Ballantine showed that to get sensitivity equal to that of an ordinary regenerative detector at least two r.f. stages would be needed at 200 meters. Furthermore, he also showed that the square-law assumption for detectors was untrue in the case of an oscillating detector. The oscillating detector was just as kind to weak signals as to strong ones, a simple fact that negated the most powerful argument for r.f. amplification. At the same time, it was a powerful argument *for* c.w., the reception of which required that the detector be oscillating. Even the introduction of Hazeltine's neutrodyne, which overcame the principal disadvantage of the r.f. amplifier, failed to make an impression in amateur ranks. However, the neutrodyne quickly became the rage in broadcast reception where the detector was *not* oscillating.

At this period, then, amateur receiving methods are notable chiefly for the way in which they clung to the fundamentals that had proved most effective for *amateur* work, rejecting those superficially attractive schemes that may have had their place in broadcast reception. The exigencies of c.w. reception demanded, and got, simplicity in circuits and simplicity in operation. It was fortunate, probably, that the manufacturer left the amateur to work out his own destiny at this juncture.

There has probably never been a time in the history of amateur radio when so much of technical interest happened as during the period from, roughly, late 1921 to early 1924. In the few pages available here it has been possible to touch only on some of the high spots; some will have to go over until next month. Even so, and even if



HOOKUP OF THE SUPER-HETERODYNE USED AT ARDROSSAN

The receiver circuit used by Godley in the successful transatlantic tests of December 1921. With a regenerative first detector and a regenerative i.f. amplifier, this could have been the first amateur receiver to approach single-signal c.w. performance. The detector tubes were UV-200s; the others, A-P amplifiers of the "hard" variety.

unlimited space could be allotted, it is doubtful that any chronicler could recapture the spirit of adventure that pervaded the amateur ranks at the time, the exciting conviction that ever-greater achievements were just around the corner, the wealth of techniques that were tried and laid away to be revived years later — often under new names — when the need become more apparent. Truly, those were great days.

Advertising:

The Broadcast Boom

THE SUCCESS OF 1BCG and other c.w. stations in the December 1921 transatlantic tests further stimulated c.w. operation. "Duplicate the set heard across the Atlantic," said RCA in February, 1922. In the same month Pacent Electric advertised Dubilier condensers as a vital part of 1BCG. Esco in March said it had a part in the station's triumph.

But now the rapid growth of broadcasting began to be reflected in the advertising columns of *QST*. Equipment for broadcast reception was advertised in quantity. Westinghouse, Burgess, Willard, Prest-O-Lite, and Eveready batteries were active and so was G. E. with its Tungar charger. Magnavox, Dictograph, Telmecophone and Western Electric were among those looking for speaker business, and let's not forget Doolittle's Audimax — the same Doolittle that had advertised the Decremeter. (Well, Dad, did you explain?) There were at least twenty-five headset manufacturers ranging from names like Everett, Monarch and Leich to more familiar present-day firms such as Federal, Kellogg, Stromberg-Carlson, Briggs & Stratton.

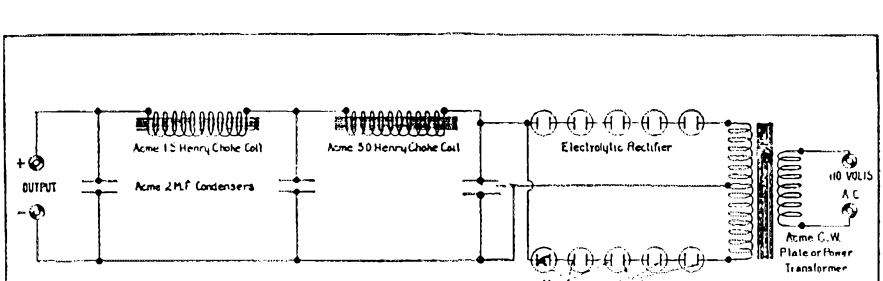
Well known among those who liked to drill their own panels were Radion, Bakelite, Celoron, Formica, Eisemann.

At that time there was no sharp dividing line between amateurs and BCLs. Many amateurs listened to music, amateur phone and c.w. on the same receiver. Advertising was addressed to either or to both. Esco in March 1923 showed a charger for "charging batteries used in wireless operation" but in December Exide asked, "Will your battery stay for the concert?" Grebe in June 1923 said the CR-6 "increases the tone qualities of music and increases the range of c.w. reception." Battery charging advertising became common in 1923 with names like Signal, Radio-Q, Valley, Westinghouse, in *QST*.

The shift from amateur to BCL advertising which began in 1922 and continued through the first part of 1929 followed a pattern that was to be repeated some years later when certain com-

Don't annoy your neighbor

How to avoid interfering with the broadcast listener



Follow this diagram and you can make an efficient filter for your set

panies deserted ham radio for television, and new companies sprang up. Receivers, mostly for broadcast reception, included Day-Fan, Kennedy, Radiodyne, Mu-Rad. These were complete receivers, not just tuners. Even Grebe in September 1924 went heavily into the broadcast receiver business. Zenith, Paragon, Crosley, tied in their receivers with MacMillan's WNP North Pole expedition.

Names like Grimes Inverse Duplex, Neutrodyne, Deresnadyne, Islodyne, in the advertising indicated the circuits employed in certain receivers to avoid infringing upon the Armstrong patent which controlled the use of the superheterodyne circuit.

Component advertising, also mostly for BCLs, remained heavy through 1925, especially on tubes and variable condensers. Cunningham, Myers, Sodion, Radiotron, Amrad, were among the tube advertisers; a few of the fifteen or more companies manufacturing condensers were Cardwell, Acme, Allen-Bradley, General Radio. National's first ad in *QST*, March 1924, was on a condenser — the type DX Vernier. Exactly one year later Hammarlund's initial ad, also on a variable condenser, showed the Model C.

In line with the use of *frequency* instead of *wavelength* in 1925, several manufacturers advertised their newly designed variable condensers. Pacent, Amsco, Duplex, U.S. Tool, talked about straight-line frequency. The advantages of their own engineering, neither straight-line frequency nor straight-line wavelength, were extolled by Precise and Karas.

Weston, Jewell, Roller-Smith, Westinghouse, were advertising meters in 1924, 1925. Hoyt started in January 1926 and Sterling in August 1927.

However, in 1924 and 1925 a few companies advertised to amateurs only: Ott Radio's receiver, Whittlesey and Hull masts, Wade transmitting condensers, and Pyrex insulators, for example. In August 1924 Acme stated ". . . we haven't forgotten the amateurs . . . while it seems that many others have ceased to do so, Acme still makes transmitting apparatus." In May 1925 Jenkins Labs made "available to American Radio Experimenters . . . machines which will both send and receive pictures, sketches, drawings . . . etc." Advised E. F. Johnson in November 1924, the first ad: "Ask for our new ham catalog."

The first *QST* Vibroplex ad appeared in April 1925, the Gold Bug in March 1926, the Ultimate key in February of the following year, the Electro Bug in July 1928.

Esco's "Filter Facts," the first monthly series in *QST* of engineering-explanatory ads, started in December of 1924. QST

Happenings of the Month

LICENSE FEES BEGIN

In early February the United States Court of Appeals for the Seventh Circuit in Chicago heard arguments on the petition of aeronautical interests for a permanent injunction pending litigation against the FCC's license application fee plan. Other users of radio, including the League on behalf of amateurs, were granted permission to join the case as "intervenors." The court ruled against petitioners, dissolving the temporary injunction it issued on December 31, and permitting the FCC to start charging fees after due notice. The court did agree to review the over-all fee proposal on its merits, and directed the FCC to place any license fees collected in a special treasury account from which the fees could be refunded to licensees if the FCC's fee-charging authority is eventually denied by the court.

Despite a League request to delay amateur fees for another month so that notice could be adequately circulated through amateur magazines, FCC announced that the fees would be required on all applications postmarked after March 16 at midnight, or hand carried to the FCC's office after the close of business on the 16th.

Meanwhile the House of Representatives subcommittee on communications called a hearing on March 4-6 to consider H.R. 6697, the bill introduced by Representative Rogers of Texas which would prohibit the charging of fees by FCC without specific legislative authority. The League was to appear at that hearing as well, in opposition to the Commission's fee schedule.

LICENSES BY MAIL

There is still some confusion on the part of amateurs about the current volunteer examination procedures, so a recap is in order. The applicant sends to any FCC office for FCC Form 610, dated August, 1963 (earlier editions are obsolete). He locates his own examiner, who must be over 21, and who must hold an FCC General or higher class amateur license, or must hold an FCC commercial license, or must be the operator of a manually operated U. S. Government radiotelegraph station.

The volunteer examiner will then administer the code sending and receiving tests. When the applicant has passed these, the examiner will certify the fact to FCC, in a letter [1] which gives the date of the exam, the applicant's and examiner's permanent home addresses, and the qualifications of the examiner.

The letter or ARRL Form S-45, the applicant's check or money order for $4.00 (except in Novice applications, for which there is no charge) and the completed FCC Form 610 are sent to the Federal Communications Commission, Gettysburg, Pennsylvania 17325. The test papers will only then be forwarded to the examiner, who must return them within the time allotted, usually twenty days.

[1] For the convenience of amateurs, ARRL has prepared a form S-45 with blanks for all the information required by FCC in the certification of the code examiner. Copies may be obtained upon request to the Secretarial Department, ARRL, accompanied by a self-addressed, stamped envelope.— *Editor*

RECIPROCAL OPERATING PROGRESS

As we reported in December *QST*, the Goldwater bill on reciprocal operating agreements passed the U. S. Senate in October. Even while this was in process, League officials were discussing with Rep. Oren Harris, Chairman of the House Interstate and Foreign Commerce Committee, a schedule for its handling in that body of the Congress, and were promised a hearing early in the year. The committee scheduled the House version of the bill for hearing on February 20, at which ARRL President Hoover presented a formal statement of the League support of the measure. Commissioner Hyde of FCC expressed a favorable Commission attitude, and written comments by Senator Goldwater and others were added to the record. Chairman Harris spoke of his own personal experience with amateurs, particularly at 4U1ITU in Switzerland. The atmosphere at the hearing appeared highly receptive, and as no serious objections were raised in questioning, it is a reasonable assumption that the Committee report will be favorable. Thus we seem to have passed one more step in the League's years-long attempt to gain reciprocal operating privileges for the amateur service.

TV RADIATION LIMIT CONTINUED

On petition of the Electronics Industries Association, the Commission continued for another year, to April 30, 1965, the present 1000 microvolts-per-meter radiation provision for television receivers. Without the action, permissible radiation would have been limited to 500 microvolts per meter, in common with other classes of receiver in the same frequency ranges. The action was taken in the absence of complaints resulting from the present rules, and apparently to avoid complicating the switch to all-channel TV sets now in progress.

A.R.R.L. STAFF NOTES

The League is pleased to announce that Jack Troster, W6ISQ, has joined the *QST* staff as a Contributing Editor. Well known for his gently sarcastic stories ("Love Them Dits", "Ahhh, Charlie" etc., etc., in *QST*) on the foibles of today's amateur, Mr. Troster will work for *QST* by "remote control"; correspondence should be addressed to him at 45 Laurel Avenue, Atherton, California.

(*Continued on page 158*)

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

THE prime purpose of this column is to chronicle the noteworthy events which take place as the "World Above 50 Mc." progresses. One of the yardsticks of the progress is the "States Worked" column on the various bands. In years past the 50-Mc. band had a "States Worked" box similar to the 144-Mc. box. As techniques improved and activity increased the number of stations achieving 50-Mc. WAS increased to the point where the monthly publication of 50-Mc. standings became too bulky to be a matter of general interest.

I might point out at this time that WAS is not just a term for having worked all states. It is an ARRL award, issued only after receipt of cards confirming contacts with 50 states. If the cards being submitted are for 50-Mc. WAS there should be a covering note indicating this. The 50-Mc. award is specially endorsed and serial numbered. A few 49-state 50-Mc. WAS awards were issued during the period when the Union was comprised of 49 states. Since the Union has increased to 50 states the only WAS awards available are for working the full 50 states. The bold-face 50-Mc. honor roll published at intervals consists of only those stations who have received the award, whether for 48, 49 or 50 states, depending on the time they achieved the WAS status. Working 48 or 49 states today does not entitle one to a position in this honor roll, except for stations outside the original 48 states, and Canada.

The 144-Mc. box consists of the top states-worked totals for each call area. The minimum requirement for a given call area is between ⅓ and ½ of the top states-worked effort in your particular call area. It should be obvious to anyone operating the v.h.f. that working six states from California is a major accomplishment, whereas working 16 states from the W1 or W2 call area is no more than a good beginning. W9KLR, with a well equipped station in Indiana, managed to work 37 states and to hear 40 in a one-year period. There have been many instances where W2s or 3s have heard as many as 27 states in one good two-day auroral opening. So the minimum requirements for listing are determined entirely by the contemporary performance in your area.

In general an effort is made to keep the boxes current and correct. Unfortunately during periods of high activity the changes required in the boxes, coupled with the normal typographical mistakes, make it very difficult to make any given box entirely correct. Please do not misinterpret this as a lack of interest on our part. Every effort is made to maintain correct listings as an indication of progress in each given area. Corrective information received from you is of considerable help and greatly appreciated.

If you wish to be listed in one of the states-worked boxes, there are two steps to follow. The first is to examine the list in reference to your own call area. If your states-worked total is in excess of the lowest listed number in your area you are ready for the second step. This consists of a postcard listing the states, the maximum mileage, and the total number of call areas you have worked on the band in question. It is also desirable to list the particular station in each state which you are claiming for credit. It is not necessary to send in your QSL cards as proof of your efforts.

Inclusion in a states-worked box for 144-Mc. or higher bands should not be confused with the 50-Mc. WAS listing. The only way you can be listed in this box is to have received the 50-Mc.

Father-and-son teams are common these days, and we get quite a few pictures of proud hams operating rigs they've built from *QST* articles—but here's a shot that combines both. Ernest Feher, K4SAJ (left) and son David, K4SAK are shown operating their 50-Mc. self-contained portable stations from Mt. Mitchell, North Carolina. From this highest point in eastern U.S.A. they worked scores of 50-Mc. stations, including a 2-watt mobile, WA4JKK, some 75 miles away in South Carolina. The 6-meter portables were built from the description in March 1960 *QST*, the only modification being use of operator-type headsets in place of the telephone handset shown with the original. To quote David: "Dad and I agree that no matter what we build in the future, we'll probably never get as much fun and satisfaction from it as we've had with these 6-meter peanut-whistles."

* P.O. Box 334, Medfield, Mass.

2-Meter Standings

W1REZ	32	8	1300	W5EDZ	8	5	1375
W1AZK	28	8	1205	W5YYO	7	4	1330
W1KCS	24	7	1150	W5UNH	6	3	1200
W1AJR	24	7	1130				
W1MMN	22	8	1200	W6WSQ	15	5	1390
W1JSM	22	7	1330	W6NLZ	12	5	2540
W1HDQ	22	6	1020	W6DNG	9	5	1040
W1IZY	20	6	1080	K6HMS	7	3	1010
W1AFO	19	6	920	W6AJF	6	3	800
K1CRQ	19	6	800	W6ZL	5	3	1100
W1MEH	20	6	1000	K6GTG	4	2	800
K1AFR	17	6	675	W6MMU	3	2	950
W2CXY	37	8	1360	K7HKD	20	7	1330
W2ORI	37	8	1320	W7LHL	10	4	1170
W2NLY	37	8	1300	W7CJM	5	2	670
W2BLV	36	8	1020	W7JIP	4	2	900
K2LMG	32	8	1200	W7JU	4	2	235
K2GQI	35	8	1365				
W2AZL	29	8	1050	W8PT	40	9	1260
K2IEJ	27	8	1060	W8KAY	39	9	1210
K2CEH	25	8	1200	W8SDJ	37	8	1220
W2AMJ	25	6	960	W8IFX	35	8	980
W2ALR	24	8	1100	K8AXU	34	9	1275
W2RXG	28	8	1200	W8SFG	31	8	1040
W2SMX	23	7	1090	W8MVE	33	9	1155
W2LWI	23	7	1050	W8LOF	32	8	1060
K2HOD	23	7	950	W8GGH	32	8	1180
W2DWJ	23	6	880	W8BAX	32	8	960
W2PAU	23	6	753	W8RMH	32	6	910
W2ESX	21	6	750	W8NOH	31	8	1090
K2KIR	21	5	700	W8EHW	31	8	860
W2UTH	20	7	880	W8SVI	30	8	1080
W2WZR	19	7	1040	W8EHW	30	8	860
W2RGV	19	8	720	W8LPD	29	8	850
WA2EMA	19	6	1010	K1CRQ/8	28	8	690
W7PUA/2	18	7	1150	W8WRN	28	8	680
WA2PZE	18	6	750	W8DX	26	8	720
W2RLG	17	6	980	W8ILC	25	8	800
K2OEI	16	6	1010	W8JWV	25	8	940
WA2YXS	16	6	720	W8WNM	25	8	900
K2JWT	16	6	550	W8GEN	23	8	540
				W8LCY	22	7	680
W3RUE	33	8	1100	W8BLN	21	7	610
W3SGA	31	8	1070	W8GTR	17	7	550
W3TDF	30	8	1125	W8NRM	17	7	550
W3GKP	30	7	1180				
W3KCA	28	8	1110				
W3BYF	28	8	1070	W9KLR	41	9	1160
W3FPH	22	8	1100	W9WOK	40	9	1170
W3LST	22	6	800	K9UIF	38	9	1150
W3LNA	21	7	720	W9AAG	35	9	1050
W3NKM	20	7	730	W9GAB	34	9	1075
W3LZD	20	7	650	K9AAJ	33	8	1070
K3HDW	12	6	1015	W9REM	31	8	850
				K9SGD	30	8	1100
W4HJQ	39	8	1150	W9ZTH	30	8	830
W4HHK	37	9	1280	W9PBP	28	8	820
W4LTU	34	8	1160	W9LVC	27	8	950
W4ZXI	34	8	954	W9OJL	27	9	910
W4WNH	34	9	1050	W9IPA	26	6	1000
W4MKJ	34	8	1149	W9ZHG	25	8	700
W4AO	30	8	1120	W9BPV	25	7	1030
W4IXC	26	8	1225	W9CUX	24	7	1000
W4LVA	26	8	1000	K9AQF	24	7	900
K4EUS	26	7	1130	W9WDD	23	7	900
W4EQM	25	8	1040	W9LF	22	7	825
W4AIB	25	8	900	W9KPS	22	7	690
W4RFR	24	9	820	W9ALU	18	7	800
W4TLV	23	7	1000				
W4JC	23	6	725	W0BFB	39	9	1350
K4QIF	22	8	1000	W0LFE	32	9	1040
W4RMU	21	7	1080	W0IHD	31	8	1030
W4OLK	20	6	720	W0LFE	39	7	970
W4LNG	19	7	1080	W0SMJ	29	9	1075
K4MHS	19	5	700	W0QDH	27	9	1300
W4MNT	18	8	1170	W0ENC	25	6	1225
K4YUX	18	8	830	W0RUF	23	7	900
K4VWH	18	6	990	W0MOX	23	6	1150
W4MDA	17	6	775	W0IC	22	7	1360
				K0TTF	21	6	940
W5RCI	39	9	1280	W0INL	21	6	830
W5FYZ	33	9	1275	W0TGC	21	7	870
W5AJG	32	9	1360	WA0DZH	21	7	1170
W5JWL	29	7	1150	W0RYG	20	8	925
W5DFU	29	9	1300	W0DQY	20	7	700
W5PZ	28	8	1300	W0JAS	19	7	1130
W5LPG	25	7	1000	W0AZT	18	7	1100
W5KTD	23	8	1200	K0AQJ	16	6	1120
W5SWV	20	5	960	W0IFS	16	6	1100
W5UKQ	18	8	1150				
W5ML	16	6	700	VE1CL	8	4	800
K5TQP	15	6	1170	VE3DTR	37	9	1330
W5KFU	15	5	1360	VE3AIB	29	8	1340
W5UGO	13	4	635	VE3BPR	24	7	950
W5FSC	12	5	1390	VE3BQN	23	7	1180
W5HEZ	12	5	1250	VE3AQG	18	8	1300
W5CVW	11	5	1180	VE3DER	17	8	1310
W5NDE	11	5	620	VE3HW	17	7	1350
W5WAX	11	5	735	VE6HO	1	1	915
W5VY	10	3	1200	VE7FJ	2	1	365
W5BEP	9	3	1000	KH6UK	2	2	2540

The figures after each call refer to states, call area and mileage of best DX.

WAS award from the ARRL. Under the present ruling this will require proof of contact with all of the 50 states and a covering note indicating that the application is for 50-Mc. endorsement of the WAS award.

If your listing is presently incorrect in any of the boxes please send a post card with your correct listing, posthaste. Because of the changing scene in the box listings, mistakes are not self-correcting but rather are self-perpetuating. Proof-reading against last month's column for example, doesn't accomplish corrective measures as the box will have been changed and the errors are very apt to be ignored as changes rather than errors. Your help in keeping the boxes up to date will be greatly appreciated.

50 Mc.

"Skip" is still the main subject of comment from the 50-Mc. operators. From New York, WA2RKK, WA2RAQ, WA2TQT and WA2DRP all noted an opening on January 13 when West Virginia, Pennsylvania, Tennessee, Georgia, Mississippi, Florida, Virginia, Indiana, Illinois, Missouri, Kentucky and VE1 were heard. Paul, WA2RKK, sez that he is building a 130-watt six-meter transmitter and matching power supply and has the modulator completed. Lou, Norm and WA2DRP all noted openings on the 15th with 4s, 8s, 9s and 0s coming through, and in addition to these openings WA2DRP also noted openings on the 14th and 19th. WB2HNP in Brooklyn is looking for 50-Mc. RTTY contacts on 50.4 Mc. Norm, WA2TQT sez there has been quite a pickup in local (New York City) c.w. activity on 50 Mc.; WA2DRP in Schenectady is working on a d.s.b. balanced modulator for six meters; and WB2DDP is on d.s.b. W2CTH, WA2VGV, W2PNQ and WA2OXM are all on 50-Mc. s.s.b. In Baltimore, K3PRN and K3TUJ both noted the January 13 opening and Bill, K3TUJ, also caught the one of the 15th. On the 13th stations were heard from Texas, Alabama, Georgia, Missouri, Florida, Indiana, Ohio, Tennessee and Kentucky, while on the 15th those heard were Iowa, Nebraska, Illinois, Wisconsin, Missouri and Kansas. At Decatur, Alabama, W4YRM worked/heard six states in three call areas on January 14, while WA4QJA at Oxford, North Carolina, heard stations in 1- and 2-lands and Canada on the 13th. At Knoxville, Tennessee, K4KYL and K4PZT report from their area: Doc (K4PZT) sez that stations from 1-, 2-, 3- and 4-land (Florida) were heard at his QTH on January 13, and from 1-, 2-, and 3-land on the 14th. Jim (K4KYL) did not mention these two openings but did observe openings on the 15th and 16th; on the 15th to Maine, Massachusetts, Vermont, New York, New Hampshire, Connecticut, New Jersey and Rhode Island, and on the 16th to Oklahoma, Texas, Florida, Missouri and Kansas.

An interesting letter was received from Ralph Baker, WA4EFI. "Would like to comment that I worked W4NYT, Herman, on January 17. Herman is located in Roanoke, Alabama, approximately 150 miles from Atlanta. This QSO developed while I was on Atlanta's South Expressway, mobile in motion, using s.s.b. At first readability was 3, strength 1 or 2 but upon reaching Hapeville, Georgia, readability came up to 5, signal strength 4 or 5. Although many stations in Atlanta have worked Alabama from their home QTH this is the first mobile-to-fixed QSO from an Atlanta average elevation to Alabama to the knowledge of anyone I have talked with around town. Atlanta's average height above sea level is around 940 feet." Pretty good for mobile work in that area, Ralph. Congratulations!

W6YKS at Fortuna, California, noted no band openings during the month of January but on the weekly scatter tests he has heard W7QDJ/6, K7OFT, W6NLZ, W6GRX and K6IBY. John now has his cascode preamp working and has erected a new 8-element beam for 50 Mc. A 4-65A linear for six meters is in the works and should soon be completed. K6QKL/KH6 tells us that K3LIJ, Nick, is in the process of putting Midway back on six, and sez that "six-meter stations are still needed on Johnston, Canton, Wake, Fiji, Christmas and Samoa. At Butte, Montana, W7CJN noted "no aurora, sporadic *E* or other propagation methods noticed during the month of January." Orrie sez he has nightly QSOs with W7OIO (Butte) with K7GVJ checking in frequently; that he is working W7NPV in Bozeman with signals not too strong in either direction; that he held

skeds with W7CJB in Missoula on 50-Mc. c.w. with no contact made but a split-second "heard" on a burst.

Ev Taylor, K7YSE/W8NAF writes: "K7JUE, K7MBI, K7OED, W7RUX and K7YSE are the only stations on 50-Mc. s.s.b. in this state of Arizona at the present writing (February 5). Tell the v.h.f. gang that QLZ is still on out here and OVK is now K6JC in California (also on s.s.b.). I worked 38 states last summer with a 99er and a 5-element beam at 60' but am going all out on s.s.b. this next *E* season. Main frequency will be 50.111 so tell the s.s.b. gang to be looking for this station for Arizona contacts. Am interested in 1st and 3rd district plus KL7 and KH6 skeds starting in April or May." Very good to hear from you again, Ev, keep the information coming and we'll be seeing you on 50-Mc. s.s.b., along with a lot of the other boys in your area (we hope). Out in Kalamazoo W8CVQ reports that the opening of January 13 lasted from six to eight hours with good contacts made from Maine to Florida. Also noted shorter openings on January 14 and 15. Walt would like to know: "Does anyone have any experience with possible harmonics from radio garage door opening gear in the 50-51 Mc. range? I have four strong signals in this range that are on all the time, day and night, and that seem to be of local origin." Now's your chance, those of you who have had such an experience. Come forth with your solution! W8MBH and WA8DZP report from Detroit, Michigan: Reg, W8MBH reports the opening of January 14 when he heard 1s, 2s, 4s, 8s and 9s. WA8DZP sez that skip was very good during the first week of January with stations heard in New York, Ohio, Pennsylvania, Indiana and West Virginia.

At Janesville, Wisconsin, K9DBR worked stations in Pennsylvania, New Jersey and Alabama during the openings on January 15 and 16, and heard stations in several other states although he did not work them. WA9EVF, K9FNB and WA9HSZ of the Chicago area all report hearing from one to seven states during the opening of the 13th, with up to four call areas heard or worked. Dick, K9FNB also noted a lesser opening the next day toward the east. At Cicero, Illinois, WA9FHI sez: "Three days of sporadic *E* were noted January 13-15. Found the band open about 3:15 P.M. on January 13 to 1, 2, 3, and 4 lands and worked Delaware, Maryland, Virginia and Pennsylvania. Signals were spotty to excellent and last QSO was with W4IIO about 6:30 P.M., after which the band closed. On the 14th about 6:50 P.M. heard several New York stations in QSO, then WA2CVF and several others in s.s.b. roundtable. By 7:45 P.M., a.m. signals from 1 and 2 lands were spotty. Worked K3ACR and K3OXE in Pennsylvania about 8:30 P.M. and the band closed around 9:00. On the 15th a few eastern stations were heard very weakly around 6 to 6:30 P.M." Harold Landers, WAØBRU, would like to see more activity above 51 Mc. Sez he had an FB QSO with a station on 52,525 while he was operating on 52.500. For WAØFLL the January 13/15 openings brought contacts with stations in Connecticut, New Jersey, Pennsylvania and Virginia on the 13th, and with Virginia and Texas on the 15th with several 7s heard but not worked.

220- and 420-Mc. Standings

220 Mc.			
W1AJR	12	4	480
W1AZK	9	3	312
W1BU	11	5	600
W1HDQ	12	5	150
K1JIX	11	4	615
W1OOP	12	4	400
W1RFU	15	5	480
W2AOD	15	5	580
K2ANQ	9	3	240
WA2BAH	1	2	167
K2CBA	16	7	660
K2DIG	4	3	140
W2DWJ	15	5	740
W2DZA	12	5	410
K2DZM	12	5	400
K2FTP	10	5	265
K2FTQ	11	5	265
K2JWT	6	3	244
K2KIB	12	4	300
W2LRJ	10	4	250
W2LWL	12	4	400
W2NTY	12	5	300
K2PPZ	11	4	400
K2QJQ	13	5	540
W2SEC	11	5	450
K2UUR	6	3	210
W3AHQ	4	3	180
W3FEY	11	5	350
K3IUV	8	3	310
W3JYL	8	4	295
W3JZI	4	3	250
W3KKN	10	4	255
W3LCC	10	5	300
W3LZD	15	5	425
W3RUE	10	5	480
W3UJG	13	5	400
W3ZRF	5	4	112
K4TFU	8	4	400
W4TLC	5	1	315
W4UYB	7	5	320
W5AJG	3	2	1050
W5RCI	8	5	700
K6GTG	2	1	240
W6MMU	2	2	225
W6NLZ	3	2	2540
K7ICW	1	1	250
K8AXU	11	5	1050
W8IJG	9	5	475
W8LPD	6	4	480
W8NRM	8	4	390
W8PT	10	5	660
W8SVI	6	4	520
W9JCS	6	2	340
W9JEP	9	4	540
W9OVL	6	3	475
W9UED	4	4	605
W9ZIH	10	5	500
K9DGU	5	3	425
KØITF	6	3	515
KH6UK	1	1	2540
VE3AIB	7	4	150
VE3BPR	3	3	300

420 Mc.			
W1AJR	12	1	410
W1BU	11	3	390
W1HDQ	9	3	210
K1JIX	8	2	230
W1MFF	8	3	170
W1OOP	11	3	390
W1QWJ	10	3	230
W1UHE	10	4	130
W2AOD	6	4	200
W2BLV	12	5	360
K2CBA	8	4	220
WA2DTZ	6	3	200
W2DWJ	10	4	196
W2DZA	5	3	130
K2DZM	10	4	390
WA2EUS	7		
K2GGA	4	4	383
WA2HQE	8	4	280
K2KIB	4	2	100
W2NTY	3	2	100
W2OPA	10	4	300
K2UUR	9	3	280
W2VCG	9	4	280
W2YPM	6	2	300
K3CLK	9	4	
K3EOF	6	3	250
W3FEY	8	4	296
K3IUV	7	3	310
W3LCC	3	2	
W3RUE	6	4	410
W3UJG	2	4	350
W4HHK	9	4	550
W4RFR	5	2	665
W4TLV	4	2	500
W5AJG	6	2	665
W5HTZ	5	3	440
W5RCI	12	3	660
W5SWV	7	3	525
W6FZA	1	1	280
K6GTG	1	1	180
W7LHL	2	1	180
K8AXU	5	3	660
W8HCC	3	2	355
W8HGC	3	2	250
W8JLO	6	3	275
W8NRM	3	2	390
W8PT	8	5	400
W8RQL	6	3	270
W8TYY	9	5	580
W8USP	3		25
K9CIF	8	5	390
W9AAG	8	4	525
K9AAJ	7	5	425
W9GAB	9	4	608
W9OJI	6	3	330
K9ITF	3	2	158

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

144 Mc. & Up

Conditions on the v.h.f. bands have not been up to par recently as proven by the number of people who are now building equipment instead of actually operating. Out in Milwaukee, WA9FNS sez that his 2300 Mc. receiver and transmitter are almost completed, in fact he should be on the air with them by the present time. Herb's antenna will probably be parabolic reflectors or microwave horns. WA5JAY is building transmitter and converter for 1215 Mc. Among the many who are building for 420 and 220 Mc. are W4FDQ, WA4FIJ, WA8DOM, K8PBA (s.s.b.). K8ZES and K9DBR, all building equipment for the 420-Mc. band. K4PZT is working on TV on 436 Mc. and has been designing slides for use in the flying spot scanner. WA8KJJ has about completed his flying spot scanner and video amplifier on 440 Mc. Fred and his brother plan two-way ATV between Galion and Nevada, Ohio. Building for 220 Mc. are K9DBR, W8CVQ, K4QIF and WA2DRP. K4QIF has completed a 6CW4 220-Mc. converter and a 5894 220 transmitter and has a 15' yagi. Speaking of building — WB2EZY is building a laser and would like to correspond with any other ham who is or has been working on the same project.

At Old Bridge, New Jersey, WB2ALF has been listening for signals which might be reflected from Echo II on 144 Mc. John has been holding skeds with WØIAY in Nebraska to attempt a QSO via Echo II and frequency is 144.035. K2KFE would like to try skeds of the same type but at 146.79 f.m. Anyone interested can contact him. WA2LBL and WB2FXB both noted good ground wave conditions on 144 Mc. during the last week of January. Bob (WB2FXB) sez that on the night of January 24, the band seemed to be open with stations in southern New Jersey and upstate New York coming in. At the present time he's waiting for good weather to put up his new 15-element wide-spaced two-meter beam. According to WA2PWI, "January a very dull month with 144-Mc. conditions being poor to average", while Bill, WA2UDT, sez there is lots of local activity above 145 Mc. K3OBU at Wilmington, Delaware, sez that although conditions were about average during the January contest he worked everything from W1RJA to W4LTU with the Maryland, D.C. section being quite rare on two meters. Joe's thinking of making an expedition to Maryland during the June QSO party. On January 23 Joe observed K1IED/4 at Langley AFB in Virginia coming through 15 db over 9 with no QSB for several hours. First time such a strong signal was heard from Virginia on two meters; all other signals seemed normal signal strength. On the 24th WA2SLY, K2EFB and K2VRV were all worked by K9OBU and all had very strong signals.

K3CFA sez that the two-meter band opened into Canada on the night of January 5 just as the v.h.f. contest was coming to an end and that VE3DIR was putting in a solid signal at Lemont, Pennsylvania during his contact with K2IEJ. Joel also wants to contribute a hint to other home brewers. Sez he: "I replaced the 6CL6 tripler in my two-meter rig with a 6HB6 pentode which resulted in additional drive to the final grid. The 6HB6, like the 6CL6, is a power pentode designed for use in television sets, but it has higher plate dissipation, plate current ratings and transconductance and costs less than the 6CL6." At Huntsville, Alabama K4HQU is working with RTTY on both two and six meters using a.f.s.k. He's running 150 watts on two and 300 watts p.e.p. on six. Dave tells us also that he rigged a whip and halo in parallel and fed both at the same time on his car, and has worked into Huntsville from Winefield, a distance of about 89 miles airline (not RTTY). He would like skeds on either band any time or frequency after 9:30 P.M. using a.f.s.k. or a.m. or s.s.b. From Honolulu K6QKL/KH6 tells us that Mack, KH6CMM is working interisland on two meters and that he (K6QKL/KH6) is working on 6299 front end for six- and two-meter converters.

WA6ROJ at Ukiah, California sez that he is erecting a 60' tower and two 10-element two-meter beams with azimuth and elevation rotors and expects to have the installation complete by the middle of February. John has one kw. transmitter (c.w.) ready to go for attempts at Echo II reflection work.

George Washburn, WA6YYM, writes us that he started working on two meters with a Twoer and his third contact (with a homebrew ground plane) was a WV6 at a fire lookout southeast of Hollister (112 miles). Since that time he has added an International Crystal Converter, a Hy-Gain 5-element beam, replaced by a homebrew 10-element beam, a 6J4 (2) GG preamp, and a 6360 homebrew phone transmitter (the present rig). With this equipment he has worked into several points in the San Joaquin Valley, Salinas (100 miles), Soulsbyville (118 miles), Mt. San Benito (134 miles — best DX), and Grass Valley (130 miles). George sez: "The newest project around here is the construction of a new 100-watt phone/c.w./m.c.w. transmitter. Although still on the drawing board, I plan to use an 829B possibly with a transistor modulator. It will be rack-mounted in 3 racks and mounted in a 3' rack cabinet. The location here is on the southeast slope of Mt. Davidson about 550' up and all operation is on two meters. Future projects may include two-meter RTTY and 420-Mc. gear."

Out in Kalamazoo, Michigan, W8CVQ sez that better than normal conditions were observed on January 28 with good contacts south and west into the ninth district during the evening. Other than that conditions were normal for the season. At Detroit WN8HTL had a slightly different story to tell. "Two meter band has been in bad shape through the month of January. A few openings did occur during the week of January 20 when Pennsylvania, New York, Ohio and Indiana were heard on 144 Mc." Jack also tells us that more stations are coming on two meters all the time, and that W8AOE keeps skeds with W3GLC every evening about 7:30 P.M. K8YWF at Tiffin, Ohio, sez there wasn't much doing during January on 144 Mc. although W8MVC did work W5UKQ on meteor scatter January 4. Out in Milwaukee WA9FNS sez that two meters was quite active during the contest on January 4 and 5 with Indiana, Illinois and Michigan coming through loud and clear for considerable lengths of time. W5UKQ at Baton Rouge sez he is building a new converter for 432 Mc. and has a 20-element beam 100' high for that band. We can be expecting to hear more from Jack. On his two-meter work Jack sez he's holding regular skeds with WA2PZE every evening from 8:00 to 9:00 P.M.; that he was heard in Connecticut by W1MEH for a 30-second period; and that he heard W7HKD with a 20-over-9 signal.

We have been informed that a group of ambitious v.h.f. men are already well along in their plans for the V.H.F. QSO Party in June. W4SKH/4 will be the call used from Mt. LeConte in Tennessee and the group intends to work the full contest period. They are looking for skeds on 50, 144, 220, 430 and 1240 Mc. If you're interested get in touch with W4LQE, WA4PJX or W4SGI.

Strays

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, by W8GUL, appears on page 34.

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

AC3PT is Crown Prince Palden Thondup Namgyal of Sikkim. — *W6MLZ*

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G3NGF reports via the newsletter of WAMRAC (the World Association of Methodist Radio Amateurs and Clubs) that Harry Wilson, EI2W, and his wife and son were among the passengers rescued from the doomed ocean liner *Lakonia*. Harry, known well on the amateur bands and a past President of the Irish IARU member society IRTS, helped organize passengers for their lifeboat stations, helped them into the lifeboats, and helped them aboard the Argentine rescue ship *Salta*. They spent four and a half hours rowing through six-foot seas before the rescue, and it was Harry's flashlight SOS which attracted the *Salta*.

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The Columbus (Ohio) Amateur Radio Association has been granted space in the new Franklin County Center of Science and Industry building for both a club station and meeting place. April 11 is the official opening date of W8TO, and the program will include dedication ceremonies, displays of historical gear, and on-the-air activity.

Pan-American Congress of Radio Amateurs

The Liga Mexicana de Radio Experimentadores is sponsoring the first Pan-American Congress of Radio Amateurs in Mexico City, April 15–18, 1964. While a primary purpose is to bring together representatives of national amateur societies in this hemisphere to discuss formation of a permanent Region II division of the International Amateur Radio Union, a program of diversified technical and social activities is planned and a cordial invitation is extended to all amateurs to spend a pleasant and informative week in Mexico City. For details contact ARRL Hq. or LMRE at Apartado Postal 907, Mexico City.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

THIS is about the time of year that we go into a statistical frenzy and come up with all kinds of useless data on activities during the previous year. From time to time we shall entertain (?) you on these pages with choice bits of interesting figures, both in the emergency and traffic field. This month, the subject is the Brasspounder's League, commonly referred to as the BPL.

Just a few days before this writing, we received a letter decrying our practice of listing those stations who make BPL on originations-plus-deliveries at the bottom, instead of at the top, of the column. This particular correspondent claimed that those who make it this way work a great deal harder than those who make it by receiving and relaying 250 or more messages (for 500 or more points). This is a switch; usually the complaint is that we should make the originations-plus-deliveries requirement higher.

What is "easy" and what is "hard" depends a great deal on who is doing it and how much it costs him in terms of effort and time. This is not the same for everybody. The habitual relayer might ask, for example, what's hard about originating 100 messages — or, if you live in a high-population area, about delivering by telephone great quantities of messages each month? The originator-deliverer thinks that relaying is by far the easier; after all, all you have to do is receive a message from one station and pass it along to another.

We have considered making changes many times, and through the years we have occasionally done so. Present indications are that the requirements are about equitable one way or the other, on the average. True, a station in New York City will find deliveries and originations easier than relays, and a station in Whistlestop, Kansas, will find relaying much the easier way to make BPL. There is no special preponderance of stations in any particular part of the country making BPL one way or the other. So, we leave the requirements as they are.

Incidentally, there has been some question regarding the meaning of the phrase "100 or more originations plus deliveries," many amateurs believing this means that 100 or more originations are required, plus any number of deliveries. The word "plus" means "added to," so if you add your deliveries to your originations and get 100 or more, you make the BPL; thus, we see nothing wrong with the above wording. However, since it was misunderstood by so many, we have changed it to make the meaning more plain (we hope).

Top BPL honors in 1963 were garnered for the fifth consecutive year, and for the ninth postwar year, by W3CUL, whose BPL point total for 1963 stands at 630 (four points for each monthly BPL listing plus one point for each full 100 monthly traffic points). This is in excess of her championship performance of 1962. Again placing second for the year was K6BPI, this time with 509 BPL points, as close to Mae as anyone has come in a long time. Another gal, KØONK, took third place with 367 points. The remainder of the "top 25" for the year are as follows: W9JOZ (362), W9IDA (347), WØLGG (272), W7BA (200), W3EML (193), K9KZB (178), W1PEX (175), W0SCA (174), W6RSY (172), W9MM (154), W3VR (146), W1TXL (144), W7DZX (140), WA2GPT (130), WA4BMC (125), K4AKP (123), W6GYH (120), W8UPH (118), W4ZJY (118), K6EPT (102), W9DYG (100), W2EW (100).

The postwar BPL top 25 contains many of the above calls. We list with three asterisks those who appear in the top *ten* of both lists; with two asterisks those on both lists but in the top ten of one of them; and with a single asterisk those in the top 25 in both lists. Thus, W3CUL*** (7353), W7BA*** (2608), WØSCA** (2453), WØBDR (2153), K7NOA (1873), WØLGG*** (1746), W6GYH** (1490), K6BPI*** (1469), W9NZZ (1427), W3WIQ (1148), W9DO (1121),

The Colbert, Lauderdale and Madison Counties AREC (Ala.) handled 180 messages on Sundays in October, December and January between receiving stations and headquarters in a Sabin Oral Vaccine drive. Above at headquarters in the Armory Building in Huntsville are WA4DZF (left) and WA4DPX.

* National Emergency Coordinator.

On Thanksgiving Day, members of the Michigan 6 Meters Club transmitted messages of greetings from the patients of the Veterans Hospital at Dearborn, Mich., to their families. W8DSQ, above, handled many such messages.

WØCPI (1099), W9JOZ** (1025), W9JUJ (982), W7PGY (940), KØONK** (904), W7CZY (885), WØLCX (882), K2UTV (880), W6CE (815), WØTQD (809), W9IDA** (803), K4AKP* (757), WØPZO (735), W2RUF (731).

You may find it of interest to compare the above lists with those in the "Traffic Topix" column of May '63 *QST*.

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January Net Reports.

Net	*Sessions*	*Checkins*	*Traffic*
Early Bird Transcon	..	31	39
Northeast Area Barnyard	26	874	6
Interstate S.S.B.	31	1159	479
8 Ball Traffic	46	344	261
7290	44	1358	673
North American S.S.B.	26	573	964
Hit & Bounce	31	464	683
20 Meter Side Band	22	229	1497

National Traffic System

QNY procedure is quite common in NTS nets, especially in c.w. nets, although it is not unknown on phone. A question that keeps popping up is, "who calls first?" The NCS dispatches two stations to a side frequency to clear traffic, and they both land there about the same time and both start calling. We have heard simultaneous calls and simultaneous standbys of two such stations repeated several times until finally they both return to the net frequency and are ready to swear that the other one was not there. In order to prevent this happening, there should be a firm understanding which station should call first and which should listen.

Standard NTS practice is for the station designated to *receive* the traffic to call. Receiving conditions are not always the same at both ends of a circuit, so we let the receiving station choose the frequency. The station to do the transmitting then QNZs (this means he zero beats, son), answers the call, and traffic begins to flow.

Once in a while a special case comes up. For example, who calls first when both stations are to transmit — that is, they are to exchange traffic? Answer: the one called first by the NCS when he dispatches them. Or, suppose we have a QNB situation (that means a third station relays for two others not able to copy each other, son)? The QNB station calls first, the station to transmit lines up on him and sends him the traffic, then the QNB station asks the receiving station if he is ready to copy (QRV?); the receiving station requests a change in frequency if required.

Other situations can arise, but this covers most of them. In special circumstances, it is the NCS's job to designate specifically what the procedure shall be, to save time and get that traffic handled without a lot of fooling around.

January reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
EAN	31	1527	.846	49.2	97.3
CAN	31	1341	.971	43.2	98.9
PAN	31	1039	.701	33.2	100.0
1RN	59	452	.314	7.7	64.4
2RN	62	565	.516	9.1	98.0
4RN	60	747	.388	12.4	90.5
RN5	62	1342	.737	21.7	92.7
RN6	60	942	.508	15.7	99.9
RN7	62	296	.218	4.8	67.5
8RN	62	437	.262	7.1	92.9
9RN	31	594	.585	19.1	94.3[1]
TEN	58	471	.355	8.1	66.4
ECN	30	65	.117	2.2	81.1[1]
TWN	31	238	.340	7.7	59.4[1]
Sections[2]	1227	7593			
TCC Eastern	124[3]	419			
TCC Central	95[3]	919			
TCC Pacific	105[3]	822			
Summary	1897	19709	CAN	9.3	PAN
Record	1974	25982	1.039	12.5	100.0

[1] Representation based on one session or less per day. Others are based on two or more per day.

[2] Section nets reporting (45): NJN, NJPTN, NJ6-2 (N.J.); ETP, TN, TSSB, TPN (Tenn.); GEM (Idaho); AENO, AENM, AENJ, AENH, AEND, AENV, AENT, AENR, AENP Eve, AENP Morn (Ala.); QFN & WFPN (Fla.); MDD (Md.-Del.-D.C.); CN (Conn.); BN (Ohio); SCN (S.C.); ILN (Ill.); SCN, SCS, SCVSN (Calif.); NCN Early, NCN Late, NCSN (N.C.); GBN & OFN (Ont.); WSBN & WTN (Wis.); EPA (Pa.); BUN (Utah); WSN (Wash.); NEB (Nebr.); RISPN (R.I.); MSN (Minn.); VSN & VSBN (Va.); NTTN (Texas).

[3] TCC functions reported, not counted as net sessions.

Sorry, no records broken this month. January is usually a slack month, and this one was no exception. Some years back, one *was* an exception, and so we have some pretty formidable January records to shoot at.

Note to all section net managers: We request that you use Form CD-125 for making your monthly reports. Send copies to *both* your SCM and headquarters, to make sure you are included in the summary above. Be *sure* to show your NTS liaison, otherwise you will *not* be included above. Some nets are so close to the borderline of NTS and non-NTS that we are not always sure; please make it very plain how you effect NTS liaison, in your report.

January was another bad month for "skip," but by early February conditions were getting a little better. By the time you read this the days will be longer and short skip will last further into the evening. By May or June we should be able successfully to resume some of our "late" region net sessions (i.e., after the area net). On the whole, better traffic conditions are ahead.

W2EZB is thinking of setting up an alternate EAN on 160 meters next fall; plenty of help from the 8RN and CAN crew (notably W9JOZ and K8DHN) helped make a creditable January showing under terrific odds. A total of 47 EAN certificates have been issued this season; in January, certificates went to W2ZVW, W8BZX, WA8FIC and VE3BZB. The RN5 gang is holding CAN together with its NCSing during rough conditions. The first PAN bulletin seems to have been favorably received. The 2RN "Traffic Clinic" is under way at 2100 GMT on 3670 kc. RN6 certificates have been issued to W6DGM, WA6WTX, WB6JGA and K7SFN. On RN7, Oregon had best QNI record (K7IWD) with Montana second (K7EWZ); Manager K7JIA says everybody shows up if conditions are anywhere near livable. The 2315 GMT session of 8RN has been a lifesaver, sez W8CHT. All sections but Ky. were 100% on 9RN. WØLGG asserts that TEN is looking up, and soon the statistics will show it. VE3BZB says he has to apply the screws to get NCS reports on ECN sessions.

Transcontinental Corps. With conditions so erratic in the evenings, our TCC directors are trying to line up daytime arrangements for out-of-net TCC skeds. Some of these are working, some are not. Each TCC director submits a fine comprehensive report each month, and we wish we had more room for their comments. TCC-Eastern certificates were awarded to WA2VLK and K4POA in January; function "D" is still the nemesis. *W4ZJY* is using a special monthly-summary format by means of which his functionaries can report monthly instead of after every function. TCC-Pacific certificates have been issued to K4AKP/6, WA6BRG and W7WST/6. January reports:

Area	*Functions*	*Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	66.0	1373	419
Central	95	92.6	1659	919
Pacific	105	71.0	1644	822
Summary	324	75.2	4676	2160

The TCC roster: Eastern Area (W3EML, Dir.) — *W1s* EMC NJM, *W2s* GVH MTA, *WA2s* BLV KQG VLK, W3EML, *K3s* FIR GJD MVO, *W4s* DLA DVT, K4POA, *W8s* CHT ELW, K8NJW. Central Area (W4ZJY, Dir.) — WA4AVM, W4ZJY, *W5s* PPE QMJ, *W0s* AKV CXY DYG JOZ PTZ VAY, *K9s* DHN ZLA, *WØs* BDR SCA, KØFPC. Pacific Area (W7DZX, Dir.) — K4AKP/6, *K6s* DYX GID, *W6s* EOT HC, *WA6s* BRG ROF, *W7s* DZX ZB WST/6, *KØs* EDH EDK.

Diary of the AREC

Amateurs were active in the flood which hit the Baldwin Hills, Calif., area when a reservoir dam suddenly burst and sent a torrent of water cascading through a residential area, drowning several people and causing millions of dollars of damage. AREC and RACES were activated and provided emergency communications and outlets for traffic. SCM/W6FNE manned the control center in Paramount City, while SEC K6YCX activated the AREC. The Sixth Region Net of NTS was activated at the request of ARRL Director W6MLZ and remained on standby during the operation. Other nets active were the Inglewood and Paramount RACES groups, SoCal Six, Salvation Army, Southern Calif., Six and Two, Golden Bear, Mission Trail and many individuals, all busily handling traffic in and out of the area. The only other calls mentioned in the sporadic reports received of amateur operation were W4FOR/6, K6BPC, W6JEJ and WA6TWS.

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On Dec. 19–20, Newfoundland was hit by one of the worst snowstorms in fifty years. Sixteen amateurs assisted in replacing broken communications that otherwise would have been lacking. When electric power failed, *VO1s* AR and CV set up emergency power and handled traffic to St. John's hospital. *VE1s* EI and BQ aided Canadian National Railways officials when communications failed between Bishop's Falls and Port-aux-Basques, assisted by *VO1s* CX BM BR and VE2BES.

On the west coast of Newfoundland, K8JQO/VO1 handled traffic for the power company from Port-aux-Basques, and VO1FK in Pasadena handled traffic for Avalon Telephone Company. Later, a doctor called VO1CV regarding the rescue of some of the crew members of a French vessel, to get urgent information to the Minister of Health in St. John's. With the help of VO1AE, VO1AO in St. John's was reached and the traffic passed in less than an hour.

After three days of operating on emergency power, electric and telephone service were restored. The following amateurs (not included above) took part: *VO1s* GP GO DZ BR DJ. — *VE1WB, SCM Maritimes.*

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Over the Christmas holidays an airman and his 12-year-old daughter were reported missing on a flight from Los Angeles to Sao Luiz, Brazil. Amateurs were called upon to assist in finding them. Within a few hours, W6MLZ had obtained assistance of amateurs in the U. S., Panama, Colombia and Venezuela in checking airports over the route. Via these contacts, it was learned that the plane had arrived safely at airports in Panama, Colombia, Venezuela, Brazil and finally its destination in Sao Luis. The final confirmation was relayed to W6MLZ by W4IYT. — *W6MLZ, Director Southwestern Division.*

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Northern Alabama received a record-breaking 17-inch snowfall on Dec. 31 which, with accompanying ice, resulted in closed highways in and around Huntsville. At 1630 local, EC W1YFN was called by the chief of police to provide mobiles for communications between roadblocks and Highway Patrol headquarters, as well as to ed. headquarters. Fourteen members of Madison County AREC were alerted and a net opened on six meters. Operations were continued throughout the night until the roadblocks were secured at 0800 local on New Year's Day. — *W4YFN, EC Madison County, Ala.*

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Three pints of a rare blood type were needed on Jan. 1 for an acute leukemia patient in the Ben Taub, Texas, hospital. W5SWK and W5IKX got in touch with S. Texas SEC W5AIR, who immediately aired the request. With the aid of *K5s* CVI WJI DGO HXR, W5FXG and *WA5s* AMV and BUG, donors were soon located. This prompt action probably saved the young patient's life. — *W5AIR, SEC S. Texas.*

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A few days after the first of the year, a train wreck north of Houston involving a number of derailed cars containing explosive materials brought K5HNR and WA5BUV onto the somewhat isolated scene with their mobiles to supply emergency communications. Houston stations K5MWC and W5AIR supplied contact at that end, the former serving as NCS. — *W5AIR, SEC S. Texas.*

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On Jan. 12, motorists in Illinois were stranded in a snowstorm. *W9s* SXL SRK FXK VPD, K9IKS and WA9DWR did a fine job locating and getting word to authorities. — *W9RYU, SEC Illinois.*

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On Jan. 12 an explosion and fire occurred at a chemical company in Attleboro, Mass. At the request of the Attleboro police department, AREC mobile units from Providence, E. Providence, Pawtucket, Warwick, Woonsocket, Smithfield/Johnston, R. I., and Somerset, Mass., were dispatched to the scene while the R. I. state command net on 51 Mc. stood by. *K1s* TQO, VYC and WIOW acted as relay stations for mobiles to NCS K1TPK. K1ELI established contact with the Red Cross via K1JFT, the Roger Williams V.H.F. Society station. At 2345 local the net was closed and all units released. The following mobiles took part: *K1s* WOF SJA BKM BWX SWK (EC Pawtucket) EOT NII RLD GRC (EC Warwick) EZN YUV TTD (EC Woonsocket) KCB PZY VEX ZQA EPP VOU USA, *W1s* VWR and IMM. Other stations helping were *K1s* NKR THE VNJ YUL KBD ROV OZI LPL SXY TAV QFI PHZ URM SMI GID ADK RFM CPL NVS VET VZU SSL FGT TZC PVJ JOL RIP VPK, *W1s* BFN ZRO TXL IMY KPM, WA1ANT. — *W1YNE, SEC R. I.*

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During the Panama crisis in January, amateurs handled much traffic to and from Canal Zone residents and their families in the states. We have reports that WA5AUT of Plainview, Texas, handled some 50 such messages on Jan. 12. W5DQT and K5EIJ (EC for Matagorda County, Texas) also handled messages for several families. Also participating in the message handling were *WA5s* BEQ

Ralph Garrick, W3FLP (left), has been doing an outstanding job as EC for Delaware County, a very important part of the Philadelphia area. The recruit on the right is K3WFD.

DGM and WN5IGZ. Needless to say, all concerned were extremely grateful for this fine amateur service.

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On Jan. 13, the Baltimore Area AREC was activated for a semi-alert to report snow conditions. However, they shortly went into real emergency action when several accident reports were relayed to the Maryland State Police and the Baltimore County police. Hourly reports on road conditions were taped and relayed to local radio stations for broadcast as "earwitness" reports. The net was in session for 13 hours, until highway crews could get the roads cleared. Those participating included *K3s* IYJ IZK MDL OGS OWX QCE QOK RGB RKU RNM SGD SOZ TAZ TKI TQN UBN UOD VBD VBE VJY VVM VPZ WIT WKV YLG, *W3s* CDI DTN PKC YZL, WA9ENO/3, K2KFF/3. The net was closed at 0105 GMT on Jan. 14, although stations stood by long afterward. — *K3SGD, EC Baltimore Area, Md.*

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On Feb. 6, *K6s* IBW and IQV were in contact when a voice broke in and said, "I think I'm dying! I'm having a heart attack!" The frequency was immediately cleared and identification requested. "This is Rachel Coates," came the reply. "My husband is having a heart attack." Contact was then made with W5BQZ in Fort Stockton, who requested a doctor and an ambulance. K5KDE, a doctor, broke in and gave medical advice. Coates, who is K5GUD, was taken to Fort Stockton hospital where he is recovering.

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Thirty-nine SECs reported for December, representing 18,517 AREC members. This is five down in number of reports from December of last year, but a small increase in total membership, showing that our AREC membership is certainly growing. SECs reporting: Ind., N.C., Va., S. Texas, Ark., Alberta, B.C., Mich., Ohio, Maine, Wash., Ala., Minn., Okla., S.N.J., E. Mass., Del., Ont., Kans., Ariz., W. Va., Tenn., Ore., E. Fla., Utah, S. Dak., N. Dak., N.N.J., W. Fla., Nevada, N.M., R.I., NYC-LI, Wa. Pa., Mo., Los A., Iowa, Colo., Ill.

This winds up another year of SEC reporting, and we find that 22 SECs have compiled perfect reporting records for 1963. During 1963 we received 472 SEC reports in 54 sections (comparable figures for 1962 were 420 and 51). Following are 100-percenters (number of consecutive 100% years in parentheses): E. Fla. (12), NYC-LI (10), Mich. (5), Ind. (5), S. Texas (5), Wash. (4), Ore. (4), S. Dak. (4), Nevada (3), E. Mass. (2), Alberta (2), Utah (2), Ohio (2), W. Penna., Tenn., N.C., Ala., Ariz., Minn., N.N.J., Iowa, R.I.

Races News

The RACES group in the Los Angeles area rendered a valuable public service last summer in Fire Hazard Alert activations to warn citizens of extreme fire danger conditions in the mountains. The RACES group regularly manned 15 check points on six different occasions in August and September of 1963. As each alert was called, personnel in the County Information Center received availability reports from district communications officers and scheduled operators for the various check points. Units at these points maintained contact with the County Information Center where a running count of the number of cars entering the area was kept. About forty amateurs were involved. — *W6YOL.*

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We have another year-end survey of RACES activity in Monroe County, N.Y., by RO W2CTA. This report briefs the various exercises, drills and activations and comments on the results thereof. We wish we had room to reproduce it in full. Beginning with a full-scale exercise involving all towns, sectors, and at least 62 operators, other activities included (2) participation in a statewide drill on June 18, (3) a local exercise in East Rochester on June 23, (4) two radiological survey drills, also on June 23, (5) an Area 9 drill on Oct. 10, another radiological survey drill on Oct. 21 — and various hidden transmitter hunts, open houses, field tests and warden's net drills. Indeed a very active RACES organization run by a RO who knows how to keep it that way. Congrats, W2CTA. QST

OUR COVER

Our cover this month features six tubes typical of amateur transmitters of the early and middle twenties.

Number One (numbering from the left) is the Radiotron UX-210, the popular "ten," used more than any other tube in low-power (and other) transmitters in its day. Introduced in 1925 as a power amplifier for receivers, the UX-210 enjoyed instant favor in amateur transmitter designs. It sold in 1925 for nine dollars.

For several years after World War I, amateurs looked for low-current-filament tubes for mobile and portable work, and the Cunningham-RCA people answered the call with our Number Two cover tube, the UV-201A. Its thoriated filament drew only a quarter ampere, as compared to one amp for the UV-200 and UV-201, its predecessors. It also had higher gain and longer life than the 200 and 201. Price in 1923, when it first appeared on the amateur market, was $9.00.

Number Three is the UV-203, the higher-power (fifty-watt) tube which helped pave the path from spark to c.w. Its tungsten filament lit the room only slightly less than its plate. Price when introduced in 1921 was $30.

Several tubes of the VT-2 "E" tube type appeared briefly in the early twenties, including the 216A (pictured, No. 4), the 208A, the 205A. They were all similar in shape, and were triodes; but could have thoriated or currugated filaments, and plain or corrugated plates, depending on type and date.

Number Five in the cover photo is the Amrad "S" tube, which first appeared to hams an an ad on the back cover of *QST* for November 1923. Because there was no filament in this gas rectifier, tube life was quite long. It was rated at 100 ma. at up to 1000 volts.

The last (No. 6) was probably the most (VT-1 or "J" tube). The first of the VT series of low-power, all-purpose triodes of the twenties, it first sold, in 1920, for ten dollars amateur net. It was also easily available after WW I as surplus. The tube in the photo is the so-called "standard" VT-1, and featured the sturdy, if not very functional, lava-block support for the dual plates, grids, and filament.

More on amateur tubes, techniques, laws, and advertising of this era is in the gold-edged section of this issue. Tubes pictured are in the museum at ARRL Headquarters.

CONDUCTED BY JEAN PEACOR,* K1IJV

497-498-499-*500*!

THE past year's BPL listings, when examined closely, reveal an increasing number of YLs in amateur radio whose traffic handling records deserve further applause. There have been many YLs counting up to 500 messages handled during the past few months, and many who do it month after month. The Brass Pounders League Award is well worthy of praise if made just once. The BPL Medallion, awarded to those amateurs who do this for three months, is a coveted award.

In this salute to all BPL YLs everywhere, the number is so great, and response to inquiries made to them has been so fine, this tribute will continue in next month's column with the hope of recognizing all.

It's impossible to think of BPL without having the call of W3CUL brought to mind. Mae Burke of Morton, Pa. headlines the BPL listings with staggering traffic totals. Using five different station positions to accomplish this feat, Mae figures that about half of her traffic is handled on s.s.b. and half on c.w. A grand total guess puts Mae well over the half-million mark in the number of messages she has handled.

There are many YLs consistently earning this award every month. Such calls as WØLGG, W2RUF, WA2GPT, WØZWL, KØONK, WB6BBO (also W3WRE), will all be recognized as veteran traffic hounds, and the list is rapidly growing.

To quote Louise Moreau, WB6BBO, "BPL is something like eating potato chips. Once you get started, you keep going back for more." A look at the following list shows the number of YLs to whom this statement aptly applies. Congratulations all!

1963 BPL Certificate Winners

(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 more or 100 or more originations plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.)

January — W3CUL, WØLGG, WA4BMC, WA2GPT, WØZWL, K5TEY, K7NWP, W9USR, WA2GAB.

February — W3CUL, WA4BMC, WA2GPT, WØLGG, WØZWL, K8LGA, K5TEY, W2RUF, WA2GAB.

March — W3CUL, KØONK, WA2GPT, WØLGG, WA4BMC, W2RUF, K8LGA, WA2GAB.

April — W3CUL, WØLGG, KØONK, WA2GPT, WA4BMC, W2RUF, WB6BBO, K5TEY, K8LGA, WA4JMP, WA9CCP, K6HIT.

May — W3CUL, KØONK, WØLGG, W2RUF, WA2GPT, WA4BMC, K5TEY, WB6BBO, WA2WBA, WA9CCP.

June — W3CUL, KØONK, WØLGG, WA9CCP, WA2GPT, W2RUF, WA6KWV, WB6BBO.

July — W3CUL, KØONK, WA9CCP, WØLGG, W2RUF, WA4PDS, WB6BBO, WA2VYS, K5TEY, K8HDO, WA6KWV, K9IVG.

August — W3CUL, WØLGG, KØONK, WA9CCP, W2RUF, WA2VYS, K3GSU, WB6BBO, K5TEY, K7CTP, WA6KWV, WA6OUK.

Queen of the BPLers—Mae Burke, W3CUL!

September — KØONK, WØLGG, W3CUL, WA2GPT, WB6BBO, WA9CCP, K6IWV, WA4PDS, WA2UZK, K7CTP, WA4BMC, K5TEY.

October — W3CUL, WØLGG, KØONK, WB6BBO, WA9CCP, K7CTP, K4DSO.

November — W3CUL, KØONK, WØLGG, WA9CCP, WB6BBO, K3BHU, K7CTP, WA2GPT, K6HIT.

December — W3CUL, KØONK, WØLGG, WA9CCP, WA2GPT, K7CTP, WA2UZK, WB6BBO, K3BHU, K6IWV, W2RUF, K9IVG, WA2VYS, KØZSQ, WØZWL, W1LES, WA8ARJ.

(Stations above are listed in the order of amount of traffic handled each month.)

* YL Editor, *QST*. Please send all news notes to K1IJV'S home address: 139 Cooley St., Springfield, Mass.

Kay Koch, K6HIT (right) is a member of LAYLRC, South Bay Wireless Association, and newly elected secretary-treasurer of the Los Angeles Council of Radio Clubs and is active mostly on 20-meter s.s.b. and two meters. (Center) To quote Ann Warren, K8LGA, "It's fun—it's a public service—there's no limit to where you can go with it, both in distance and learning." Ann thoroughly enjoys hamming. You can hear her on the Morning Watch Net, Hit and Bounce Net, 8RN, and EAN. Yolanda, WA9CCP (left) earned her first BPL certificate in April 1963 and hasn't missed a month since. Often heard as NCS for the North Central Phone Net, she has become a very active YL since getting her General license in January 1963.

FOURTH YL V.H.F. CONTEST

Time: Start — Wednesday, April 15, 1964, 1700 GMT.

End — (Friday, April 17, 1964, 0500 GMT).

Eligibility: All licensed YL and XYL operators are invited to participate. High YLRL member score will receive a small plaque. Contacts with OMs do not count. A special certificate will be issued for the highest-scoring Novice.

Operation: Bands 50 Mc. and above are to be used — phone and/or c.w. Crossband operation is not permitted. Only one contact with each station will be counted.

Procedure: Call CQ YL.

Exchange: Station worked, QSO number, RST report, location. Entries in log should also show band worked at time of QSO, whether A1 or A3, time of contact, date, transmitter, and power used.

Scoring: Total number of contacts for contestants running 50 watts input or less at all times may be multiplied by 1.25 (low-power multiplier). All other contestants list number of contacts. Please see vice president's comment regarding this change.*

Awards: Highest score: Plaque (YLRL member only).

Top three scores: Certificates.

YE District and Country: Certificate.

Highest Novice score: Certificate.

Logs: Copies of all logs must show claimed score, be signed by the operator, and be postmarked not later than April 30, 1964, and received not later than May 15, 1964. Send copies of logs to: Martha Edwards, W6QYL, 44303 North Date Ave., Lancaster, California 93534. No logs will be returned. Be sure it is a *copy* of your log you send in for confirmation.

* Vice president's Note: This contest was started because the girls wanted it. Since so little interest has been shown, WRONE does not feel it can afford to bestow the Revere Bowl, engraved with the winner's name, when so few send in logs to show they joined in. Of the logs sent in last year (13 grand total), there were none from Districts 2, 3, 4, 6, 7, 9, or 0. Highest number of contacts listed by the winner was 34. Confirmation of contacts is difficult for this number if only 13 logs are turned in. Note that there are no section multipliers this year. Since some areas are large, and skip peculiar, many girls never hear another section. So, she who works the greatest number of YLs will have the high score. Talk up the contest on the v.h.f. bands. The success of this year's contest will enable us to decide whether or not it will be continued.

Two BPL YLs relaxing at the N. Y. State Phone Net picnic are Bea, WA2GPT, and Jean, WA2UZK. Enjoying the fun are, l. to r., Minerva, WB2JNL; Peg, K2TDG; Bea, WA2GPT; Clara, K2TXP; and Jean, WA2UZK. (Center photo) Louise Moreau, WB6BBO and W3WRE, is not only a many-time BPL YL, but also Manager of the 6th Regional Net. She is pictured with W6GH, who is admiring the Grand OM award presented him by Louise at the annual old timers' nite of the Ramona ARC. Mae Coltin, K6IWV (right), joined the BPL circles in 1963 and now maintains traffic skeds each day, is a member of several nets.

A Ham Paradox

The December, 1962 YL column pictured Ruth Vander Horck, WA6RCR, smiling a rather impish grin. The latest story about her activities sent in by her OM, Van, WA6HUW, gives assurance that her grin is still there. On the last day of 1963, Ruth underwent gastric surgery and now possesses a permanent QSL from the surgeon, Dr. Ed Carry, K6ICG. The anesthetic was administered by Dr. William Berson, ex-8TIK.

Ruth shared a hospital room with another girl, not a ham, whose name turned out to be Ruth Vanderford. Or they shared, that is, until the nurses became so confused that it was necessary to move the second Ruth to another room. Overheard after both gals had been discharged: "I'm glad to get rid of those two!" said the head nurse, Ruthlessly.

Upon returning home, Ruth was ably nursed by Dory, WB6ASN, whose OM is Archie, WN6IBD, and daughter, Patty, WN6HCB. Dory took over Ruth and Van's rig to inform friends of her patient's rapid recovery and to keep tabs on her family in Lancaster. This resulted in the receipt of an OO report of key clicks heard in Pasadena during the period when Dory talked with her OM, WN6IBD. The report was sent by Warren, W6IBD! It is a small world!

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Three to Make Ready — Four Let's Go

He-Ya-Hi! Conventions bring out the gypsy in me! ! A recent card from Marte, KØEPE, expressed her convention sentiments this way. As YLs all over the world prepare to attend the YLRL 5th International Convention in Columbus, Ohio in June, this is becoming a common YL thought. Are you ready to "Migrate to the Buckeye State in 1964"?

YL Club News

LAYLRC has regretfully accepted Pat, WA6PQI's, resignation as corresponding secretary, and announces the appointment of WA6UBU, Esther, to this position for the rest of the year.

Coming Events

YLRL 5th International Convention — June 19, 20, 21 at the Nationwide Inn, Columbus, Ohio. Buckeye Belles are the hostess club. For further convention and ticket information see Jan. *QST* YL column and Sept.-Oct. 1963 *YL Harmonics*.

4th YL V.H.F. Contest — April 15-17. See rules in this column. QST

Nina Wallis, K5TEY (left) is president of TYLRUN, PAM of the Sooner Traffic Net on 40 meters, and one of the leading BPL YLs for 1963. Roberta Kroulik, K9IVG, was recently appointed PAM of the Indiana Phone Net. Her first BPL medallion earned in 1962, Roberta has been an avid traffic hound ever since. She holds a public service award for operations during Hurricane Carla in 1961. Bertha Willits, WØLGG, is manager of TEN and Past manager of the Iowa C.W. Net and A.M. Net. Earning her first BPL in March 1956, Bertha now has 92 BPL Certificates. Her numerous public service awards include recognition from the Air Force, Marine Corps, the City of Marshalltown, and several ARRL awards. In her thirty years of traffic work, Clara Reger, W2RUF, (right) has many times over proved to be an adept traffic gal. Manager of the NYS C.W. Net for 13 years, she is now also helping form a statewide c.d. county network. In addition to her many public service awards from ARRL, Clara was named outstanding amateur of N. Y. in 1961, an Edison award citation in 1958 has received many more honors. Clara is the originator of YLRL's "33," celebrates 25 years in YLRL next year.

Strays

Oscar III Progress Reported

W6SAI reports that the problem of the transistorized linear amplifier for Oscar III has been solved, bringing the satellite's launch a step closer. Two-tone tests at 144 Mc. indicate one watt p.e.p. output with intermodulation distortion products better than −27 db. below peak output.

Oscar III will weigh in at about 25 pounds, will be 6½ × 12 × 17 inches in size. It will of course be powered by batteries. A 25-mw. beacon on 145.85 Mc. will be included in the satellite. The "HI" keyer is included in the three planned telemetry channels.

The repeater setup will receive a 50-kc. band centered on 144.10 Mc. and retransmit this on 145.9 Mc. at one watt p.e.p.

Launch date is *not* expected before July. More details will be forthcoming via *QST* and W1AW bulletins.

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The Old Old Timers Club has elected officers for 1964. New leaders are W4MF, president; W2EG, secretary and treasurer; W6WPF, vice-president; W2WL assistant secretary; W1KC membership and publicity chairman; W5RIH, net manager; W2ZI, historian; and K2NP, listing chairman.

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More on the origin of 73 (see page 51, September 1963 *QST*) comes from W9NHO: Assign numbers to each letter of the alphabet ($a = 1$, $b = 2$, etc.), add up the numbers corresponding to the words GOODBYE and GOOD LUCK and see what you get.

Correspondence From Members-

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

OL' TIMER SEZ

¶ Comparing the 50th anniversary issue with that of the 25th and a few years before even that didn't make me feel ancient but did make me feel changes. Used to be, and "tain't now," that an amateur was a creator of ideas and a most ingenious critter in getting radio things out of near thin air and a few bux. Now, creator and critter are in the low-low percentile of our craft; our fellows are buy-guys, and can't cook up a thing, the helpless boughten-bound chaps!

I suggest, in kindness, that they not be called that honorable name "ham," but that it be reserved for those who are really amateurs, not using professionally made equipment (and some of them may, themselves, be professional, to be sure). Any amateur can learn to figure his gear and can draw upon publications of others doing the same. If he does, he's a ham. The rest should devise their own name (*not*, ugh!, handle), and can go right along punctuating their fully spelled out c.w. like beginners forever. — *W9YLD*

¶ Congrats on the Jan. and Feb. 50th anniversary issues. I am also celebrating my 50th anniversary in amateur radio. I really liked seeing those old ads in the Feb. issue because I had Murdock & Brandes phones and Chambers Loose coupler. My rotary gap was home built and we had 25 cycle current then — hi.

I would like to see a list of calls heard from the early 20's published in one of the anniversary issues. The OTs would get a kick out of it seeing their call listed. — *W2QB*

¶ What a wonderful issue — *QST* — January, 1964. I enjoyed every minute of it.

It recalled memories of my own early-day Ford spark coil and crystal detector operation. I still have one of the spark coils, and my early Murdock phones.

I just had to get out my old catalogs, etc., and review the early-day apparatus. Catalogs from the Electro Importing Company, 1916 and 1920; Reynolds Radio Speciality Co., Denver, 1920 & 1922; and a government call book 1921 in which not only the names and calls were listed but also the power. I had marked in this early call book the names of hams with whom I had QSOd.

But the most important of all to me are the two documents I have — both signed by Herbert Hoover, only one is senior and the other is junior. My first license in 1922 signed by the elder gentleman, and my contribution to the building fund signed by the younger gentleman.

What an advancement to the art since those days! I only hope that I'll be able to keep up with it in the days coming. — *W00MV*

LEAGUE BROTHERHOOD

¶ The purpose of this letter is to let you know of the high calibre of one of your Official Observers. You see, I recently had trouble with harmonics, which were detected by an OO, John Huscava. W9IMN set a time and place for us to check these harmonics out. The night of the sked, John struggled one and one half hours checking me out.

I trust all of your OOs are like John, ready and willing to help troubled and inexperienced Novices like myself. — *WN9ILT*

¶ Just received my QSL cards from the WØ bureau and a note from Alva. He has just finished 25 years as QSL manager for the Ø district. I have had the pleasure of visiting Alva at his home in Caledonia, Minnesota several times and it has been an experience to see the work and time he has to put in each month on this job.

All the DXers in the WØ district surely owe Alva a thank you and well done for all his efforts. I would like to see some articles on the service records of all QSL managers. I still meet hams who are unfamiliar with the ARRL QSL bureaus. — *WØMCX*

GET THAT JUMP

¶ Man is ever in a competitive position in his sports, among his friends, in his hobbies and particularly in his professional status. Life itself is highly competitive. The man who is alert, who can assess any situation and use it to his advantage, will advance himself over others. I have been quite successful in broadening my professional status by being ever on the alert for new electronics techniques and systems, being quick to understand these new techniques and being able to convert them to constructive use. I am envied by many of my co-workers for this ability, and I owe this, in no small part, to the very advanced and radical approaches to electronic and communications systems problems which *QST* has had the foresight to publish, far in advance of the general "state of the art." It would seem that the really creative engineers spend their confining winter months constructively and by late spring have their systems and ideas sufficiently perfected for late spring publication — these usually appear in the April issue of *QST*. I find my co-workers catching up to me and if I am going to maintain my status, I'll have to get the jump on them again. I hope these winter months were used constructively by some of our engineering and technical friends and that they will have something startlingly new to contribute to the art, that I can get my teeth into and regain my status.

My workbench has been cleared, my slide rule oiled, my soldering iron tip replaced, my tools sharpened, amply supplied with fresh coffee and cigarettes, anxiously awaiting April *QST!!!* — *W2QCF*

WE WOULDN'T

¶ In answer to Mr. Ebenreiter's letter in Feb. *QST* where he asked why hams don't use I instead of the usual "we" (at least it was simply we for 17 consecutive QSOs anyhow!).

The answer is simple — we refers to the operator and his rig — after all you couldn't make many

QSOs without it could you? We QSL 100% means the operator QSLs for his rig's QSO. The op can't dip his own plate current (or can he?).

Please, Mr. Eberseiter, don't leave ham radio because of a few we's — we wouldn't! — *WB2AXW/3*

¶ Congratulations to W9LXC for his letter in the Feb. issue. Nothing is more stupid in the shop talk of ham radio than the ridiculous use of "we." The only ones permitted to use "we" are those who have a Siamese twin, are pregnant, or have a tape worm. — *W9FNX*

¶ In defense of the usage of "we" on the air, let me paraphrase Charles Lindbergh to whom the Spirit of St. Louis was the other member of the team. At this QTH, the use of "we" means "The rig and I."

Perhaps a "plug-in-appliance" does not merit an affectionate "we," but for over 20 years it's been "we" at "our" shack!, I feel rather attached to the old rig by now. — *WØRUG*

PROPER BAND USAGE

¶ I suggest that power on 6 meters be limited to 20 watts maximum input to final stage. Here we have a good band for local communication and yet some are trying for DX on it with 100 watts and higher when 50 watts on a lower band would suffice. TVI is bad enough with low power. When some clown a mile away knocks the S meter to pieces coming on suddenly, it destroys your faith in human judgment. — *K3VQW*

QUIET, PSE

¶ Sending in step with W1AW to improve one's fist is a fine idea but I would like to remind the brethren to use c.p.o.s and not their xmtrs to pound along with W1AW. When I was listening to W1AW code practice to speed up my copy, some local lid fired up his rig and sent along with W1AW *on the air*. His sending was "90°" out of phase with W1AW with the result that I could copy neither.

I managed to pass the General code despite the local lid — tnx to W1AW's early practice and K2IBI (Rich). So, pound along with W1AW — but off the air. — *WB2DOM*

LIBRARY AIDE

¶ I would like to suggest that amateurs contact their local public library about getting a subscription to the *Callbook* so that all of the amateurs in the community might have access to a current edition of same. — *KØVA1*

HOLD THAT BUG

¶ Although I am fairly new in hamdom, I have already had a good example of how few hams have ever read the amateurs "Code of Ethics." I refer to the part concerning good operating procedure. Every applicant for any type of amateur license is sent a copy of the booklet, *Operating An Amateur Radio Station*. The bifocals must slip off here. Maybe they file it in No. 13. At any rate, darn few ever read it. This is especially true where traffic nets are concerned. The NTS is a very vital service to the public. Is this not our main reason for being licensed? Service to others? I have heard nets from coast to coast trying to pass emergency traffic only to be blasted off frequency. So they QSY up or down 10 or 20 kc., find a hole and try again. Some nut is sure to tune up just as they get to the text of the message. Our deaf ham grinds out a solid 3 minutes of CQs, waits 10 seconds and tries again. Our traffic boys are blitzed. What is wrong with the hams of today? Don't they listen before they overload the final? Don't they read the net activities section in *QST*? Bifocals slip again? Don't they know the net frequencies? Don't they realize that they may need these services some day too?

I think that every ham should make it his business to know net times and frequencies and stay off these frequencies during the one hour that most nets operate. After all, what is one hour in our lives. Let's take another look at these net listings; we may save a life by holding off just a few minutes more. Conditions are bad enough these days anyway, why add to the misery and confusion. Hold that bug, stay that keyer, until you know for sure that the net is off the air (by the clock), or until you hear the NCS say QNF. Help, not hinder the traffic system of amateur radio. — *K7PXA*

INCENTIVES

¶ Here is my check for renewal of *QST* — and a separate check for the building fund.

I've been torn all this while about the building fund. You have been so helpful and constructive to a wonderful hobby, I wanted to help. Then this incentive licensing thing came up — ugh! I have finally figured a way to help a little and still clear my conscience a lot: by hoping the whole building falls down on certain heads. — *K1PCU*

¶ Realizing the future of amateur radio as we know it today may hinge on the ability of the amateur to upgrade his service to the public and to the government and also realizing one way of doing this is through the incentive licensing program, the members of the Etna Radio Club wish to go on record as backing your proposal one hundred per cent. — *Etna Radio Club, Inc., Etna, Pa.*

¶ I do not feel that the amateurs are being represented by this ARRL action (RM-499). We were given vague definitions to the effect that something was going to be done, but the exact contents of ARRL petition RM-499 was *never* brought before the amateurs by their ARRL representatives before the presentation of petition to your office (*FCC*). — *WGLGW*

¶ You guys have really plowed up a snake in this new bid for incentives. I am still thinking about it. There are some good things which would result from this new proposal, but there are also some undesirable factors. So I am undecided as yet. But take me, for example. I have an Extra Class, but up until four months ago, worked 100% c.w. — now work 97% c.w., 3% s.s.b. Not much incentive for a c.w. man, is there?

Of course, Wayne Green is raking you guys all over the coals on this one. But I think he is appealing to the emotions rather than to the intellect on too many points of argument. And speaking of emotionalism — I think it is interesting to note that a good percentage of the "agin" letters you are getting on the incentive licensing subject are angry, venomous sarcasm, rather than cool well-thought-out rebuttals. — *K3KMO*

¶ The art of radio communications has advanced tremendously during the past fifty years. Let's face the fact that the days are gone when the average ham can construct a modern station from the junk box. The equipment necessary to align an s.s.b. rig properly costs many times the price of the rig itself.

(*Continued on page 148*)

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.

"Our field offices and FCC know the Official Observer service as one quite independent of our government obligation, but one which has kept many an amateur out of trouble. . . . We hope skilled and experienced amateurs may continue to step forward and participate in this ARRL program which keeps signal conditions on the track and so reduces the necessary burden of FCC citations that we must send out. This inevitably helps the over-all *record of your service.* . . ."

—GEORGE S. TURNER, Chief
Field Eng. & Monitoring Bureau, FCC.

Official Observers Wanted. One of the greatest fields of service "of, by and for" the radio amateur is that of the Official Observer. To review what OOs do, who they are and Mr. Turner's statement from which the above is an excerpt see pages 20–22, November 1963 *QST*. Our ARRL Observer's forms (advisory reports) save many an amateur from receiving an FCC rebuke or black mark for signal deviations from the rules. Observers using form CD-36 also assist ARRL in logging and identifying signals from nonamateur sources in our bands so the League may protest the presence of stations not authorized under treaty provisions to use these frequencies. *Appointment* as Observer comes from your ARRL Section Communications Manager and the application form CD-45 may be obtained from him (address page 6, *QST*) or from ARRL Hq. in Newington, Conn.

There is space on the application form to list applicant's equipment. The form asks questions to explore the know-how of the applicant in matters pertinent to observing. The SCMs of the field organization screen applicants to find qualified amateurs for the different types of OO work. Their purpose is to fill vacancies, then to *double* the present number of actives. However, only licensees who will be active in observing and assisting other amateurs with notices are asked to *contact* SCMs. All League *members* are invited to apply, if qualified by experience and inclination to help. Many more v.h.f. Observers, *two- and six- and* ten-meter workers are needed, as well as some using RTTY and some for h.f. bands and to watch the harmonic shadows of our amateur bands. As explained in *Operating an Amateur Radio Station* (booklet) there are four classifications of OO work. These relate to phone observing, c.w. observing or according to two degrees of precision in frequency-measuring capability. For this last it is required before appointment to prove to the SCM one's ability to measure W1AW in scheduled Frequency Measuring Test runs from that station.

During the Frankford Radio Club annual dinner in January, W3QMZ (right) presented the 1963 DX gavel to W3OCU. So *that's* how those fists look!

An Observer's work is not confined to a given band. Since all amateurs are served and expect to be helped by thoroughly skilled and experienced OO's, *four years* having been licensed as an amateur is prerequisite to OO appointment. U.S. amateurs must hold FCC's General Class amateur license or higher. In Canada the DOT equivalent is required. In each case the SCM's approval of the CD-45 application is necessary, of course. When Headquarters receives from your SCM the approved appointment form, each new Observer receives our "Standing Information for Official Observers" as a guide to system functioning, an initial supply of the forms used (postage paid by ARRL), and quarterly bulletins and bulletin letters regarding FMTs and current observer problems. If you can help in the goal to assist individuals and increase efficiency and pleasure in use of our amateur bands, drop a line to your SCM to ask about OO work and get the CD-45 application form today.

Those Precedence Definitions. Do you have the new official ARRL list of precedences? You can refer to page 44 of Jan. '64 *QST* but we'd be happy to send a printed list (gratis) for reference. Sooner or later you will run into a need to know all about the new EMERGENCY, Priority (P) and Routine (R) indicators now appearing in amateur traffic. In starting a message off by amateur radio it is your operator responsibility to add one of these three classifications immediately after your message number. To request our list of precedence definitions just send us a radiogram; ask for CD Form 3. This contains additionally the list of ARRL form texts, HX-Handling Instructions. A Number Sheet is also included. League logbooks currently shipped from Hq. have this new information bound in for ready reference, of course. —*F. E. H.*

A fairly recent shot of W3TMZ, prominent in both parties in January. Jack spent 16.1 hours in the c.w. party and 7.6 with W9SZR in the phone party making both high-claimed lists. A special thank you from W3TMZ to WA6GFY K4PQL WA6TCX and K2EIU/5 for going to 15.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for January Traffic:

Call	*Orig.*	*Recd.*	*Del.*	*Rel.*	*Total*
W3CUL	173	1996	1764	216	4149
K6BPI	68	1665	1600	65	3398
W0LGG	352	1361	1255	63	3031
W3IVS	21	1030	1003	27	2081
W9JOZ	34	978	978	0	1990
WA4BMC	101	970	772	99	1942
W9IDA	13	965	912	9	1899
W1PEX	60	897	865	38	1860
W0BDR	118	822	799	6	1745
WA2GPT	37	656	603	33	1329
W3VR	44	693	576	13	1326
K9KZB	7	654	647	7	1315
K0ONK	37	618	592	22	1270
W4KIS	9	582	560	22	1173
WA2UZK	22	492	460	31	1005
K4AKP/6	42	451	389	61	943
W7BA	2	464	446	16	928
W9MM	3	471	450	2	926
W8UPH	30	448	388	55	921
WA4LJH	13	451	441	10	915
W5CPZ	16	460	406	4	886
K3BIU	12	423	420	13	868
W3EML	37	424	329	3	793
W2EW	64	352	127	218	761
WA8DDI	176	262	11	253	702
KZ5VR	680	0	0	0	680
W1TXL	67	310	274	26	677
W7DZX	18	342	298	11	669
W6JXK	4	336	105	221	666
K7CTP	33	321	243	67	664
K9DHN	16	331	301	4	652
WA4FYV	634	12	1	3	650
WA8GUV	281	184	6	178	649
WA9CCP	27	336	249	24	636
W5DTA	2	304	223	99	628
W0WYJ	8	310	199	109	624
WA2EXP	2	311	286	19	618
KZ5AA	600	0	0	0	600
W3UQV	2	287	282	5	576
WA9ECX	4	275	256	23	558
W2MTA	25	259	224	29	537
K1WKJ	38	245	244	1	528
K3GJD	453	39	28	4	524
WA4PDS	19	276	211	12	518
K5UBZ	23	246	235	11	515
K3DKH	14	248	248	0	510
K1WKK	21	248	209	28	506
WB2ALF	25	240	237	4	506
KZ5RW	500	0	0	0	500
KZ5UN	500	0	0	0	500
Late Reports:					
W4KIS (Dec.)	18	607	561	46	1232
WA4BMC (Dec.)	222	440	396	68	1126
WA2NCE (Dec.)	25	406	340	55	826
W5CEZ (Dec.)	12	422	308	25	767
W4TUB (Dec.)	6	352	317	71	746
K1NEF (Oct.)	6	364	328	2	700
W4MIN (Dec.)	118	302	246	12	678
WA4AVM (Dec.)	15	320	296	0	631
K4EHY (Dec.)	90	290	190	41	611
K7SFN (Dec.)	101	202	196	6	505

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W61AB	556	2893	2503	317	6269
W6YDK	2354	362	336	26	3078
KZ5AX	1085	0	0	0	1085
KR6GF	576	106	0	96	778

BPL for 100 or more *originations-plus-deliveries*

K6GZ 268	KZ5FC 123	W8DAE 105	
KZ5PC 261	WA6PDS 115	WB2CSS 103	
KZ5EZ 258	WA8EIC 112	WB2FCT 101	
KZ5LC 245	WA2TQT 110	Late Reports:	
W9NZZ 209	K8GOU 109	K4YSN (Dec.) 335	
KZ5NS 175	K9IMR 109	WA2STM (Dec.) 271	
KZ5BH 173	K8SJH 108	K8SJH (Dec.) 130	
WA8DGE 138	WB2HWB 105	W1AOG (Dec.) 120	
K4ULT 132	W2RUF 105		

More-Than-One-Operator Stations

KR6MH 216 KR6DI 129 W4SGH 124

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: WB2ALF, K2SPG, K3DKH, K3GJD, WA4PDS, K8LGA, WA9AKE

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.

JANUARY CD PARTIES

High-Claimed Scores

Wow! It was a great CD Party, starting off '64 with a bang and with reports in by roughly 360 or so of the appointees. The Atlantic, Hudson and New England Divisions reported best, but wait for the April *Bulletin* and see the raft of *sevens!* As usual the operators who can put 80 and 40 to work for them scored well up on the accompanying high-claimed list. Tops for the c.w. party and our pictured operator this month is W3TMZ (OO/ORS, MDC). Jack topped the 200K mark and, additionally, took a turn at the phone portion, multiop with W9SZR, for a nifty figure. He reports that activity and conditions, especially on 40 Saturday night, were really something; 80 in f.b. shape too. Familiar K2EIU/5 made third-high c.w. and a fine phone showing with a modest DX40-Drake 2B and dipoles plus that extra special skill special to the CD gang. That fine fist at W1AW, and voice too on the phone portion, compliments of the new Communications Department staffer K2UTV.

A highlight of the c.w. party, at least to your reporter, was the modest footnote on W4KFC's log: 101K, 319 QSOs, 4 hours and 5 minutes.

The following are high-claimed scores, QSOs and sections. Final results will appear in the April *CD Bulletin*.

— *W1YYM*

C.W:

W3TMZ	203,940-618-66
K1WJD	191,730-574-66
K2EIU/5	184,250-544-67
K4VFY	168,350-515-65
K2KTK	163,020-487-66
W0WYJ	159,040-490-64
W9EWC[1]	157,790-503-62
W1AW[2]	156,325-474-65
K5OCX	154,330-500-61
W6CUC	153,425-464-65
K7CHH	150,480-450-66
W8LT[3]	148,850-458-65
K8NJW	141,980-453-62
WA8ENO	137,640-438-62
K0AZJ	135,160-432-62
K9DHN	134,230-428-62
K8HLR	132,925-402-65
W4DVT	131,985-412-63
WA6MIE	131,100-377-69
W9AQW	130,800-432-60
K1LPL	125,965-420-59
WA9AUM	124,310-395-62
K7NHV	120,590-383-62
W8VPC	120,280-381-62
W6ASH	115,300-349-65
W4LK	114,900-383-60
WA2WLN	114,165-382-59
W8ERD	113,770-361-62
W4WHK	112,530-358-62
K7CTI	109,120-337-64
K9WIE/9	108,885-353-61
W4BZE	105,000-345-60
K2PHF/6	101,310-300-66
W4KFC	101,060-319-62
WA2YLL	100,700-376-53

PHONE

K2QDT	29,820-142-42
W1NJL	24,660-130-36
K5MDX	19,995- 93-43
W1FJJ	19,600-106-35
WA8DGE	16,460- 92-36
K3MNT	14,940- 78-36
W1AW[2]	14,760- 75-36
K9MAN	14,175- 81-35
W9AQW	12,180- 80-29
W4LK	11,390- 67-34
W8LT[3]	9760- 61-32
W8ERD	9620- 68-26
W9YT[1]	9300- 56-30
WA2IYB	7965- 55-27
WA4FJM	7930- 54-26
K2EIU/5	7140- 45-28
K9UOV	6600- 50-24
K3RFH	6375- 51-25
K4BAI	6250- 43-25
K9WIE	5750- 42-25
K9IVG	5500- 48-22
K9LVK	5280- 44-22
W2BEI	5145- 44-21
W2CWD	5125- 41-25
W3TMZ[4]	24,570-117-42

[1] K9ELT, opr. [2] K2UTV, opr. [3] K8JZZ, opr. [4] W3TMZ, W9SZR, oprs.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

Apr. 2: CP Qualifying Run — W6OWP
Apr. 11–13: C D Party (c.w.)
Apr. 15: CP Qualifying Run — W1AW
Apr. 18–20: CD Party (phone)
May 1: CP Qualifying Run — W6OWP
May 21: CP Qualifying Run — W1AW
June 18: CP Qualifying Run — W6OWP
June 13–14: V.H.F. QSO Party
June 19: CP Qualifying Run — W1AW
June 27–28: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

April 11–12: International SP DX Contest, PZK (p. 66, this issue).

April 11–12: Ohio QSO Party, Ohio Council of Amateur Radio Clubs (p. 112, this issue).

April 15–16: 4th YL V.H.F. Contest, YLRL (p. 90 this issue).

April 18–19: II-22 Contest, USKA (p. 66, this issue).

April 25–26: PACC, VERON (p. 66, this issue).

April 25–27: Missouri QSO Party, Northwest St. Louis ARC (p. 118, this issue).

May 1–15, 17–18: Bermuda AR Contest, RSB (p. 67, this issue).

May 9–10: International Telegraphic Contest, USSR Federation of Radio Sport (next issue).

May 9–11: Georgia QSO Party, Columbus Amateur Radio Club (next issue).

May 10: Tennessee QSO Party, Radio Amateur Transmitting Soc. (next issue).

May 23–25: Connecticut QSO Party, Candlewood ARC (next issue).

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.

Virginia	Robert L. Follmar, W4QDY	Feb. 11, 1964
Ohio	Wilson E. Weckel, W8AL	Mar. 28, 1964
Arizona	Floyd C. Collyar, W7FKK	Apr. 15, 1964
Washington	Robert B. Thurston, W7PGY	Apr. 30, 1964

In the New York City and Long Island Section of the Hudson Division, Mr. Blaine S. Johnson, K2IDB, and Mr John S. Brandau, K2OVN, were nominated. Mr. Johnson received 679 votes and Mr. Brandau received 511 votes. Mr. Johnson's term of office began Jan. 2, 1964.

In the Utah Section of the Rocky Mountain Division, Mr. Thomas H. Miller, W7QWH, and Mr. Marvin C. Zitting, W7MWR, were nominated. Mr. Miller received 92 votes and Mr. Zitting received 57 votes. Mr. Miller's term of office began Feb. 6, 1964.

In the New Mexico Section of the Rocky Mountain, Mr. Newell Frank Greene, K5IQL, and Mr. John C. Kanode, K5UYF, were nominated. Mr. Greene received 122 votes and Mr. Kanode received 105 votes. Mr. Greene's term of office began Feb. 10, 1964.

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*	*Term Ends*
West Indies	Apr. 10, 1964	William Werner	Aug. 10, 1963
San Joaquin V.	Apr. 10, 1964	Ralph Saroyan	Apr. 10, 1964
Alaska	Apr. 10, 1964	Kenneth E. Koestler	Apr. 10, 1964
Maritime	Apr. 10, 1964	D. E. Weeks	June 11, 1964
Quebec	Apr. 10, 1964	C. W. Skarstedt	June 11, 1964
E. Mass.	Apr. 10, 1964	Frank L. Baker, Jr.	June 15, 1964
Ontario	Apr. 10, 1964	Richard W. Roberts	June 15, 1964
South Carolina	Apr. 10, 1964	Lee F. Worthington	June 26, 1964
Wyoming	Apr. 10, 1964	Lial D. Branson	Deceased
W. Penna.	June 10, 1964	Anthony J. Mroczka	Aug. 7, 1964
W. N. Y	June 10, 1964	Charles T. Hansen	Aug. 10, 1964
Santa Barbara	June 10, 1964	William C. Shelton	Aug. 10, 1964
Montana	June 10, 1964	Walter R. Marten	Sept. 1, 1964
Northern Texas	July 10, 1964	L. L. Harbin	Sept. 12, 1964
Mississippi	July 10, 1964	S. H. Hairston	Sept. 27, 1964

DXCC Notes

Announcement is hereby made of the addition to the ARRL Countries List of the *Crozet Islands*. The Crozet Islands are located in the South Indian Ocean at about 46 degrees 30 minutes south latitude and 51 degrees east longitude. Acceptance of the Crozet Islands as a separate entity on our Countries List is based on Point 2(b) of our criteria; (see July, 1963, *QST* DXCC Notes).

Confirmations for contacts with the Crozet Islands may be submitted for DXCC credit starting June 1, 1964. Confirmations received for this listing before June 1, 1964 will be returned without credit.

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 credit 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 of receipt. All totals shown represent submissions credited through January 31, 1964.

W1FH....306/332
W2AGW...306/330
W6CUO...306/331
4X4DK...306/324
W8BRA...306/329
W3GHD...306/330
KV4AA...306/330
CX2CO...306/327
W1GKK...306/331
W2TOC...306/325
W9RBI...306/331
W7GUV...306/329
W8JIN...306/331
W8UAS...306/327
W4DQH...306/330
W4GD....306/327
PY2CK...306/329
W8PQQ...306/323
W9NDA...305/329
W7PHO...305/323
W8KIA...305/329
W8BF....305/326
W8DMD...305/327

W8MPW...305/323
W2LPE...305/326
W9YFV...305/329
W3KT....305/329
G4CP....305/329
W1ME....304/327
K2GFQ...304/325
W5ADZ...304/326
W9HUZ...304/324
W9LNM...304/327
K3UPG...304/328
W4QCW...304/321
W2JT....304/323
W8KMI...304/325
W1BIH...304/328
W5MMK...304/325
W2BXA...304/328
W3LMA...304/326
W0DU....304/326
W0QVZ...304/325
W8JBI...304/323
W1JYH...304/327
CE3AG...304/328

W2DEC...304/320
G2PL....304/327
W2HMJ...303/323
W7GBW...303/327
W5ASG...303/327
W6YY....303/323
W8LKH...303/323
W6GPB...303/324
W6EBG...303/328
W8EWS...303/327
W0AIW...303/326
HB9J....303/327
W4TM....303/325
W1CLX...303/326
DL3IL...303/319
G3FKM...303/320
W3JNN...303/327
LU6DJX..303/327
DJ1RZ...303/321
W6AM....302/327
W5ABY...302/319
W5KC....302/325
W2BOK...302/319

W2ZX....302/321
K2DCA...302/319
VE7ZM...302/326
W3JTC...302/325
W2LV....302/321
W8BKP...302/323
W2WZ....301/324
W3EGR...301/318
OE1ER...301/323
W0ELA...301/324
W5CKY...301/320
W2SUC...301/318
W7ENW...301/325
W4ML....301/321
K2BZT...301/318
W8DAW...301/324
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K6ENX...300/317
W5AFX...300/325
W4AIT...300/323
W6GYV...300/318
W0BFB...300/319

W1ZW....300/317
W0SYK...300/318
W3GAU...300/323
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W2OKM...299/317
W2ZGB...299/315
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K6EVR...298/315
W7AG....298/322
G8KS....298/316
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W4OPM...298/313
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W4GXB...297/318
W2UVE...297/315
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CX2CO....306/327
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W7PHO....305/323
4X4DK....305/323
W8GZ.....305/328
W8BF.....305/326
W8PQQ....304/321

W1FH.....303/324
VQ4ERR...303/325
W8KML....303/324
PY4TK....303/320
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W4DQH....302/323
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W3JNN....301/322
W0AIW....299/320
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W6AM.....297/321
W4QCW....296/309

From January 1, through January 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.

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KG6ALD...141
W2ZTV....131
DJ4AX....129
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JA3BEA...122
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9K2AN....115

W6TZN....113
W7MX.....110
W0GNX....110
VE3BXY...110
JA1IFP....110
DJ6PI.....108
W0ICQ.....105
DJ3GJ.....105

W1HNI....104
WA2FJW...104
W4BRC....104
YU3NN....104
WA2KXX...103
JA8ADQ...103
PA0JPC...103
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K4JAG....102
W4MRH...102
VE3CWQ...102
VE3HL....102
DL9BS....102
F7CP.....102
UA9JH....102
WA2DQH...101

WA2KWH..101
WA2QMC..101
K3GIO....101
K3TIQ....101
K4KHT....101
LU7AU....101
K1MBM....100
WA2HLH...100

K2RQC....100
K2VHU....100
W4HAE....100
W4RZN....100
K7UCH....100
W9DNE....100
K9DWG....100
DJ6LN....100
G3LAS....100

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PY3AHJ...132
G3ABG....126
K1DMG....110

DJ3LT....107
HZ1AB....107
W6LDA....106

VE2BCK...106
G3PTN....106
K4PQV....105
W2GRS....104

FG7XL....103
W6LV.....102
W6ZKM....102

DL9BS....102
JA1GV....102
W1EZL....101
W6TZN....100

W9DNE....100
DL4BT....100
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PY4OD....280
W8PHZ....277
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W1RAN....270
W2ZVS....270
W4JJL....270
W6BYB....270
W9RCJ....267
CR6BX....264
W5EJT....262
W2PDB....260
W3PN.....260
W8IBX....260
W0AUB....260
VE5JV....254
K4AJ.....253

W4NJF....250
W5EZR....250
W7UMJ....250
K8IKB....250
W8QNW....250
W8KMD....250
VE3CIO....243
W2MJ.....242
W4UMC....242
DL6MK....242
W5VSQ....240
WA6DUG...239
YV5BZ....232
W6OF.....231
W2UFT....230
K8WOT....230
G2IO.....230
ZS6ATA...227
K6KTK....225
W8QWI....225
W3QMG....224
K4BAI....224
G8JM.....222
W2QDY....220
W8EVZ....220
G2FYT....220
JA5FQ....220

W9VZP....216
G3ABG....214
K1DIR....213
K8IQQ....212
W2ADP....203
W8IQS....202
K1ANV....201
W1NTH....201
K8VDV....200
W0YZB....200
ZS5KU....200
W6CBE....199
OK2QR....199
G3HCL....198
W1FJJ....193
DL1FZ....192
MP4BBE...192
WA4DCP...191
VE7PU....190
DL9PC....190
W5EJV....187
W1DBM....184
K0ZEC....183
K3NMY....182
K8ANX....182
K4MPE....181
K8ZPK....181
K9PNV....181

ZS2U.....181
W2GHK....180
W5AI.....180
WA6HRS...180
DL9TJ....180
SM5BEU...180
VR2DK....180
OH2FS....178
VE2BK....177
K1RTB....176
K1DMG....175
WA2HUV...171
W3GOQ....171
W9GAI....171
KH6ACU...170
K3MNG....166
K4OYR....164
K0JPL....163
K4VFQ....161
W6YC.....161
F2PO.....161
W7AEA....157
W2OCL....155
VE3KP....155
WA2NWW...153
WA6HIQ...152
K9UIT....152

DL9GH....152
W1YYM....150
W4JFW....150
K4MWB....150
VQ2IE....150
W4FRO....149
KL7DTB/6.149
WA6QGW...148
CR6AU....145
W2FVI....144
CR7CR....144
SM3BEI...144
W4KJL....142
W1ECH....140
WB2FMK...140
W3UHV....140
W4VWW....140
WA6OHJ...140
K7MEW....140
K9OPF....140
K0EUV....140
G3OZU....140
W8LKM....139
JA1GV....138
WA4BJL...137
K8BCK....136
W3QYG....135
DJ1RZ....135

W8NPF....134
W6LDA....133
W2FXA....131
W3KID....131
K6HZP....130
W0OVQ....130
W9TDR....130
VE3BCK...130
WB2FMK..129
K8VIX....128
W1TEC....127
G2CP.....126
VE3MZ....123
W8WUO....121
W1BPY....120
WA2PWI...120
K2YFE....120
W3ZVJ....120
WB2CFS...116
W0RJF....114
KP4BJD...113
WA2LMW...111
K1AQI....110
WA2RUB...110
K8GOP....110
K9QBV....110
W9SCZ....110

Radiotelephone

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G5VT.....310
HB9TL....305
W0QVZ....300
OZ7FG....300
W3MAC....291
W2PTE....290
YV5AE....265
ZS1DO....261

YV5AIP....254
K4AJ.....252
W9JYJ....252
K5JEA....250
W5TIZ....240
W4NJF....231
YV5ANQ...220
W1HJB....210

WA2EOQ...210
W3QMG....200
VE3CIO....190
VK2JZ....190
W1DBM....184
W8QNW....184
VE5JV....183
W2ODO....170

W2GHK....164
WA6DET...164
K2POA....160
VE3CBY...155
K4WHD....154
HC8WN....153
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K2OEA....150
W5EJT....148
CR6AU....142
W1JSK....141
W8EVZ....140
K0OYQ....140
W4AVY....130
CR7CR....125

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W2ZTV....115
I1LCF....114
W1FJJ....111
KR6OF....111
W6BYB....110

SUGGESTED OP. 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, NST −7, PDST −7, PST −8, Hawaii −10, Central Alaska −10.

OPERATOR OF THE MONTH

Have you thought back over the month of March and picked out your nomination for "operator of the month?" Details appeared on page 96, March *QST*. Let's hear from *you*.

During February the following amateurs were nominated in recognition of their extra skills and courtesies:

W1KXM	WB2DEF		
WA2KCL	W2RUF		
W2WXJ	W3EML		
W3WZL	WA2VKU		
K4BAI	W3RMX		
WA4DMB	K4APF		
WA4JWV	W4CZ		
K4PQL	W4EAW		
W5WEO	W5SS		
K6CRA	WA6BRG		
W7MY	W7DIS	K7PXD	
WA8CUQ	W8JXK	W8KJP	K8LGA
W8NBK	K9ERL	K9FPA	W9WJU
WØDCA/5	WØEXQ	KØZOB	KZ5SS

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 Apr. 15 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,700 and 145,800 kc. The next qualifying run from W6OWP only will be transmitted Apr. 2 at 0500 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, 0230 GMT Apr. 15 becomes 2130 EST Apr. 14.

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 0030 and 0230 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 0230-0320 — 15, 20, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0230-0320 — 10, 13 and 15 w.p.m. daily from 0030-0100 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* and to allow checking strict accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

Date Subject of Practice Text from Feb. *QST*

Apr. 1: *It Seems to Us . . .*, p. 9
Apr. 7: *Kilowatt Amplifiers for 50 and 144 Mc.*, p. 11
Apr. 16: *The Noise Diode Caper*, p. 28
Apr. 21: *Tailor-Made Volts*, p. 36

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

Apr. 22: A.C. Amperes and Volts, p. 18
Apr. 24: Stored Energy, p. 19

W1AW SCHEDULES

(April, 1964)

Operating Visiting Hours

Monday through Friday: 3 P.M.–3 A.M. EST.
Saturday: 7 P.M.–2.30 A.M. EST.
Sunday: 3 P.M.–10.30 P.M. EST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent on request.

Operating Frequencies

C.W.: 1805 3555 7080 14,100 21,075 28,080 50,700 145,800.
Voice: 1820 3945 7255 14,280 21,330 29,000 50,700 145,800.

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., 0100; Tues. through Sun., 0500.
Voice: Mon. through Sat., 0200; Tues. through Sun., 0430.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local tme.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from *any* amateur station in accordance with the following schedule:

GMT	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0120–0200[1]	.....	.....	7080	3555	7080[2]	3555[2]	7080
0210–0230[1]	.....	.....	3945	50.7 Mc.	145.8 Mc.	3945	3945
0330–0430	.....	.....	3555	3945	7080	1820	3555
0440–0500[1]	.....	.....	3945	14,280	3945	14,280	3945
0520–0600[1]	.....	.....	3555[2]	7255*	3555	7080[2]	3945
0600–0700	.....	.....	14,280	14,100	3555	14,100	.....
0700–0800	.....	.....	7255*	7255*	7080	3945	7255*
2000–2100	.....	.....	14,280	21/28 Mc.[3]	14,100	.....	.....
2100–2200	.....	14,280	21/28 Mc.[3]	14,100	21/28 Mc.[3]	21,330	.....
2200–2300	.....	14,100	14,280	21,075[2]	14,280	14,100	.....
2330–2400	.....	7255*	.....	7080	.....	7255*	.....

[1] General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0200 and 0430 on phone and at 0100 and 0500 on c.w. Starting time is approximate.
[2] W1AW will first listen for Novices before checking the rest of the band for other contacts.
[3] Operation will be conducted on either 21,075, 21,330, 28,080 or 29,000 kc.
* Operation may be on s.s.b. as announced at the beginning of the period.
Station Staff: W1QIS, W1WPR, K1MET.

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—In deepest sorrow and regret I report the passing of our SEC, Emmet Kuehner, W3DUI. Em became a Silent Key Feb. 8 at 1 P.M. in the Veterans Hospital at Wilkes Barre. Active, serious and a staunch worker for the section AREC, he will be missed by your editor. All ECs and new applicants for AREC, send communications to Albert Rhoads, K3MQE, 537 Susquehana Ave., Sunbury, Pa. Al has been appointed the new SEC for this section. The EPA C.W. Net on 3610 kc. had 391 QTC with a QNI of 483. The net still is drawing a big blank from the Scranton-Wilkes Barre area. Any 80-meter c.w. stations in that area? The fuse-blowing problem at W3RV was caused by a bad transformer-winding. K3KTH has added the 40-meter band to his 300-watter. W3BIP, an ex-SCM, again is active in the traffic nets. K3TEJ assisted the Novice in the Novice Roundup. W3LN, K3HEC, K3QCB and K3ZDK worked the V.H.F. Contest in 9 inches of snow. Appointments: K3FHR, K3HNP, K3IMR, K3OMP, K3TEJ and K3YQJ as ORSs; K3BHU as OBS. Rig trouble gave K3HTZ his longest QRT—two weeks. W3VR acquired a broken leg and a pair of crutches. The transmitter of K3MTF is having a.c. gremlin troubles. K3HAQ constructed a 6-meter rig from the 1957 Handbook. K3YVG added a vertical antenna and is active on 80 meters. The Lancaster Radio Transmitting society graduated 5 Novices recently. K3TYE and company plan to be on 6,2,220 and 432 in the V.H.F. Test in June. The 807 Society's new officers are K3KLQ, pres.; K3SGT, vice-pres.; K3SFP, secy.; K3TSG, treas. Delaware Valley ARC's officers are W3TAT, pres.; K3SZK, vice-pres.; K3TFR, treas.: K3JWL, secy. The Mahanoy Valley Brass Pounders ARC's officers are K3TLY, pres.; K3KNR, vice-pres.; K3LEF, treas.; W3ZRQ, secy. The Germantown Boys Club RC, visited by your editor, is one of the most active teen-age amateur groups in the Philly area. The Jim Thorpe ARC, also an active young group, shows great promise for the future of amateur radio. All membes of this club are General Class. Traffic: W3CUL 4149, W3IVS 2081, W3VR 1326, K3BHU 868, W3EML 793, W3UQV 576, K3MVO 367, W3FLP 153, K3OMP 139, K3CAH 124, W3RV 102, K3MQE 81, K3KTH 58, W3ELI 47, W3JKX 42, W3HIP 28, K3TEJ 28, K3HNP 25, K3SFP 25, W3ZRQ 25, W3VAP 19, W3OY 18, K3ZDK 11, W3ADE 10, K3JHT 10, K3IMR 9, K3JHF 9, W3BFF 6, W3BKF 6, K3KNP 6, W3LC 6, K3AKN 3, K3HTZ 3, K3MNT 3, K3EMA 2, W3LXN 2, K3YVG 2, W3BNR 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. PAM: W3EQK. RM: W3QCW, K3JYZ. The MDD Net is on 3649 kc.; MEPN net on 3820 kc. The National Capitol V.H.F. Society Hamfest will be held at Marshall Hall, Md., May 24; the Confederate States Rebel Hamfest, at Marshall Hall, Md. on June 21. W3BKE took part in the 160-Meter Contest. K3BYD reports that the antenna of the club station, K3CEZ, came down in the heavy wind storm but was undamaged. K3BIX left for a tour of duty with the Air Force. W3CJT, K3QOO and K3YKC have accepted appointments as communications advisors to the Director of Selective Service System. W3CQG, a new amateur in Frederick Co. has been checking into the MEPN. W3ECP operated portable while he was in Georgia over the holidays with 15 watts. W3EOV is busy changing his equipment around. W3EQK is not very active because of the QRM. K3GJD finally made the BPL. K3IWJ is active with the Red Cross. K3JYZ sent out the MDD Net bulletin and it contains a lot of news about the net. May I suggest that you check into the MDD regularly and get on the mailing list. K3LLR has been making some tests on the v.h.f. bands. W3MCG has been busy in the contests. K3NCM has changed jobs and is very busy. W3OHI says that his grandson, W3WPN, now is using a KWM-1. K3PEJ and K3QOO are busy with school work. K3PRN and K3TUJ reported a band opening on the v.h.f. bands. W3QCW, RM on the MDD Net, is using only the exciter of the kw. rig on the air at present. K3QDD has a 50-ft tower up and soon will have the tribander on top. K3RUQ enjoyed getting home from school and getting on the air. K3SGD reports that the Baltimore Area AREC group operated during the heavy snow storm on Jan. 13, with 32 stations taking part. K3URZ enjoyed the January CD Party. K3VGX has a new T-150 on the air. KN3YOF is operating on the 2-meter band. K3YBK has changed his mobile antenna from a vertical to a halo and the results are much better. W3YKQ is having a good time ragchewing on the v.h.f. bands. K3MAU is net control for the Roval Order of the Hoot Owls Sat. at midnight on 50.4 Mc. W3ZNW has a GSB-100 working on the low frequencies and will be trying s.s.b. I regret to report that W3ZCD, of Washington, D.C., passed away Jan. 8. Traffic: K3GJD 524, K3APM 116, W3OHI 77, K3GZK 76, K3QDD 72, K3JYZ 64, K3OSX 63, K3QOO 62, W3QOW 61, W3MCG 52, K3NCM 50, K3RUQ 41, W3AHQ 36, W3ATQ 35, W3EOV 35, K3CEZ 29, K3CXX 29, W3PQ 29, W3ECP 26, K3URZ 25, W3ZNW 20, K3SGD 10, K3LLV 4, W3CQG 3, K3LLR 1.

DELAWARE—SCM, M. F. Nelson, K3GFK—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. New appointments: W3FJF as OO, W3DEO as OPS. Renewals: W3HKS as ORS. Frank is beginning his eleventh year as ORS. K3SHD won the Kent ARC contest in the Delaware QSO Party. W3IYE has a new tower up. The 1963 "Operation Holiday Greetings" was more successful than last year with 713 message originations and a total of 2300 messages handled. Some of those participating included K3s AXW, AZH, BYJ, CNI, DTZ, EWK, GHC, GKF, JLY, JXR, KAJ, LEC, NEK, MPZ, OWS, PKH, QCN, RNV, TLG, UBN, UNH, URP, UXQ VWX, YHR, YUC, YUD, ZKA, and W3s AHW, CFA, CGV, EEB, EKO, FUD, HC, HKS, IYE, KOI, LQE, URR and WZB. Letters and calls of thanks were received from state, county and city officials. Traffic: K3LEC 57, KN3YHR 14, KN3YSW 12, W3HGA 8.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARV. PAM: W2ZI. RMs: WA2BLV and WA2VAT. WA2BLV, mgr. of NJN, has been appointed RM. K2JJC and WA2KAP has been endorsed for another year as OPSs. The reorganized Salem County Radio Club elected W2BIN, pres.; K2GYM, vice-pres.; WA2JRD, act. mgr. W2EZM, has returned to the air with s.s.b. NJN totals for Jan.: QNI 564, QTC 402, 67 different stations. We have a new traffic handler this month—WB2FJF. The Burlington County Radio Club's 1964 officers are W2WUP, pres.; W2ADA, vice-pres.; K2INQ, treas.; K2BG, secy. The Delaware Valley Radio Assn. will hold its 17th Annual Old Timers Nite Roundup, May 2 at the Hotel Stacy Trent, Trenton. Contact W2ZI for information. The N.J. Phone and Tfc. Net totals for Jan.: 31 sessions, QNI 612, traffic 248. In the November Sweepstakes the SJRA leaders were WA2HSP, W2PAU and WA2UEJ on c.w.; WA2EIY, WA2GSO and W2ORA on phone. W2EBW was top scorer XYL c.w. operator. WA2UOF replaced W2BLV as SJRA's *Harmonics* news and libel editor. the SJRA will celebrate its 50th anniversary in 1966. Gloucester County ARC celebrated its 6th year with a Birthday Party. The Southern Counties ARA installation dinner was held at Smithville Jan. 21. Gloucester Cty. Club paper *Crosstalk* is increasing in pages and interest. Burlington County EC, W2ZVW, is planning a Sun. morning net on 29.580 Mc. WA2QHQ made DXCC. Make plans now for a successful Field Day. No Atlantic, Cumberland or Cape May news was received this month. Traffic: W2RG 166, WA2BLV 160, W2ZVW 136, WA2VAT 120, W2MMD 80, WB2FJF 49, WA2WLN 38, W2ZI 32, WA2KAP 23, K2SHE 22, W2BEI 4, K2JJC 4.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB, 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 3610.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 7102.5 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. BPL this month goes to

W2RUF. Correction: last month W2GVA was reported as making the BPL. It should have been W2GVH. Sorry. WB2DPR has been appointed ORS. WA2KQG is renewed as ORS and WA2VZA as OES. K2TQC has been elected pres. of the Niagara Frontier DX Assn. The group elected W4BPD as DX signal of the year. W2RHQ has a new rig on 6 meters with a 4CX250B; he also is looking for skeds on 432 Mc. New officers of the Syracuse V.H.F. Club are W2MTG, pres.; K2TXX, vice-pres.; K2AVA, treas.; K2OXJ, secy.; WA2XGL act. mgr. WA2VZA is building a high-power rig for 6 meters. WB2JCE worked 22 states confirmed as a Novice on 80 meters. Congratulations to W2UVE on making the DX honor roll. W2PZI and K2HUK joined the Erie County wide-band F.M. 2-Meter Net. W2RQF has a Drake TR3. I am sorry to report that W2SUK, of Penn Yann, joined the Silent Keys. WB2DMU has an HE45B on 6 meters. WB2GAL, of Fort Edward, is operating mobile from a tugboat in N.Y. Harbor. WA6BAQ, formerly K2JGP, gives his regards to the W.N.Y. gang. WN2KQI is running an HT-40 and a CM-1. WB2DZA is running homebrew equipment on 80, 40, 6 and 2 meters. Among the speakers at the 1964 W.N.Y. Hamfest sponsored by the RARA, will be W9AC, W2ICE, program chairman, reminds us that this event will be held May 23 at Vince's Fifty Acres, which is on Rte. 15 four miles south of thruway exit 46. K2UCQ and W2EDE have new NCX-3s. K2YCO has a new 6-meter mobile using solid state power supply. The Erie County Emergency Net elected W2PVI, mgr.; W2JPE, asst. net mgr.; W2CUU, secy. K2EE had an article published in *Electronics Illustrated*. Traffic totals should be reported either to W2RUF on the N.Y. C.W. Net or to K2HUK via Form 1 postcard by the 3rd of each month. Traffic: W2RUF 437, W2GVH 307, WA2KQG 258, W2EZB 244, WA2HSB 163, W2HYM 133, W2FEB 107, K2KTK 99, W2FCG 51, WB2DPR 40, K2IMI 36, K2OFV 36, K2JBX 32, W2RQF 29, K2AYQ 24, WB2JCE 22, WA2RLV 19, K2HOH 17, WA2GLA 9, WA2ANE 8, WB2DMV 7, K2RYH 7.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN, K3OOU and W3NUG. PAM: W3TOC. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets 2330 GMT Mon. through Fri. on 3585 kc. W3SMV is working DX on 160 meters. The Breezeshooters' Hamfest will be held at West View Park May 24, 1964. The Monessen ARC (W3CSL) now holds meetings at Memorial Civic Center in Monessen the 1st and 3rd Fri. W3UNQ and K3WVD now have HQ-170C receivers. The Steel City ARC reports: W3KPI is putting a Heathkit SBA-300 together; the W3UUH's have a new harmonic; W3NKM is now the second ham in the world and the first in the U.S.A. to have 300 countries confirmed on s.s.b. New officers of the Bureau of Mines ARC are K3PXE, pres.; A. Furno, vice-pres.; K3SYM, secy.; K3VYQ, treas.; K3WNQ, act. mgr.; K3TJX, training mgr. Congratulations to K3DKH on making BPL for the fifth consecutive month. New Generals are K3SYM and K3WNQ. New officers of the Skyview Radio Society are W3ZFJ, pres.; W3RSR, vice-pres.; K3KSY, secy.; W3GDS, treas. K3KUZ has an HX-20 s.s.b. on mobile now. The Uniontown ARC reports: K3RLB is going on 2; K3OQP now is on 6; K3RTG has a Galaxie. The Horseshoe ARC reports via *Hamateur News*: K3BMH has a CDR rotor; K3GIH is on 6 with a Pawnee; KN3FGL has a Communicator IV on 2; K3YKO is building a linear on 6; K3IGA is attending the Military Academy at Chester, Pa. K3PLV is in the Air Force. K3QQN is on 20 meters looking for DX. W3KUN had a perfect attendance for QNIs on the W.Pa. Net for the month of January. Traffic: (Jan.) K3DKH 510, W3KUN 236, K3NZB 197, K3PIE 189, W3MFB 156, K3PYS 100, K3TEZ 87, K3ZMH 53, W3SMV 41, W3LOS 30, K3OWN 30, W3UHN 28, W3OEO 11, K3SMB 11, W3TCC 6. (Dec.) K3OOU 52.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: W9USR. PAM: W9WWJ. Cook County EC: W9HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. The EC Net meets every Sun. at 1600 GMT on 3840 kc. W9YTQ, W9WYB, K9VVL, W9NPC, W8HPG, W9JUV/K9OSO, K9KRW, W9QKE and W9REC participated in the recent ARRL Frequency Measuring Test. The LARKS manned the daytime hours of the Flower Show at McCormick Place of the Chicago Area Radio Club Council's station W9TEM. W9YZE is publishing *QRK*, a new amateur magazine which will include local news and happenings. K9MDW, WA9GUT, K9RLG and K9EBN were elected as the new officers of the Macoupin County Amateur Radio Club. The new officers of the Joliet Amateur Radio Society are W9KPC, W9REA, W9UCW, K9YAJ and K9MHW. This column sends sympathy to the families and friends of K9TTG, W9ICJ and W9YUC, who recently passed away. K9AMG was appointed communications officer for civil defense in Skokie, and K9KWV was named as trustee for the station. K9EWV, K9RRF and K9BDJ are on 50-Mc. teletype. The Chicago Vocational Amateur Radio Club has been approved by the League's Executive Committee for its club affiliation with ARRL. W9SXL, McLean County EC, writes that W9SRX, WA9DWR, W9FXK, W9VPD and K9IKS did a fine job on 147.5 Mc. locating and getting out word about stranded motorists in the Jan. 12 snow storm. W9QKE, W9MSG, W9LQF and W9FVU were elected to take over this year's official duties of the Chicago Area Radio Club Council. The North Central Phone Net had a traffic count of 1113, while for the same period the ILN QTC was 10. WA9HDF has a new Twoer with a two-band five-element beam, on a 60-ft. tower. K9RIV is now WØIKT with his QTH in Cedar Rapids with the Collins Co. W9JEC demonstrated amateur television at a recent North Shore Amateur Radio Club meeting. K9KCX, K9VJJ and K9SAN were elected officers of the Rockford ARA. W9NIU is basking in the fine sun in W4-Land. WA9IIH (a lad of 13) received his radiotelephone 2nd-class license. W9OKI received his A-1 Operator Award. K9EIV has a new TA-33 jr. K9YFS has returned to the air. W9CEO is recuperating from a serious illness in St. Joseph's Hospital in Bloomington. W9REC has added ECHO II to the list of satellites that he has monitored. The Jersey County Amateur Radio Club's new officers are WA9DUQ, K9QHA, K9FLP, K9UOT, K9CWL, K9LUP, K9SBP, K9KMH, W9DHU and K9QHA. K9KZE was appointed as OBS and W9ING was appointed as OO. W9UZU, WØWVH, KØFJM, W9YZE, K9TCU, W9PHO, W9JEV, W9YID, W9YIY and W9THB were elected officers of the Egyptian Radio Club, Inc. W9IDA, K9KZB and WA9CCP are recipients of the BPL award. Traffic: (Jan.) W9IDA 1899, K9KZB 1315, WA9CCP 636, K9BTE 272, W9AKV 237, W9HAS 116, W9KJ 102, W9JXV 72, K9UOV 68, WA9AJF 55, W9SMD 31, K9CYZ 30, W9USR 25, K9RAS 23, K9LRN 21, K9FBN 12, W9PRN 12, W9HPG 11, K9ZNU 11, W9SKR 6, W9LNQ 4, W9QQG 4, WA9BQQ 2. (Dec.) W9HAS 97, W9OKI 16, K9UOV 14.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9GLL, K9IVG. RMs: K9DHN, W9JOZ, W9TT. Net skeds in GMT: IFN, 1400 and 2300 Mon. through Fri., 1400 Sat., and 1330 Sun. on 3910 kc. ISN, 0030 daily on 3920 kc. QIN, daily at 0000 and RFN at 1200 Sun. on 3656 kc. New appointments: W9HNJ as EC of Wabash Co., WA9BNW as EC of Benton Co., WA9GKF as EC of Randolph Co., W9IGW as EC of Monroe Co., K9FHQ as EC of Howard Co., K9KTL as OO Class I, WA9HQP as OES. New Kokomo ARC officers are K9IMD, pres.; WA9AXU, vice-pres.; WA9GUY, secy.; WA9GKT, treas.; W9GIB, director. Clark Co. ARC has a new call, W9WWI. K9GEL has a new 30L-1. New officers of the Michigan City ARC are K9GLK, pres.; K9SGZ, vice-pres.; K9HYV, secy.; ex-WN9CLA, treas. Those making BPL: W9JOZ, W9MM, WA9ECX, W9NZZ and K9DHN. QIN Honor Roll: WA9ECX, W9VHY, K9DHN, W9AUM. K9HYV and WA9AVT. *Amateur Radio exists because of the service it renders.* Jan. net reports: ISN 973, IFN 200, QIN 155, Hoosier V.H.F. 98, RFN 42, 9RN 594. Ind. represented 100 per cent. Jan. Traffic: (Jan.) W9JOZ 1990, W9MM 926, K9DHN 652, WA9ECX 558, W9VAY 441, W9NZZ 328, WA9AUM 301, K9IVG 185, W9QLW 161, WA9AVT 105, W9TT 83, WA9BWY 77, W9BUQ 62, K9CRS 52, K9RWQ 51, W9QYQ 48, K9HYV 46, W9YYX 45, W9DGA 40, K9ZLB 36, WA9BRD 35, WA9ELY 33, W9CC 29, K9GEL 27, W9RTH 24, K9UXX 21, WA9BGI 20, W9DZC 20, K9ILK 20, K9VHY 19, W9BTZ 16, WA9CJR 16, K9UEO 16, K9SWL 15, K9WET 15, W9FWH 13, W9HRG 11, W9FZW 10, W9ZYK 8, K9ARW 7, K9BSL 7, K9KTL 7, K9LVK 7, K9MAN 6, K9UHQ 5, W9BDP 4, K9FPA 4, W9FJI 2, K9PNP 2, WA9AEL 1, W9AQW 1, K9DHJ 1, WN6GXF 1, W9URQ 1. (Dec.) W9QLW 372, W9VAY 181, K9SGZ 114, K9HYV 66, K9UXX 22, K9WET 10, W9BRW 9.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9BCC. RMs: W9KQB and WA9AKE. PAMs: W9NRP, K9IMR and W9NGT. Nets: WIN on 3535 kc. daily at 0045Z; WTN on 3710 kc. Tue. through Sat. at 0130Z; BEN on 3950 kc. daily at 2400Z; WSBN on 3985 kc. daily at 2315Z, SWRN on 50.4 Mc. Mon. through Sat. at 0300Z. Net certificates were issued to W9IAL and K9YSR for WSBN. New appointees: WA9EUA as EC for Winnebago County and K9KGM as EC for Dane County. Renewed appointments: W9BCC as SEC, K9HBT as OES, K9KJT as EC, W9FXA as ORS, W9VSO as OO, K9GDF as OPS. New club officers: Badger Amateur Radio Society—K9ELT, pres.;

(*Continued on page 102*)

A FEW months ago we promised you that National would produce a number of remarkable new products for the amateur this year . . . and here's some advance information on the first — the NCL-2000 Linear Amplifier. What's remarkable about the new National Linear? First of all, let's talk about what it isn't. It is *not* an under-metered, lightly powered, economy amplifier using a string of tubes running at or over maximum ratings and straining to deliver a peak k. w. input.

IT *is* a husky, conservatively designed, self-contained table-top amplifier for the 80 through 10 meter amateur bands — with full metering, all important operating features, *and almost a kilowatt of available plate dissipation to deliver a clean 1300-1400 watts of peak output into your antenna.*

THE NCL-2000 uses a pair of ceramic tetrodes designed specifically for high power SSB service, and is rated for a "DC" kilowatt — 1000 watts average SSB input (2000 watts PEP), and 1000 watts input for CW, RTTY, or AM linear service. Incidentally, the tube parameters are adjusted at the flick of a switch to allow high efficiency operation for the latter three classes of operation.

IF THE available driving power in your shack is marginal, you'll be glad to know that the NCL-2000 may be driven to full output with any exciter delivering 20 watts PEP up to 200 watts PEP without special matching networks, critical cable lengths, or T-pads!

HERE are some of the other features of the NCL-2000 . . . separate precision multimeter and PA plate current meters . . . ALC output for use with exciters incorporating ALC input provision . . . built-in antenna relay for either transceiver or transmitter-receiver combinations . . . instantaneous choice of *exciter-only* or *high power* to meet band conditions . . . only three operating controls — *Bandswitch*, Pi-network *Tune* and *Load* . . . 115/230 volt input. . . . Time Delay and overload protection. . . . In fact, everything we could think of that a big linear should have. Did we say big? Big in performance and signal only. The National NCL-2000, with self-contained power supply, is approximately the size of the most popular 1 k. w. PEP tabletop amplifier, but is almost two inches shorter in depth.

THE price? All we can say right now is that it will be competitive to 1 k. w.-only rigs! How can we do it? Just the way we produced the NCX-3 — by first designing maximum performance, high quality equipment, and then pricing in anticipation of high volume sales.

IF YOU want early price and delivery information on the new NCL-2000, drop a QSL to Department K, National Radio Company, Melrose, Mass. — We'll mail you the advance information before the regular magazine ads appear.

MIKE FERBER, W1GKX

National Radio Company, Inc.

ADVERTISEMENT

(*Continued from page 100*)

K9WHO, vice-pres.; WA9BZY, secy.-treas.; K9CYD, chief engineer, Mancorad Club—W9DYC, pres.; K9GOZ, secy.-treas.; Racine Megacycle Club—W9PTN, pres.; W9JPC, vice-pres.; W9KZZ, secy.-treas. The Racine Megacycle Club will hold its third annual S.E. Wisconsin Hamfest in Racine Apr. 11. For additional information contact Al Lueker, W9KZZ ,2610 No. Main St. Racine, Wisconsin. FMT results: W9DKE 26.6, W9RKP 34.3, W9LFK 79.3 p.p.m. error. W9CBE is back on the air after an illness. W9YT received phone DXCC. WA9EDZ has a new 6-meter rig. K9UTQ has a new antenna up. W9VSO led the OOs in Jan. with 25 notices sent. K9IMR made the BPL in January traffic: Traffic: (Jan.) K9IMR 352, W9DYG 300, W9NRP 61, W9CBE 53, W9AOW 48, WA9BWD 46, W9YT 33, K9DBR 30, W9-MWQ 26, K9GSC 23, W9UEB 14, W9HPC 12, WA9EDZ 11, W9NLJ 11, K9DKU 10, W9OTI, 7, W9WJH 7, WA9AQT 4, K9DTK 4. (Dec.) K9UUT 17, K9DTK 7. (Nov.) K9DTK 13, W9CBE 11, K9UUT 5.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel. WØ-HVA—SEC: WØCAQ. PAM: KØTYY. WØVCQ passed the 2nd-class radiotelephone exam and the General Class amateur exam. He wants to make skeds with anyone interested in working Wahpeton, No. Dak., on 2 meters. A new call in Bismarck is K4HGG. He is working mobile until he gets an antenna up. KØMHB is erecting a 20-meter beam. The North Dakota RACES Net reports for January: 23 sessions with a total of 473 check-ins, 10 pieces of formal traffic and 27 informal handled. Traffic: KØITP 124, WØIDM 14.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN—SEC: WØSCT. KØZTV renewed his OPS appointment. New officers of the Mitchell ARC are KØFQH, pres.; KØUGM, vice-pres.; WAØAOY, secy.; W2YQM/Ø, treas.; WØGWW, act. mgr. KØALU returned from duties aboard the hospital ship *Hope* in Ecuador. KØWEN has returned to Sioux Falls after two months in California. WØCUC demonstrated preparation of printed circuit boards at the SFARC. Traffic: (Jan.) WØZWL 476, KØGSY 232, WØSCT 193, WAØDEM 101, KØVYY 47, WØDVB 30, KØYGZ 26, WAØAOY 19, WAØARZ 19, WAØCIJ 19, WAØCWX 19, WØDIY 13, WAØFUZ 12, KØCXL 10, KØZBJ 10, WØRWM 6, KØBSW 4, KØHQD 4, KØYJF 4, KØZTV 4, WAØ-BMG 3, KØAKT 1. (Dec.) WAØFUV/Ø 7.

MINNESOTA—SCM, Mrs. Helen Mejdrich, WØOPX —Asst. SCM: Emerson Mejdrich, WØRIQ. SEC: KØ-KKQ. RMs: KØZRD,KØIJU. PAMs: WØYHR, KØVPJ. MSSB: WØHEN. A warm welcome is extended to the Univ. of Minn. Gopher ARC and Hutchinson ARC, newly affiliated with the ARRL. Appointments issued are WAØBZG as EC and WØWAS as OO. Endorsements: WØHEN as OO, WØALW as OPS. Officers of the Rochester Area Piconet are WØYZQ, net mgr.; WØAZR, asst. net mgr.; KØZIW, secy.-treas. Considerable enthusiasm is being shown in the Rochester ARC sponsored radio theory class being conducted by WØIGI; 71 people have registered, 35 have licenses of some sort. Congrats to WØHEN, WØTIV and WØWMA, who placed on the OO Honor Roll. OO/OPS/PAM WØHEN qualified for Class I in the recent FMT. EC KØZKK has appointed KØVJS as Asst. EC. The Park Rapids ARC has completed a power supply as one of the projects in its equipment-building program. ORS/OBS WØKJZ has received the 7-HK7 C.W. award. EC WAØBZG reports good attendance in the Itasca Co. AREC weekly net. EC KØGKI reports activity and interest in 160 meters in the Fairbault area. ORS ex-RM KØAKM, home on a 30-day leave from the USN, visited WØKJZ and other old friends in the Rochester area. ORS KØGCJ is attending IBM school in Lincoln, Neb. OPS WØALW has a 20-A and a linear on 75 meters. WØDVG and WØAJJ have Jan. *QST* antenna tuners working well for them. WNØHVW is active from Red Lake Falls using a DX-35 and an HC-30. KØJOA is building a 6-meter sideband rig and has a sixteen-element beam. WAØGLI and WAØGLL are working h.f. DX. KØPAU has 30 states confirmed on 160. WAØBNX, KØPPD and KØMG are new St. Paul RC members. KØGJZ and his XYL have moved to Hong Kong, where he will be with the immigration service. ORS/OPS WAØARA complains of band conditions on NTS and evening nets. WAØFFK is active with a Ranger HQ-129X and long wire. WØMXC has a new three-element 15-meter beam and rotor. MSN NCS WØFCJ is building the Simple X Super Receiver from the '62 ARRL *Handbook*. Silent Keys: WØEYH and WØFRE. Traffic: (Jan.) WAØARA 459, WØHEN 98, KØZKK 78, WØGRW 63, WØOPX 61, WØATO 47, KØBAD 46, KØMIA 44, WAØDGW 42, WAØFIK 42, WØKYG 35, KØSRK 35, WØUMX 35, KØJFV 34, WØKNR 34, KØVPJ 30, KØZRD 28, WAØDVH 24, WØKJZ 23, WØYHR 23, WØRIQ 21, KØFWC 19, WAØ-EDN 17, KØFLT 17, WØALW 16, KØFTB 16, WAØ-ASV 15, KØJYJ 15, WAØBZG 14, KØIJU 14, WAØDSH 13, KØZIW 13, WAØEPX 11, WØEQO 11, WAØFNS 11, WAØDXV 10, KØSXQ 10, KØAKM 8, WAØBKA 8, WØMXC 8, WØIRF 7, KØLWK 7, WØLIG 6, KØJOA 5, KØEPT 4, WØRBA 4, KØIKU 3, WØPET 3, KØ-UBA 2, WAØFCJ 1. (Dec.) WAØDSH 83, KØRCF 15, WAØFCJ 14.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5. PAM: K5SGG. RM: K5TYW. New appointments: K5AKS, EC Boone County; WA5BBS as ORS. A new bulletin for the amateur radio operators went to print for the first time in January. This bulletin contains *helpful* net information and ideas on emergency communications and is called the *Amateur Radio Public Service Corps Bulletin for Ark.* K5ALU reports some fine DX on 75 meters such as ZLI, G2, LA8, F2, etc. Our Section Emergency Coordinator has written a fine state communications plan for emergencies and it should be distributed by the time this hits print. Bad skip still continues to plague both section nets, but *most of us keep trying to clear all the traffic.* All ECs should remember to forward the monthly reports to the SEC, W9PHR/5. On accepting appointment, each EC agrees to do this. The reports must reach the SEC by the third of each month. If you would like a copy of the ARPSC monthly bulletin, send name and address to your SCM (address page 6). Traffic: W9PHR/5 413, W5DTR 227, K5MVH 48, WA5BBS 25, K5TCK 18, W5YM 8, K5AKS 2, KØTPM/5 2.

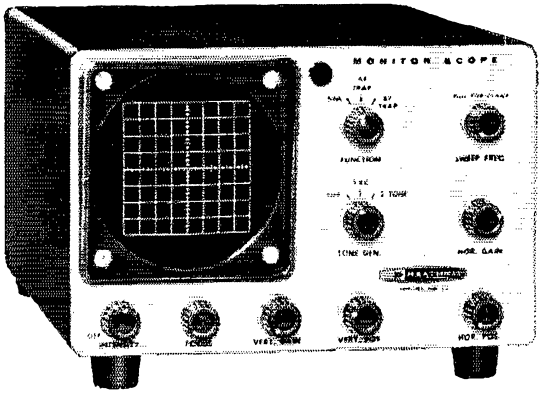
LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—The Louisiana C.W. Section Net, LAN, is in full swing ramrodded by W5CEW, our RM. WA5FNB is net manager of LAN; W5MYZ is one of the net controls. If interested in c.w. and traffic handling, contact these stations on 3615 kc. daily at 2330 GMT. The Catahoula Amateur Radio Club is making plans for another hamfest to be held the latter part of August. W5IQH, ORS and a member of LAN, is active in traffic-handling. W5WGC is back from 9K2-Land and on the air in Houma. W5SDL is back on after 4 years of inactivity. K5JKR has figured a way to beat TVI. He plans to find a new QTH. W5ADE and K5QWR are looking forward to summer mobile activity. K5BCN has 470-Mc. gear but no one to talk to. The students amateur traffic net meets Mon. through Fri. at 1600S on 3868 kc. and is looking for Louisiana members. W5MXQ is enjoying hamming while recovering from a very serious operation. Al is our SEC and is looking forward to receiving reports from all Louisiana ECs. W5JET had his ORS appointment renewed. W5UQR renewed his OES appointment. George got on with an 829 homebrew 2-meter and an eleven-element yagi. The Loyola University Amateur Radio Club is now affiliated with ARRL. The Space Team Amateur Radio Society meets at a dinner type affair each month with around 20 in attendance. New officers of the Jefferson Amateur Radio Club are WA5BAN, pres.; WA5AJE, vice-pres.; K5HEK, treas.; WA5BLG, secy.: W5EKL, W5FMO and W5-MYZ, board members. Traffic: (Jan.) W5CEZ 886, WA5-FNB 180, W5IQH 57, W5TAV 32, W5EA 16, K5FYI 5, K5KQG 5, K5WOD 5, K5IGW 1. (Dec.) W5CEZ 767, WA5FNB 103, K5KGG 3.

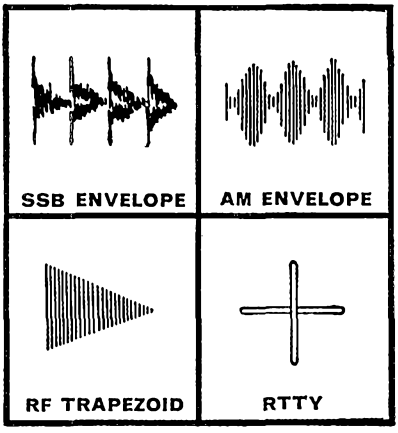
MISSISSIPPI—SCM, S. H. Hairston, W5EMM—WA-5CAC has a new HT-32. W5MUG has been working DX and bagged six new countries in one week. W5JDF, W5WZ and others are keeping up the good work on the Miss. C.W. Net. W5JDF is forming a Novice c.w. net. If interested, contact Jack Beene, W5JDF, Aberdeen. K5YEN joined the Silent Keys. W5LDD is leaving Biloxi and Keesler. W5SPX has gone mobile with his SR-150. K5PIK has been transferred to France. W9-MFI/5 retired from the Air Force recently and plans to make his permanent home in Biloxi. The Biloxi ARC is working on plans for its Annual Hamfest July 4. Committee members are W5SPX, K5UBU, W2FSF/5, W5-RZP, Miss. S.S.B. Traffic Net standbys continue to be WA5EHZ, K5LWS, K5YQZ, K5TJG and W5WZ. W5-CUU has a 4-1000—for his teletype but will continue using his 813s on sideband. K5PYS is anxious to get out of the hospital to get his sideband rig going. Traffic: W5JDF 277, WA5CAC 173, W5MUG 91, W5WZ 59.

TENNESSEE—SCM, David C. Goggio, W4OGG—SEC: K4JIG. RMs: W4MXF and W4ZJY. PAMs: K4-

(*Continued on page 104*)

WATCH IT...WITH THE





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Kit HO-10 . . . 11 lbs. $59.95

SPECIFICATIONS—Vertical response: ±3 db from 10 cps to 500 kc. **Sensitivity:** 500 mv per inch deflection. **Input resistance:** 50 k ohm. **Horizontal response:** ±3 db from 3 cps to 30 kc. **Sensitivity:** 800 mv per inch deflection. **Input resistance:** 1 megohm. **Sweep generator: Recurrent type:** 15 to 200 cps (variable). **Tone oscillators:** Approximately 1000 cps and 1700 cps. **Output voltage:** 15 mv (nominal). **GENERAL: Frequency coverage:** 160 through 6 meters (50-75 ohm coaxial input). **Power limits:** 5 watts to 1 kilowatt output. **Front panel controls:** Function Selector, Sweep Frequency, Tone Generator, Horizontal Gain, Horizontal Position, Vertical Position, Vertical Gain, Focus, Intensity/Off. **Rear control:** Xmtr. Atten. Attenuates 0 to 24 db at approximately 6 db per step. **Power supply:** Transformer operated, fused ½ amp. **Power requirements:** 105-125 VAC, 50/60 cps, 35 watts. **Dimensions:** 5¼" H x 7⅜" W x 10½" D.

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Station Activities

(*Continued from page 102*)

WWQ, WA4AIS and W4RMJ. New appointments: K4-UMW as OPS; K4CLE as OES; K4EWI and K4VZI as OBS. New officers of the Nashville ARC are WA4-KOC, pres.; WN4OPH, vice-pres.; WA4OJS, secy.-treas. The Delta RC will hold its hamfest Aug. 30. The MARA celebrates its 25th birthday. Director Spencer will speak before a combined meeting of three Memphis clubs in May. East Tennessee Net certificates were awarded W4JVM, W4PQP, WA4s BUP, GLS, HRG and LAX. WA4DCO, NCS for the Eye Bank Net, reports 23 states represented and 16 requests filled. WA4EPY is convalescing from a heart attack. Net reports for Jan.:

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Average*
TN	3635	1900C	M-Sat.	27	100	181	6
ETPN	3980	0640E	M. Fri.	19	38	295	16
TPN	3980	0645C	Daily	31	210	838	27
TSSN	3980	1830C	M-Sat.	27	156	807	29

The RATS of Nashville will sponsor a Tennessee QSO Party May 10. Look for frequencies and times in or near the Tennessee report. Your SCM urges everyone who received copy of the State AREC emergency plan to register in the AREC. Write or radiogram me for an application blank. We especially thank all those who arranged and attended meetings held during 1963 at Jackson, Tullahoma, Shelbyville, Nashville, Chattanooga, Crossville, Cleveland, Kingsport, Knoxville, Martin and Clarksville. Traffic: W4PQP 439, K4ULT 274, W4ZJY 244, W4MXF 195, W4OGG 189, W4FX 141, WA4AWG 125, WA4IHG 112, W4KAT 89, K4JXG 82, W4RMJ 79, WA4HRG 78, WA4GQM 76, K4WWQ 65, W4CVG 41, K4PZT 39. W4HPN 38, WA4IUM 37, K4-OUK 36, W4TZJ 34, W4WBK 29, W4UPV 28, W4VNU 21, K4CII 17, K4LTA 16, W4VTS 16, WA4AIS 14, K4CPC 13, WA4BXH 12, K4UMW 12, WA4GLS 10, K4NRZ 8, K4RIN 8, W4UIO 7. WA4KCN 6, WA4PSU 6. WA4-PSV 6, WA4LAX 5, WA4QEZ 5, WA4EWW 4, WN4NIV 3, K4EPS 2, K4FDR 2, K4GBN 2, WA4IRX 2, K4LPW 2, WA4PSE 2, K4PSH 2, WA4PTD 2.

GREAT LAKES DIVISION

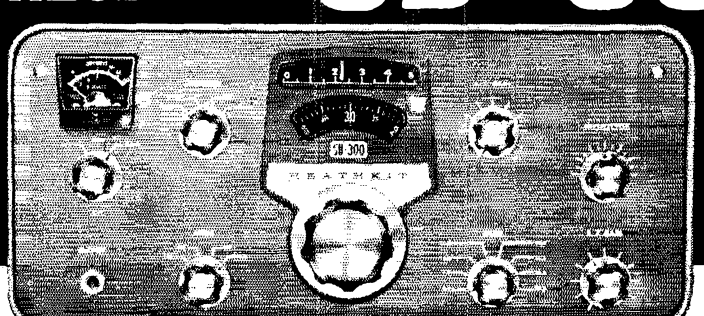
KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4-QIO—PAMs: W4SZB, W4BEJ, W4USE. V.H.F. PAM: K4KJQ. RM: WA4LCH. RM KNN: WA4APU. The EMKPN held 23 sessions in Jan. with 277 QNI and 35 QTC. The MKPN held 31 sessions with 454 QNI and 82 QTC. The KYN held 38 sessions with 390 QNI and 144 QTC. The Central Ky. Emergency 6-Meter Phone Net held 9 sessions with 97 QNI and 16 QTC. The Louisville & Jefferson County Emergency Net 11 on 6-meter a.m. held 12 sessions with 155 QNI and 42 QTC. Our thanks to WA4LCH and K4ZIQ for liaison with 9RN. Ky. was represented over 77 per cent in January. The KYN now holds informal sessions on 3600 kc. at 0900 EST Mon. through Fri. WA4ELK has a new NCX-3. K4SWL is home from a hospital stay and doing well. Encircle Sept. 27 for the hamfest the Henderson Club is planning. We've lost K4AML and W4HKT to Dallas, Tex. W4TFF, a police judge in Ashland, received nice publicity with his picture in the Ashland paper. W4CDA is busy putting up antennas at his new QTH. WA4AGH is Louisville's liaison with the Eye Bank Net. K4PNG is using an HW-32 on 20 meters with a Marauder. W4ZR is mobile with an HW-12. WA4LMD received his WAS while still a Novice. His XYL, WN4PWY, just got her ticket. Our sympathy to W4ODK and K4AIS on the loss of members of their families. W4BEJ and his XYL, K4CGW, will be moving to Elizabethtown soon. W4-UWR had an NCX-3 and a new final. W4KJP, W4JHU, and WA4AGH all have HW-12s. Plans are being formulated for an official weather net on 3600 kc. at 0700. The Louisville Gas and Electric Radio Club has become ARRL affiliated. Traffic: (Jan.) WA4ILCH 244, W4BAZ 155, K4ZIQ 52, K4HSB 51, WA4AGH 50, K4QIO 48, K4NVO 45, WA4BSC 44, WA4ELK 39, W4QCD 36, K4HOF 24, W4KJP 24, W4BEJ 21, W4SZB 18, W4BEW 10, K4SWL 10, K4LOA 8, WA4ENH 7, W4RNF 5, W4JRA 4, WA4NBX 3. (Dec.) WA4NBX 10, W4ZJR 2.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX. RMs: W8EGI, K8QLL, W8FWQ, K8K-MQ. PAMs: W8CQU, K8LQA. V.H.F. PAM: W8PT. While at an Oakland County RC meeting on Jan. 8, our hard-working SEC, W8LOX had a cerebral hemorrhage and the club took him to the Pontiac General Hospital. At this writing he is slowly recovering. Appointments: W8GTL, W8QQO, W8WXO, W8ZJE, VE3CYG/W8 as ORSs; W8CQU, W8EJR, K8EPZ, K8LNV as OPSs; W8CKK, K8PET as ECs; W8TBZ as OO; WA8HGE, W8PET as ECs; W8TBZ as OO; WA8HGE, K8IVG as K8IVG as OBSs; WA8IWX as OES. New officers of the Detroit ARA are W8GTL, pres.; W8MGQ, vice-pres.; W8MOB, secy.; W8LEU, treas.; K8AMH, W8JKD, board members. K8IWI, W8OAT and W8RUY are board members of the Kent RC. W8DVB is working with the Lions Club "Eye Ball Net" on 3970 kc. daily at 1300, procuring cornea transplants for the blind. W8SWI had a successful complicated eye operation, but both eyes are now OK. W8UA, Wayne State U, has reassembled its old 8UA spark station for permanent exhibit with a Grebe CR3. The 5th Annual OT Nite, sponsored by the MCRC at Henry Ford Museum, to be held May 30 will honor all OTs in this area who have had a license for 50 years. The Great Lakes Division Convention will be held Apr. 3, 4 and 5 at the Statler Hotel, Detroit. Let's go. W8EMD (OO) reports 50-Mc. s.s.b. is very bad and a.m. carriers broad and unstable. New officers of the Adrian ARC are WA8EIQ, pres.; W8ZJE, vice-pres.; K8NFO, secy.; W8MQN, treas.; K8KGK, K8-HCL, K8BCT, board members. K8NJW passed the Extra Class exam. We can no longer list all the DX that W8IWF has been working! W8MGQ finally got the 6- and 2-meter beams and Tri-bander up. W8SS now works Canal Zone, Liberia and Thule. W8BEZ now has 4 boys and 5 girls! U.P. hams again provided communication for the '64 March of Dimes Telethon. W8SWF is getting a new tower and beam and all new gear for s.s.b. W8ZHB needs a job with grind organ, dark glasses, pencils and a cup. The Lansing Sunday Net now operates on 29 Mc. at 2400Z. W8FDO has a new HT-37. Traffic: (Jan.) WA8DDI 702, WA8GUV 649, K8GOU 332, WA8DNZ 276, K8KMQ 227, K8HLR 172, W8ELW 163, K8NJW 157, K8LNE 136, W8PBO 113, W8BEZ 106, K8VRF 83, K8QKY 74, WA8DZP 68, K8JED 64, K2SIL/8 54, WA8CPH 52, W8FWQ 43, K8QLL 40, K8WQV 36, VE3CYG/W8 31, W8FX 30, WA8JJH 26, W8VPC 23, K8CIP 22, W8AUD 21, W8HKT 21, W8EU 20, W8RTN 18, W8SWF 18, WA8ASV 16, W8ZLK 16, WA8ENO 15, W8ZHB 12, W8QF 11, K8VDA 10, W8MAI 9, W8EGI 8, W8SS 8, W8AHV 7, K8TFE 6, K8VFR 6, W8RHF 5, W8TBP 5, K8ZZV 5, W8AAM 4, WA8DJC 4, K8GJD 4, W8DSE 2, K8DX 2, W8FDO 2, W8MPD 2, K8ZXB 2. (Dec.) K8NJW 375, W8UA 201, W8GTL 146, K8BYX 76, W8FSZ 16, K8PYW 12, K8VRF 8, K8TFE 7.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE, K8LGB. PAMs: W8VZ, K8BAP, K8UBK. Attention all Ohio amateurs: The Twelfth Annual Ohio QSO Party will be held Apr. 11 and 12 and again we have a chance to get the counties we need to get the Worked All Ohio Counties certificate. Appointments made in January: W8EWD, W8TVW, W8PKU, K8CSX and K8TVW as ECs; WA8CAJ and WA8CJO as OESs; W8BU and W8PKU as OOs; WA8CJO as OBS. K8WSR received his CP-35 sticker. Warren ARA's *Q-Match* states that 1964 officers are K8JLK, pres.; K8OAS, vice-pres.; Imogene Kalman, treas.; K8BXT, secy.; W8TAE, act. mgr.; K8ZNB, trustee; K8VJI moved to Washington, D.C.; W8NQQ has a new HQ-180; W8-CMS has a new NC-303; W8KAK is in Germany; WN8-JCS is a new Novice; WA8GUP received his Tech. Class license and WA8GLF his General; K8BSH received his CP-30 sticker. Tusco RC's *Beam* says the club heard W8PTX speak on the Microwave System as well as discuss community TV systems; K8MXI was home over the Christmas holidays; W8NBK worked DXCC on 80 meters. Dayton ARA's *R-F Carrier* informs us the club elected K8BSC, pres.; K8EJI, vice-pres.; W8DPW, secy.; W8JRN, treas.; K8KNU, director; The Dayton Hamvention will be held Apr. 24 and 25; both W8PHV and K8NBY were in the hospital; W8-GIC and K8AZR joined the Silent Keys. The Seneca RC heard a talk on antennas. The Queen City Emergency Net elected K8DQU, pres.; W8PKD, vice-pres.; K4DEZ, secy.; W8MRX, treas.; K8MFY, comm. mgr. The Babcock & Wilcox RC saw the movie, The Voice of Mercury. A radio club is being formed in Mercer County. Springfield ARA's *Q-5* says that WA8AEY spoke on the basic aspects of sideband; W8VXE has a new Drake 2B; WA8BBG and WN8LGM are new hams in area. Canton ARC's *Feedline* says that K8SND and K8VWW moved to Alliance; K8AGB moved back to Canton from W4-Land; Santa brought WA8FKJ a new TA-33 Jr. and the stork brought W8TTJ a baby boy and K8PRR a baby girl. Massillon ARC's *MARC* informs us that K8EKG and K8HTM made it home for the Christmas holidays and K8EJV left for Lockbourne AFB. Columbus ARA's Carascope tells us its 1964 officers are WA8AXB, pres.; K8HRR, vice-pres.; W8INO, secy.; WA8GWO, treas.; and W8OSL spoke on the topic, Control and Guidance. Parma RC's *P.R.C. Bulletin* says W8PMA/VE8MC spoke and showed color slides on life and ham radio in the Land of the Midnight Sun; K8-

(*Continued on page 112*)

DELUXE HEATHKIT® SSB RECEIVER SB-300



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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:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **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. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal, ±.005%. **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 Heterodyne 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 6⅝" H x 13⅜" D.

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Strays

(Left) Air Force Major General John Bestic, K4BMR, was guest speaker at the ARRL Dakota Division Convention in Sioux Falls, South Dakota, in September (Photo by KØCER). (Right) Ira Bechtold, W6NCP/WA6KOW, was recently presented the Department of Defense Award for Distinguished Public Service at ceremonies at the Los Angeles Press Club. Bechtold is well known for his amateur and MARS activities and is a graduate of the California Institute of Technology.

Hams of the Sarasota (Fla.) ARC and the Riverview High School Radio Club recently arranged an exchange of greetings between students in "sister cities" of Sarasota and Santo Domingo, D.R. Sarasota youngsters who visited Santo Domingo last year extended an invitation to Dominican students to visit this country next Easter. Taking part in a well-planned and effectively publicized operation were HI8XHS, W4YI, W4ZBU, WA4EFW and WA4SEF. K4BNY helped keep the frequency clear (of vast help because conditions were spotty). Our photo shows W42BU at the controls and WA4EFW (seated right) logging, while students prepare to transmit. At far left is Robert McGregor, executive secretary of the sister city program. Holding the mike is student John Iwaniec, president of the "junior" program. (Photo courtesy of the Sarasota *Herald Tribune*).

Thirty tenth grade students from Valley Stream, Long Island, New York, got first-hand answers to their current events questions when Senator Barry Goldwater spoke to their class via amateur radio last November 8. K3UIG, at his home in Washington, D.C., carried on a spirited and often amusing QSO with WB2KFG at Valley Stream North High School. CBS television and the wire services gave excellent national coverage to the 45-minute discussion.

»

«

Teacher-adviser WA2IFA made the arrangements for the contact. The Hallicrafters Company provided equipment for the school station. Many amateurs copied on 7.2895 Mc. s.s.b. In our photos, the television camera grinds and a student speaks as Barry prepares to reply.

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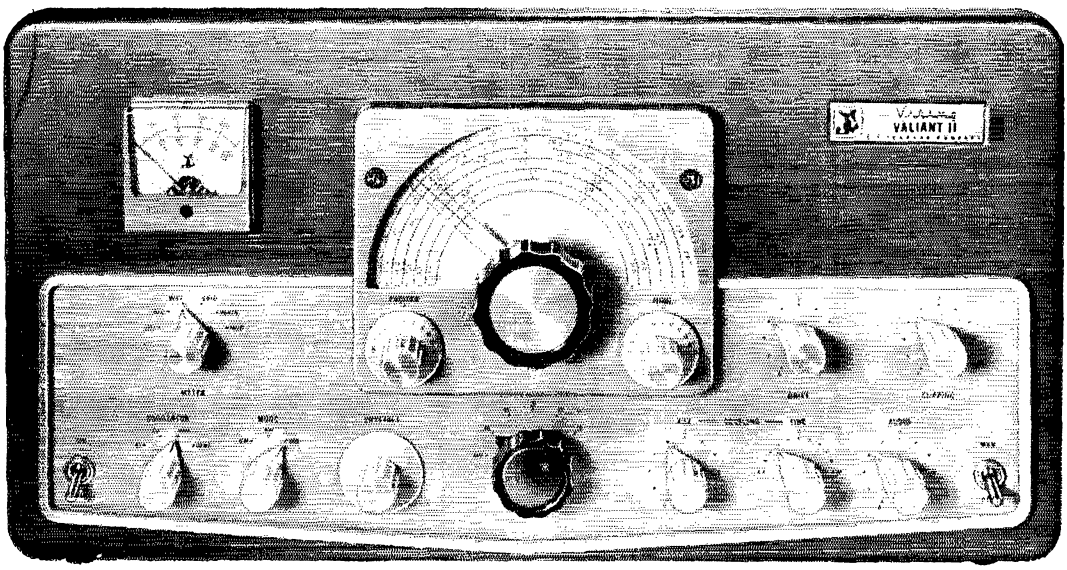

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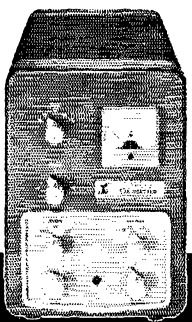

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If you, like many of today's amateurs, find yourself with your interest fairly equally divided between working AM/CW and SSB, there's a real feeling of frustration with most available equipment. Why? Because most AM rigs require extensive modification to operate SSB—and few SSB rigs offer high level AM and Class "C" CW—and the end result is compromise in one mode or the other!
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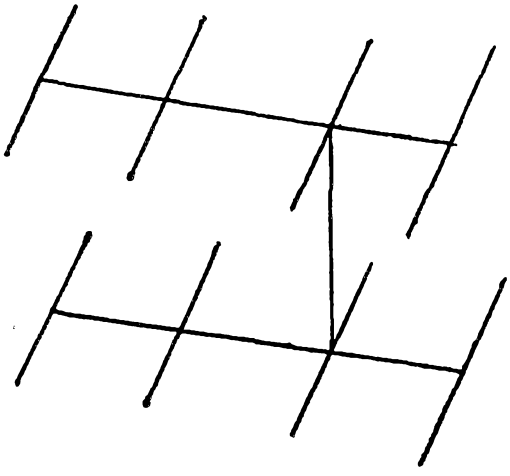

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15-20 Two-Bander	**49.95**
10-15-20 Tribander	**59.95**

NOTE: Specify frequency; otherwise band center

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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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SURVIVES THE COMPETITIVE STRUGGLE CONTINUES TO BE ADVERTISED.

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- Accepted design—in use for many years.
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- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
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- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

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2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.

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☐ 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

☐ V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO..... $18.95

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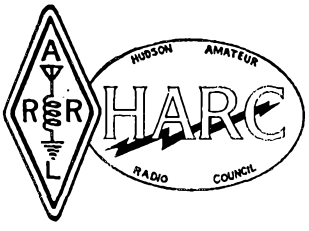

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FOR THE BIGGEST, BEST HAM CONVENTION EVER

CONVENTION

AUGUST 22

AUGUST 23

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WOUFF HONG initiation after Saturday Banquet — plus SWOOP for the XYL's.

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Main Address by The Honorable Barry Goldwater, K7UGA/K3UIG

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BVM left for a tour of duty in the Army; K8NPH is finishing his basic training in the Army; the Cleveland Veteran's Administration ARC at Crile Hospital was organized with K8ZFR, pres.; and K8ZBL, secy. South East ARC's *Ham Fax* mentioned that W8FKI spoke to the club concerning Mobile Noise Elimination. Toledo's *Ham Shack Gossip* tells us that WA8DDV and WA8FRJ received their Gen. Class licenses; WAØEOK is now WA8IFG; WN8IFN is a new Novice; K7OPI is now W8FPI, the Toledo Mobile Club's 1964 officers are W8MBE, pres.; W8WIT, vice-pres.; K8ZMI, secy.-treas.; Wood County ARC's 1964 officers are K8HWU, pres.; K8UGC, vice-pres.; K8WDS, secy.-treas. The V.H.F. Highbanders' *The Highbanders Log* states that 1964 officers are K8ZES, pres.; K8QBY, vice-pres.; WA8AGP, secy.; WA8DON, treas. W8DAE and W8UPH made the BPL in January. Traffic: (Jan.) W8UPH 921, W8DAE 415, K8DIU 211, W8BZX 163, WA8AJD 146, WA8CXY 142, K8LGA 140, W8MGA 136, K8SQK 122, K8UBK 117, W8QCU 84, WA8BXN 83, K8BAB 67, W8GRG 42, K8YDR 41, K8LGB 34, K8PBE 33, K8BNL 32, K8BAP 31, WA8AJZ 30, W8LZE 28, K8LUP 27, K8ONQ 23, W8DIH 19, K8VWN 17, W8ZYU 17, W8ETO 12, W8ILC 10, WA8EEW 9, W8ERD 9, WA8CXC 7, K8-DDG 6, W8GQD 6, K8RFU 6, W8IEP 4, W8OOU 4, K8-DDB 2, K8PJH 2. (Dec.) W8OOU 4.

TWELFTH OHIO QSO PARTY

April 11-12, 1964

All Ohio amateurs are invited to take part in a QSO party, sponsored by the Ohio Council of Amateur Radio Clubs.

Rules: 1) The party will begin at 2300 GMT Saturday April 11 and end at 2300 GMT April 12. 2) All types of emission and all bands may be used, but a station may be worked only once regardless of mode. A maximum of ten stations may be worked in a single county. 3) The general call will be "CQ Ohio." 4) *Scoring:* Multiply the number of Ohio stations worked by the number of Ohio counties contacted. Logs should include calls of stations worked, time, date and the county in which the station is located. 5) Suggested frequencies are: 3550, 3740, 3860, 7100 and 7250 kc. On the other bands, take your choice. 6) A cup and four appropriate certificates will be awarded to the highest scoring stations. 7) All contest logs must be postmarked not later than May 6, 1964, and should be sent to the contest manager, Mr. Marvel Tyson, W8HUX, 3325 Brock Drive, Toledo 13, Ohio.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and K2QJL. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 0000 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; Emergency Coordinators on 146.550 kc. Fri. at 0015 GMT. Appointment: WB2FOA as OES. Endorsement: W2FQL as EC. K2US, at the World's Fair, starts operations Apr. 22 with kilowatts on all bands 2 through 80 on c.w., a.m. and s.s.b. If you would like to operate, contact K2SJN in New Rochelle for details. "Project Telstar," by the N.Y. Telephone, was the topic presented to the Schenectady Club. DXer W2FBS has moved to San Diego, Calif. "Meters and Their Applications" was discussed at the Albany Club. The club's new officers for 1964 include K2BUF, pres.; WA2BLC, vice-pres.; WB2RZE, secy.; WA2RYF, treas.; K2EJV, director. "Semiconductor Power Supplies" with a vote on the incentive licensing proposal was the program at the Westchester ARA in White Plains. Westchester has 35 members constructing 2-meter transceivers. K2DEM reports 96 toward DXCC. WA2VLK is conducting a traffic clinic each Sun. on 3670 kc. at 2100 GMT. W2CTH, WA2VGV, WA2ZCY, W2PNQ, WA2OXM and WB2DDP are on 50-Mc. s.s.b. A new fifteen-element 2-meter beam is reported by WB2FXB. Schenectady mobiles are working into N.Y.C., Utica and Burlington, Vt. on 146.94 Mc. via repeater station using wide-band f.m. Our congratulations to WA2UZK on making her fourth BPL. Traffic: WA2UZK 1005, WA2VYS 431, W2THE 416, WB2FZC 204, K2TXP 86, WB2FXB 69, WA2JWL 49, K2SJN 47, W2-EFU 41, WA2HGB 38, WA2HYB 36, K2QJL 35, K2DEM 31, WA2PUM 31, WB2FVD 23, W2URP 19, W2PKY 16, WA2DRP 5, K2HNW 3.

(Continued on page 114)

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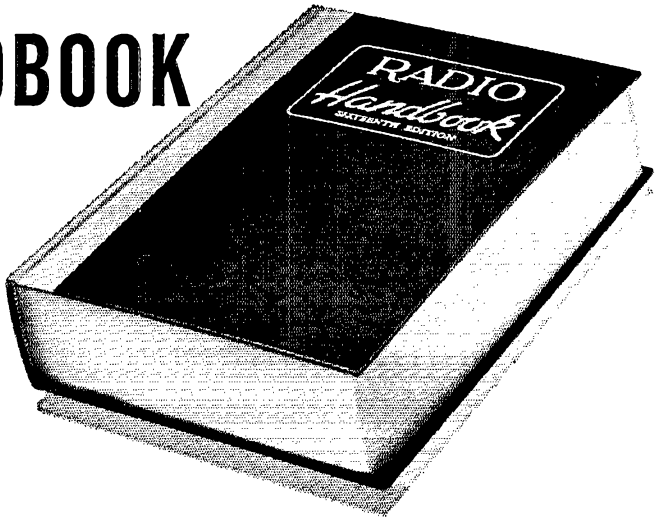

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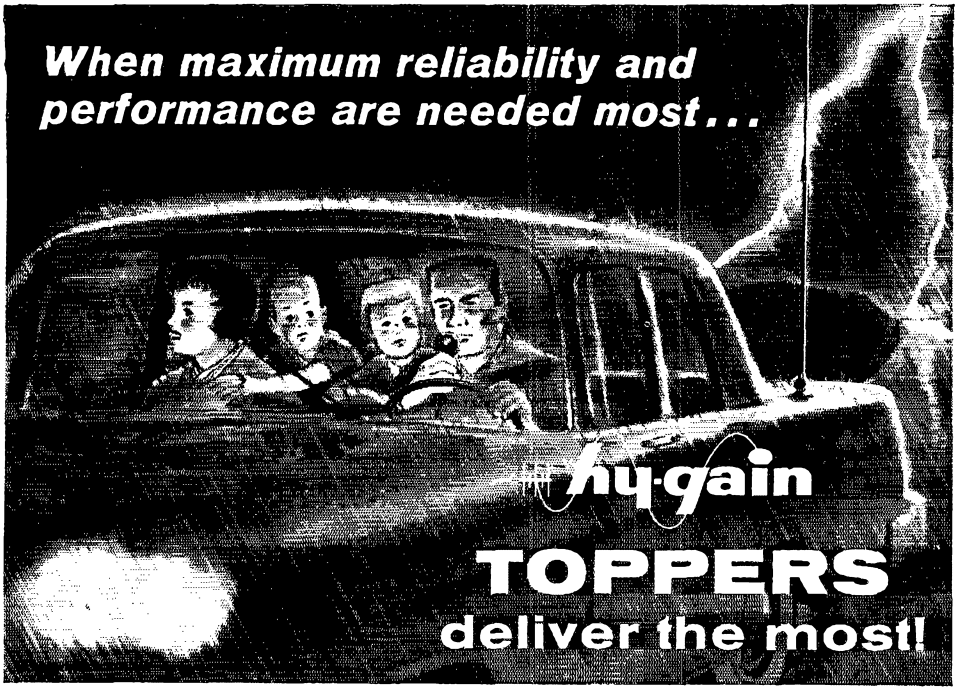
NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN. RM: W2WFL. V.H.F. PAM: W2EW. Section nets: NLI, 3630 kc. at 0015Z nightly; V.H.F. Net, 145.8 Mc. Tue.-Wed.-Thurs. at 0100Z and 146.25 Mc. Fri. through Mon. at 0000Z; the NYCLIPN, which is re-forming at 3932 kc. Mon. through Sat. at 2100Z. All interested in joining this phone net should contact WA2QJU, K2YMU or the SCM. The section thanks K2OVN for the fine job as Acting SCM. BPL certificates went to WA2GPT, W2EW, WA2EXP, W2MTA, WB2CSS, WB2HWB and WA2TQT. Net certificates went to these *exemplars* of NLI's '63 session: W2DBQ, K2DKK, WA2EXP, W2GKZ, W2GP, WA2HCD, WA2IUQ, K2KYS, W2MTA, WA2NCE, WA2QJU, WA2RUE, WA2UYQ, K2UFT, WA2UWA and WA2YLL. Also a Net certificate went to the *exemplar* of the Queen's 10-Meter AREC Net: WA2WZQ. Chairman of the 2nd District YLRL is our own WA2GPT, who is looking for YL news. W2EW says, "The way to learn to handle radio messages is to join the 2-Meter Traffic Net." So, WB2ECR and WB2HRO did. Why don't you? K2LCK is active on 2-meter RTTY. WA2VLK received a TCC certificate. WB2CSS reports NYC QPP Chapter No. 1 is active again. New appointments: W2YBU and W2EIK as OBSs; K2PWG as OES; W2SIL and W2DID as OOs; WA2OOL as OPS; WB2HWB as ORS. CHC No. 50 was obtained by WA2PMV. K2CMJ is Alt. NCS of the V.H.F. Traffic Net. K2DNY is another, by gosh! WAS was received by WA2QJU, who is using VOX now. The Nassau 6-Meter AREC Net holds training every Mon. at 0130Z at 50.25 Mc. Great for you 6-meter boys and girls! WA2OOL is looking to play chess on 2 meters. School work is buggin' WA2YLL, but he's lickin' it! WB2FXN was appointed Asst. EC for the Kings 6-Meter AREC Net. W2LGK is having fun with Heath handy-talkie on 29.5 Mc. daily at 1215Z and 2115Z from Great Neck. K2MEM has a new Apache on 75. WA2EFN, WA2GKX and WA2GLU visited ARRL Hq. WA2RAQ is using a new Jones Micromatch. K2SJP is planning to put a three-element beam on six; 250 feet straight up. K2AHS has a model 26 printer and audio TU for RTTY. WA2IEC is using an inverted "V" with 55-ft. apex on 80. W2TUK hosted HB9GA and SM5ZD on a brief stop-over in N.Y.C. and showed 'em the town! WA2VNK notes that s.s.b. is increasing on 6 meters. WA2IFQ has a new HW-32 for 20-meter s.s.b. WA2SCF, Hicksville HSARC, is on the air with a DX-100, an NC-190 and a 10-15-meter beam. New officers of the Mid-County Net: WB2ALM, pres.; WA2JFA, secy.; W2CZZ, treas. WA2KSP has a Communicator IV in the car and his son, WA2SAR, is a MUX Supervisor on the DEW Line. New officers of the Suffolk County R.C. K2JQO, pres.; W2OQI, vice-pres.; W2FGD, rec. secy.; WA2KKD, corr. secy.; W2DID, treas. This club now has 208 members. W2KDC and W2BTP are sporting new TR-3s. W2OQI, W2INT and K2RJO are gung-ho for WBFM on 146.94 Mc. W2GKZ has an SB-300 receiver. WN2LUU has 5 states with a Twoer. New officers of the Walt Whitman HSRC: WA2PJL, pres.; WB2HLM, vice-pres.; WB2LFL, secy.; WA2YSQ, treas. Officers of the N. Y. Ionosphere Busters are WA2YBL, pres.; WB2COW, vice-pres.; WB2JIP, secy.; WB2BSD, treas.; WA2VKK, pub. Many thanks to all those who extended best wishes for a successful term as SCM. The assistance of one and all will be gratefully received. Traffic: (Jan.) WA2GPT 1329, W2EW 761, WA2EXP 618, W2MTA 537, WA2VLK 295, WB2CSS 148, WB2HWB 134, WA2TQT 118, WA2PMW 103, WA2YNH 82, K2CMJ 78, K2KYS 71, K2DNY 67, WA2VKK 62, WB2ECR 44, WA2QJU 44, WA2ZXR 37, W2ELK 36, WA2UYQ 36, WA2GAB 29, WB2BKS 27, WA2OOL 22, W2EC 19, WA2KQG 15, WA2YLL 15, WA2WAO 14, K2OXQ 12, WB2FXN 10, W2GP 10, W2LGK 10, W2IAG 8, K2MEM 6, W2PF 4, WA2EFN 3, WA2RAQ 2, WA2TPM 2. (Dec.) WA2NCE 826, WA2STM 271, W2DBQ 16, WA2GFP 8.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis Amoroso, W2LQP. SEC: K2ZFI. NNJ ARPSC activities:

NJN	3695kc	2400Z Daily	W2QNL-RM
NJ Phone	3900kc	2300Z Ex. Sun. (1400Z Sun)	K2SLG-PAM
NJ 6&2	51150kc	0400Z TThSn	K2VNL-PAM
NJ 6&2	146700kc	0300Z WSn	K2VNL-PAM
NJNN	3725kc	0020Z W F (Novice)	WA2SRK-RM
16N	1804kc	0030Z Wed. (160 M AUX)	WA2QPX-RM

New appointments: W2IIN as EC; WB2JFQ as OBS-MWSt-1600-1700-1300 EST-14.250-7215-14.225 phone; WB2ICH as OBS-TWTh-1830 EST-7080 c.w. Note that the practice has been to list nets in GMT and OBSs in local time. WA2DEW spent some time in the Virgin Islands as KV4CQ. WB2FXY and W2SUS have new HQ-170s. WB2FYE received his General Class license.

(*Continued on page 116*)



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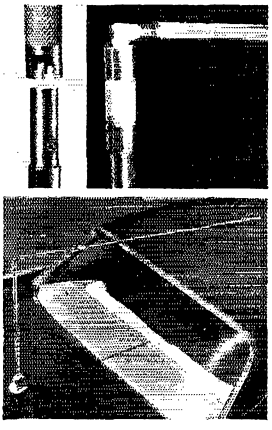

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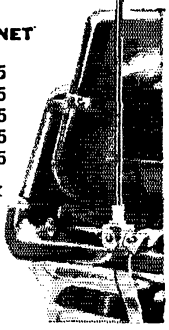
TL-15	15 Meters	1 KW P.E.P.	250 W	Approx. 5'	7.95
TL-20	20 Meters	1 KW P.E.P.	250 W	Approx. 5'	7.95
TL-40	40 Meters	300 W P.E.P.	125 W	Approx. 5'	9.95
TL-75	75 Meters	300 W P.E.P.	125 W	Approx. 6'	11.95

Topper Mast—Model TM-36 For body or bumper mount **$7.95** Ham Net



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The So. Amboy Club meets at the YMCA the 1st and 3rd Wed. WB2GDP wants to correspond with someone interested in ham TV. WA2UDT is active on h.f. as well as v.h.f., picking up new states on 40. WB2ALF has 21 countries on 80. New officers of the Amateur Radio Club of Belleville: WA2JGE, pres.; WA2BNF, vice-pres.; WA2QGZ, treas.; K2UCY, secy. WA2CCF received a Worked All N.H. certificate. WA2ZKT has a new 2-meter mobile mike and halo. K2LNS is building a kw. for 2 meters. WA2ZRP has an 829-B ex-taxicab rig on 2 meters excited by a Ranger! WN2MNX is a new YL ham in Somerset County. WB2CRS is trying to get on ham TV. W2VMX found a recent *QST* article on indoor antennas helpful at his QTH. WA2PBN received the Worked All Del. and the Dixieland awards on 6 meters. WA2ZOW is looking for a station to run tests on 6 meters. The DVRA will sponsor its 17th Old Timers Nite May 2 at the Stacy-Trent in Trenton. Contact W2ZI for details. WB2CVN reports 35 check-ins to the East Coast RTTY Net despite poor conditions. K2UCY reports Novice QRM to his OBS schedules. Please, fellows, *listen before you transmit*. K2AGJ received the WAC/CHC. W2NIY received the WZ4. WB2ALF is listening for signals bounced from Echo II and is trying to sked Nebraska. K2KFE wants to try Echo II bounce on 2-meter f.m. WB2CRS heads an amateur tracking network. WN2LUU used a Twoer for a N.N.J.-Wash., D.C. contact with a KN3 using a Gonset. WN2KDD reports a lot of activity in the V.H.F. SS. K2EQP has been busy with RTTY. Attention SCM staff and all ECs: There will be an ARPSC meeting at the QTH of the SCM Sat., Apr. 4 to discuss the "Pre-SET" ARPSC Exercise. Please mark this date on your calendar. Details will be sent by mail. Traffic: (Jan.) WB2ALF 506, K2VNL 312, WB2FCT 247, K2UCY 244, WA2TEK 155, WB2DEP 139, K2SBS 114, W2CVW 90, WA2SRK 73, WA2UOO 65, K2JTU 48, WA2MYB 42, WA2WAJ 40, WA2KVQ 39, W2QNL 35, WA2GQZ 33, WA2VTD 26, W2LQP 24, WA2CCF 23, WA2QPX 20, W2TFM 20, WA2ZKT 20, WB2HBC 16, K2SLG 12, K2EQP 10, WA2ZRP 9, W2ABL 8, W2EWZ 8, WB2CRS 7, W2PEV 7, W2DRV 6, W2VMX 5, WA2ZFX 5, WA2-PWI 4, WA2ZKO 4, K2MFX 3, WA2GQI 2, W2OXL 2, WA2PBN 2, K2VVL 2, WA2ZOW 1. (Dec.) WA2GQZ 74, WA2GQI 64, W2DRV 13.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTS—Asst. SCM: Ronald M. Schweppe, KØEXN. SEC: KØVBM. PAMs: KØBBL and WØLSF. KØVBM, our new SEC, is working hard at his new job. He has some vacancies to fill in AREC or the ARPSC (new). If interested in this work, please write to him directly at Washta, Iowa. There has been good response to my call for c.w. operators. Now I need a volunteer to manage such a net in this section. Contact me for this appointment. Our 160-meter boys have been contacting a few Gs and at least one DL. If interested in this form of DX, contact Robert Denniston, WØNWX. Nets: Iowa 160, QNI, 1201, QTC 19, sessions 31. Interstate S.S.B., QNI 1159, QTC 479, sessions 31. Iowa 75-Meter Phone, QNI 1189, QTC 206, sessions 27. Hamilton County, QNI 328, QTC 5, sessions 31. It is interesting to note the highs recorded above. Our 75-Meter Phone Net, at 1230, daily has been seriously hampered by thoughtless QRM from 9-land largely. Such behavior does not do either you or amateur radio any good. WØIKT, ex-K9BIV, now is living at Cedar Rapids, Iowa. Traffic: (Jan.) WØLGG 3031, WØBDR 1745, WØNTB 188, WØUSL 46, KØBBL 44, KØBRE 20, WØREM 17, WØSEE 14, KØVBM 14, WØJPJ 12, KØJMA 11, KØTDO 9, KØEVC 8, WØYDV 7, KØAFI 6, KØKAQ 4, WØNGS 4, WØFMZ 3. (Dec.) KØQKD 7.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF. PAMs: KØEFL, WØBOR. RMs: WØQQG, WØPFG. V.H.F. PAMs: KØVHP, WØHAJ. New appointments: WØPKD and WØYZB as Official Observers. January net reports:

Net	Freq.	Time	Days	Sessions	QTC	QNI	Ave.
KPN	3920	1245Z	M-W-F	11	54	226	20.1
KPN	3920	1400Z	Sun.				
QKS	3610	0030Z	T-T-S-Su				
HBN	7280	1800Z	Daily				

Most clubs are now in the process of teaching the new initiates what a little code and theory can do for them in providing entertainment and making new friends. This is the time to start the ball rolling for Field Day activity. This year your SCM will award a beautiful trophy to the Kansas amateur radio club that chalks up the best score. (More details later.) Let's put this section at the top of the winners' list. We urgently need operators for the QKS C.W. Net. If you are interested,

(*Continued on page 118*)

Clegg VENUS - SSB Transceiver For 6 Meters

The Clegg Venus is a high quality, compact, attractively styled SSB receiver and transmitter that puts you on 50 mc single sideband without all the fuss, bother and expense associated with adapting low frequency SSB exciters, crystal controlled converters, relays, linear amplifiers, etc.

Employing all the latest circuit techniques, the Venus, in one small package, provides a combination of advanced operating features and conveniences heretofore unavailable in rigs at any price. Some of the outstanding features of the VENUS include a nuvistorized high sensitivity, low-noise front end; crystal lattice filter in both receive and transmit positions; ± 1.5 kc receiver offset tuning; broad band circuits throughout providing maximum simplicity and ease of tune-up; and a separate front panel control for smooth injection of carrier for excellent quality AM and adjustable CW output.

ELECTRICAL SPECIFICATIONS

TRANSMIT: *Frequency Range:* 49,975 to 50,475 KC, standard (other ranges available on special order). *Power Ratings:* 85 watts PEP input — all modes (AM, SSB, and CW.) *SSB Performance:* (9 MC lattice filter). Unwanted sideband down more than 50 db at 1000 cycles. Carrier suppression greater than 56 db. Distortion products down more than 30 db at full ratings. *Frequency Stability:* Less than 500 cycle warmup drift after first five minutes. Less than 100 cycles/hour drift after warmup.

RECEIVE: *Frequency Range:* Same as TRANSMIT. *Frequency Stability:* Same as TRANSMIT. *Sensitivity:* .25 μV for 6 db S/N on AM. .1 μV for 6 db S/N on SSB. *Selectivity:* 2.7 KC at 6 db, less than 6 KC at 50 db. *Spurious Responses:* Images and IF leak through down more than 60 db. *Overload Characteristics:* Less than 5% cross modulation results from any two signals separated by more than 20 KC if stronger signal is less than 2 μV across 50 ohm input. *AVC Characteristics:* Less than 10 db change in AF output for input change from 1 μV to 400 μV (52 db). Fast attack, panel selectable release times of .15 or 1.2 seconds. *AF Power Output to Speaker:* More than 2 watts at 3.2 ohms. *Physical:* 15" wide x 7" high x 10½" deep. Weight approximately 22 lbs.

Interested in HF? See the Squires-Sanders SS-1R at your nearest distributor.

VENUS 6 TRANSCEIVER — Amateur Net Price..... $495.00

115 V. A.C. 60 CPS Power Supply — Amateur Net Price..... $110.00

See your Distributor or write for information.

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please contact your SCM. Your call isn't listed? Perhaps you forgot to send in your monthly report to your SCM. Why not send in yours this month and continue to *make it a regular habit*? Traffic: WØBYV 223, WOORB 106, KØYTA 97, KØBXF 60, KØGH 46, KØYBR 40, WAØEDD 35, WØALA 23, WØERQ 20, KØVWT 18, WØBMW 10, KØEFL 10, WØIFR 9, KØVQC 7, KØZHO 5, WØWFD 4.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. RMs: KØONK, WØOUD. PAMs: WØBUL, WØBVL, WØOMM, KØONK. KØVPH and KØONK renewed as ORSs. KØBWE resigned as OBS. New officers of the Southwest ARC (Springfield) are KØBWE, pres.; KØCZD, vice-pres.; KØKWZ, secy.; KØZQD, treas. The monthly *OARS Newsletter* from the Greene County ARS makes interesting reading. A 6-meter link between Kansas City and St. Louis made connection on the second try. Among those participating were KØTCB, WØHTO, KØVTS, KØRZH, WØBCE and KØVWQ. WØRTO, WAØFLL and WØTPK lost antennas in the bad weather but all are back on the air. KØFPC operates 90.9 Mc. as new chief engineer of KCMW-FM, in Warrensburg. WAØDJG worked ZB1 on 7 Mc. WØGCL operated 7 Mc. in the CD Contest. WØKIK got his $4 back from the FCC when he applied for renewal. An extra sessions of MON meets at 1900Z to combat long skip. New regulars on MON are WØFHV, KØZBO, KØLQH, WØWYJ and WØZLN (operated by KØUVL). Don't forget the Mo. QSO Party Apr. 25-27. The Mc. Net picnic will be held at Jefferson City June 7.

Net.	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MON	3580	0100Z	Tu-Sun.	42	317	233	WØOUD
MSN	3715	2200Z	M-F				KØONK
		1300Z	Sat.				
SMN	3580	2200Z	Sun.	4	25	18	WØOUD
MEN	3885	2345Z	M-W-F	14	280	64	WØBUL
MoSSB	3963	2100Z	M-Sat.				WØOMM
PON	3810	2100Z	M-F	22	184	233	KØBWE

Traffic: (Jan.) KØONK 1270, WØWYJ 624, KØTGU 179, WØOUD 102, WØTPK 60, KØFPC 59, KØBWE 54, WØHVJ 53, KØLQH 45, KØMMR 39, WAØCWV 25, WØBUL 21, WAØDGT 14, WØKIK 13, KØTCB 11, WØBVL 10, KØVIQ 8, WØAIM 6, KØWOP 6, WØGQR 5, WØRTO 2. (Dec.) WØBUL 23, WØBVL 20.

MISSOURI QSO PARTY

April 25-27, 1964

The Northwest St. Louis Amateur Radio Club, KØAXU, invites all amateurs to participate in the First Missouri QSO Party.

Rules: (1) The contest period starts at 2300 GMT Saturday April 25 and ends at 0200 GMT Monday, April 27. (2) No time limit or power restrictions. (3) Missouri stations count 1 point per contact and multiply total by the number of states, provinces and countries worked. All others count 2 points per Missouri contact and multiply by the number of different Missouri counties. (4) The same station may be worked on more than one band (phone or c.w.) for additional credit. (5) Suggest frequencies 3550 3850 7050 7250 14050 14250 21050 21350 28050 28650. V.h.f.ers are welcomed. (5) The general call will be CQ Mo c.w. and calling Missouri on phone. (6) Information required to exchange: QSO number, signal report, Missouri county (or state province or country outside Missouri). (7) Certificates will be awarded to the 5 high Missouri stations and, additionally, to the highest scoring individual in each state province and country (5 QSO minimum). Awards will also go to the 5 highest clubs in the world. (8) Logs and scores must be postmarked no later than May 30 and sent to: Rich Zysk KØGSV, 2528a West Sullivan Ave., St. Louis, Missouri 63107.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØTSU. Net reports for Jan.: Nebraska Morning Phone Net, WAØBRH reporting, QNI 265, QTC 51. Western Nebraska Net, WØNIK NCS, QNI 637, QTC 77, 100 per cent check-ins, WAØAES, Nebraska Emergency Phone Net, WØFIG NCS, QNI 1024, QTC 159. Nebraska Storm Net, KØJXN reporting, QNI 606, QTC 4. The Pine Ridge Amateur Radio Club at Chadron will hold its Annual Picnic at Chadron State Park, June 7. The Smoke Signal Senders Morning Breakfast will be held the same day. The Tri-City Amateur Radio Club will

(*Continued on page 120*)

1964 EDITION

The RADIO AMATEUR'S HANDBOOK

By A.R.R.L.

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Distributors throughout the Nation have the 1964 Edition in stock. Better get your copy of this complete Handbook now. The demand is tremendous!

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- **Sections which include How-to-build-it articles dealing with Receivers, Transmitters, Power Supplies, Radiotelephony, V.H.F., U.H.F., Antennas, Mobile Equipment, radioteletype, transistorized equipment, etc.**
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The AMERICAN RADIO RELAY LEAGUE, INC.

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hold its Annual Hamfest at Riverside Park, June 21. Clubs are asked to inform the SCM of their hamfests as soon as possible so information can be included in this column. Many new transceivers are being heard on the bands and net attendance is increasing. Traffic: WAØCIE/Ø 129, WØFIG 52, KØZEO 38, KØJFN 31, WØBKW 30, WØVEA 30, WØEGQ 25, W1CJP/Ø 24, WØNYU 22, KØYZP 19, WØCCD 18, WØZHV 18, W4LEE/Ø 16, WAØBOK 13, WØBOQ 13, WAØAES 11, WAØDFS 9, WØFBY 8, WØPHA 8, WAØEGK 7, WØFTW 6, WØGGP 6, KØHNT 6, WØNIK 6, WØYFR 5, WAØCPS 4, WØFTQ 4, WØVZJ 4, KØKJP 3, WAØBYK 2, KØHNW 2, KØSCN 2, KØVTD 2, WAØERN 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. RM: K1GGG. H.F. PAM: W1YBS. Net meetings: CN, at 1845 on 3640 kc.; CPN, at 1745 on 3880 kc. Mon. through Sat., Sun. at 1000; CECN, Sun. Starting at 0900 on 3880 kc. this net is for ECs, emergency traffic and any AREC members who like to report in. If possible to arrange a sked with your EC to let him know you expect to check in, perhaps you might help in getting your area better situated for emergencies. Traffic nets reported a fair amount of traffic for January, CN with 31 sessions total of 379 messages and average of 10.2 stations per meeting, high QNI to K1WKK, W1RFJ, W1CTI and CPN with 30 meetings total of 194 messages and average of 18 per session, high QNI to K1NTR, W1LUH, K1AQE, K1DGK and K1LFW, in that order of attendance. K1OJZ is the newly-appointed radio officer in Old Savbrook. BPL was made by K1WKJ and K1WKK. W1FHP is an OPS. Late appointment cards are going out to holders who are behind in their endorsements. Your appointments must be endorsed or canceled 30 days following receipt of form CD-34 card. K1CSY, Southington, has been endorsed as EC. The CQRC is planning a better race in the 1964 Field Day. The Torrington Club held a supper night with the YLs and XYLs. Slides and history movies of years gone by were shown. The ladies enjoyed it and passed the comment that all clubs should have one in their record files. The V.H.F. PAM appointment is open to an interested station operator able to get on the air in the 144-Mc. band. The New England Division Convention will be held May 9 and 10 at Swampscott, Mass. by the FEMAR associations. Traffic: K1WKJ 528, K1WKK 506, W1EFW 292, W1AW 196, W1RZG 150, W1CTI 102, W1MPW 93, K1UYZ 93, W1ECH 82, WA1ALZ 67, K1JAD 52, K1GGG 45, K1PQS 45, K1ZND 44, K1NTR 41, W1BDI 36, K1SRF 36, W1YBH 36, K1AQE 26, K1WXN 18, W1OBR 17, K1OJZ 17, W1QV 12, W1BNB/1 6, W1CUH 4.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG. PAM: K1ADY. RM: K1MZB. Traffic nets: Phone, Seagull Net, 3940 kc., 1700-1800 EST daily except Sun. Pine Tree Net, 3596 kc., 1900 daily Mon. through Fri. First Regional Net, 3605 kc., 1815 and 1930 daily. Maine State C.D. Net meets Sun. at 1100 EST on 3993 kc. and Wed. at 1900 EST on 3530 kc.; W1BYK is NCS. The AREC Net meets Sun. at 0900 EST on 3940 kc.; K1DYG is NCS. K1DTW wishes to have the word passed to all Maine hams that members of the crew of the Coast Guard cutter *Mackinac* want to thank them for all the traffic and messages passed to their families over the Christmas and New Year holidays. W1BPM made WAS on five bands phone. The Pine Tree Net needs more operators and also is looking for a few more net controls. Let's hit the c.w. more. K1MZB is trying to work KL7 on c.w. on 3.5 kc. for WAS. I imagine the southern exposure gang is now in the process of looking toward New England for the summer and getting the gear ready for shipping north. There was a nice picture of W4BU (W1BRU) in the newspaper here recently and the SCM was asked as to his acquaintance with him and was given an affirm. Don't forget the Augusta Hamfest in June. The date will be announced later. Traffic: (Jan.) K4BSS/1 164, K1VXU 47, K1MZB 44, K1NAN 30, W1AHM 3. (Dec.) K1DTW 348, K1VXU 88, K1NAN 41.

EASTERN MASSACHUSETTS—SCM, Frank Baker, Jr., W1ALP—W1AOG, our SEC, received reports from the following ECs: W1STX, K1s ICJ, QLG and HZU. W1s BGW, AYG, TZ, K1s WJD, MEM and CCL took part in the Nov. F.M.T. Sorry to have to report W1s JPM, JXU, UC, ZE and K1NEU as Silent Keys. K1-AAA writes that the Pendleton Radio Club of the North Shore has been formed in honor of Bob, her husband, and has received his call W1IO. W1LZW says he operates from No. Eastham under the call W1PVD. W1s AOG and LES made the BPL in Dec. New officers of the QRA are W1HBB, pres.; W1VDV, vice-pres.; K1-LJT, treas.; K1VMT, secy.; W1s MXC, FSN, HXK, K1s VKW, GLD, SWU, directors. K1SWU is net mgr. A movie of Col. Glenn's flight was shown at a recent meeting. Officers of the Fall River ARC, W1ACT, are W1YHZ, pres.; K1VCB, vice-pres.; W1AUP, treas.; K1MYL, secy. The 6-Meter Cross Band Net had 23 ses-

(Continued on page 122)

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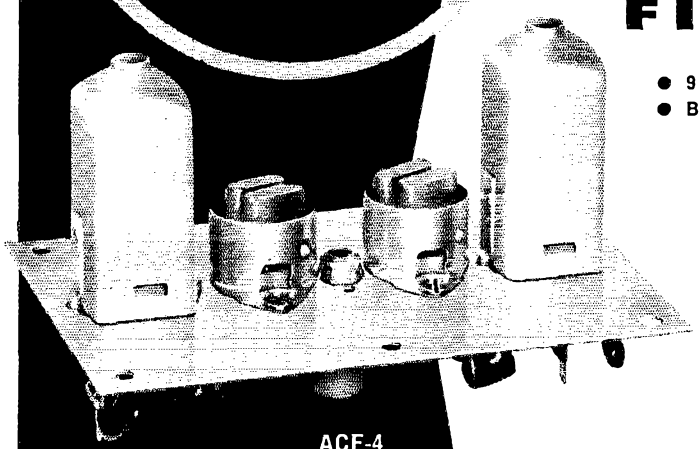

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sions, 503 QNIs, 80 traffic. Norwood ARC, K1JMR, elected K1ZMA, pres.; K1QLG, vice-pres.; K1RKN, secy.; W1LUG, treas. The club meets every Mon. night in the Fire Station. New appointments: W1SH Dedham, K1VCO Sudbury, as ECs; K1LPJ as OO. W1KSB had a bad fall and is in the Winthrop Hospital. The Framingham Club showed a movie, "Tools of Telephony". Massasoit ARC's new officers are W1WLZ, pres.; W1LJH, vice-pres.; K1DSU, secy.; K1HNP, treas. Meetings are held the 3rd Tue. at the Hanson Grange. WØPAN has a new trap vertical. W1ECK has a new modulator and is DXing on 15. W1WLZ has a new jr. operator and W1RHN had his third son. The T-9 Club met at W1MVQ's. W1DMD and K1AWP attended the 25th Annual Banquet of the Nashua Mike & Key Club of N.H. The Central N.E. Net had 27 sessions, 1 traffic, 476 QNIs, reports K1PPP. W1NF says DX is very good on 80. W1BGW worked AP5GB. W1ADY, a YL, is on 160-40-6. W1VAH is building a mobile rig for 6. WA1BFY is the call of the SEI ARC in Waltham. K1ZII is pres. and trustee, W1USO is secy.-treas. K1FWV is on 6 with a five-element beam. K1TVW is on several bands. W1EUJ has a 4X150A tripler on 432 Mc. Middlesex ARC had the NASA movie "The Mastery of Space," and W1HBB spoke on antennas, Towers and Rotors. WN1AZI reports a net as a local high school project on 40. K1PNB is interested in meeting Novices on our net on 3733 kc. Mon., Wed. and Fri. from 6:30 to 7 P.M. K1UUQ is on 75-20-10. W1BJE used W1GYM's idea and eliminated channel 2 Indians on 50.85 Mc. W1TZ uses s.s.b. some and has worked a lot of DX. K1UIW, now General Class, has a 500-watt, 813 amplifier added after his DX-35. K1VGM, on 40-10, will handle Greater Boston traffic. K1BGK is NCS for the Mutual Aid Net on 2 each Mon. at 2000. It is composed of c.d. ROs and others of Sector 1E. The EM2N had 23 sessions, 231 QNIs, 148 traffic. The EMNN had 14 sessions, 43 QNIs, 20 traffic. W1AQE had a bad car accident. The North Shore RA had a talk on "Transistor Circuits" by J. R. Boucher. Appointments endorsed: W1AOG, W1BHD, W1HGT as OESs; W1s AOG, PEX, EMG, MRQ, AQE, BB, K1WJD as ORSs; W1s FMW, DFS, VAH, TZ as OOs; W1s TZ, VMD, BHD as OBSs; W1s MRQ, BB, K1GYM as OPSs; K1GYM Winchester, W1BHD Everett, W1KZW Westwood, W1KQJ Quincy, W1MRQ Groveland, W1DVS Falmouth, K1MBU Attleboro as ECs; W1AQE as RM for 15-meter c.w. K1ZHS has a Drake 2-B. K1BUF is busy with a baby YL. The Milton Amateur Radio Club will hold an auction Sat., Apr. 18 at 7:30 P.M. in Cunningham Gym, Pleasant St., Milton, Mass. Traffic: (Jan.) W1PEX 1860, K1YKT 304, W1LES 294, K1ESG 228, W1EMG 182, W1DOM 142, W1OFK 140, K1PN 130, K1ZQU 66, W1ZSS 52, K1WJD 48, W1BJE 46, K1GKA 36, K1LCQ 28, W1AOG 27, K1ZHS 24, K1BGK 19, K1GTX 16, W4TFL/1 16, K1UIW 13, K1ONW 9, K1VGM 6, K1VOK 6. (Dec.) K1WJD 35, W1FON 26, K1GTX 23.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. PAM: K1RYT. With QRM what it is on 75, K1RYT is considering s.s.b. only for the Massachusetts Phone Net (3842 kc. 5:30 P.M.). The West. Mass. C.W. Traffic Net (WMN 3560 kc. 7:00 P.M. daily except Sun.) still is going fine with the following attendance during the month (listed in order of activity): K1IJV, W1DWA, K1ZBN, W1AMI, W1DVW, K1LBB, W1BVR, K1WQQ, K1ZVJ, K1SSH, K1CPG, K1NWF, K1YMS, K1UYY, W1ZPB, W1MNG, W1HNE, W1AJX, K1HTN (the last five all had the same attendance). 112 messages were handled at a rate of .191 messages per minute (on basis of total time net in session). W1DWA has a new NC-140 receiver. K1VPN's new 6-meter rig is coming along well. W1ZPB reports that the Mt. Hermon Radio Club station, W1IPN, has been reactivated. W1BKG's XYL is recovering from a fractured hip. Best wishes for a fast recovery, Margaret! Al Goodwin, ex-K1JDC, is now manager of the Electronic Development Section of the Aeronica Company in Middletown, Ohio. W1AZW, W1DGT, W1GTO and W1UUK still are banging out the DX. W1TDS is on 6-meter s.s.b. W1NY is active on 160-meter c.w. Our C.W. Route Manager, K1IJV, was the guest speaker at the Annual Banquet of the Mike and Key Club at Nashua, N.H. Many of you holding ARRL appointments are not reporting monthly. Remember, that is one of your obligations. Traffic: (Jan.) W1BVR 104, K1IJV 92, K1LBB 66, W1DWA 31, K1ZVJ 5, W1ZPB 2. (Dec.) K1ZVJ 12.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI— SEC: W1TNO. Certificate endorsement: W1BYS as OPS. Appointment: KN1FXM as OES. New AREC members: W1GQK and K1THG. The Granite State Phone Net meets on 3842 kc. Mon. through Fri. at 2400Z and Sun. at 1430Z. Activity is needed on this net. Remember traffic-handling is a public service. Efforts on the part of c.w. operators could put the NHN (c.w.) back

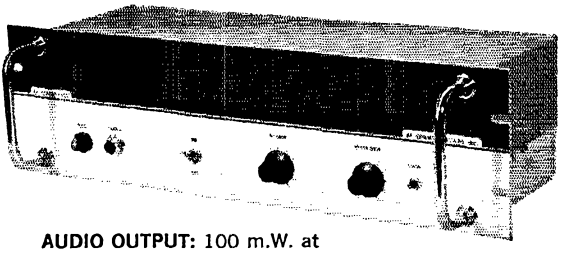
(*Continued on page 124*)

SSB COMMUNICATIONS

Announcing

TWO NEW **FIXED CHANNEL** SSB RECEIVERS FOR ***COMMERCIAL APPLICATIONS***

Model RF-501, Single Channel Strip Receiver



FREQUENCY RANGE: 1.6 to 28 Mc with Four plug-in heads

FREQUENCY STABILITY: 3 parts in 10^7 per day

SENSITIVITY: 1uV for 10 db S+N/N

IMAGE REJECTION: 65 db

IF REJECTION: 70 db

IF BANDWIDTH: 2.1 KC, Mechanical Filter

AGC: 3 db Audio Variation, 10uV to 100,000uV
Time Constant 0.02 seconds charge
2.0 seconds discharge

AUDIO RESPONSE: 350 to 2450 cycles

ANTENNA IMPEDANCE: 50 ohms unbalanced

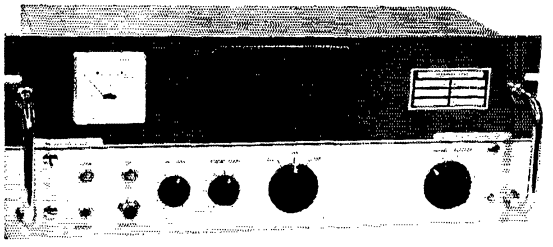
AUDIO OUTPUT: 100 m.W. at 600 ohms balanced, 1 watt at 3.2 ohms

POWER INPUT: 115/230 volts, 50/60 cycles Approximately 65 watts

SIZE: 5¼" H x 17" W x 6" D

WEIGHT: 15 pounds, approximately

Model RF-503, Six Channel SSB Receiver



METERING: "S" Meter

POWER INPUT: 115/230 volts, 50/60 cycles Approximately 70 watts

SIZE: 7" H x 17" W x 8" D

WEIGHT: 17 pounds, approximately

FREQUENCY RANGE: 1.6 to 25 Mc

MODE: SSB-Selectable upper/lower sideband and Compatible A.M.

FREQUENCY STABILITY: ±2 part in 10^6

SENSITIVITY: SSB-1uV for 10 db S+N/N
A.M.-1.5uV for 10 db S+N/N at 30% Modulation

IF BANDWIDTH: SSB-2.1 KC Mechanical Filter
A.M.-7.0 KC

AGC: Fast/Slow Time Constant

AUDIO RESPONSE: 350 to 2450 cycles

ANTENNA IMPEDANCE: 50 ohms unbalanced

AUDIO OUTPUT: 100 m.w. at 600 ohms balanced 1.5 watts to built-in speaker

SPEAKER: 4 x 6 inch

Write for details on this and other items in the world's most complete line of fixed channel commercial SSB communications equipment.

R F COMMUNICATIONS, INC.

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in operation in connection with 1RN. Anyone interested in appointment as PAM or RM, please contact your SCM. K1QFJ is the new State MARS Director for Air Force MARS. The Souhegan Amateur Radio Assn. reports its new officers as W1UXS, pres.; K1CLB, vice-pres.; K1TZZ, secy.; K1UDI, treas. The station call is WA1APN and is operated on 75 and 80 meters. Your SCM can only write on items sent in to him. Let's have a better representation from appointees and all New Hampshire's operators. What's new and different and reports on activities, etc., are needed for this article. Traffic: W1EVN 36, K1BGI 6, W1ET 5, W1TFS 1.

RHODE ISLAND—SCM, John E. Johnson, W1AAV—SEC: W1YNE, RM: W1BTV, PAM: W1TXL. New appointment: K1VOC as EC. Endorsement: K1BWX as EC. RISPN report: 31 sessions, 614 QNI, 137 traffic. As SCM I would like to thank all the hams who participated in the emergency caused by an explosion at the Thompson Chemical Company in Hebronville, Mass. The AREC, under the direction of the SEC, provided mobile communication at the scene and other hams working with the Red Cross provided emergency shelters for persons whose homes were wrecked by the blast. The many fine compliments received by me about action of the hams makes me feel proud of the R.I. hams. K1NEF is temporarily off the air until he gets his transmitter repaired. W1YNE has received a Navy MARS appointment. New Novice tickets were received by WN1s BGJ, BBW, BBX and BBZ. New Techs. are K1s BWQ QKJ, YUD and PUM. New General Class tickets were received by K1NKZ and K1YJU. Traffic: (Jan.) W1TXL 677, K1TPK 179, W1BTV 88, W1YNE 40, K1NJT 38, K1SXY 24, K1VYC 21, K1YEV 17, K1RRK 11. (Dec.) K1VEY 88. (Oct.) K1NEF 700.

VERMONT—SCM, E. Reginald Murray, K1MPN—Green Mt. Net, 3855 kc. daily at 2230Z; Vt. Fone Net, 3855 kc. Sun. at 1400Z; Vt. C.W. Net, 3520 kc. alternate nights at 0000Z; Vt. S.S.B. Net, 3900 kc. alternate nights at 0000Z. Note the reactivated c.w. and new s.s.b. nets. Welcome to new Novices WN1BCD and BCI and congratulations to Conditional Class licensee K1NIW. Listen to the Trading Post Net on 3855 kc. 4 to 5 P.M. weekends. K1AUE has a 6-meter converter. K1YMY is a member of the Quarter Century Club. W1VSA has a new ten-element 2-meter beam. K1APA/1 now is operating from the Univ. of Vermont with an NCX-3. W1SAT has been on the sick list. DL5AH is back as K1YNN/4 in Georgia until August, when he returns to Vt. The Vt. Fone Net had 117 check-ins for January. Traffic: (Jan.) W1WFZ 14, K1MPN 13, K1AUE 4, W1-CBW 3, W1KJG 2. (Dec.) K1LLJ 24.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—RM: W7EMT. New officers of the PARC are W7YXM, pres.; K7IMB, vice-pres.; K7GQE, secy.; K7CXP, treas. The Pocatello Club is set up for emergency commonications should there be a repeat flood this spring, using 2 meters for local work and 80 meters for assistance to the highway department inside and outside the county. Anyone interested in PAM or any other appointment be sure to contact your SCM. Net traffic: GEM Net 38, FARM Net 16. Traffic: W7EMT 102, K7CXG 31, K7HLR 18, W7GGV 9, K7OAB 7.

MONTANA—SCM, Walter R. Marten, W7KUH—Asst. SCM/L.F. PAM: Dr. Marvin Hash, W7YHS. SEC: K7AEZ, V.H.F. PAM: W7TYN. RM: W7FIS. OPSs: K7NDV, W7NPV, K7PKV, K7PWY, K7UPH, K7SVR. ORSs: W7FIS, K7TCI, W7COH, W7KGJ, K7-EWZ, W7EWR, W7LBK, K7NHV. Endorsements: K7-CTI as OBS; W7CJN as OES, W7NAW and K7LUB are Silent Keys. Capital City Radio Club's officers are K7KME, pres.; W7BLD, vice-pres.; K7RXO, secy.-treas.; K7PFQ, act. mgr, W7FGZ, K7EGJ, W7KUH, K7-SIL, K7PKV, K7JXL, K7MOY and K7UON, Big Sky Radio Club members, met with the Capital City Radio Club to discuss hamfest activities. A new call in West Yellowstone is KN7ZML. KN7ZZS and KN7ZTW are new calls in Bozeman. W7INI has a new jr. operator. W7CJN and W7NPV are working regular schedules between Butte and Bozeman on 6 meters. K7PWY is active on 3 nets. K7OGF put up a new vertical. W7IUN built a new 803 GG linear. W7EWR got HB9, ON4, HKØ and VR2EH. K7CTI made a fine showing in the C.W. Sweepstakes. 160 C.W. and C.W. CD Contests. K7EWZ reports improvement in band conditions. K7-GOS and K7GOT have a new HX-50. K7JBH revamped and rewired an ARC-5 receiver for mobile use. K7ELW completed his all-band, triple conversion home-brew receiver. W7IUN constructed a vertical antenna. The Laurel AREC, under the direction of EC W7LBK, has been meeting once a week. The Montana sideband net had 22 sessions, 530 check-ins and 35 traffic. KN7WUL is a new call in Miles City. K7LUH has a new SR-150.

(Continued on page 126)

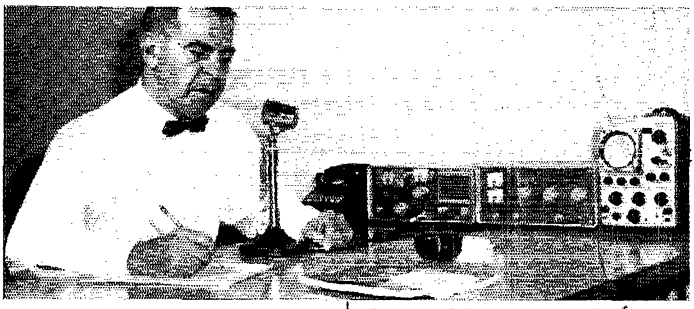
K7LTV has a new TR3. W7PF donated his entire station to the VA Hospital in Miles City. K7ZZA is custodian of Navy MARS at Billings. K7OGF put on a very fine program at the Yellowstone Radio Club meeting; he had a two-tube s.s.b. transmitter. The Yellowstone Radio Club holds theory classes at the Navy Training Center with WØUOW as instructor. K7JUC has the hottest key in Billings! K7CWT moved to Billings. K7QLP has found the trouble in his receiver. New calls in Billings are KN7ZUA, KN7ZUQ, KN7ZZR and KN7-ZBH. K7TZE loaded up a new inverted "V" while home for the holidays. A couple of KOs visited their father, W7IWW, during the holidays. W7YZQ is now on the air with s.s.b. W7FIH is working on a new linear. New officers of the Hellgate Radio Club are W7FX, pres.; K7MUM, vice-pres.; W7IPB, secy.-treas. K7-CVK, K7IMZ, W7JIZ, W7NEG, W7PDE, W7COH and W7DPG are active in the Missoula area on 2 meters. The Hellgate Radio Club holds radio classes at Central School; instructors are W7FX and W7IPB. W7CJN has a nightly QSO with W7OIO and K7GVJ on 50-Mc. phone. Traffic: K7EWZ 139, W7LBK 28, K7UPH 23, K7OGF 16, W7QGJ 14, K7PWY 13, K7SVR 13, K7ELW 8, K7JAT 4, K7JBH 4, W7SMY 4, W7FIS 3, K7MOW 3, K7MYH 1, K7PGN 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. OSN, 3585 kc. 0230 GMT Tue. through Sat., sessions 23, total attendance 125, traffic 54. BRAT awards went to W7BVH, W7ZFH and K7IWD. After being net manager for a few years W7ZFH suggested that a new one be appointed, so K7IWD will take over as the new manager. He also is very active on RN7 and PAN. The regular monthly meeting of the Multnomah County, Portland Area, AREC was held Jan. 17. One of the main topics was Mobile Emergency Operations, with a panel discussion by W7AZD, W7PQF and W7NGW. K7KBK has a new antenna relay system and says it is working fine. K7PMB is working mobile with a Heath "Tenner." K7BZP has installed a Cheyenne and Comanche (radio gear that is) in his pick-up camper. W7KTG, as OO, sends in another long list of observations on off-frequency operations by ham stations. These reports are based upon your activities, so let's have one from you each month. Traffic: K7IWD 409, W7ZFH 72, W7MAO 36, K7KBK 35, W7DEM 12, K7-SHC 7, W7KTG 2.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. The new Western Washington Net will start operation on 7120 kc. at 2000 PST daily except Sun., K7RSD is manager. K7PIY and K7CHN, on leave from the Coast Guard, visited the VARC in Puyallup. W7IST transferred to W4-land. The valley Amateur Radio Club (VARC) of Puyallup has started a code and theory class in the high school. W7MCU and W7JJK are heard on RTTY every night on 145.65 Mc. W7s FWR, HMJ, K7s QNC, IEI, PCP, RBR, YPP and IGW helped with the Christmas package delivery in the Thurston County area. W7HMQ is visiting clubs on the west side of Cascades. 3895 kc. has been chosen for the mobile s.s.b. stations on the west side of the mountains. The Tacoma Club, W7DK, has come up with a very outstanding publication called the *Loggers Bark*. K7FUL and K7CZF lost their towers in a windstorm. W7ZTG and his XYL have a new jr. operator. K7NPG and K7NKZ are moving to a new QTH. W7AZI and his XYL were visitors at W7GYE in Seattle. K7BBP is a Silent Key. One of the big DX hounds is W7BSW in the Tacoma area. New officers of the Apple City Radio club of Wenatchee are K7LVB, pres.; K7QMK, vice-pres.; W7ETO, secy.; K7VQG, trustee. The club started code classes for Novices Feb. 5. K7MGA, Yakima County EC, reports good results with c.d. and RACES Drills. The Auburn Amateur Radio Club was officially formed Dec. 15 with 20 members. Officers are K7TGF pres.; K7MWF vice-pres.; K7PZQ, secy.; K7-ZWP, treas.; K7RSN, act. mgr. K7ALG moved to a new QTH in Enumclaw. K7PZI attends WSU in Pullman. The Walla Walla gang hopes for a 10-meter opening. K7OEX and K7OXI have the new Christmas scope working FB. W7NVE is heard on s.s.b. The West Seattle Club is trying to form a 2-meter bunny hunt. WF9WK and F2TJ visited the West Seattle Club. K7-GQJ is the Seattle area EC. K7SRI is QRL making a new crystal calibrator. K7PVO has passed the FAA technician test and is awaiting assignment. W7VFR, K7OFW and W7OEB are active on Navy MARS. K7-OFX has captured the YLRL C.W. top award for the second consecutive year. K7YSD passed the Conditional Class exam. The Richland Club's code and theory class is being conducted by W7YFO with fine results. W7AIB is instituting steps to correct excessive power lines interference from the local power company. K7PIG is trying hard for CHC membership. Noon time Net report for Jan.: QNI 1101, QTC 490, NSN reports 31 sessions, QNI 341, QTC 74. Traffic: W7BA 928, W7DZX

(*Continued on page 128*)

FIELD ENGINEERING WITH A FUTURE



Ed Doherr, WIEEE, a well-known New England call, has been hamming since 1921. Former calls were K6CLC/W3CIR/W8CIR/W8ASB. Ed recently placed the Raytheon SBE33 transceiver and the new Raytheon SBE, 1KW PEP linear amplifier on the air. He claims it talks up a storm and does everything his older SSB gear will do. Ed's other station equipment includes a receiver, exciter, and two 2KW PEP home brew linear amplifiers.

As Manager, Market Development at Raytheon, Ed is responsible for providing executive level liaison with military and industrial customers. In his position, he investigates new areas of business and recommends marketing action on programs offering a potential for the operations services.

Joining Raytheon as a field engineer in 1942, he assisted the Navy in maintaining shipboard radar equipment at North African and European naval bases during WW II. Post war duty included exciting assignments in Hawaii, Japan, and the South Pacific. Ed Doherr has made a number of important decisions in the last 22 years but he considers his decision to join Raytheon as the best he's ever made.

At Raytheon, field engineers are playing an increasingly important role in the installation, maintenance and operation of complex, sophisticated electronic systems. In space, on the ground, under the seas, in every environment probed by electronics, Raytheon engineers are finding and meeting new challenges. The opportunities for qualified people are many and rewarding.

Perhaps you can qualify for a Raytheon field engineering future. Requirements include an E.E. or its equivalent in practical experience in guided missiles, fire control, radar, sonar or communications equipment.

Among Raytheon's benefits: attractive starting salary with regular merit reviews; life and hospitalization insurance; retirement plan; educational and relocation assistance.

For complete details, write Mr. R. E. Guittarr, Electronic Services Operation, Raytheon Company, Equipment Division, Northwest Industrial Park, Burlington, Massachusetts.

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669, K7CTP 664, W7APS 107, K7JHA 79, K7SRI 49, K7JRE 44, W7OEB 39, W7AMC 35, W7BTB 30, W7AIB 13, K7PIG 13, K7RSD 7, K7CHH 3, W7EVW 3, W7JC 2.

PACIFIC DIVISION

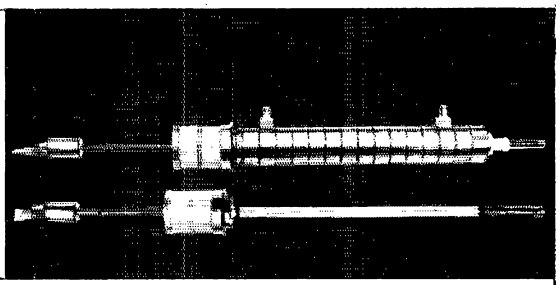
HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SEC: KH6BZF. RM: KH6EWD. PAM: K3DIO/KH6NAA. OBSs: KH6EWD, KH6EOF. OOs: KH6BZF, KH6BG, KH6KS. OPSs: KH6ATS, KH6BG. OBSs: KH6EWD, KH6ATS, KH6DXB, KH6AU. OESs: KH6BAS, KØ-QKL/KH6. The Honolulu ARC elected KH6GG, pres.; KH6ANM, vice-pres.; KH6EIT, secy.; KH6EBA, treas.; KH6EZU, KH6CLD, KH6KH and KH6EZ, directors. KH6DLA won a prize at a recent HARC meeting. The HARC and EARC now meet at Bldg. #22, Fort Ruger. Contact KH6GG for details. KH6BAS reports 8 Oahu stations were contacted from Kauai on 2 meters. Don't forget RACES, 0930 HST the 2nd and 4th Sun. on 7.225, 28.7 and 147 Mc. KH6HP is on with a new NCX-3. Ex-KH6AED is now in JA-land with the FAA. KH6EHF, KH6BHJ and KH6BG have been bitten by the radio-control model airplane bug. KH6-BYG was home on a vacation. The Hilo ARC meets the 2nd Fri. at 7:30 P.M. at the Commercial School. KH6-ALD has been up on the Poi Net evenings at 1900 (local) on 3750 kc. Congratulations to KH6FX and KH6CXK on their promotions. KH6ARL was in Honolulu and eyeballed with KH6BZF. Aloha to KH6HAA, who we lost to WB6-land. KH6BAS has added new vagis, control lines and feed lines to his remote shack on a 450-ft. hill overlooking the ocean. KH6IJ has resumed his weekly newspaper column after a much noticed 2-year absence. Traffic: KH6EOF 57, KH6EWD 41, KH6NAA 18, KH6ATS 5, KH6BG 1, KH6BZF 1, KH6EJN 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. The Las Vegas Radio Amateur Club, headquartering at the Thunderbird Hotel, held its annual dinner meeting and installation of officers for 1964. Officers are K7VHS, pres.; W7PBV, vice-pres.; W7OYQ, secy.; K7TNY, treas.; W7RBV, act. mgr.; W8DVJ, W7FJN, K7RLX and K7NVB, directors. W7JU and K7BVX have summer cottages on the Colorado River. W7BJY issued the Southern Nevada Radio Amateur Club certificates, No. 82 to W8UAS, No. 83 to K6YTA and No. 84 to W6DIX. K7PYF is on 6 meters. K7ICW is starting a v.h.f. club. K7OLQ is setting up RTTY. K7ZOK is on 6 and 2 meters. K7ZOK, W7YDX, W6-NLN/7, K7ADD and others are on 6-meter f.m. K7-WLR, KS7WPQ, W5EQV/7, W7LVP and K7SWT are new stations on 2 meters. W7TGK and W7PBV are driving new Volkswagens. K7SFN has moved into his new QTH. Traffic: (Jan.) K7SFN 70, W4CJD/7 29, W7PBV 7. (Dec.) W7SFN 505.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Edward T. Turner, W6NVO. SEC: WA6HVN. Santa Clara Valley Section Net reports 24 sessions, 182 check-ins and 54 traffic count. SCVSN is showing great improvement, but we are saddened by the resignation of WA6RRH, v.h.f. PAM, who has moved to San Francisco. Chuck did a great deal to bring the 2-meter section net to its present high level and I'm sure I express the thanks of the section for a job well done. There were 30 section appointees, including the Asst. SCM, SEC and V.H.F. PAM at the Second Semi-annual S.C.V. Section meeting in San Jose Jan. 19. The group is planning another meeting in June under the direction of the SCM. W6QMO, former manager of NCN and RM of SCV, is back in the section and active as OPS/ORS on SCVSN and NCN. K6DYX sends Official Bulletins on RTTY. W6DEF and W6RFF are active in NCN. W6HC has moved his TCC sked to 20 meters Thurs. morning because of poor conditions. He works Station J to W1NJM via W1AW. W6PLS is active on SCVSN. W6ASH is active as OO Class I and works DX on 40 meters, with WAC in four hours. W6YHM is active in SARO, NCN and RN6. WA6UAM is a new ORS and is working NCN and SCVSN. W6-AUC is busy with OO operation. W6YX, the club station at Stanford, is quite active with traffic handling and contest operation. WB6KMK reports the club station also is working into the Redwood City C.D. Net. W6ZLO is working on RTTY gear. W6PLG is active on Navy MARS. K6YKG is very QRL at work but manages CD parties. WA6HVN and W6CYL are active on RTTY and Oscar work. The SCM and SEC attended the annual Foothills Amateur Radio Society dinner at Sunnyvale. New officers of the PARA are WA6QGX, pres.; W6UOK, vice-pres.; K6YBX, secy.; WN6FME, treas. W6ISQ spoke before the Stanford RC on his *QST* articles. The San Mateo County Society of Radio Officers, (RACES) January meeting featured discussions on county coordination and was attended by twelve city

(*Continued on page 130*)

Ballpoint TWT



Ask any engineer involved with electronic pitch and catch, and he'll tell you there's nothing like phased-array radar.

In case you're not up-to-date on military advances, phased-array radar is a long-range surveillance system that fans a complete arc of upper space in a split second with a stationary antenna.

A highly important component of this new system is the traveling-wave tube, or TWT. In some of the larger systems, as many as ten thousand TWT's are used---all pulsing at once.

One condition is that these banks of tubes operate under a strict phase control. In fact, they must maintain phase within 6° of the total 10,000° under a variety of operating conditions. And that's cutting tolerances mighty fine. It's also one reason why these TWT's cost in the neighborhood of several thousand dollars each.

Unfortunately, no matter how precise the conventional types of TWT's are to begin with, they are subject to variation with age, and no two tubes age at quite the same rate. As you might suspect, the rate of replacement is excessively high.

The Sylvania Electronic Components Group tackled the problem and came up with some interesting answers. First, they developed a "controller" that is similar to an inverse feedback circuit. It's small, inexpensive, and adjusts phase instantly to the desired value.

Then they "bottled the beam" so that the relatively inexpensive electronic gun assembly can be replaced almost as easily as putting a refill cartridge in a ballpoint pen. This is done by enclosing the beam-forming elements in an evacuated glass envelope that slides into the TWT (see illustration). Thus, an aging or spent tube can be renewed with a "refill."

There's another advantage in this type of construction: the glass envelope isolates the cathode and gun from the contaminating gases emitted by the outer TWT structure.

We think the whole idea is pretty clever. Who knows but one day you may be able to reload your power tubes... but don't hold your breath.

73, Bob Lynch K2RMN

SYLVANIA

SUBSIDIARY OF GENERAL TELEPHONE & ELECTRONICS

reps. The SCARS meeting in January featured a talk by WA6VGR on amateur miniaturization. The SCCARA's January meeting featured W6CYL on tropo-scatter. K6-HCP has made General Class. The Associated Radio Clubs of Greater San Jose have started work on the 1965 National Convention. W6MVL is chairman and W6ZRJ is vice-chairman. The Oscar Association held an election of Board members at Foothill College. W6KAS was elected president of the Board and W6SAI has been named project director. Traffic: (Jan.) W6JXK 466, K6GZ 336, WA6RRH 120, W6AIT 108, K6DYX 80, W6DEF 78, W6REF 57, W6HC 28, W6PLS 28, W6YBV 24, W6ZRJ 23, W6ASH 21, W6YHM 21, WA6UAM 14, W6AUC 13, W6YX 12, K6MTX 8, K6VQK 6, K6EQE 4, W6ZLO 4. (Dec.) W6CYL 16, K6EQE 7, WA6UAM 7, WA6HVM 5.

EAST BAY—SCM, Richard Wilson, K6LRN—The new address of the SCM is 107 Cordova Way, Concord. WB6JGA is now Class I OO and is QRL traffic work and reorganizing the AREC. K6GK reports that 40 meters is crowded with DXers. WA6FBS was instrumental in relaying an emergency order from the Lake County, Ore., Highway Dept. to Motorola in Burlingame. Parts were needed in the search for a downed plane near Lakeview, Ore. WA6UQM reports QRL school but finds time to QSO Novices on 80-meter c.w. W6ZF transmits the Pacific Division bulletin each 2nd and 4th Mon. on 3540 kc. at 0400Z. W6ELW, WA6QZA and WA6PTU attended the s.s.b. get-together in Sacramento Jan. 26. The following is a list of radio clubs in East Bay with their meeting places: Oakland Radio Club, 2111 E. 14th St., Oakland. The MDARC meets each 3rd Fri. of the month at the Red Cross Center at 2121 Ygnacio Valley Rd., Walnut Creek. The Lark/Livermore meets the 1st Thurs. at the Rec. Center, 8th & G Sts., Livermore. The Hayward Radio Club meets each 2nd and 4th Fri. at 116 W. Winton in Hayward. The Silverado ARS meets at the Mt. George Farm Center on Hagan Road in Napa on the 1st Tue. Join and support your local radio club. You need it as much as it needs you. In unity there is strength. The MDARC pancake breakfast was a qualified success. About 64 people attended. The only trouble was that most of the people were from other radio clubs. Most 80-meter mobiles operate in the top 10 kc. of the band. How about some of you guys with 80-meter rigs taking a listen once in a while in case some aid is needed? WA6FBS, WA6MIE, WA6ECF and K6LRN were active in the Jan. CD Party. In order to get this report in on time all activity reports must be in to me by the first of the month. I appreciate all the club papers but would like to see more individual reports. Traffic: WB6JGA 252, K6GK 85, W6ZF 8.

SAN FRANCISCO—SCM, C. Arthur Messineo, W6-UDL/K6CWP—SEC: W6KZF. WA6ROJ, of Ukiah, is erecting a 60-ft. tower to place his twin 2-meter beams equipped with azimuth and elevation rotors for satellite tracking. W6YKS has a new eight-element up for 50 Mc. From W6KZF's letter, "If every club in the section would set up a 2-meter net, using standard homebuilt transistorized walkie-talkies, we could have an invaluable system of nets free from low-frequency skip and QRM for use in parades, races and emergencies." Bill lost his 75-meter dipole in the storm but has it up again. K6RCR, in Santa Rosa, is now northern net control for the Salinas Valley Traffic Net on Mon., 50.550 Mc. at 8 P.M. PST. New officers of the Humboldt ARC are W6SLX, pres.; WA6IYB, vice-pres.; WA6PTA, secy.-treas. K6JQB regularly works into the S.F. area on 50 Mc. WA6UJU says his new Galaxie transceiver is great. The Mendocino RAC has started a code and theory class for future hams. I hear that the Petaluma RC already has started gathering its gear for Field Day. The San Francisco Radio Club is planning a QSO Party to inaugurate its "San Francisco Award." Watch for details. The new editor of the club paper is WA6IVN and it is published by K6UGS. The club now meets back at the old stand, Forest Hill Lodge on 7th Ave., the 3rd Fri. of the month. The SFRC has code and theory classes immediately preceding each meeting. W6-BYB, the ol' dyed-in-the-wool DXer, is moving his QTH so now all of the towers and beams are down, although he can be currently heard on 50 Mc. with a G-50. Because of the pressure of business we are losing a very active OBS and OES in K6VXI. The Northern Calif. Chapter of the QCWA holds active Sun. morning nets on s.s.b. at 10 A.M. on 3907 kc. with K6KC at the helm, a.m. phone at 9 A.M. with W6HLM calling the roll on 3950 and the C.W. Net, with some mighty fine fists I might add, at 11 A.M. on 3785 kc. with W6PLS acting as net control. Traffic: W7YKS 55, WA6IVM 10, WA6-QXV 2, W6UDL 2.

SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC: Mary Ann Eastman, WA6-HYU. The Pacific Division 1964 ARRL Convention will be held in Sacramento Sept. 25, 26, and 27 at the Hotel

(Continued on page 132)

Cross Modulation and Overload Performance ....

IS ONE OF THE MOST IMPORTANT CHARACTERISTICS of a communications receiver—particularly one used on the crowded HF bands—yet most equipment specifications quietly neglect this factor and many receivers (even some expensive ones) behave just miserably in the presence of strong local signals nearby on the band. Not so with the SS-1R—its superb freedom from cross modulation and overload is an outstanding feature and a result of the completely new balanced mixer (7360) front end *with no r. f. stage*. The SS-1R performance in this characteristic (see specification below) means, from a practical point of view, that the key clicks and the splatter from the strong locals will disappear in all but the most impossible situations—when that kilowatt neighbor blasts in on almost the same frequency.

The SS-1R offers many other performance advantages over other receivers, such as direct *digital* frequency readout (no more mental arithmetic); exceptional frequency stability and accuracy; *Autocalibration* of amateur bands with WWV; crystal bandpass filters with unusually sharp skirt selectivity; and the excellent sensitivity of the unique low noise front end mixers. *Motor Tuning* control gets you from one end of the band to the other without the tedium of knob cranking. There are *different* accessories also: the SS-1S Noise Silencer for *elimination* of most impulse noise and the SS-1RS matching speaker. The SS-1T transceive transmitter and the S-1V Video Bandscanner will be announced soon to complete the SS station.

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ μv, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a **10** μv signal with 2.5 kc. selectivity, an unwanted **0.1 volt** signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack—1 ms., **Slow** release—1.0 sec., **Fast** release—0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

The SS-1R, SS-1RS and SS-1S are available—ask your distributor for information or write

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El Dorado. The McClellan Amateur Radio Society is host with all clubs to assist. W6ESZ is general chairman. The El Dorado County Radio Club's officers are K6SJN, pres.; K6UML, vice-pres.; WB6DSW, secy.; K6HGV, sgt. at arms. WA6RMF and WA6RMG thank all who participate in their net activity. W6SEA and W6SBL are sporting an FB signal these days using a new "inverted, drooping Vee folded at both ends." YZO says the results are good with his 200-Mc. 20-milliwatt output. W6BZS is quite happy with his new scope. W6FQQ has completed his 400-watt linear. MARS comment: "Net activity remains good, but looking for more s.s.b. members." Much interest is developing on 220-Mc., many using PRC-14 rigs. W6ZJW, OO, complains of noisy band conditions. The brand-new Oroville Amateur Radio society boasts 31 members to data, proudly announces W6AF. W6AF is OBS at 1300 on 14,080 kc. The North Hills Amateur Radio Club is presenting all paid-up members with new and very sharp NHRC badges, including names and calls. K6EJZ is converting a Navy MBF transceiver. K6VPF is on the air with his SCR-522. New AREC members: WA6RBD, WN6IWR and WB6FOR-WØUNU, Navy MARS. SCM W6BTY announces a new OBS—WA6YKR, formerly WØOKY and W4NMA. Jerry is a member of the Yolo Amateur Radio Club and is active with the San Joaquin Net. Please, fellows, keep the reports coming.

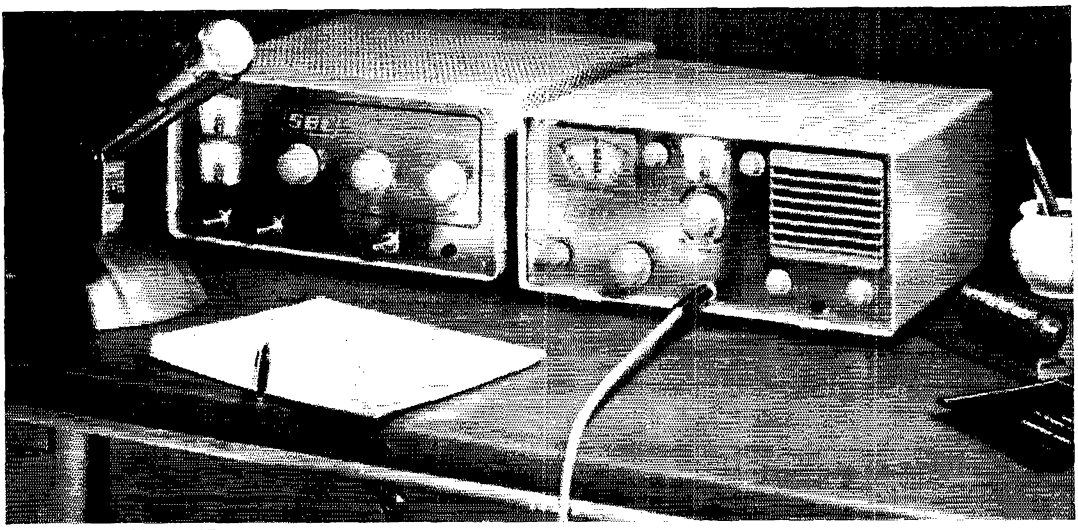
SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Fresno Radio Club's annual hamfest is to be held May 16, 1964, at the Town and Country Lodge, Fresno, Calif. Set this date aside and will meet you there on the 16th. More details later. WA6VPN is having harmonic problems. WB6BWA is running a Viking II and a 75S-3 receiver. W6JMP is on RTTY. WA6BUH is heard on 75. K6SEV is running a 20-A exciter and is on 75 and 40. WB6ETQ is on 6- and 2-meter s.s.b. WA6EDQ is running a 62S-1 on 6 and 2 meters. WA6SQI is on 6-meter s.s.b. WA6RDY has a 6-meter rotation on his SB-33 and claims that the resale value has peater in operation. W6NKZ has improved the a.v.c. ac not deteriorated. W6TZJ and W6BJI are experimenting with Klystrons. K6YYK has a Swan 240 on s.s.b. K6IXA has a 50-watt Link base station on 2-meter f.m. driving a pair of 35T tubes. K6SNA is on 2-meter f.m. with 50 watts. W6PSQ is on 40-meter s.s.b. with a Swan 240. W6MYU is on 20-meter s.s.b. with 90 watts. See you at the Fresno Amateur Radio Club meeting on the 10th floor of the PG&E Bldg., every 2nd Fri. of the month. Traffic: WA6ESH 204, W6ADB 156.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4FJM, K4CDZ, WA4ANH. PAM: K4ODX, V.H.F. PAM: K4MHS. W4AJT says they are working on a new antenna system for the local communications center so as to cover Gilford, Forsythe and Davidson Counties. WA4EYA has a new vertical for omnidirectional bulletins. WA4QJA picked up six new states during two good openings on 6 meters. K4MPE is home again, after two weeks of special instruction for his company. W4FDV says the Wake County Club is holding code classes, and also has approximately 15 members on v.h.f. with the number increasing each week. W4COJ has been appointed to the position of communications chief for High Point Civil Defense. Russ says, "My job is to organize all amateur, CB and industrial radio units, along with municipal, county and air units into one operating unit, without too much overlapping confusion." K4EWD reports that Alamance County is holding weekly AREC drills on 80, 75, 6 and 2 meters with good attendance on all bands. W4ACY says there is a coastal 6-meter net now in the section. Nets: NCN early, 3547 kc. at 2330Z; late, 3612 kc. at 0300Z. THEN, 3865 kc. at 0000Z. CCEN, 3907 kc. at 0000Z. Net traffic: NCN 341, CCEN 99, NCN (L) 95. Traffic: WA4PDS 518, W4LWZ 221, K4CDZ 111, W4IRE 81, K4YYJ 68, WA4FJM 57, WA4ANH 53, WA4EIS 33, W4FDV 33, W4BAW 32, K4QFV 23, K4QDO 19, K8MTI/4, 14, W4COJ 11, WA4GEU 6, K4YCL 5, W4AJT 4, K4MPE 4, WA4QJA 2.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ. RM: K4LND. S.S.B. PAM: K4IOQ. Nets: C.W., 0000Z and 0300Z, 3795 kc.; A.M., 0000Z, 3930 kc.; S.S.B., 0000Z, 3915 kc. Two of our Official Observers turned in such good reports on the November Frequency Measuring Test they deserve mention here. W4NTO had an average error of only 1.5 parts per million and W4FFH reported 2.2 parts per million. These are extremely accurate measurements and Fritz and John deserve a lot of credit for their work. W4NTO retained his position as most active S.C. OO in January with over 50 infraction notices mailed during the month.

(*Continued on page 134*)



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SB-33/SB1-LA . . . diminutive duo . . . four-band (80-40-20-15) SSB transceiver/exciter and high power linear amplifier. Bright, state-of-the-art version of a full thumping kilowatt . . . entirely self contained, **including all power supplies** . . . in two tiny cabinets! The only "extras" needed are microphone . . . antenna . . . two lineal feet of mounting space . . . and a strong desire for a clean-cut big signal. And when you look at the photograph above, (the 664 dynamic **does** look big in comparison to the linear amplifier behind it) consider that the SB-33 transceiver on the right also includes **an outstanding receiver** capable of solid-copy reception of the DX that is bound to be stirred up by the KW signal from your powerful pair.

Aside from the use of advanced solid-state circuitry and techniques, there are at least 37 other good reasons why SB-33 can be so small and still deliver in such a convincing manner—18 transistors, 18 diodes and 1 zener diode! (The heavy-duty work is done by two rugged PL-500 beam tetrodes and a 12DQ7 driver). The SB1-LA linear uses 6—6JE6's for 1000 watts P.E.P. on 80-40-20 and 750 watts P.E.P. on 15, achieves its small size in part by careful design and by the use of an all-solid-state voltage-multiplying power supply.

See these best buys at your SBE distributor—**compare** them fully with anything else available, feature-wise, price-wise. (Remembering that SB-33 has **4-bands—panel selectable sidebands—Collins Mechanical Filter—built-in 117V AC power supply** and **loudspeaker,** is 5½"H, 11¾"W, 10¼"D, weighs 15 pounds.

SB-33 TRANSCEIVER

389.50

SB1-LA LINEAR AMPLIFIER

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Please send full information on SB1-LA Linear and SB-33 Transceiver.

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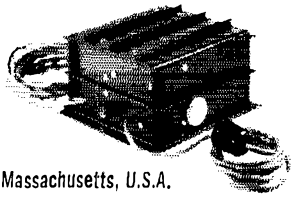
NEW Model SB2-DCP DC to AC INVERTER for SB-33 (only) Quiet . . . entirely solid-state.



Export sales: Raytheon Company, International Sales & Services, Lexington 73, Massachusetts, U.S.A.

The Charleston ARC elected W4UOQ, pres.; W4UEV, vice-pres.; and W4FFH, secy.-treas. for 1964. Congratulations to these men and their club for the fine work accomplished by their active club. The Spartanburg ARC has elected WANTO pres.; K4HDX vice-pres.; and K4LEI secy.-treas. for this year. The Spartanburg Club is now meeting at the Memorial Airport courtesy of the Air Force. C.W. Net traffic: 52. Traffic: K4LND 82, K4OCU 65, W4NTO 61, WA4LPV 37, WA4JHD 34.

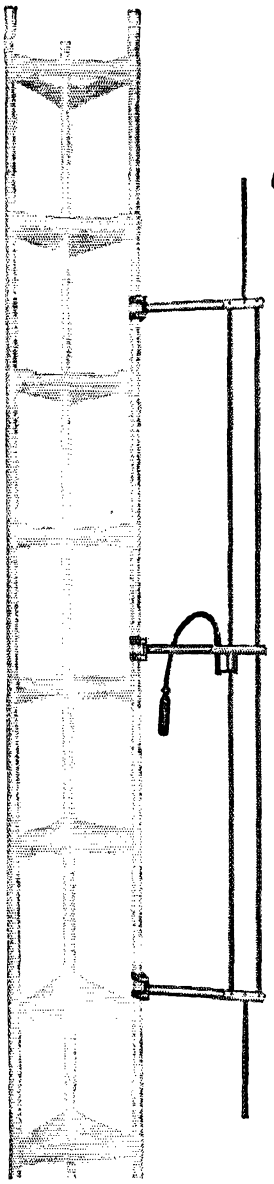
VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM/SEC: H. J. Hopkins, W4SHJ. PAM (s.s.b.) W4JMA (also VSBN mgr.). RMs: K4MXF, W4ZAU, W4SHJ, W4QDY. K4EUS, OES, reports that the CVN helped with the Salsin Polio Vaccine Clinic in Richmond during January. From Lynchburg W4DLA reports that the LARC put 24 base stations plus several mobiles using 146.94-Mc. f.m. during the oral polio drive. Seems to be a lot of 2-, 6- and 10-meter operation in the northern part of our section, according to W6GGR/4, K4NOV and W4ZMT. K4JDK, Virginia Beach EC, is getting an effective group organized and operating. W4-CHG finished college. On the eastern shore, EC W4OID says that three new hams are coming up soon and that he is installing a new rig in the new auto. VA-CWC chairman W4JUJ reports 181 of these awards issued to date. W4WBC is remodeling the shack with mahogany paneling and *heat*. K4SDS and W4QDY received public service awards for their work during the '62 emergency. VSBN now is fully NTS and the VFN is working toward that end. The VSBN, like the VSN and VN, now comes directly under the jurisdiction of the SCM, who appoints the respective net managers and assistants. W4JMA, the PAM, is now functioning as VSBN mgr. with W4DKP as his able assistant. W4DKP has become interested in RTTY and plans extensive work in that direction. WA4GWD is being groomed for VSBN asst. mgr. when W4DKP relinquishes the job. Don just made WAS after 4 years! WA4KBU is struggling to install "push-to-talk" in his Apache. VFN mgr. WA4-FCS is doing some c.w. work at times and enjoying same. W4BZE got his 35th state capitol toward WAS. WA4HQW is now using a new keyer along with QSK operation. Traffic: (Jan.) W4DLA 458, WA4EUL 288, K4PQL 272, W4DVT 203, W4RHA 159, WA4FCS 142, W4JMA 108, K4TV 85, W4LK 83, W4TE 65, W4ZMT 63, WA4GWD 62, W4SHJ 61, K4MXF 56, W4DKP 47, K4-FSS 47, W4ZAU 47, K4SDS 44, W4OKN 38, W4MXU 35, W4LNC 33, K4KNP 24, W4QDY 24, K4JDK 21, W4-BZE 16, W6GGR/4 15, WA4HQW 13, W4NVX 13, K4-YZT 11, W4OP 10, W4JUJ 8, W4WBC 8, WA4JRY 7, W4KRT 6, W4KX 6, K4BAV 5, K4NOV 5, K4MYO 1, K4SGQ 1. (Dec.) K4KNP 127, W4BZE 65, K4MXF 57, K4PXY 40, WA4DUW 6. (Nov.) K4MXF 61, W4NVX 4. (Oct.) W4LK 103.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RM: K8HID. PAM: K8EPI. West Virginia nets are on 3570, 3890, 3903 and 3905 kc. It is indeed a sad task for your SCM to report the passing of two "ole timers," W8GBF, ex-8ACZ, and W8VA, ex-W8VZ and W8EZR, were ardent c.w. hounds and both passed away on the same day. New officers of the Black Diamond ARC are K8ZDV, pres.; K8NNF, vice-pres.; W8SSA, secy.-treas. New ECs are W8PRO, Mingo County; K8INA, Raleigh County; K8GWV, Monroe County; K8UEH, Wood County. A new OES in Wood County is WN8JDJ. WA8FIC is working 8RN-WYN-PON-EAN and made BPL again. W8IRN, Kanawha County EC, reports 30 full ARPSC members with 14 mobile units. The Emergency Net meets on 29,490 and 50,250 Mc. New officers of the Tri-State ARC are K8-EEJ, pres.; W8IEQ, vice-pres.; W8DUV, secy. and pub.; K8YEU, treas.; WN8KCJ, activities. Active Tri-State ARC members in the recent Toy Drive were WA8ACH, WA8AOW, WA8CGR, WA8JCE, W8AFX, K8CAY, W8DUV, W8DUW, W8IEQ, K8IYU, W8EH, K8GOM, W8NJL, K8OEN, K8OVI, K8KST, W8SDU, K8UDN, K8UHC and K8WHN. WA8DGE comes through with an outstanding traffic total and makes the BPL again. New officers of the Kanawha Radio Club are W8PQQ, pres.; W8HZA, vice-pres.; W8NCD, secy.; WA8AYP, treas.; W8VZO, act. mgr. Circle July 4 and 5 on the calendar for the West Va. State ARRL Convention at Jackson's Mill. Contact Ray Anderson, W8DUV, for information. Traffic: WA8DGE 258, WA8FIC 232, W8HZA 90, W8CKX 30, W8JM 14, K8ELH 5, W8DUV 3.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØ-TTB—NET NUTS: I received some traffic the other day addressed to SADIE, Alamosa, Colo. *Unless messages received have address and signature complete*, they cannot be delivered. The unofficial Sleepy Head Net on 3820 kc. from 7 to 9 A.M. each morning, picks up weather reports and tapes them for rebroadcast on

(Continued on page 136)



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CAT. NO. 320-509, FREQUENCY RANGE 30-54 MC*

BASE STATION SIDE-MOUNT ANTENNA

*Exact frequency must be specified

Cat. No. 320-509 Side-Mount 2.5 db Gain Antenna is designed for applications requiring an antenna which must be side mounted on existing or new towers. This antenna has essentially a cardioid pattern and has approximately 2.5 db gain in the forward direction. High strength aluminum alloy is used for all antenna parts, except the mounting clamps, which are made of stainless steel. All insulators are made of the best available materials for the various uses involved. Each antenna is supplied cut to the desired operating frequency and is assembled ready for installation.

SPECIFICATIONS

Electrical:

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	±1.0%
Maximum power input	500 watts
Flexible terminal extension	18 in. of RG-8A/U
Termination	Type N male with Neoprene housing
Lightning protection	Direct ground

Mechanical:

Radiating element material	6061-T6 aluminum
Insulated support material	Phenolic
Feed point insulator	Polycarbonate
Overall length	10 ft. at 50 Mc, 16½ ft. at 30 Mc
Spacing from tower	8"
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs. at 30 Mc
Weight	15 lbs. at 30 Mc

Stainless Steel Mounting Clamps supplied to mount antenna on round tower legs 1 in. to 1½ in. diameter.

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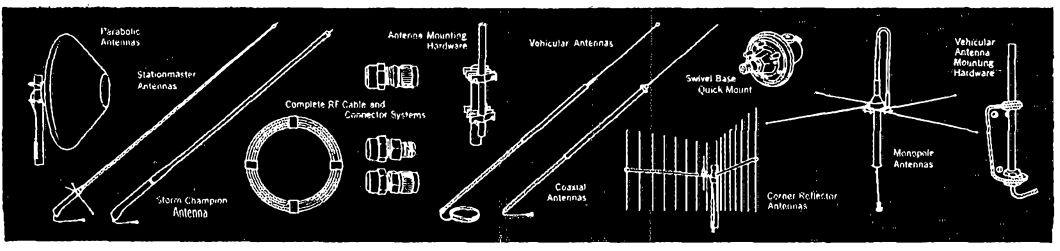

BC. KØBCX is NCS. After the weather it turns into the shittless net for those poor souls who don't punch time clocks. WØSIN, our SEC, is getting his staff back in shape, but it sure is costing him gas and tires. HNN reports traffic total of 170. Traffic: WØHXB 276, KØZSQ 257, KØDFH 145, KØCDW 135, WØSIN 26, WØCBI 17, WØENA 5, WØPGX 4.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, Jr., W7OCX. SEC: K7BLR. 1964 officers of the Ogden Amateur Radio Club are K7RGY, pres.: K7SAD, vice-pres.; K7PRH, secy.-treas.; W7ZJI and W7LLH, directors. K7s LUM, GOF, SAI, SAJ, YQU, YQZ, NYO and PRJ have received Radiological Monitoring Certificates from the Utah County Civil Defense. EC K7PRJ said that a very successful drill in the transfer of radiological information was held Jan. 14. BUN traffic was 63 for the month. Conditions were poor but hard work on the part of net members pushed the traffic through. Director Carl Smith, WØBWJ, was the principal speaker at the annual banquet of the Ogden Amateur Radio Club. His talk was primarily on the incentive licensing proposal. Traffic: K7OCX 66, W7LQE 50, W7VTJ 27, K4VRT 10, W7QWH 7, K7PRJ 4, W7ZC 3.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN. V.H.F. PAM: W5FPB. 10-Meter PAM: W5WZK. W5CRF is a new ORS in Albuquerque. Glad to have you with us, Don, we need active traffic stations. WN5IPW underwent major surgery recently and now is doing fine. We all wish "Happy" a speedy recovery. This being my last report as SCM I wish to take this opportunity to thank all those who have worked with me and given such loyal support over the past two years. Because of very critical illness in my household (XYL), many of the things I should have done had to be left undone and more than likely I have done some things that I should not have done. Hi. Again I ask that each of you give active support to your new SCM: it is only through that support that we can build the kind of organization that all of us want. It takes only a moment to fill out an activity card to keep him informed. Even negative reports are useful. We welcome K5IQL back to his second term as our SCM and wish him only the best. BCNU and 73 to all. Traffic: W5CRF 77, W5ZHN 27, KØJTD/5 13.

WYOMING—Acting SCM, Wayne M. Moose, W7CQL—Nets: The Pony Express meets Sun. at 0830 on 3920 kc., YO, Mon., Wed. and Fri. at 1830 on 3610; TWN, daily at 2000 on 3570. K7AHO is vacationing in Mexico; W7BXS in Tucson and W7VB is in Australia. W7TZK is in his new home on the shore of Glendo Lake. W7VDZ and K7GLL are new members of the MARS 2-Meter Net. We hope to hear K7UHS on the air soon. W7HEB, W7TEL and W7VTB are busy building new amplifiers. K7UUF has the rig set up in his new home in Casper. W7UFB is on the sick list.

Lial D. Branson, W7AMU

Our Wyoming Section mourns the passing of this pioneer and well-known amateur who died Jan. 31, 1964. He was known personally by almost all hams in the state and served several terms as Wyoming SCM. Lial was an early-day aviation enthusiast and licensed pilot. He taught radio during World War II, was later interested in auto racing. He was a charter member of the Casper Amateur Radio Club. We will all miss W7AMU as he closes the switch for the last time.

Glad to hear K7TAQ back on the air with a different rig; K7KMT is working on a transistorized transmitter which he hopes to put aloft with the aid of a balloon. The Casper Club has a full agenda of activities planned for 1964. Traffic: W7BHH 42, W7DXV 22, K7AHO 10, K7VTM 8, K7ITH 5, W7AEC 4, K7QJW 4, K7YPT 4, K7BTE 2, K7HHW 2, K7NQX 2, K7RFL 2, K7SLM 2, K7STM 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: W4USM. PAMs: K4BTO, K4NSU and K4WHW. AREC groups continue to do excellent jobs over the state in Sabin programs. Several stations were active in the V.H.F. SS. The Birmingham group reminds everyone of its hamfest May 3. The FARO now is affiliated with ARRL. The new president is W4RLS. New equipment: K4UMD-bandspanner, K4WSH-HW-12, K4YUD-200V. Alabama had a top representation in RN5 for 1963. WA4AVM was 2nd and WA4EXA 4th in total QNI. WA4EXA was top QNI in RN5 in Dec.

(Continued on page 138)

IT'S HERE!!!

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WA4AVM made the CAN honor roll with top QNI from RN5. We are proud of all these records. WA4AVM made the BPL for the 3rd time. K4KJD is back on 6 meters. Jan. net reports:

Net	Freq.	Time GMT	Days	Sessions	Avg. Tfc.	Avg. QNI
AENB	3575	0100	Daily	31	3	7.4
AEND	3725	2200	Mon.-Sat.	26	1.23	8.35
AENM	3965	0030	Daily	31	3.5	44.7
AENP	3955	1230	Mon.-Sat.	26	2.7	12
AENP	3955	0000	Daily	35	2.6	21.2
AENR	50.55	0115	Tue./Thurs.	9	.33	24
AENT	3970	2230	Daily	34	3.27	13.85

Traffic: (Jan.) WA4AVM 472, K4WOP 191, WA4EXA 122, W4YRM 101, K4AOZ 84, K4WHW 59, K4BSK 52, K4UMD 34, K4KJD 31, WA4EXB 27, WA4MGI 24, K4NSU 22, K4DJR 21, K4FZQ 20, K4GXS 15, K4NUW 15, WA4LDC 13, K4CTB 10, K4WWP 8, K4JDA 4, K4RIL 4, K4WSH 4, WA4LGF 3, WA4CWI 1, WA4YFN 1. (Dec.) WA4AVM 631, WA4EXB 114, K4DJR 51, WA4GLX 35, K4CFD 34, K4KJD 16, WA4OPB 8, W4DS 5.

EASTERN FLORIDA—SCM, Guernsey Curran, W4GJI—SEC: W4IYT. The following League Officials have been appointed: A.M. PAM all h.p. bands: W4SDR. S.S.B. PAM: W4OGX. V.H.F. PAM: WA4AZZ. C.W. RM: K4KDN. RTTY RM: W4RWM. It is gratifying to report that many appointment certificates have been received for endorsement. There are a number of traffic handlers who hold no appointment. Please contact your PAM or RM for action, if interested. The FMTN has moved from 7230 kc. to 3945 kc. for obvious reasons and the change has proved beneficial. It is noted that the a.m. nets are handling s.s.b. traffic quite easily, and it would seem that this has been aiding in establishing better frequency coordination and the efforts of the various NCS to this end is appreciated. Officers of the RTTY Society are K4KXP, pres.; K4RNR, vice-pres.; W4RWM, secy.-treas. This society prepares to establish a strong emergency net and key cities are now being set up and the recruiting of RTTYers and appointment of an NCS also is in process. The Florida S.S.B. Assn. elected W4GPD, pres.; and WA4HDH, secy. Those retained in office were W4BNE and W4PUW, vice-pres.; W4JQ, treas.; W4OVE, net mgr. W4GJI remains as a member of the board. WA4JQQ was elected mgr. of the FAST Net to replace W4GPD. This officer must of necessity be a qualified member of the FSBA as he automatically becomes the asst. mgr. of the FSBEN and must act in his stead when required. The policy of this office has been one of action and we shall continue to attempt to keep up the clearance of all mail on a daily return mail basis. The change from Meyer to Cherry Plaza and the dates of the Orlando Convention will be publicized as changed to Apr. 18 and 19. This SCM will be there on the 17th and will look forward to seeing you all. May your tubes run cool! Traffic: (Jan.) WA4BMC 1942, W4KIS 1173, WA4IJH 915, WA4FYV 650, W4TRS 372, WA4RXG 339, K4KDN 273, W4DFU 259, WA4RSQ 259, W4SGH 242, W4MIN 232, WA4LBM 201, WA4JYB 200, W4TUB 183, WA4BAW 156, W4URX 155, W4IEI 152, WA4GBM 147, W4BYG 140, K4RHL 124, WA4LHK 119, K4ILB 117, K4SJH 117, W4AKB 104, K4BY 91, W4SDR 84, K4NVD 73, WA4FGE 61, WA4KDL 43, W4OGX 43, WA4JQQ 34, WA4IXI 32, WA4IYG 30, WA4COR 28, WA4IWO 28, K4OTJ 26, W4YJM 25, WA4BGW 23, W4GUJ 23, K4VNA 21, K4DAX 19, W4VWL 19, W4EHW 17, W4DSH 16, K4FQP 15, K4ENW 13, W4IYT 13, W4SVB 13, W4GJI 10, K4MTP 10, W4LVV 7, W4QVJ 7, W4FP 6. (Dec.) W4KIS 1232, WA4MBC 1126, W4TUB 746, W4MIN 678, K4EHY 611, K4YSN 417, K4SJH 145.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. RM: W4BVE, Tallahassee: The TARC is holding a series of technical meetings to upgrade the proficiency of its members. The club hopes to find a new meeting place soon, through the efforts of WA4EOQ. WN4PUK is building a modulator for his rig. TVI complaints near W4WGR and W4OYR were traced to a CB kilowatt. W4MLE had to call the fire department to cope with a shorted power supply transformer recently! Port St. Joe: W4WEB has a Heath HW-12. When not mobile, he uses it to monitor 3836 kc. daily. Give him a call. WA4NDA also is mobile with an HW-12. Panama City: WA4FIJ was appointed West Fla. RM-RTTY. All those interested in forming an RTTY Net contact him at once. WA4EJF handled considerable traffic from the Canal Zone during the recent emergency. The PCARC provided communications during the March of Dimes Telethon. G3NXV and his XYL were visitors in town. K4MZA and WA4RME are pushing 6-meter activity. Fort Walton: W4ZWD was appointed OBS for e.w. WA4ABP and W4TAO are active on the 145.2-Mc. interrom net. Milton: K4NMZ has a

(*Continued on page 140*)

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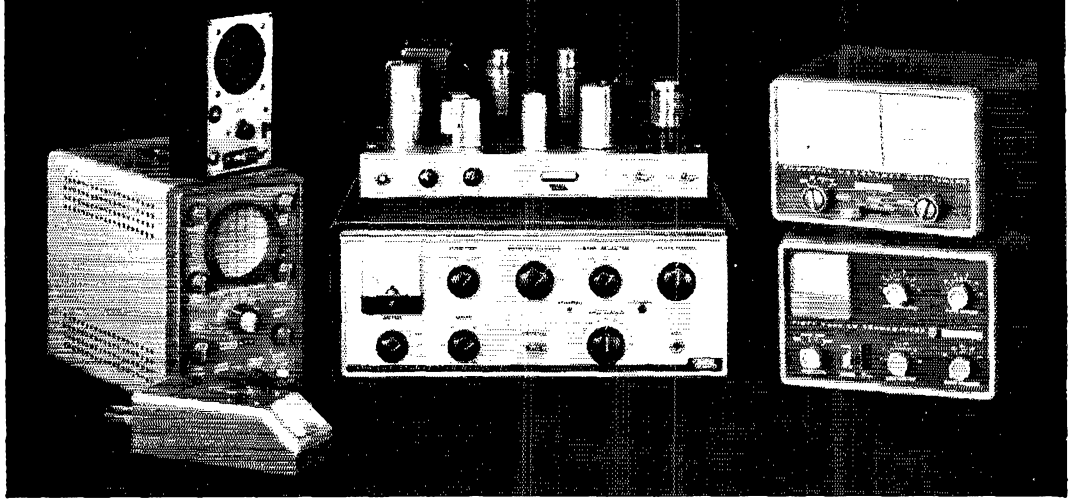

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regular spot as NCS on WFPN, Pensacola; W4HQ keeps skeds with British Guiana on 7010 kc. W4ZPN is getting on 6 meters. W4QK is looking for room among the trees for his beam. Traffic: K4VFY 267, WA4FIJ 223, WA4IMC 168, W4BVE 128, W4WEB 65, WA4ECY 62, W4ZWD 31, W4ZGS 2.

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE. PAMs: W4FYH, K4PKK, W4RZL. RM: W4DDY. New officers of the Sowega Amateur Radio Club are K8PWE, pres.; WA4IQU, vice-pres.; K4IEK, secy.-treas. K4EIK is NCOiC of K4MCL and expects to retire this year after 20 years of military service and settle in Albany. W4HWY, Southeastern Division Director, has been relieved as A4USA operator. K4BVD returned to M.I.T. after an active vacation at the home rig. WA4BVD is active in the Navy MARS program, and K4FUE is now a member of Army MARS Ga. 2. The Rebel Teen-age Net meets week days at 1600. K4NQQ is doing research work on computers. New officers of the Heart of Georgia Radio Club are K4DNB, pres.; K4DKJ, secy.; WA4LBJ, treas.; W4VZB, act. mgr. The club meets at 8 P.M. at the Red Cross Chapter House in Macon. Congratulations to K4CGI on the arrival of jr. operator Parks IV. The ASTRO (Atlanta Society Teenage Radio Operators) is now conducting free classes of instruction in code and theory. W4VIM is happy over the addition of a granddaughter, the first harmonic of his oldest son. Traffic: (Jan.) W4HWY 65, K4FRM 62, K4BVD 40, K4MCL 40, WA4FTM 36, WA4BVD 34, WA4GPA 6, K4FLR 3, WA4LLI 3. (Dec.) WA4BVD 19.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—The amateur community in the Canal Zone once again displayed the type of service that can only be rendered via amateur radio during the recent crisis in this area. KZ5JD, KZ5VR, KZ5RV and others set up a Traffic Control Center to take messages for the U.S. and the operators worked long hours passing the traffic to the U.S. Those outstanding in traffic output were KZ5AX, KZ5AA, KZ5VR, KZ5PC, KZ5EZ and KZ5LC. KZ5UN returned to the U.S. and suffered a stroke on the ship en route to New Orleans. At a meeting of the CZARA discussions were held on the subject of operating on the lower-frequency bands. Several of the operators reported good success with contacts on the 40 and 80 meters. KZ5JT is in school at Oklahoma City. KZ5GQ is one of the newer stations on the air. KZ5AA has moved again because of poor antenna performance at his last location. Traffic: KZ5AX 1085, KZ5VR 680, KZ5AA 600, KZ5RW 500, KZ5UN 500, KZ5PC 261, KZ5EZ 258, KZ5LC 245, KZ4NS 175, KZ5BH 173, KZ5FC 123, KZ5EJ 67, KZ5FL 60, KZ5KA 60, KZ5SM 52, KZ5CL 47, KZ5HH 45, KZ5AG 40, KZ5CO 30, KZ5EV 30, KZ5TD 30, KZ5WE 30, KZ5BF 24, KZ5DX 20, KZ5BO 18, KZ5CU 15, KZ5HR 9, KZ5JC 9, KZ5TT 9, KZ5WI 9.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Kenneth P. Cole, W7QZH—Asst. SCM, E. A. "Pete" Marshall, Jr., K7AWI. SEC: K7NIY. PAM: W7OIF. RMs: W7LND and W7FKK. The Copper State Net meets at 1930 MST Mon. through Fri. on 3880; the Grand Canyon Net Sun. at 0800 MST on 3880; the Tucson AREC Net Wed. at 1900 MST on 2880; the Cochise County AREC Net each Sun. at 1400 MST on 7260 kc.; the Tucson 2-Meter Net at 1000 MST on 145.35 Mc. The Tucson 10-Meter Net, being reorganized by K7OLZ, VMO and VUB, meets every Fri. at 2000 MST on 18.650 Mc. Arizona claims the youngest amateur Extra Class licensee, K7OLZ, 13 years old. K7VMO carried home two first place prizes in the Arizona State Fair, Electronics Division. DL6UK is now employed by the *Tucson Daily Citizen*. He is Anton I. Franc, 2314 East 21st Street, Tucson. The Scottsdale Amateur Radio Club maintains a technical assistance committee. Any and all troubles can be quickly solved by contacting W7FXT. The 1915 station pictured on page 74 Jan. *QST* belonged to, and was operated by, W7EH. New officers of the Old Pueblo Radio Club of Tucson are W7QNC, pres.; K7OBS, vice-pres.; K7BCW, secy.-treas.; W7LHD, activities. A Sunday get-together and pot luck dinner at the Shadow Mountain estate of W7QNC brought a turnout of over 100. The Arizona Amateur Radio Club of Phoenix published a bimonthly newsletter. Contact K7PXJ, 937-2503, if you have items for this paper. W3AN has moved to Litchfield Park, Ariz., from Philadelphia. K7MTZ recently was awarded WAS for the third time. Traffic: W7FKK 80, K7MTZ 64, K7UTF 52, K7VQI 9, K7RUR 6.

SAN DIEGO—SCM, Don Stansifer, W6LRU—Last month I made two goofs in the column: Instead of W6JVA, OO, it should have been OBS, and instead of "officers for the San Diego are WA6OZL, pres., etc.," it should have been the San Diego DX Club with WA6OZL, pres., etc. The new president of the Newport Club, W6KNP, has moved to the Bay Area, and has

(*Continued on page 142*)

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been replaced by WA6VJV. 1964 officers of the Northshores Club are WA6UQK, pres.; W6KX, vice-pres.; WB6GMM secy.; W6SK, treas.; W6BKZ, W6ZBE and WA6QBN, directors. The club meets the 1st Tue. at 7:30 P.M. at the North Clairemont Community Center. A new OO in the section is K6ENX in Escondido, a well-known DXer. The San Diego County hams have organized into the San Diego County Public Service Corps, replacing the AREC. At the head is County EC, W6MHY. Assisting him are W6SK, secy.; W6EWU, asst. secy.; W6KBT, c.w.; K6BPI, RTTY.; W6BKZ, 75-meter phone; W6JUZ, s.s.b.; K3UEY/6, 2 meters; WA6OSB, 6 meters; K6QXN, 10 meters; WA6SJM, AF MARS; K6RYI, Fallbrook; WA6EYX, Escondido; and K6ABG, Vista. The corps has joined with United County Civil Defense and offered its service to them. W6CCE lost his antenna in a big wind. W6NWI is building new finals. New officers of the San Diego Council of Amateur Radio Organizations are WA6CQF, chairman; W6GGX, vice-chairman; WA6MJC, secy.; WA6OSB, treas. All club bulletins report work already underway on Field Day planning. Traffic: W6IAB 6269, K6BPI 3398, W6YDK 3078, K4APK/6 943, W6DGM 185, WA6PDS 152, WA6ROF 124, K6IME 83, K6GJM 32, W6-WRJ 5.

SANTA BARBARA—SCM, William C. Shelton, K6-AAK—SEC: WA6OKN. RM: W7WST/6. The Point Mugu Emergency Net on 144 Mc. is off to a fine start and hold drills weekly with over 20 stations reporting in. The Ventura County Mobile Net meets daily on 3890 kc. at 1400 and 2300 Zulu. They have helped many motorists and assisted the police authorities in accidents etc. W6-KZO is moving to a new QTH and will have a Hy-Tower vertical. W6BJM has a new KW-M2 and an 30LI. WB6GZE is busy with UCLA classes. The RM is about to make BPL if he keeps up the good work. K6VBC and K6MIM are the program sparkplugs for the Poinsettia Club. K6BUD is looking at linears. Very few reports have been received lately from the San Luis Obispo area. How about it, gang, what's new? Traffic: W7WST/6 396, K6AAK 10.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. PAM: W5BOO. RM: W5LR. I would like to call to the attention of all ORSs, OPSs and other League appointees that a part of their obligation as appointees requires them to report any news or activities to the SCM each month. Failure to do this is considered reason for cancellation of the appointment. The Red River ARC held its RACES drill in January with a very good turnout. When a real emergency occurs, the group that has been practicing the most will be the most efficient. WA5CMC reports the amateur class from Novice through General Class of instruction is going great. WA5CRD, WA5CDJ, WA5CMC, WA5CJW and others are devoting many hours to making this project of the Red River ARC a big success. K5PHT has moved to Fort Worth. W5HWT is the proud papa of a girl born in December. WA5EVS reports the Wylie Wireless Club of Wylie, Tex., consisting mostly of citizen banders, has started a Novice class with 13 in attendance. The club president is K5-SXU. W5TOO has gone into business for himself, in an amateur radio store in Fort Worth. K5ESX has a new KWM-2. K5FLA has a new SW-240. K5IFL is in the Air Force and stationed at Griffiss AFB in N.Y. K5-KNX has been appointed OO. K2EIU/5 is stationed at Webb AFB and is very active on the TEX C.W. and RN5 Nets. W5LR reports good DX such as JAs, VKs and ZLs on the low end of 80 meters. W5DTA needs more c.w. traffic handlers. Traffic: W5DTA 628, W5LR 22, WA5EEM 14, K2EIU 3.

OKLAHOMA—SCM, Bill Lund, K5KTW—Asst. SCM: Cecil P. Andrews, W5MFX. SEC: K5DLP. It is with deep regret that I accept the resignation of K5-JOA as PAM for the Sooner Traffic Net. Don served under W5DRZ and myself for several years and has done an outstanding job. It was a very rare occasion when Don missed a net, but because of other obligations he has found it impossible to continue as PAM. I want to thank Don for a job well done. Our former SCM, W5DRZ, was appointed to take over the job as PAM. K5CAY still is working on the 2-meter nets and getting almost state-wide coverage. It is his goal to get a complete coverage so if you can, please check in on the "Juice Can Net" on 144.180 Mc. at 1800 CST. W5BKN recently retired from FAA. K5MTT moved from Oklahoma City to Dallas. W5HZD has a new TR-3 transceiver. Misfortune has fallen upon our ranks, one of our oldtimers, W5QL, of Oklahoma City, has become a Silent Key. We wish to offer our condolences to his family. K5OST, of Tulsa, traded his old Tech. Class license for a new General Class. I would like to see

(Continued on page 144)

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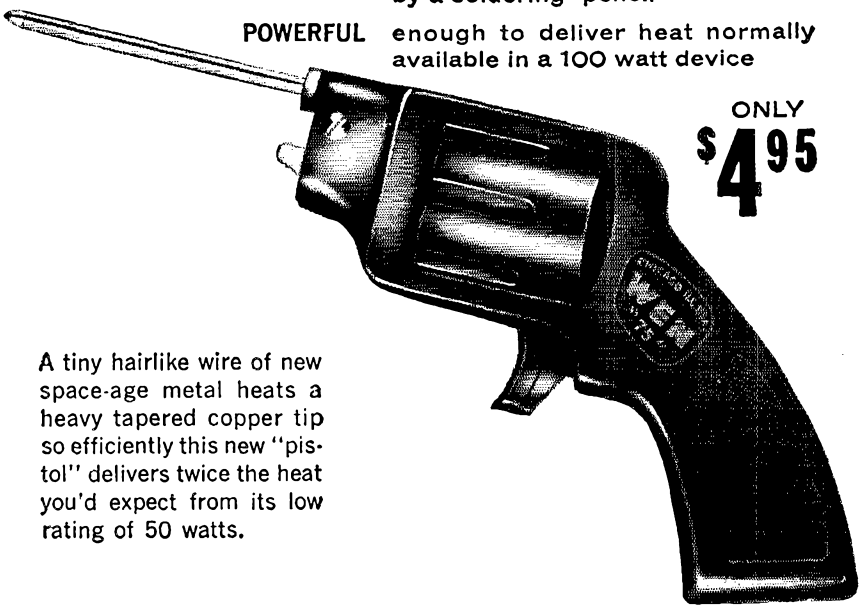

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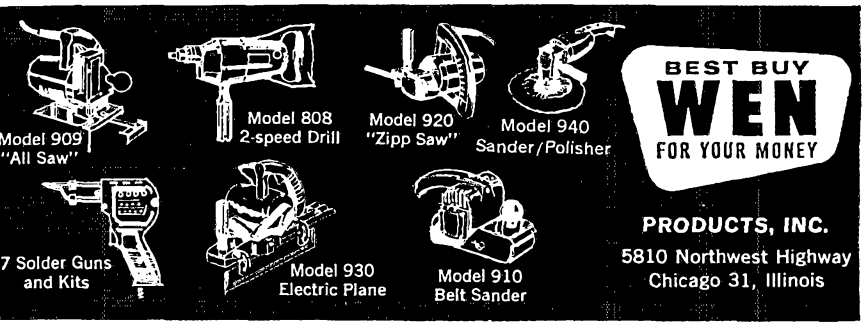

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more Technicians and Generals upgrade their licenses. W5ZXD in Bartlesville has been suffering from S.I.I. (Severe Installation Interference) and his antenna masts have been in jeopardy for the past month. Let's all get our equipment checked out and ready for the coming storm season. Traffic: (Jan.) K5IBZ 515, W5QMJ 447, W5PPE 266, K5TEY 249, W5MFX 75, W5JXM 55, K5KTW 41, K5DLP 28, W4DRZ 21, K5MTC 21, K5OCX 20, K5CAY 18, W5PAIL 17, W5EUL 13, W5GMJ 13, K5JOA 1, 2W5UYQ 12, K5CBA 8, K5YAQ 6, W5EHC 5, W5VDD 5, WA5FLV 3. (Dec.) W5JXM 112.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—SEC: W5AIR. W5ANV has a new Galaxy 300. The Houston Amateur Radio Club has one of the best museums of old radio gear this writer has seen. Anyone visiting Houston should make a special effort to get by the club house and see it. W5QEM has a new TR-3. K5ZSC has a new NCX-3 mobile. K5LWL is building a new linear, 750 watts s.s.b. and 1000 watts c.w. The only trouble is that school is interfering with his hamming. W5KR reports that conditions on 80 meters sure were peculiar in January, changing from short to long skip and back again in just a few minutes. W5ICL went on a five-day trip up north, but because of cold weather and snow it was nine days before he could get back home. Now is the time to be making your plans to go to the STEN Convention at Victoria May 29, 30 and 31. You don't realize what you have been missing until you attend one of these. If everyone who has been commenting on the columns being missing from *QST* would send me some news, we could have a good column. If you won't send any news, don't be surprised if the column is missing. Traffic: K5LWL 33, K5ZSC 1.

CANADIAN DIVISION

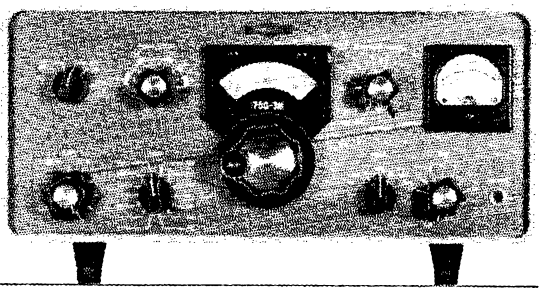
MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A.E.W. Street, VE1EK. VE1 and VO amateurs have a special invitation to participate in the "Georgia QSO Party" May 9-11. Details available from this office. Planned your vacation yet? Don't forget the Charlottetown Convention, Sept. 5-7. Newfoundland amateurs are to be congratulated on their splendid work in the recent emergency. Those active include VO1s CV, GP, EI, BM, DJ, FK, AR, BQ, BR, AE, GO, DZ, CX, AO, VE2BPS and K8JQO/VO. New amateurs from Bathurst include VE1AGM and XYL VE1AGN. VE1DB and VE1OM are new members of the QCWA (Quarter Century Wireless Club). VE1WL (Mr. "DX") has made WAZ twice, phone and c.w.! VE1FN recently visited Ceylon. Does your club or group receive the Canadian Division *Newsletter*? If not, please advise. Once again we request your cooperation with nets. They serve a purpose. Should you not participate, at least you might cooperate by reducing the QRM on or near the net frequencies. It seems necessary to remind the amateur that he has responsibilities as well as privileges! Traffic: VE1DB 6, VE1OM 1.

ONTARIO—SCM, Richard W. Roberts, VE3NG—The Nortown ARC operated the booth at the Sportsman Show in Toronto. VE3EQU, down Windsor way, is on 2 meters. VE3DKR has returned from the hospital. VE3CIL won the SS 2-meter trophy and VE3ESE the 6. Both trophies were presented at a recent v.h.f. party in Oakville. VE3BKO is leaving Wingham to reside in New Hampshire. The Belleville ARC elected VE3CBE, pres.; VE3DHH, vice-pres.; VE3CAB, secy.; VE3AUU, treas. An attempt to have the customs and sales tax removed on ham band *only* amateur equipment will be presented to Ottawa by our Canadian Director, VE3CJ, in the near future. VE3FDK is the new editor of the Hamilton paper. New calls in the Hamilton area are VE3EMG and VE3FQV. VE3QU is on 160 meters. ECs are urged to use the section of 11 meters that we hold for emergency nets. With a bit of liaison work you can utilize the services of some of the General Radio Service lads by having one of your operators licensed as such. VE3EZI is now mobile on 2 meters. VE3EZC is building a linear. VE3ESE has one hundred watts on 2 meters. VE3EWJ is now in Cornwall. VE3BUR is on vacation in Florida. VE3FPF (ex-VP4NC) is now in Port Credit. New calls in the York North ARC are VE3FRD, VE3FRL, VE3FRW, VE3FRK. Welcome to the Heathkit ARC in Cooksville. The club call is VE3KIT, the pres. is VE3BS. We were pleased to hear that the Timmins ARC is functioning again. The St. Kitts Air Cadets are on the air with the call VE3BHF and is looking for similar groups. Officers of the Ontario DX Assn. are VE3UX, pres.; VE3BAC, vice-pres.; VE3EWY, secy.; VE3EPL, treas. The DX Assn. is affiliated with the ARRL. VE3WW is a new ORS on OQN. Traffic: VE3DPO 110, VE3AWE 89, VE3NG 89, VE3CYR 85, VE3BZB 79, VE3FGV 60, VE3BUR 53, VE3EHL 39, VE3BLZ 32, VE3CLK 31, VE3ETM 29, VE3GI 29, VE3DUU 28, VE3CFI 27, VE3CIL 26, VE3DRF 25, VE3EAM 22.

(Continued on page 146)

Frank: How's this! John

John: Let's run an ad like Collins' on their new rcvr. All our customers ought to know about it!
Frank Q



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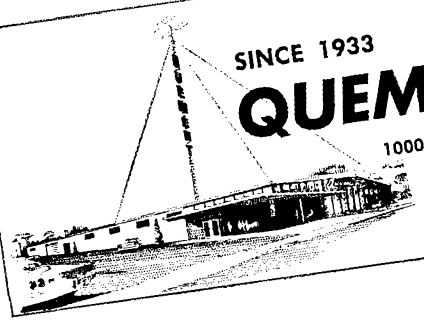

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QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. With great regret we learn that VE2YA has been transferred to Halifax. He has handled the VE2 QSL Bureau most efficiently and also has excelled DX-wise. Please report into the AREC Sun. Net on 3755 kc. at 11 A.M. VE2EC reports that ARPSC in the St. Maurice area is active. Any group not receiving the newsletter by VE3CJ, Canadian Division ARRL Director, please contact him. VE2ATU likes 160 meters and snags some DX there. Our DX king on this band is VE2UQ. VE2BR, mobiling in Florida, did not lack news from the home front supplied by a number of eager skedders. VE2BB also visited the sunny South. G2AMX and VE7AMB are QRL a course at TCA in Montreal. TCA hams meet on 14,120 kc. Sun. at 1900Z; also 14,020-kc c.w. VE2OJ is a new ORS and VE2AQJ a new OO. Une station opérée par les maisons mères-des Oblates et des Voluntas Dei, VE2BOL, établit des contacts avec leurs missionnaires en Amérique du sud. Cette station, à Trois-Rivières, a été l'objet d'un reportage dans un journal local. Ceux qui seraient intéressés à avoir des renseignements sur les coordonnées des récents satellites peuvent communiquer avec VE2TU. VE2CQ a organisé un rassemblement à l'occasion du Carnaval de Québec. VE2PY enfin actif après une longue absence sur 20. Un autre club enformation à l'Institut de Technologie Laval. VE2AJV aimerait contacter des amateurs intéressés à la TV amateur. Traffic: (Jan.) VE2ALH 86, VE2DR 76, VE2BOC 56, VE2FY 48, VE2EC 47, VE2BEZ 36, VE2AUU 26, VE2UN 19, VE2OJ 10, VE2BMS 4, VE2CK 2. (Dec.) VE2BEZ 30.

ALBERTA—SCM Harry Harrold, VE6TG—SEC: VE6FS. PAM: VE6PV. RM: VE6AEN. ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ. OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA. OOs: VE6HM, VE6NX, VE6PL. OBSs: VE6HM, VE6AKV. ORS: VE6BR. OESs: VE6DB, VE6HO, VE6AKV. In the future your SCM will have articles in the Northern Radio Club bulletin and Calgary *Key-Clicks*. Our PAM reports that Jan. 29 was the worst blackout ever with checkins nil. Our SEC reports that some ECs are not sending any reports. Watch for your free copy of the Northern Radio Club bulletin. A report was received from a club remarking that ARRL had not done much for the Canadians, but it forgot to mention that the Canadians were not supporting the only organization that stands for all amateurs. When your membership is only 2 out of 10 what do you expect, those 2 to carry the other 8? And don't forget that if you don't holler how does the other fellow know what you want. Don't blame anybody but yourselves. Traffic: VE6HM 240, VE6TG 15, VE6FK 4, VE6UH 2, VE6VE 2, VE6ADS 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB – VE7AUF and VE7US are both undergoing surgery of a serious nature and we all wish them a speedy recovery. The Vancouver ARC is the first winner of the plaque donated to the three-transmitter class by the Windsor ARC to the 1963 Field Day Canada Club winner. VE7AMW was heard on c.w. answering 160 Contest stations. If any one wants tall poles see VE7LL. Congratulations to the Orchard City Club on its affiliation with ARRL. VE7AC is finishing the new house. Bet it is wired for c.w. (Phone on forty Reg?) VE7BJV received a Public Service Award from the League. VE7QQ reports from Terrace the increase of 144-Mc. mobiles. The West Kootenay ARC reports activity on 2 meters and that the members come from miles around in spite of snow and ice to attend the meetings. VE7GR is progressing with his amateur TV transmitter. The Nanaimo Club really is active on 6 meters and theory classes are doing well. Many clubs in B.C. and elsewhere are forming club nets. What about the space 26,960-27,000 kc? If not used you know who will be there. Has anyone heard from Prince Rupert? Have sent several letters and heard nothing. Traffic: VE7BJV 70, VE7OM 49, VE7QQ 45, VE7BHH 41, VE7AC 36, VE7AMW 6.

MANITOBA—SCM, M. S. Watson, VE4JY—The highlight of January was a visit by Goodwin L. Dosland, WØTSN, ex-President of ARRL, and his XYL to the ARLM meeting. Dos gave an excellent address on the value of ARRL to the amateurs. VE4UM, the University of Manitoba club station, has been granted affiliation with ARRL. The Windsor ARC is presenting a trophy for competition during ARRL Field Day, open to Canadian clubs only. For details see your SCM. VE4RE has been elected the new pres. of the WARA. Congratulations to VE4QD on his 76th birthday Jan. 7. We regret to learn of the death of VE4TQ, late of Carman, Man., on Jan. 8. Traffic: VE4UM 15, VE4EF 11, VE4ZB 9, VE4NV 6, VE4QD 6, VE4SW 6, VE4EG 4, VE4JY 3, VE4EX 2, VE4QJ 2, VE4UC 2, VE4JA 1.

SASKATCHEWAN—SCM, Mel W. Mills, VE5QC—Spring is here and mobile time is fast approaching so take care and break for those weaker breakers. VE5OB's

(*Continued on page 148*)

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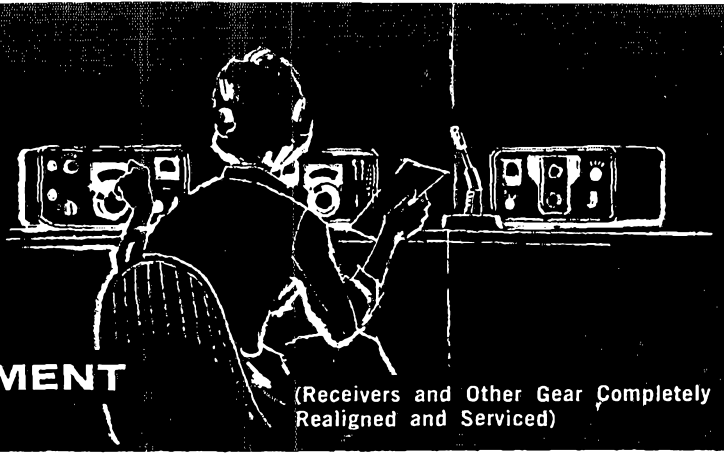

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SX101A	249	RANGER	149	TX-1 Apache	159
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SX117 L.F. tuner	29	6N2 LINEAR	229	HW20 Pawnee	199
SX110	99	THUNDERBOLDT	339	HX20 ssb xmtr	167
S85	79	TR SWITCH	19	MR-1	77
SX99	89	HQ100C	99	MT-1	47
SX42	149	HQ100AC	119	SB10	79
SX43	87	HQ105	109	HP10	29
SX62A	279	HQ140X	109	HEATH GDO	14
S76	79	HQ145	159	HEATH VOX	24
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		HC10 ssb adaptr	69	R100	67
		HX50	289	B&W 5100	139
		HX500	339	LA400C	147
		NCX-3	269	P&H 6-150	179
		AC SUPPLY	79	PALCO 65 xmtr	69
		HRO-60	299	PMR7	74
		NC173	89	MI1070 supply	37
		NC183D	177	AMECO x6w	69
		NC125	79	AMECO ac supp.	19

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winter hamfest was a success and *now* is the time to plan for the main hamfest in Moose Jaw the July 1st *week end*. VE4VX *now is* VE5OK *at* Dana. VE5FY *is* out of the hospital after two eye operations. Better get those modulation meters out, fellows! Congrats to VE5-HN on his new ticket at Keneston; Also VE5DW, the son of VE5MS. Congrats to VE5JI for his WAS on 80-meter c.w. Glad to see VE5FH back on the air after 7 *years. Gordon, our PAM, reports that the net is func*tioning well considering adverse band conditions and increased propagation, but he underlines the need for careful zeroing in on the net control station. We still require applications for EC's and AREC members. Congrats to VE5MG on his ORS appointment. Traffic: VE5HP 109. VE5LM 29, VE5NX 22, VE5QC 8, VE5HQ 6, VE5IG 4.

Correspondence from Members

(Continued from page 93)

Yet the ARRL says it can bring back the practice of "home-brewing" with its incentive licensing program. This is ridiculous. Any person with an ounce of common sense can see that he can buy a piece of commercially built gear for less money than he could build and calibrate it himself. The problem is not one of technical know-how, it is one of dollars and cents. If he finds that he can build an item cheaper and better than he can buy one, he will build it.

Will incentive licensing make hams a better class of people? No. There is no way that the ARRL or anyone else can improve the already high caliber person who becomes an amateur radio operator. I can honestly say that I have never had an unpleasant QSO in my ten years of hamming. This includes QSOs on a.m., s.s.b., RTTY, and c.w. Yes, some of us still work c.w.

What *do* we need? When the highways become crowded do we kick the cars off the road? No. We build bigger and better highways. When the bands become crowded should we kick all the Generals off the air? No. We should strive for additional frequencies to accommodate the load.

Who advocates incentive licensing to begin with? Certainly not the majority of hams I've talked to (and I've talked to many). No, it's a few old timers who have lost their prestige of being among the elite few with "phone" privileges — and they want that prestige back. By the way they act it would seem that they couldn't care less about the rest of the hams in the country. Unfortunately many of these people hold office at ARRL headquarters.

No gentlemen, I don't want to cancel my ARRL membership. I intend to stick around and do all I can to vote this type of individual out of office. We don't need incentive licensing, what we need is directors who look forward to the years ahead, not backward to 1914. — *W9ZMR*

¶ Much has been said, both pro and con, about the proposed incentive licensing plan. Most of the correspondence I read that is in favor of the proposal seems to be well thought out, unemotional, and sincere. However, very few of the people who are against the proposal have impressed me as having any logical reason for their position. In fact, most of these people seem to be arguing from a very selfish viewpoint.

Since I started operating in 1953, I have been aware of two major types of amateurs: those who take an active, constructive interest in their hobby, and those who complacently take advantage of the situation afforded by their more active fraternal members.

There was a time when amateur radio was at the state of the art, but today the state of the art has

(Continued on page 150)

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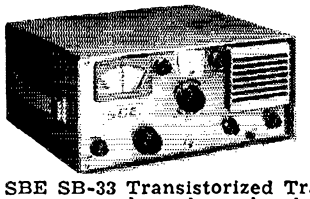

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passed many of us. Now is the time to make an honest, sincere, intense self-evaluation of our ranks, correct our faults, re-educate ourselves and finally, cast out the dead wood.

Let us not allow amateur radio to stagnate. Since we have not been overly successful in raising ourselves by our own footsteps, very possibly the incentive licensing program, if passed, will give us enough initiative to get started and then, perhaps our own inertia will be enough to bring amateur radio back up to the high level to which it rightfully belongs. — *K2CQQ*

¶ If we, in Europe, had such a situation on the bands as you must have, as you are proposing an incentive licensing system, I sure would be for it. — *SM4DRD*

¶ I appreciate all that the League has done for me, and if I should ever be so unthinking as to blast the League for any of its policies, or if I should ever disagree very hardily on any League matter, I will still be sure to remember the public services of the League.

Regardless of what the League does that starts controversy, it must be praised for the personal help it gives hams and the free material and advice which it dispenses. — *W1ØECV*

¶ If there is not enough incentive in ham radio for those who make that statement, then let them get out of amateur radio and go into commercial radio. It is as simple as that. — *W9AOD*

¶ The comments in the January issue of *QST* infuriate and embarrass me. I refer in particular to such gems as ". . . drop it down your pretty little smokestack . . ." and ". . . I will burn my . . . In short I hate you. . . ." These are the people we can well do without! Ham radio to them is just a hobby. It is not and I hope it never degenerates to that. To me ham radio is an avocation and way of life. It is a highly technical process and must be treated as such.

I am now a Technician Class and very proud of it, I hope to hold, however, the highest class available someday. The ARRL is to be praised for their firm stand to better our lot. — *W1ØFTK*

¶ I am pleased to see all the effort being made to provide a real incentive licensing program; this is the surest sign of progress I can think of. The plan has been needed for a long time. Naturally those who always want something for nothing or who are unwilling to add to their own knowledge, will always oppose such a plan. Perhaps amateur radio can still find some way to convince them of the obvious fact that without some kind of incentive plan we may wake up some day and not have any amateur radio at all. I wish the League much success in the present program. — *K4CQ.A1/8*

¶ When a bright 12-year-old like K7OLZ can pass the examination for an Extra Class license, why all the beefing about getting an Advance Class for phone privileges on certain bands? Perhaps the old tree needs some pruning for its own good.

Judging from some of the vituperative comments in January *QST*, I've decided Hartford hasn't had a worthy critic since the untimely demise of Colonel Clair Foster, ex-6HM. — *W6HG*

¶ I am behind you all the way on your incentive licensing program. The technical knowledge of hams in the U.S.A. is far behind that of our foreign brethren. We need less hams with the "why bother" attitude of W1LWV and more with a thirst for knowledge. — *KØALL*

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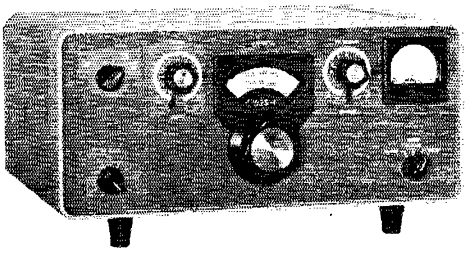

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(Continued from page 16)

and ¼ by actually unsoldering them, he plate lead from the base of RFC_6, and the screen leads from the screen terminals. Turn the power back on and let the tubes warm up. Apply grid drive to the final amplifier and then set C_{10} at maximum capacitance. Next, tune C_8 through resonance. As you go through resonance you'll notice a slight "kick" in the grid-current reading. The object is to adjust C_5 by moving the two halves of wire up or down the tubes, or away from the tubes, until you get the least amount of "kick" in grid reading as you tune through resonance. The adjustment of C_5 was not critical in our setup. Turn off the power again, reconnect the plate and screen leads, and the transmitter is ready for operation.

One last word of caution. Whenever doing any wiring work on the transmitter, make sure that all voltages are *off*. Always be extremely careful when working around any area of the rig (or any rig for that matter) where you can come in contact with "hot" leads. The voltages in this transmitter can be lethal. QST

Strays

Frank Davis, Curator, Department of Communications and Applied Sciences, Henry Ford Museum and Greenfield Village in Dearborn, Michigan, would like to hear from all hams past or present who were operating in 1913 or earlier. It's in connection with Old Timers Night, May 30.

—...—

Code practice is being run nightly at 1800 and Saturdays at 1400(PST) on 3747 and 7198 kc., by W6OZ. Code proficiency runs are Sundays at 1400 PST.

Public Service Corps

(Continued from page 51)

decided upon as most necessary. The procedure may vary considerably from place to place. Later in this series perhaps we can consider some typical alert and activation problems.

Where Does RACES Come In?

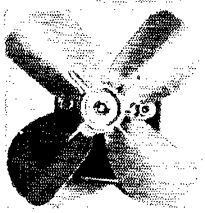
RACES is the Radio Amateur Civil Emergency Service, an amateur service sponsored by the Office of Civil Defense and implemented through local and state civil defense agencies under a special sub-part of the amateur regulations. Its operation is restricted to civil defense communications, but this term has received rather broad interpretation and in some areas RACES and AREC operation have seemed to duplicate each other.

There can be any number of reasons for this, and all of them are bad. Duplication of facilities is one of the things that ARPSC (and AREC before it) has been set up to avoid. RACES is a means for amateurs to serve civil defense, using

(Continued on page 154)

BULLS EYE BUYS AT ARROW

HAND-PICKED FOR HAMS BY HAMS



COOLING FAN

110-115 V., 60 cps, 4 aluminum blades. Ideal for many applications. Shown approximately 1/25th of actual size. Shipping weight 3 lbs.

$2.29 ea. 3 for $5.95

DIRECT/5:1 REVERSE VERNIER DRIVE

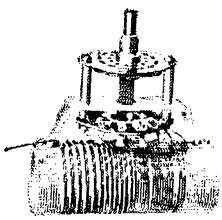
The newest in the line of fine tuning aids from Jackson Bros. Direct/Slow Reverse (5:1 ratio) Vernier Drive. Easy fixing — requires only one ⅜" hole. High torque, low back lash, smooth and permanent movement, coaxial spindles, ¼" shaft dia.

Model 4111/RV
Amateur Net **$1.95**

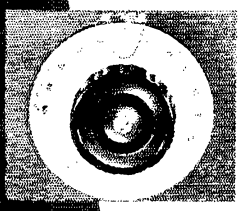
AMERICAN GELOSO V.F.O.'s

Wired, tested, calibrated, ready for use.
Mod. 4/104 for driving one 807 or 6146 final in AM or CW under Class "C" conditions.
Mod. 4/102 for driving two 807's or 6146's final. Has 5 bands. Supplied with Mod. 1640 dial ass'y.
Mod. 4/103 for 144-148 mc bands. Combines VFO primary freq. of 18 mc with xtal fundamental freq. of 12 mc. Supplied with Mod. 1647 dial ass'y.
Mod. 4/104, 4/102 or 4/103 less tubes and xtal, each **$29.95**

AMERICAN GELOSO PI TUNING COILS



Units have 6 posit. tap switch mounted on ceramic coil form. Mod. 4/111 designed for use with two 807's or 6146's (in parallel). Freq. Range 3.5 to 29.7 mc.
Mod. 4/112 is designed for use with single 807 or 6146. Handles up to 60 w. Range: 3.5 to 29.7 mc.
Mod. 4/111 or 4/112, **each $4.95**



PRECISION BALL DRIVE DIAL

Another superb product of Jackson Bros. of England. 4" dia. dial with 6:1 ball drive ratio. Fits standard ¼" shaft. For that velvet touch...

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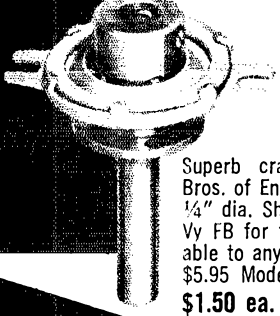

PRECISION PLANETARY-VERNIER for exceptionally fine tuning

Superb craftsmanship by Jackson Bros. of England. Ball bearing drive. ¼" dia. Shaft 1⅛" long: 6:1 ratio. Vy FB for fine tuning. Easily adaptable to any shaft. Comparable value $5.95 Model 4511/DAF.

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Same as used in W2EWL SSB Rig—March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x ¾" w. x ¾" d. New and fully shielded.

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212 — DIgby 9-4730 516 — Pioneer 2-2290 203 — Victor 7-5889

our own bands. Bear in mind that in time of national emergency (a euphemism, meaning *war*), civil defense will serve the entire civilian population, and RACES will be one of the important elements of its communications system. In normal times, the ARPSC can serve any or all agencies, *including* civil defense. Thus, on the surface, it looks like RACES for wartime, ARPSC in peacetime; but it's not quite as simple as all that, because the necessity for RACES preparedness gets into many peacetime activities, including those connected with natural disasters.

Detailed discussion of the problems arising therefrom are beyond the scope of the present article. It almost goes without saying that every to-be-served agency, government or otherwise, would prefer to have its own amateur facility, set up just to serve *it*, and several of them are even now attempting to do just this. This would seem, however, to spread the amateur effort rather thinly among all, and in the end greatly diminish the total public service we can render as *amateurs in an amateur service*. We feel that whatever merit there is to special-agency organizations and to RACES (and there is considerable), we would not be doing our utmost in the name of amateur radio public service if we failed to provide for an over-all amateur public service such as ARPSC. We invite and urge all amateurs to participate. We invite and urge all agencies desirous of amateur services to look into use of ARPSC to serve their emergency needs. We are opposed to nothing; but we are *for* ARPSC, and hope you are too.

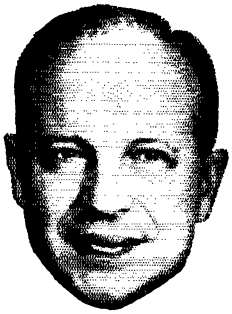
How You Can Help

There is room for every licensed amateur in the ARPSC. Somewhere, somehow you can take part if you really want to. Too many amateurs make a barely visible effort, shrug when they find no one especially eager to use them, and go back to their hobby-hamming, not knowing that they are lopping off more than half of the reason for being an amateur in the first place — the satisfaction of doing something useful and worth while.

How you can participate depends mainly on your situation and your inclinations. You can be part of the Emergency Division (AREC), or the Traffic Division (NTS). If you want to, of course you can be part of *both*. A great many amateurs are.

Let's assume you want to take part in the AREC. The man to get in touch with is your local emergency coordinator. If you don't know who he is, we'll be glad to tell you. He is usually

(*Continued on page 156*)



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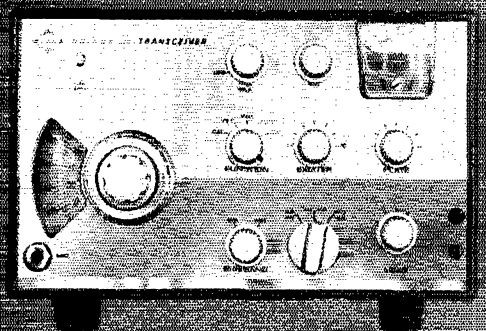

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someone within local telephone range, so you can call him up, get the forms (or we'll send them), fill them out, and then he'll let you in on what is going on locally. From that time onward, you will have a part in shaping the local AREC group under his leadership.

Sometimes there *is* no local EC. After all, being EC is a voluntary job and if properly done it can be a lot of work and responsibility. *Someone* has to step forward; if no one does, no organizing gets done. In this case, you would send your completed forms to your *section* emergency coordinator (SEC), and when doing so give serious consideration to volunteering to organize locally. If you are an ARRL member and have a conditional, general, advanced or extra class license, you are eligible to do so. Otherwise the SEC will merely issue your AREC membership card and keep your registration on file until an EC *is* appointed.

Taking part in an organized traffic net can be an invigorating experience; perhaps you are more inclined to *this* kind of operation. If you think you might be, get a copy of the net directory (ask us) and study out the local net situation. When you have selected the net in which you would like most to participate, do some listening to get the hang of the procedure, then take the plunge. We think you'll be surprised at the jovial reception you'll get. And these fellows aren't just chewing the rag; they are handling message traffic as part of a nationwide system.

Whatever you do in the line of public service work, try to keep in mind one important thing: you aren't doing anyone or any organization any particular favor in taking part. You are a part of it, and it is a part of you. In the end it will be whatever you, and thousands of amateurs like you, make of it.

ARRL has much material available to assist ARPSC organization, and chances are in the future we shall have even more. Whatever your problems, don't hesitate to write us about them. We don't have the solutions to all, but we will be glad to wrestle them with you. QST

Cathode-Follower Power Supplies

(Continued from page 33)

oscillations will surely result. Such oscillations are best detected on an oscilloscope. There should be no change in ripple waveform when one of the tubes is unplugged.

Silicon diodes were used as rectifiers in spite of their high initial cost, simply because it was a pleasure to build a power supply that did not

(Continued on page 158)

by hams... for hams... Harvey is reliability

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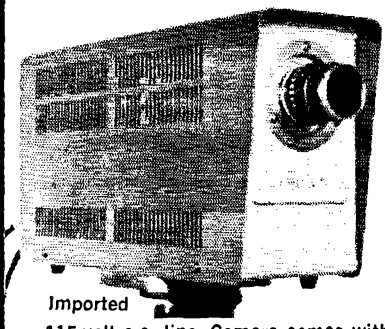
VALUES OF THE MONTH



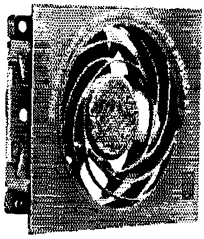
SHIBADEN TRANSISTORIZED TV CAMERA

Versatile, compact, closed-circuit type TV camera with all solid-state circuitry is ideal for ham TV and numerous other applications. Simple connection to any standard TV set through a single RG59/U coax cable. Standard video signals produce pictures of sharp definition. Modulated RF output is available on any unused VHF channel from 2 to 6 for direct feed to receivers; or unmodulated video signal can be taken off for monitoring or other purpose.

Standard scan, compatible with domestic receivers, uses horizontal frequency of 15,750 cps and vertical frequency of 60 cps (synchronized by power line). Check with EIA test patterns demonstrates high resolution and linearity. Modulated RF output at 25 mv is enough to feed any number of TV sets; direct video output is 1 volt p-p. Output is matched to RG59/U cable (not included). Imported Draws negligible power (approximately 18 watts) from standard 115-volt a.c. line. Camera comes with 25... F:1.9 lens, but the C-mount lens base accepts all common 16mm motion-picture lenses, such as wide-angle, telescopic, zoom and others.

The HV-13A closed-circuit TV camera has many uses in the home, in industry and in the laboratory. It can be used for keeping an eye on the baby in another room or on the lawn, for remotely observing hazardous operations or experiments, and for providing service to sports fans at race tracks or arenas. It can be combined with a microscope to present highly magnified views to numbers of people in educational TV or other applications.

MODEL HV-13A CLOSED-CIRCUIT TV CAMERA.....**$399.95**



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Uni-card

158

contain a vacuum-tube rectifier occupying chassis space and consuming 15 watts just to heat up the surroundings. The total peak voltage from the transformer secondary is 1132 volts. The 1N2489s have a p.i.v. rating of 600 volts. Using only two of these in series in each leg as shown is perhaps working too close to the ragged edge. QST

Happenings of the Month

(Continued from page 80)

An Old Old Timer (not really that old, but he's a founder of the group bearing that name), Roland B. Bourne, W1ANA, has joined the staff part time as Curator of the ARRL Museum. The restorations he has already done are a joy to the eye, and we look forward to the luster coming from the glass cages in the lobby when he finishes the renovations.

In the past year a couple of additions have been made to the League's professional staff at headquarters. Dick Baldwin, W1IKE, Managing Editor of *QST*, has taken on the additional duties of Assistant General Manager officially, and of "head janitor" unofficially. To assist him in the "*QST* factory", therefore, we have a new little fellow (only 6 feet, 6½ inches tall) from near Pittsburgh, Pa., Edward Mehnert, W3JZJ/K1EUK, a graduate of Pitt.

In the Communications Department, G. Peter Chamalian, K2UTV/1 has joined the staff principally as assistant to National Emergency Coordinator George Hart. Pete is well known in N. Y. State traffic nets, and studied at Knox College (Ill.).

There have been staff anniversaries, too. General Manager-Editor-Secretary John Huntoon, W1LVQ, observed his 25th in February. Our National Emergency Coordinator, George Hart, W1NJM/W3AMR reached the quarter-century mark in August, 1963. George is the principal architect of the Amateur Radio Public Service Corps and its two branches, NTS and AREC as they are now constituted. Assistant Circulation Manager Joseph A. Moskey, W1JMY made it to twenty-five in December. Joe keeps our radio-store outlets happy and well supplied with books, and orders supplies and equipment for the hq. gang, to keep *us* happy — and hard at work!

Welcome aboard and congratulations, respectively, to the new and old at headquarters.

THIRD PARTY: 4U1ITU AND CANADA

The **International Telecommunications Union** and **Canada** have an agreement permitting the handling of third-party messages during the various Geneva meetings between 4U1ITU and VE/VOs similar to the agreement between the U. S. and ITU announced in this department last month. The present agreement is scheduled to expire on July 31, 1964.

W/K CALLS ON VO LICENSE PLATES

The Government of Newfoundland is believed to be the only one recognizing amateur calls

(Continued on page 160)

issued by another country for call-letter license plates. At the urging of the Newfoundland amateur body, the government grants license plates bearing W or K calls to amateurs serving in the U. S. Armed Forces in Newfoundland. *QST* congratulates the amateurs of Newfoundland their government and the Society of Newfoundland Radio Amateurs for this heartwarming gesture.

QST

How's DX?

(*Continued from page 65*)

CR8AD, Defesa Maritima, Dili, Timor
DM3GML, J. Dorer, Zschirnsteinstrabe 12, Dresden A21, E. Germany
DU4-5-0DM (via PARA)
EL2AD, c/o U.S. Embassy, Monrovia, Liberia
EL3D (via W3NNC)
FB8WW (via 5R8BC)
FP8CB/FO8 (via W2JAE)
FU8AG, Box 104, Santo, New Hebrides
HC1s AGI DC (to W3EIS)
HC1HL, c/o U.S. Embassy, Quito, Ecuador
HH66D, E. Henry, Plantation Dauphin, Cap-Haitien, Haiti
HI8s MOG NOG, G. Lluberes, Box 366, Santo Domingo, D.R.
ex-HL9KE (see preceding text)
HL9KR, E. Quinn, 6146th AFAG, APO 18, San Francisco, Calif., (or via ISWL)
HP2MR, P.O. Box 961, Colon, R.P.
HS1S, Box 2008, Bangkok, Thailand
JA1CG, H. Takahashi, 4811 Midori, Kawaguchi, Saitama, Japan
ex-JZ0PH (to PA0HES)
K5YAA/VO1, G. Chouinard, Navy 103, FPO, New York, N. Y.
KG1CX, W. Lancaster, 1983rd CommRon, APO 23, New York, N. Y.
ex-KL7DBG/KS6 (to KG1CX)
ex-KR6LJ, F. Jerome, 908 Holloway Dr., Midwest City, Okla.
LA9PI/p, c/o Norwegian Embassy, Reykjavik, Iceland
LJ2S (via NRRL)
LU2XL/9K3 (via W5DOZ)
MP4TBA, Box 300, Abu Dhabi, Trucial Oman
OA8D/3 (via W2CTN)
PJ3CD, Box 82, Willemstaad, Curacao, N.W.I.
PY7TS, Box 251, Natal, R.N., Brazil
PZ1CM, Box 71, Nickerie, Surinam
SM5BKK/9Q5 (via SSA or RSGB)
SM6CTY/mm (via SSA)
SV0WF (via W2PCJ)
SV0WFF, c/o ISWL, 7 Parkside Gardens, E. Barnet, Hertfordshire, England
SV0WGG, Box 998, Iraklion, Crete
VP2LS, Ellis, P.O. Box 171, Castries, St. Lucia, W. I.
ex-VR3A-VK9GP (to VK2ANB)
VR3s O S (see preceding text)
VS5GS, G. Scott, P.O. Box 300, Brunei Town, Brunei
VS9MB, Amateur Radio Club, RAF, Gan, BFPO 180, c/o GPO, London, England
W5HJ/KJ6 (via K5WYY)
W5WVX/mm, E. Harwell, USS *Gridley* (DLG-21), FPO, San Francisco, Calif.
W7BBX/mm, H. Batie, USS *Mattaponi* (AO-41), FPO, San Francisco, Calif.
W8BBI/mm (to W8BBI)
W9ITF/KP4, B. Hale, P.O. Box 202, Ramey AFB, P.R.
WA8JJM/mm, N. Sterrett, RM2, USS *Charles H. Roan* (DD-853), FPO, New York, N. Y.
WA8KKD/VO1, M. Lyons, Navy 103, FPO, New York, N. Y.
XE3CPL, P.O. Box 329, Merida, Yuc., Mexico
XE0ZZZ (via W8ZZZ)
XW8AW (via W4ECI)
YA1BW (via DL8AX)

(*Continued on page 162*)

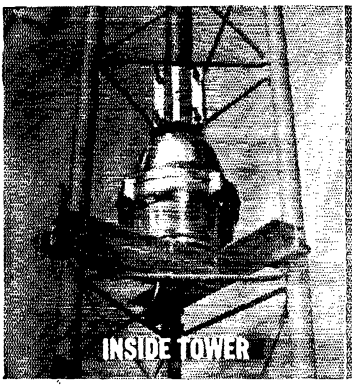
YN6RD, Box 925, Managua, Nicaragua
YS1FQM, Box 99, San Salvador, El Salvador
YS1RES, P.O. Box 1401, San Salvador, El Salvador
ZB2AH, c/o ISWL, 7 Parkside Gardens, E. Barnet, Hertfordshire, England
ZE1AC, Box 3232, Salisbury, So. Rhodesia
ZK1AR (via K4SIB)
ZSs 8Z 9Z (to ZS6BBB)
3V8IR, J. Van Lear (VE7IR), c/o ISWL, 7 Parkside Gardens, E. Barnet, Hertfordshire, England
5N2JAB Box 994, Lagos, Nigeria
5N2JCW, c/o U.S. Embassy, Lagos, Nigeria
5Z4IN-VQ4IN, K. Smethurst, G3GPE, 35 Westfield, Oldtown, Hebdenbredge, West Yorkshire, England
5Z4IV (via W2CTN)
5Z4JU, Box 30125, Nairobi, Kenya
9G1FE, Box 194, Accra, Ghana
9Q5III, Box 44, Elisabethville, R. C.
9U5AC c/o U.S. Embassy, Usumbura, Burundi
9X5MH (via DL1ZK)

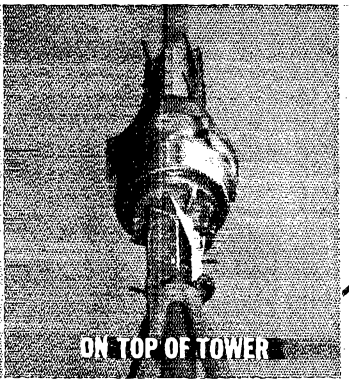
Your benefactors in the preceding proceedings are Ws 1ADW 1ECH 1KQY 1SWX/1 1WPO 1YYM 2GT 3EFZ 5KNE 7DJU 8BIE 8KIT, Ks 1TCE 3SLP 4JSZ 5JVF 5YPS 7VMO 8UNL ØJPL, WAs 4CZM 4DZU 6KHK 8CHU 9ICQ, WB2FMK, VE3ADV, VK3AOM, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary 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), Kanawha (W. Va.) Radio Club *Splatter* (K8WMQ), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (W1BPW, K1NOL), Northern California DX Club *DX*er (W6HVN) and West Gulf DX Club *DX Bulletin* (W5IGJ). Editors and reporters, well done!

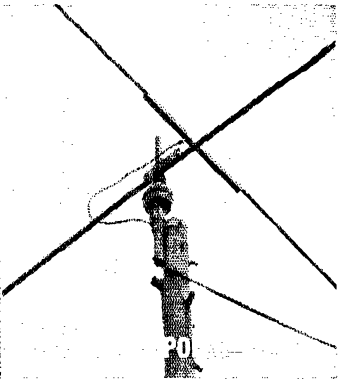
Whence:

EUROPE — Several interesting DX contests are lined up on the Continental docket this month. From 1500 GMT on the 11th to 2200 the 12th, PZK (Poland) urges your indulgence in its c.w.-only International SP DX Contest on 10 through 80 meters. Non-SP's will strive to catch as many SPs as possible, a given station to be worked but once per band. The standard RST001, RST002, etc., serial exchange will prevail. You rate one point per SP contact, the sum of these to be multiplied by the number of Polish call areas collected per band for final score. May 31, 1964, is the deadline for submitting log entries to PZK, P.O. Box 320, Warsaw, to be eligible for possible certificates of meritorious performance to be distributed among high scorers — . — . — Then, from 1500 GMT on the 18th to 1700 the 19th, USKA (Switzerland) holds its annual Helvetia-22 DX Contest on 10 through 160 meters, c.w. and phone entries to be filed separately. The usual RST- or RS001, RS002, etc., serials will be exchanged between Swiss amateurs and the rest of the world. Each HB station can be worked once per band at 3 points per contact, this point total to be multiplied by the number of Swiss band-cantons worked for final score (watch for these 22 canton designators appended to HB serials: AG AR BE BS FR GE GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG and ZH). Logs postmarked within 30 days of the contest for shipment to HB9ZY, USKA Traffic Manager, Meggen-Lu, Switzerland, will be eligible for possible certificates of merit to be awarded high scorers. Good chance to gun for the 22 QSLs needed to qualify for USKA's coveted H-22 certification! HB9KC and friends will climb 11,700-foot Jungfrau Joch to put HB9KC/p on the air from rare Valais canton. By the way, Swiss portables no longer sign the HB1 prefix . — . — . — Next, from 1200 GMT, April 25, to 1800 the 26th, you can choose phone or c.w. weapons for battle in the 1964 PACC Contest sponsored by VERON (Holland) wherein non-Netherlanders will work as many PA/PI persons as possible, once each per band, 1.8 through 30 Mc., using the customary RS- or RST001, RST002, etc., serial swap. You earn 3 points per two-way exchange, this point total to be multiplied by the number of Dutch band-provinces worked for final score. Each log, post-marked on or before June 15, 1964, should be sent to PAØVB, VERON Contest Manager, Keizerstraat 54, Gouda, The Netherlands.

QST







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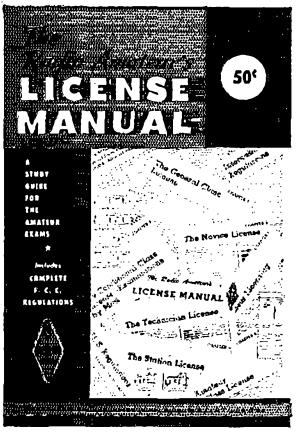

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W1DPO, Paul W. Karr, Chatham, Mass.
W1EGR, Aubrey R. McKinney, Boston, Mass.
W1JXU, Bernard B. Twombly, Woburn, Mass.
W1MMP, James W. Lenihan, Brighton, Mass.
K1NBB, Frederick A. Bernklow, Jr., Thompson, Conn.
W1NHO, Richard T. Smith, Henniker, N. H.
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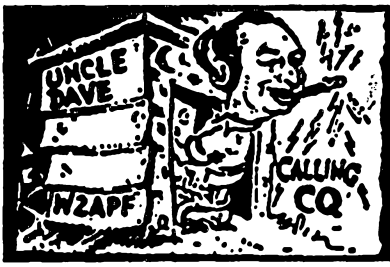

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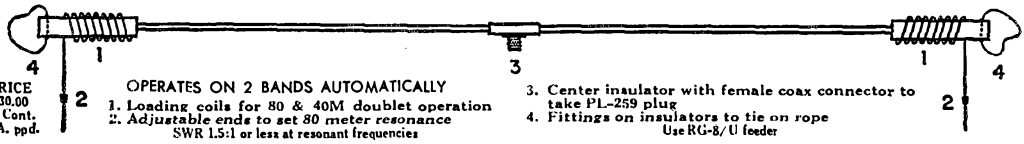

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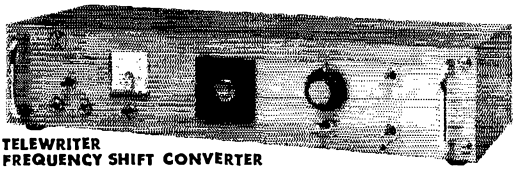

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W1, K1 — G. L. DeGrenier, W1GKK, 109 Gallup St., North Adams, Mass. 01247.
W2, K2 — North Jersey DX Ass'n, P.O. Box 303, Bradley Beach, N. J. 07720.
W3, K3 — Jesse Bieberman, W3KT, P.O. Box 204, Chalfont, Pa. 18914.
W4, K4 — Thomas M. Moss, W4HYW, Box 20644, Municipal Airport Branch, Atlanta, Ga. 30320.
W5, K5 — Brad A. Beard, W5ADZ, P.O. Box 25172, Houston, Texas. 77005.
W6, K6 — San Diego DX Club, Box 6029, San Diego, Calif. 92106.
W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon. 97301.
W8, K8 — Walter E. Musgrave, W8NGW, 1215 E. 187th St., Cleveland, Ohio 44110.
W9, K9 — Ray P. Birren, W9MSG, Box 510, Elmhurst Illinois. 60128.
WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn. 55921.
VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
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VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ont.
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VE6 — W. R. Savage, VE6EO, 833 10th St., N., Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, B. C.
VE8 — George T. Kondo, VE8RX, W Dept. of Transport, P.O. Box 339, Fort Smith, N. W. T.
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QSLS. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

RUBBER Stamps $1.00. Call and address. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLS. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

1¼" Call QSLS $2.40/100, $2.90 (2 sides). Samples. Garlepy, 2624 Kroemer, Ft. Wayne, Ind.

OUTSTANDING QSLS. New low prices. Professional, Samples 10¢ Brigham, North Billerica, Mass.

SUPERIOR QSLS. Samples 10¢. Ham specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLS: 100 for $3.50. Glossy. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLS. Samples free. Blanton's. Box 7064, Akron, Ohio 44306.

RUBBER STAMP call: Name, address: $1.00. Dick, WAØFTH, Box 35, Irvington, Nebr.

QSLS. $2.50/100. New catalogs. Samples 10¢. Longbrook, Box 393-W, Quakertown, S.J.

FINE QSLS. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

RUBBER Stamps for hams, sample impressions, Hamm, W9-UNY, 542 N. 93, Milwaukee, Wis.

QSLS-CB-SWLS Letters and cards, $2.00 and $3.00 per 100. Sample 10¢. Martin, 828-A Schuylkill Ave., Reading, Penna.

QSLS. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

RUBBER Stamps for QSL cards. QSL kit includes: 3 stamps, ink, pad, plus 5 year QTH and call change certificate. Write free information. E & R Rubber Stamp, 50 Gerald Rd., Rantoul, Ill.

RUBBER Stamps, 3-line, $1.00. Andrew Travis, 2002 West 8th, Austin, Texas, 78703.

QSLS, SWLS 3-colors 100, $2.00. Samples dime. Bob Garra, Lehighton, Penna.

QSLS. Samples, dime. Printer, Corwith, Iowa.

FREE QSL Samples. 1167 East 23rd, W6OHE Press, San Bernardino, Calif.

CANADIANS! Sell 75S-3 revr. Used six months. In perf. condx. Eric, VE1PB, 3065 Olivet St., Apt. 12, Halifax, S.S.

CANADIANS! Wanted for cash. Communications receiver, Drake 2B, NC-270 or? Also want SB-10, White, VE3BUX, 5 Northwood Crescent, Belleville, Ont., Can.

SIDEBAND: Marauder exc., $300; Drake 2B and spkr. and Q-mult., all exc., $200. Also ant. relay and acc. All for $480.00. Stu Personick, WA2KCH, 3230 Cruger Ave., Bronx, N.Y. 212-014-2381.

SALE: HT-32A, $400; SM-10, $60; Gonset Super Six converter, $18. All excint condx, f.o.b. W3BCP, Morganza, Md.

COLLINS Station complete: 32S-1, 516F-2, 30L-1, 75S-3: $1195.00. 75A-4, 3100 and 500 cycle filters: $450.00. QST bound volumes. Run is from 1926 through 1925: $100. Entire lot: $1595. Cash and carry deal only. Write W2AEB.

HALLICRAFTERS SX-111, excint. John Lamy, KØWME, 509 W. B'way, Sedalia, Mo.

CENTRAL Electronics 100V, excint condx, $485.00; HQ-170, $249.00; K2JZW, 212-HI-5-8947.

CREAM Puff, matching Hallicrafters station, HT32 ($350); HT33A ($500), SX101A ($260); FV729 mike, LP filter, connecting harness and desk. All for $995 certified check or separately as priced. K2JEI, 1122 Hillside Avenue, Plainfield, N.J.

DRAKE 2B, $199; DX-100, $99. Might trade for VHF rig. K9FLY, 4524 Cross St., Downers Grove, Ill. WO 8-2003.

WANTED: 4 or 5 element 20M Telrex beam. Desk cabinet for relay rack 19" x 17" panel space, any condx. W2UGM, 66 Columbus, Closter, N.J. Tel: PO 8-1884.

SELL: Cleaning out! Send for list of power supplies, meters, miscellaneous parts, etc. Molyneaux, 5801 Shadesview Dr., Mobile, Ala. 36608.

EQUIPMENT Constructed, kits assembled, communication receivers and service equipment serviced, 40 years of electronic experience. Wally Cox, 1826 N. Talbot, Indianapolis 2, Ind.

COLLINS Owners! Work A.M. Wired kit, $5.00. No soldering, holes, chassis removal! Switch In-Out! (State Model)! KWM-2 independent receive control, $15.00. It's a honey! Kit Kraft, B-763, Harlan, Ky.

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.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141.

SELL, swap or buy ancient radio sets and parts, magazines. Laverty, 118 N. Wycombe, Landsdowne, Penna.

INVADER 200 5 months old, like new condx. Must sell to first reasonable offer. All offers acknowledged. Fern Belanger, 61 Lafayette St., Fall River, Mass.

SELL: Drake 2B, 2BQ combination speaker and Q-multiplier, 2 AC xtal calibrator. Cost $327 but will sell for $260. New. Transtenna T-R switch, $45; 2 walkie-talkies, like new, 1-1½ watts, each $50; Edico low-pass filter, $5. You pay shipping. R. Lamb, 1219 Yardley Road, Morrisville, Penna.

FOR Sale: Heath DX-20 transmitter; AR-3 receiver, QF-1 "Q" Multiplier complete with manuals, perf. condx. Used only four hours. $70.00. Blakeslee, 17 Mountain Rd., Chatham, N.J.

SHAWNEE Transceiver, excint condx: $180. Dan Reid, Anderson College, Anderson, Ind.

INTERESTED In two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable to members of St. Mary's Radio Club, or as tax exempt donation to Missions. K8WLB, St. Joseph's Mercy Hospital, Centerville, Iowa.

304TL tubes wanted. Also other xmttg and special purpose tubes. We will buy military or commercial transmiters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

ATTENTION! Mobilcers 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.

MUST Dispose: 82 copies Proceedings of the IRE. 3 volumes complete, 1926 to 1952. Real bargain for lot. Write for list Mrs. Miriam Y. Knapp, W1ZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

WANTED: For personal collection: QSTs March, April, May and August 1916; ARRL Handbook Edition 1. CQ's for 1945 thru 1947. W1CUT, 18 Mohawk Dr., Unionville, Conn.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

WANTED:Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GArfield Area code 201-471-2020.

OVER 400 QSTs, CQs, Radio, Callbooks, Handbooks, etc., 1925 through 1962. $100 or best offer lot only, f.o.b. Minneapolis. Send stamp for list. WØCTW, 8715 Logan Ave. South, Minneapolis, Minn.

QCWA—Amateurs licensed 25 or more years are eligible for membership in Quarter Century Wireless Association. See page 63 November 1963 QST. Write Executive Secretary W2ZM for information, 244 Forest Ave., Locust Valley, N.Y.

FOR Sale: Complete instructions including 28-p. booklet and 26" x 36" schematic for converting the ART/13 transmitter to AM and SSB. $2.50. Satisfaction guaranteed. Sam Appleton, K5MKI, 501 N. Maxwell St., Tulia, Texas.

FOR Sale: 200V in excint condx: $565 f.o.b. Indianapolis or you make reasonable offer. Bob Heaton, K9RDL.

HEATH Mohawk receiver, gud condx: $155. Jerold Peacock, Rte. 1, Dade City, Fla. 33525.

HALLICRAFTERS Linear HT-41 w/spare 7094: $225.00. Edmund Rawa, W3DWC, 2231 Lake Ave., Baltimore, Md. 21213.

NEED Specifications manual for Elmac A-54H transmitter. Buy or send deposit for temporary loan. WA1ATU, 91 Mansfield Apts., Storrs, Conn.

NCX-3 with AC supply. New, less than 20 hours on the air. In orig. cartons: $350.00. K2TRU, Marty Schiff, call: 212-LO-6-7387. Write: 1684 West 8th St., Brooklyn 23, N.Y.

CE-100V wanted. Please state details. Write W6IOW, 1246 M.B.B., Manhattan Beach, Calif.

WANTED: SSB transmitter, 32S-3, HT32, etc, 2-meter transmitter, 6N2, Seneca, etc. Gud 2-meter convrtrter. NYC area. Dave Smith, 510 West 112th St., NYC, AC 2-7317.

SELL Complete station. Johnson KW w/glass top pedestal. Ranger with PTT and new Astatic mike. Mint 75A-4 w/mtchg spkr, ser. 4908; Dow-Key Relay, T-R switch, Signal Sentry, Tribander beam. Come and get it! $1700 inc. all spares. Charlie Nash, KØYXZ, 307 N. 5th, Atwood, Kans. Tel: MAin 6-3155.

BROKE! Need dough. Sell Hallicrafters S-85, Knight T-60 with Dow-Key Relay, Turner mike, key, xtals, the works: $90. Bud, KV4DI, Cruz Bay, St. John, Virgin Islands, UST.

WANTED: HQ-129X w. matching spkr. Must be in vy gud condx both mechanically and outward appearance and at a reasonable price. Ted Cook, WA2JEM, Edgemere Rd., Montauk, N.Y.

SELL Or trade: Gonset II 2M. Need Twoer, recorder, revr. WA2HRD, John L. Sullivan, 1593 Herkimer Rd., Box 67, Utica, N.Y.

2000 Watts SSB, 1000 watts AM linear, Chippewa KL-1 w/supply, $325.00; new gear, gud condx. Also Apache, $195.00 and SB-10, $65, gud Hammarlund HQ-180C plus spkr, $325.00; Drake TR-3 300 watts PEP, new, $575.00. Excint condx. Will deliver within 100 miles. John Pattee, W1VHF, 60 Pleasant St., Marblehead, Mass.

FOR Sale: Viking Johnson 500, like new condx, factory wired, 500W, AM, 600W, CW. 4-400A in final, complete w/cable, moving. Cost $995. Come and get it for $395. Marty Green, W3VDP, 7101 Ventnor Ave., Ventnor City, N.J. (Atlantic City).

MUST Sell: 75A-4-500A. Globe King, Johnnie Brines, K4-GGM, 16 Barbrick St., Concord, North Carolina.

SELL: VOM Triplett 630APL, $48; VTVM Simpson 303, $58 (both new, unused); RCA xtal marker Gen. WR89, $98; Simpson tube-tester 1000, $95. (Both excint electronically). Col. Edward Sears, K6QQI, 4725 Bridletrail, Santa Rosa, Calif.

SELL: KWS-1, $650.00. In excellent condition. Dave De Armond, W6MSD, 3024 Seminary, Oakland, Calif.

HARVEY-WELLS TBS-50C, VFO and pwr. supply: $75.00. R. K. Fetterman, W3FYC, Blue Bell, Penna.

BEST Cash offer takes Collins 32V-2 xmtr and 75A-1 receiver. Overseas. Cannot ham. Therefore no trades. R. Glass, W5MK, Box 9, APO 63, San Francisco, Calif.

FOR Sale: Duplicate QST and CQ magazine. Send list for quotation. Wanted: Old callbooks, Pacific Radio News, Modern Electics, early wireless gear, catalogs, etc. for private collection. W6YPM.

GONSET II, 2 meters; Lafayette HE-35. Best offer. Sry, no shipping! WA2QPV, J. Van Pelt, 538 Paramus Rd., Paramus, N.J.

APACHE w/SB-10 Sideband adaptor, in perf. condx, $260.00. HQ-145 XC with clock, calibrator, spkr. Like-new condx: $210. Harvey-Wells R-9A Ham-band receiver, $45. W8QHP, 141 S. Schenley Ave., Youngstown, Ohio.

FOR Sale: Unused Hallicrafters SX-140: HT-40. Sry, no trades. Lurie, Barkers Point Road, Sands Point, L.I., N.Y.

FOR Sale: Hammarlund HQ-180XE only used one week. New, $350.00. WB2TXV, Z. T. Tokazewski, 207 Division St., Trenton, N.J.

"HOSS Trader" Ed Moory offers following new equipment at fantastic bargains for cash. No trades. New Galaxy 300, $229; new Swan 240, $269; SB-33, $319; new Collins 75S-3, $549; new Spithre mobile linear, $139; new PR-3 old price, $495; new TH-4 Hy-Gain beam demo ham-M rotor, $175; new Hunter Bandit, $439. Used equipment: HT-37, #269; 2-B, $189; SX-101A, $189; KWM-2 sealed carton with warranty, ser. 12104, $965; 75S-3, $459; HQ-129X, $75; demo HT-44 and FX-117, $559; SX-115, sealed carton with warranty, $399; SR-150, $429; 75S-1, $289; 32S-1, $415; new demo 2-B, $229. Terms cash. Ed Moory, Wholesale Radio, Box 506, De Witt, Ark. Phone WHitney 6-2820.

KWM-2 with 312B3 pwr. supply. In excint condx: $750.00. W3DAE, C. Pool, 69 Greenwood Circle, Wormleysburg, Penna. Call 717-234-9303.

COMPLETE SSB Station: Collins 75S-1, 32S-1, 516 F-2, pwr. supply, spkr. Homebrewed KW 813 G/G linear, complete with power supply and controls. Johnson T/R switch, B&W L-P filter, D-104-C mike, SWR Bridge, 50 ft. self-supporting tower, Ham-M rotor and TA-33 beam, 5 extra 813's. Many other items. Only $1250.00. Contact Bob Hays, 182 Cherokee Rd., Hendersonville, Tenn.

SELL: 6-meter transceiver, HE-45A, $75; DX-40 and VF-1, $35; complete station, Harvey-Wells T-90, R-9A, pwr. supply, mike, key, etc. $150; HB-150 watt CW transmitter (McCoy, June '62 QST), less than cost of the parts, $50; RCA audio generator, $20; RCA RF generator, $20; DeVry 5" 'scope, $20. Capt. R. G. Melzer, W4GMZ, 362A Chance St., Ft. Devens, Mass.

CASH For callbooks. Old callbooks prior to 1925 or after 1931 wanted. W8EF, 795 Lake Shore, Grosse Pointe, Mich. 48236.

EXCELLENT KWS-1 and 75A-4, three filters, speaker. All for $1100 cash and carry. K4UMC, 107 Chatham Lane, Oak Ridge, Tenn.

WANTED: 1.5 Kc mechanical filter for 75A-4. R. Lumachi, 73 Bay 26th St., Brooklyn 14, N.Y.

HEATHKIT Mohawk receiver w/spkr, $240.00. Cheyenne mobile transmitter, AC pwr. supply, w/mike, cables, $90.00. Station is in fine wkg condx. Need college money. Jared Wolf, K3ATX, 1451 Lenox, Schenectady, N.Y.

FIRST Certified check or money-order for $550 gets (unopened boxes) Drake TR-3 #3325 and AC power supply AC-3, #5522. LeRoy D. Lawhorn, W4V1W, 213 McDonald Ave., Greenville, S.C. 29609.

DX-40, in excint condx: $45.00. H. G. Shaffer, Jr., WA8CXD, Box 38, Madison, West Virginia.

GUD! Viking II, factory-wired, $140.00. Harvey-Wells R9A revr, $40. W. Steen, 8 N. 3rd St., Selah, Wash.

NATIONAL FRR-24 dual diversity receivers and converters, etc. $495; FRR-21 low freq. recvr. $175; SP-600JX17, $425; R-390 URR, 500 kc, 32 mc., $675; CE 200 V, $625; URA8A, $195; 51J-3, $675; Boehme Aut. keyer, $125.00; Wheatstone perforator, $175; Drake 2B $199.00; Thor 6 transceiver $295.00. Wanted: Teletype equipment. Alltronics-Howard Co., P. O. Box 19, Boston, Mass. 02101 (RI 2-0048.)

SELL: Following items in mint condx: KWS-1 with RTTY at $700; model 14 typing reperf at $100. Telrex Triband beam (needs slight work) at $30. Want: R-278B/GR, R-390A, R-390, R-391 recvrs. N. K. Thompson, WiLWV, 99 Water St., Millinocket, Me.

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.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

SELL: SP-600 J-11, perf, condx. $375; VFO O-165, $25; carbon ptt mic, $3.00. Will crate and ship. Prices are f.o.b. Lawton, Okla. WAØENH, Vee Brown, 4204 Pollard, Lawton, Okla.

FOR Sale: DX-60 xmtr, like new, $80. Walt Robbins, Jr. RR #1, Daleville, Ind.

NOVICE: Exclnt xmttr. Factory-wired Globe Chief Deluxe, 75 watts input, 80-10 meters. WA4JSX, "Butch" Smith, 4606 Belmont Park Terrace, Nashville, Tennessee.

DX-40 with VF-1 and SX-71, in exclnt condx. $150. 4 810s and two 813s, unused, $5.0 each. Tom Haymond, W8CCN, Rte. 5, Box 159, Fairmont, W. Va.

GONSET GSB-100, $225.00; GSB-101 linear, $240.00. W5FJR, 5475-G Kelley, Fort Knox, Kentucky. Shipped collect.

SELL: 1 Kw final PP813s, 10-80 meters. All HDVL and JDVL coils, 2 spare 813's, $50.00; 36 in. cabinet. Best offer; 1 Kw xmttr in 72 in. cabinet; PP813's, Millen 807 driver, screen modulator, pwr. supp. 2500v at 1A. 2 spare 813's and 866's. All coils. $125.00. HT-18, $25.00; xfrmr 300V at 400 M, $25.00. W3EVW, 313 Pontiac, Lester, Penna.

FOR Sale: S-53A, OF-1, FCV 6M. $29.99 plus shipping. K4JCX, Box 3162, Oak Ridge, Tenn.

SALE: Heath SSB station, in perf. condx. HX-20 transmitter, $195; HR-20 receiver, $135.00; HP-20 pwr. supply, $30. Also: Hornet beam, rotator, cheap. Louis Grill, WB6COA, 505 W. Mauna Loa, Glendora, Calif.

MATCHBOX, $45.00; Vibroplex Original deluxe, $20; Hy-Gain 14 AVS, $20. Ameco LN-2, $2.00. Shield mike, $2. K8CVV, 4612 Woodland, Royal Oak, Mich. 48073.

WANTED: KWM-2 with AC pwr. supply. J. B. Hill, 3509 Victoria Rd., Birmingham 13, Ala.

JOHNSON Viking II, VFO Matchbox, Hallicrafters SX-96 with RME DB23 Preselector, D-104 mike, Vibroplex test set. Desk wired complete, $325.00. Estate of W9KGD. Will separat items. Tel: 312-668-7385. Mrs. P. Roloff, 704 N. Blanchard Wheaton, Ill.

TOROIDS: 88 mhy uncased, 50¢ each. Tom White, 867 Berkinshire, Dallas 18, Texas.

SELL: 40 ft. E-Z Way crank-up tower, galvanized inc. Wonder Ground post, $225; Ham-M rotator and indicator with control cable, $95; TH-4 Hy-Gain multi-band beam, $100. All items are like-new condx and are guaranteed perfect. K3MVP, 8258 Brittany Place, Pittsburgh, Penna. 15237.

MUST Sell R-100A/S meter/spkr. $100. WA8DWT, 205 Gidding Pl., St. Louis, Mich.

HAMMARLUND Receiver HQ-160, $190; Heath transmitter HX-20 with two power supplies and TR switch, $210; Johnson Matchbox, $35; Heath HO-10 monitor scope, $35.00; Electro-Voice mike 664, new, $35. Miscellaneous, etc. D. L. Robinson, 513 Dix Rd., Jefferson City, Mo.

SALE: HQ-180, Viking Valiant, 3-El Triband beam, rotator, tower, or any part. In mint condx: $550 takes all. N.Y. call TI-2-9500, Ext. 532 (W2DRS).

JOIN Newark News Radio Club. Organized in 1927. All phases of SWLing. 25¢ for sample Bulletin to: Corresponding Secretary Harold Williams, 50 Third Ave., Seymour, Conn.

AMPLIFIER-Gonset GSB101 in mint condx, with 3B28 rectifiers, $150 plus shipping. K3DCP, 818 Sturgis Pl., Baltimore, Md. 21208.

FOR Sale: BC-610E transmitter, in exclnt condx; BC-221AK freq. meter; write for details. Byron Fortner, W9FYM, RFD #10, Box 486, Indianapolis 19, Ind.

FOR Sale: HT32A new finals, still in box, with D-104 mike on G-stand; HT33A with six hours on final, both in A-1 condx. A good buy for some one. A. Avallone, 30 Aetna Ave., Torrington, Conn. 06790.

FOR Sale: HQ-110C w/match.ng spkr, in exclnt condx: $160.00. Ship express collect. Ted Cook, PM, Montauk, N.Y.

TELREX 20-meter 3-element beam. Cash & carry: $50.00. W1OOS, Vern Anderson, Ridge Road, Terryville, Conn. LU 3-8667.

FOR Sale: Drake 2B recvr with 2BS spkr, 10-meter xtals and xtal calibrator, $215; Heathkit Twoer w/microphone and xtal, $38; Heathkit HO-10 Monitor Scope, $50; Heathkit transistor pwr. supp. HP-10, $30; Knight T-150A xmttr, $75. Howard Klinger, W8PZQ, 26834 Parkinston, Roseville, Michigan 48066.

RTTY. MU Western Model M-1 FSK and AFSK converters regular, $111.50; special $89.95 new. Pat's Used Electronics, 1138 16th St., Denver, Colorado 80202.

MUST Sell complete years QST 1925 to 1929 inclusive: 1931 to 1963 incl. Want six dollars per year. Write for list of entire collection. W9LZ, 4423 North LaPorte, Chicago, Ill. 60630.

FOR Sale: Hallicrafters SX-71, $65. J. Towle, 103½ White Park Rd., Ithaca, N.Y.

COLLINS 32V3 for sale, $200 plus shipping charges. W8VJD.

NAVIGATOR. Wanted: Neatly wired Johnson Navigator in tip-top optg. condx. Must be priced very low because resale of very low power. CW-only xmttrs are becoming increasingly difficult. V. L. Dawson, 3 Ball Hill Rd., Storrs, Conn.

MAYBE I have what you want! Disposing of complete station because of college expenses. AF-67, HQ-100C, Globe Scout 680, SB-10, rotators, surplus gear, test equipment, and many more goodies are yours at bargain prices. Send postcard for complete list. Max Berendzen, K5HVR, 213 Sandra Dr., Irving, Texas.

FOR Sale: Heath Twoer, $40; Heath HX-11 80 to 10-meter, 75W c.w. xmttr, $35; Superior tube tester bought new in 1963, $18; Heath Capacitor checker, $10; Heath TV alignment generator, $35; Heath Electronic Switch, $19.00; Globe 775 VFO, $20.00. Everything is in absolutely perf. condx. K3IBQ, 608 Maple Ave., Southampton, Penna.

GENERAL Radio 616-D heterodyne frequency meter, manual, $100; Gosct Commander, VFO, $70. Jack Berman, W1BGW, 28 New Haven St., Boston, Mass. 02132.

FOR Sale: HQ129X with speaker, back issues of QST complete run 1935 through 1957, also broken sets of QST and CQ from 1935 through 1963. Any reasonable offer considered. Write to Mrs. Charles Mitten, 842 No. Grant Ave., Indianapolis, Ind. 46201.

RTTY Terminals. Need your cash or SSB gear for high quality, ex-commercial type FSY converters and AFC and power supply. Compact, 3½" x 19", new in orig. case, 850 cyc. or narrow shift, 110-220 VAC 50-60 cyc. SM5KI, Hans Goldschmidt, Persikogatan F4, Vaellingby, Sweden.

SELL: SX-101A with speaker, DX-60, homebrew transmatch, microwave micromatch; Johnson key. All in new or in exclnt condx. Best offer over $300 takes all. Dick Fraser, 616 Chapel St., Ottawa, Illinois.

SELL: RME DB-22 Preselector, $25.00; WRL 755 VFO, $25.00. Irv Charm, 75-34 113th St., Forest Hills, N.Y.

SALE: Elmac AF-68 transmitter, PMR-8 receiver, M1070 powr supply, WH-6 cable assembly. In mint condx, used only three months. $300 cash takes all. Don Tobias, WA9GIC, 1810 Washington St., Evanston, Ill.

J-BEAM, 8/8 with AR-22 and U-98 rotors for elevation and azimuth, $75 postpaid. Science encyclopiedias, copyright 1963, cheap. SX-110, $85. T-150A, 185; HQ-200, $7. Two 2C39A and 4X250B, new. WA9EGU, Ron Pitts, 910 Summit, Villa Park, Ill.

SIDEBAND Exciter similar K4EEU, pr. 807 outp. Frequency multiplier McMurdo-Silver, Model 703, 80-6 meters; BC-459A, HRO-7, 900 Kc-30 Mc, 5 coils, $175.00 takes all. W2WMZ, Devon Lane, Middle Island, N.Y.

WANTED: Coils E, F, AB; NFM-83-50 FM adaptor and 60SC-2 combination unit for National HRO-60. K8LCU, 3431 W. Brainard Road, Cleveland, Ohio 44122.

TRADE Valiant in mint condx for Navigator and Courier. A. Bogart, 451 Oak Street, Emporium, Penna.

WANTED: B&W LPAMU2 matching unit. W2FX, 155 Bayview Rd., Plandome, L.I., N.Y.

GONSET G-76, xcvr, perf, condx, 80-6M. Both pwr. supp. $375. E. Hahnel, 9626 Livenshire Dr., Dallas, Texas.

SELL: 75A4, in immaculate condx, serial No. 5236; 3.1 and .5 Kc filters, $535.00. Preston Smith, K6RGO, 776 N. Hoover St., Los Angeles, Calif.

WANTED: Set broadcast coils for National HRO if reasonable. D. Romain, W2IEV, 124 Romain Ave., Pompton Lakes, N.J.

FOR Sale: Panadaptor, near new condx; RBV 2 10 tube, 3-in., 200 Kc sweep, 455 Kc. IF. $79.50 f.o.b. W4FA, 13 Pine Tr. Dr., Jackson, Tenn.

COLLINS 75A3 receiver in A-1 shape, spkr, manual: $285. W3BBV, 1357 Hill St., York, Penna. PH 2-6037.

FOR Sale: Gonset Twins G66B and G77 R & T modulator and pwr. supply for 6 or 12V. A-1 shape. $175.00. Dr. R. C. Colburn, WA6NGL, 17036 So. Clark Ave., Bellflower, Calif. TO 7-9800.

SELL: 75A4 (3.1, 2.5, 0.6 filters); 32S-1 and 516F-2 AC supply. Package deal $800 or best offer. Hy-Gain TH4 antenna, $60. K2HFU, Westbury, L.I., N.Y. (516) ED 37312.

WANTED: Precision Royal Scintillator and pre-amplifier, also Esiertine-Angus recorder G-1 MA. Will pay cash or will trade amateur equipment. W5DON, Byron Edwards, 2430-33rd St. Lubbock, Texas.

FACTORY Reconditioned pacemaker, perfect, $189.50. Thunderbolt, $325.00. F.o.b. WØBDG, 421 Groveland Ave., Minneapolis, Minn.

FOR Sale: HT32B, $450; Drake 2B with spkr, Q-multiplier and xtal calibrator, $240; Hallicrafters HA-1-TO keyer, $45.00; Johnson T/R switch, $18.00; TA-33, $75.00; 55-ft. Rohn tower, $75.00; AR-22 antenna rotor, $20; complete station tor $900. All equipment is in exclnt condx. Thomas E. Frazier, K8CZJ, RD #2, Deacon Road, Mt. Holly, N.J. 08060. Tel: Area code 609-267-7933.

MUST Sell: Eico 720, in exclnt condx, with self-powered VF-1, $70; DB-23, new, $40; Lafayette KT-200, gud, w.QM-1, $50. 60-watt modulator, $25. K1PUR, 53 Carter St., New Canaan, Conn.

APACHE, SB-10, Mohawk w/spkr, Heath swr bridge; cables and manuals. All in exclnt condx and appearance: $495.00. Will ship. Reason for sale: going Collins! Bill Dean, K5ZSC, First National Bank, Pleasanton, Texas 78064.

SALE: Hallicratters SR-150: P-150AC and P-150DC power supplies; MR-150 mobile mount. All for just $675. K3BFT, Howard E. King, 33 Noblewood Lane, Levittown, Penna.

FOR Sale: SX-99, R46B speaker, QFI-Q multiplier, DX-40, VFI VFO, in exclnt condx: $150.00. K1TIZ, 763-6221.

FOR Sale: Heath Marauder HX-10, 10 thru 80 meters; also Hammarlund HQ-170 rcvr. Both factory-aligned in June 1963. Schedule can be arranged on any band. Will sell separately. Will ship in original cartons at your expense. First certified check for $550 takes pair. C. D. Alexander, WA4FOK, Bishopville, S.C.

SELL: SR-150 with PS 150AC, $625.00; HQ-180C, $320. Both are in perf. condx, with all manuals and in orig.nal cartons. Joe Reifer, WA2BOB/9, 2305 Sheridan Road, Evanston, Ill.

BOSTON Technical High School Radio Club is broke and needs equipment. Any equipment donations please! Will pay postage. Write: K1UHV, c/o Mr. Diggins.

CHEAP: 2-304TH w/skts and caps, $29; 4-125A w/skit and cap, $7; 4-65A, $9 (all unused); RCA 3600-3000-2420 vct, 120 VAC at 2KVA, $27; 3100 VCT, 115VAC at .5 A, $24; dead 4-250A, $.01. You ship! K3MNJ, Phila, Penna.

KNIGHT T-60, in excint condx, $35. WA5HRD, 62 Crane, New Orleans, La.

BARGAINS: Reconditioned guaranteed shipped on 15 day trial, subject to sale. SX99 $99.00, SX110 $119.00. SX170 $179.00. HT32 $299.00. HT37 $299.00. HQ10 $119.00. HQ109 $149.00. HQ170 $229.00 HQ180 $289.00. HRO60T $239.00 NCX3 $289.00. SW240 $259.00. 75S1 $349.00. 75S3 $495.00. 32S1 $395.00 to $495.00. Many other items. Write for list. Henry Radio, Butler, Missouri.

HEATH Comanche, expert wiring, excint condx, $60; Ameco Nuvistor converter, 50 Mc., factory-wired, 14-18 Mc., 1. F., barely used, $35. John, WA2PBS, 1035 Summit, Westfield, N.J.

VALIANT in perfect condx. Plans for SB-10 conversion to SSB included. $225 or best offer. K9FXW, Chuck Hunt, 505 Hyde Park, Bellwood, Ill.

BC-611 walkie-talkies, 3885 Kc., tested, batteries, schematics, $85.00 pair, $45 each. Ken Stevens, WA2KTN, RD 2, Ouderkirk Rd., Pulaski, N.Y. 13142.

SPRING House Cleaning: Collins MPI mobile power supply; 351 DI mobile mount; Hustler antenna 10M-20M coils and Mount; Eico Model 772W-CB xcvr with mike factory W/T; Shure model 520 high impedance mobile mike; Frahm AC freq. meter; Triad 115V isolation xtrmr; Lakeshore time master; Minivac model 601; new telephone dial; assorted xtals and many odds and ends. All in excint condx. Sell entire lot or will sell any part cash and carry. Best offers. No deliveries, shppg, etc. Elliott Adler, K2GLG, 1 Adams St., East Rockaway, L.I., N.Y. LY 9-1057 or Bus. BE-3-7171

HAM Equipment, buy, sell, or trade thru Heed Directory, The Ham Director for buying, selling or trading Electronic Gear. Card or letter brings free copy. Rush to WA2NHH, Phil Lupi, 1225 Hillside Place, North Bergen, N.J.

WANTED: Commercial, military. All types. ARC, ARN, ARM, BC, GRC, PRC, TRC, URN, URM, TS, 618S-T, 17L, 51R, others. Ritco, P.O. Box 156, Annandale, Va.

TUBES: 3-75THs. New. Two 100THs, used 1 hour. $40.00 for the lot. PPD. F. Lewis, K8GKR, RR 1, Harrod, Ohio.

CERTIFICATE will be issued by Henry Ford Museum to any station that works Motor City Radio Club station W8MRM during the 24 hours prior to the Old Timers' Night Banquet and Program. Work W8MRM on May 30 (GMT) on 1.815, 3.660, 3.877, 7.040, 7.172, 7.215, 14.060, 14.230, 29.610, 50.178, 146.94 or 147.3 Mc. QSL for certificate.

SELL: Heath Seneca VFH-1; needs work. $75. K1AQY, 73 Pond St., Natick, Mass. Tel: 653-2847.

PRINTED Circuit boards. Hams, Experimenters. Catalog 10¢. P/M Electronics, Box 6288, Seattle, Wn. 98188.

VIKING I, 122 VFO, grid block keying, 829B final, in excint condx; $110. WA9KKH, 305 Beverly Rd., Barrington, Ill.

FOR Sale: Plate transformers, 36000-0-3600 VAC at 1000 Ma., with dual 110V and 220V primaries. $35.00. Peter W. Dahl, 5331 Oaklawn Ave., Minneapolis, Minn. 55424.

SELL: 6V 100 amp., Leece-Neville system, $30; AF67 xmttr, $55; Polycom 62B factory overhauled, $225. W2OBH, 200-27 46th Ave., Bayside 61, L.I., N.Y. Tel: BA 4-1346.

75A4. Ser. 4738, vernier dial, mint condx, used vy little, $425, also HQ-180C, new $300.00. W3MB, 53 Crestmont St., Reading, Penna.

FOR Sale: Collins mechanical filters F455Q1 (600 cycle), $20; F455Y21 (2.1 Kc), $20; F455J15 (1.5 Kc), plug-in type, $30; F455J21 (2.1 kc) plug-in, $30. All are in excint condx. W6IEG, Charles Allessi, 1122 S.E. Windsor Lane, Tustin, Calif.

PRINTED Circuit boards: 6" x 6" x 3/32" thick, G-10 glass epoxy 2-ounce copper 2 sides, 60¢ each, 10 for $5.00. The Sibley Co., N. La Fountain, Bridge St., Haddam, Conn.

BULLETIN Boards for QSL cards. Now tack your cards on cork tack boards. These boards are trimmed in aluminum and come in all sizes and colors. Cork samples are 25¢. Robert Williamson, K2UWM, 124-37th St., Union City, N.J.

FOR Sale: HX-11, $25.00; Star Roamer, $30. Both for $50. Want: VF-1. WN8KEH, 6230 Dove Rd., Smiths Creek, Mich.

LA-400C, like new, $110.00. Ken Law, 5873 N. Overhill, Chicago, Ill. 60631.

HR-20 SSB Heath recvr. Vy clean and professionally wired. Only $115. All inquiries answered. K3SBQ, RD #1, Montgomery, Penna.

RTTY, Model 14 TD, $75, Model 19, complete. Make an offer. Cash or trade. SX-99 w/QF1, $75; Heath Twoer $35.00. K1NBZ, 22 Russell Rd., North Haven, Conn.

CRANK-UP Tri-Ex HZN, HRZN HS 71"; 88 Ft. E-Z Way RBX70 needed. Send particulars and quotation first reply. W1HN.

RECEIVER, Mosley CM-1, 5 months old. In new condx. $110.00. W4NI, 3600 Old Vineyard Rd., Winston-Salem, N.C.

CONVERTER: Johnson Viking 6N2 18-20 Mc. Sell or trade for Heathkit Sixer HW29A. Ken Mann, 1522 Kelton Ave., Los Angeles 24, Calif. WA6FZG.

SELL: Viking II and VFO, like new condx, $125.00 will take it. Ed Slaga, K9BTX, 129 N. Wood, Spring Green, Wisconsin.

LOOKING For old tenor banjo. Have some equipment to trade or will buy outr.gnt. K. Funk, 4115 Walnut Lake Rd., Orchard Lake, Michigan. W8GWA.

HQ-100A, Viking Ranger, 75 ft. coax, all-band vertical, mike, key, all in vy gud condx; $289.00. I pay postage. Dean Crosby, Trevecca College, Nashville, Tenn.

COLLINS 30S1, in mint condx, near new 40 X1000A. Will ship anywhere continental USA, $875. Irv Bell, Fashion Square, Las Vegas, Nevada.

SELL: Heath HX-10; SX-101 Mark III; D-104 mike with PTT stand; key, antenna relay. Heath reflected power meter, Reyco all-band doublet antenna. This equipment is in like-new condx, in original cartons. Complete station: $550. F.o. Denison, Texas. W. R. Hempkins, 1210 W. Bullock.

HALLICRAFTERS HT-32, clean condx, unmodified $300; Telrex KW balun, $15.00; Duomatic keyer, $20. Jack Berman W1BGW, 28 Newhaven, West Roxbury, Mass. 02132.

FOR Sale: Ampex 601, full track tape-recorder. Like new condx, used vy little; $425.00. Cash only. R. Levine, WB2JFE, 19 Jackson Ave., Washington, N.J. 689-0693 or 689-0771.

GONSET G-77 mobile transmitter, power supply and modulator, $115.00; Heath Mohican rcvr, $85.00; Gary Armour, WOUAT, 4816 W. 75th St., Prairie Village, Kans.

VIDICON Camera, Dage, with 3 in. viewfinder. Vidicon manual, complete. Model 101, modified from 111A. First $150. K4GYO, 430 Island Beach, Merritt Island, Fla.

MOBILE: HE-50A 10-mtr. transceiver, whip and squelch; $85.00. K7ZRF, 1655 Birch, Richland, Wash.

FOR Sale: Drake 2B with Q-Multiplier, 100 Kc standard, $235.00; Gonset GSB-201 linear, $150.00; Swan 120 with power supply, $185.00; HT-37 $300; Globe Deluxe VFO, $45.00. All new condx. Hank Wymbs, WB2GMN, Circle 5-3500, 100 Joyce Rd., Hartsdale, N.Y.

COLLINS KWM-2, PM-2 power supply and traveling case. Latest factory modifications. New condition, never mobiled. $875 will ship. WA4PDJ, 3513 Shirley Drive, Apopka, Fla.

ATTENTION! Have you seen "Equipment Exchange"? Buy, sell, swap offers galore! 12 interesting issues $1. Or sample copy free! Write: Brand, publisher, Sycamore, Ill. (our 3rd successful year).

SELL: HT-32, $275; HRO-50-T1 with all ham coils, spkr, $175; CE-10B slicer, $25.00. Hank Weaver, W9BHX, 215 Carter, Goshen, Ind.

GONSET G-76 with gud homebrew P/S in A-1 condx. First $200 takes it. W8DRV, 7761 Big Creek, Cleveland, Ohio 44130.

WANTED: Signal Generator, GR805-C, or GR 1001A or Measurements Corp. 65-B. Must be reasonable. W5FMO, 3409 Beaulieu St., Metairie, La. 70001.

G-E 4JA3011 full-wave bridge, 115 volt input. Output 140 volt/7 amp with 1000 mfd. filter. Six available: $5.00 each. Want HRO or equivalent. J. M. Hiznay, RD #2, Vestal, N.Y.

COLLEGE Expenses force sale: SX-117. Used less than 15 hours. In perf. condx. Best offer over $350. Paul H. Gresser, 36 8th Ave. East, Dickinson, N.Dak.

SELL Vy clean Collins 75A4 rcvr, ser. No. 3168, w/ 3.1 kc filter; $425. Also clean 20A w.BC458 VFO, $75; 2 kw. PEP 4-1000A linear complete with tubes and power supplies, ready to go for reasonable offer. Sry, cannot ship. D. C. Smyth, W1BOE, 30 Lancaster Dr., Westwood, Mass.

SELLING Complete operating 2-meter station. Ameco converter CN144W, pre-amp PV144, power supply PS-1, also 522 transmitter with power supply and crystal modulator in one unit, plus ground plane 2-stacked Big Wheels and coax. All for $125.00. W2GON, 114 Phylis Court, Elmont, N.Y.

TRADE: Collins 75A4, KWS1, Rohn tower beams, rotator. Want boat rig equal value. Pick up, 7224 Alexander, Dallas 14, Texas. W5YRY.

COLLINS 75A4, two filters (3.1; 1.5) serial 3561, very nice; $495.00. Rev. Melvin Palmer, Box 10021, Greensboro, N.C.

SALE: TV camera GPL rugged industrial 400 lines video or RF output with Vidicon and lens. In excint condx: $375 or trade plus cash for Collins SSB gear. Will sell surplus 500W 420Mc. trans. PR 4X150 less PS for $75 with camera. Also Morrow 3BR conv. with FTR. Any reasonable offer. Sakal, W2KJF, 62 Bacon Hill Rd., Pleasantville, N.Y.

APACHE, In perf. condx, $180. National HRO-7 and coils A-F $120. Meissner Signal Shifter, $15 or make offer on the above. C. A. Turner, 5372 University Dr., Santa Barbara, Calif.

FOR Sale: New England Area only. Collins 75A4 with 500 cycle and 3 kc. mechanical filters, and Johnson Viking Ranger with grid block keying, factory-wired. Both bought new, 5 years old, used vy little. In excint condx: $650.00, or best reasonable offer. W1WJW, Bob Hudson, 20 Riverside St., Watertown, Mass. Call 926-0755 evenings and week-ends.

SELL: SX-71, headphones, 10-15 converter, $125. SSB-CW 500W 813 final and power supply, $125.00. Heath Sixer, $39; Knight VFO, $19.00; DX-40 mike and key, $45.00. 60W modulator and power supply, $20. All in vy gud condx. K8GSP, 341 Wetmore, Everett, Washington.

SR150, W/AC supply. New, never used. Sell or trade. Both for $600. Beadles, W5DHD, 212 Inlow, Bryan, Texas.

"KID From Texas" can give you immediate delivery on the new Swan Transceiver. Gonset GSB-201 in factory sealed carton, $259; AF-67, $49; HT-37, $279; Collins 51J-3, $459; National SCX-3 with AC and DC power supplies, $399; Globe King 500A, $249.00. Immediate delivery on the new Galaxy II transceiver. SW-240, $229, Galaxy 300, $229; CE 20-A, $99; H-O-110, $99; Challenger, $49.00; B&W 5100 with 51SB, $229.00; HQ-170C, $179; Drake 2-A, $179; SX-101A, $199.00. Wide selection of clean homebrew linears at low prices, send for list. Cash, trade, or 24 months to pay. W5KFT, Edwards Electronics, 4124 34th St., Lubbock, Texas. SW 5-2595.

SELL: Elmac AF68A, $139; Hallicratters SX-96, $134; Vibroplex Original, $14; Morrow SBR-2, $29. All are in excellent condx. W2ZKD, Talmage, 8-9822.

SELL: HQ-170C, like new condx, used vy little, $239.00. SB-10, late modifications, new condx: $69.00. Horace Brokaw, W2-ACC, Neshanic Station, N.J.

FOR Sale: Cheyenne transmitter UT1 power and mike, $80; SSB HX-20, HR-20, HP-20, HP10, AK7 speaker, mobile mount, mic, $300, Heath OL-1 'scope, $25, National HFS-27 to 250 Mc receiver, $75. Milo Heckt, WØTKU, 3030 Tomahawk Dr., Rapid City, South Dakota.

SELL: Kilowatt Sideband station Eldico SB100A exciter (spare 5894 final); Hammarlund 170-C and Eldico SSB1000 amplifier (2 spare, 4CX250Bs). Will schedule 40-75. Will ship. Best offer over $700. WAØCWW, 1611 South Norton, Sioux Falls, So. Dakota.

MOHAWK rcvr, recently aligned, in mint condx, $175 or best offer. 300 watt Stancor A3898 Multimatch xfrmr, $25; powerstat 15 amp, 0-140 volt, $15. William Cullison, RD 7, York, Penna. Tel: 47-7648.

SELL: Galaxy 300 transceiver AM SSB CW 20-40-80 AC power console spkr, EV729SR mike, WRL vertical looks, works, perfect. Two months old. No time to operate. Cost $440. Will sell for $330. WA4SBD, 2414 Springhill, Huntsville, Ala.

FOR Sale: Collins 30L-1 amplifier, $350; in mint condx. Instruction and cables included. Also Mosley TA-33 Triband beam, $50; Gonset III 6 meter Communicator, $150; also Hallicrafters S-94 and S-95 Civic Patrol receivers, $30 each. Joseph Calvanico, W2OQO, 2951 Pearsall Ave., Bronx, N.Y. Tel: OL 2-7376.

MUST Sell: Heath Comanche, Cheyenne, AC power, E-V mike, spkr, TA-31, antenna, extras, like new, $200. Another $50 takes HO-10 'scope. Dummy load, SWR, extras. WA2RCE, 84 Kaymar Dr., Tonawanda, N.Y.

COLLINS Complete station: 75S-1 with Waters Q-multiplier/Notch filter, matching spkr, $350.00; 32S-1 with 516F-2 power supply, $495; 30L-1 linear with 110V or 220v tap, $450.00; TH-4 Hy-Gain 4-element Tribander, $75.00. Purchased new and kept in air-conditioned quarters. Absolutely perfect, mint condx, will bear most scrupulous inspection. Late "proof of performance" sheet on 32S-1 from Collins. K9DMG, Perry Mowery, 21 Waibel Rd., Bartonville, Ill. Phone 697-6597.

SX-25, $75 with spkr; BC-342N, $40.00; RCA, No. 158, 5-in. scope, $40.00; BC-645, G-E with tubes, new, $30; Simpson counter-type tube checker, $25. Don Kessler, Rte 2, Clintonville, Wis.

GONSET G-77A mobile transmitter: $75. Shure 505C mike, $10.00. P. Williams, 27 Hanford Lane, Wilton, Conn.

FOR Sale: 30L-1, perf., $375.00; 20A w/VFO, $115.00; 399C-1, $110.00; 52Z, $15.00; ARC-1, $15.00; ART-13, $30.00; BC-639, new w/pw supply, $75.00; BC-779 w/supply, $65.00; complete TCS, $75.00; 4-1000A, new, w/socket, $75.00; 4-250A, $15.00; 450TL, TH, $12.00; RCA URA-6, CV-57 converter, $75.00; UCS-300 VAR condx., $35.00; 5736, $10.00. W. R., 8510 Comanche, Canoga Park, Calif.

HT-32, new tubes, like new, $325.00; HB Linear, 1 KW 3-4X150, $150; Onan 115V 2000 watt AC generator, $150; Amertran 95 to 130V voltage regulator, $10; 4X250 tubes, $12 pr; 4X150 tubes, $7 pr. Will trade. Inquiries ans'd. C. M. Pruett, 2060 Highview Rd., Atlanta 11, Ga., K4BHV.

WANTED: Complete or partial set(s) of B&W HDVL coils, 805, and 250TH tubes. Will trade or sell new T200, $15.00 and 450TL, $20. K6MHY, 5750 Jed Smith, Hidden Hills, Calabasas, Calif.

RANGER: $135.00, No. 500 Viking, $500.00. Both F/W immaculate. W6WTH, days LA phone MA 7-6351. Bill Wilson.

CHRISTIAN Ham Fellowship now being organized (undenominational), non-profit, missionary and fellowship organization. Details free. Christian Ham Callbook, $1.00. Harry Wieskamp, WA8CFH, 96 East 21st St., Holland, Mich.

VIKING II with Viking VFO, $145.00; HQ-110C (perfect) with matching speaker, $165.00. F.o.b. Wenatchee, Washington. Dale Law, 103C Little, Hanover, N.H.

SELL: Four element 20-meter quad antenna as described in May 1963 QST. WØAIW, 808 East 108th St., Kansas City, Mo.

SELL: Tower with built-in Nuvistor preamp and P.T.T., complete with mike, antenna, crystal and 12V dynamotor. First $60 takes all. WA4JCP, 64 Marta Road, DeBary, Fla.

COLLINS 30L-1, like new, will ship. $400.00. W6DZQ, 177 W. Blithedale, Mill Valley, Calif.

JOB Summer counselor wanted. Preferably with equipment, college student. Contact Herman Schulman, 3611 Henry Hudson Pkwy, Riverdale, N.Y.

COLLINS 30S1, perfect, $850; K2BQO, Paul Hazels, 679 Bedford Rd., Pleasantville, N.Y. RO 9-0176 or WH 9-3261.

GONSET G-76, immaculate, $260.00; Gonset DC supply, need transistors, $60.00; Mounting bracket, Mosley MA-3 antenna, stainless HD mount; $20.00. Everything for $300. Bruce Kramer, 8691 188th St., Jamaica, L.I., N.Y. Tel: 212-SP-6-8163.

SELL: B&W 504 Multiplier or 50 W xmttr, $35.00; H. B. pwr. supply available; Bud cabinet CR 1741 black 8¾" panel space, $12.00; Simpson milliameters 0-50; 0-150; 0-500; 3½" black rect. case, $8.00 ea. HV xfrma UTC 49, $10; HV chock 4 hy 250 mil. $4.00:Nat. ACN dial; BC 453 Q9'er No p/s; xfrmer 10 v. 10 a.. xfrma 2.5v 10 a; 813 es socket; 1000 v.8 mfd cond., any item, $5; pair 866A with cerm, plate caps, $3; adj. bleeder 200 w. 30K, $2; relay 110v, 5 pole DT, $2; QSTS 1949 thru 52. Blank steel chassis 7x15x3. Pls add postage. Many heavy es fragile items delvrd 100 miles NYC. Write only Fred Bailey, 10 Midwood St., Brooklyn 25, N.Y.

NEW Mosley CM1, $135.00; HT-40, $70.00; Ameco CN50, Nuvistor converter, $33.00; HE-35 Transceiver, $45; Drake low-pass, $9.50; Johnson TR switch 250-39, $17.00; Ant. tuners, AT4, $45.00; AT3, $9.00; small tube tester, $14.00; Novice xtals, 4 for $5.00; earphones, $3.00; c-w key, $2.00; Johnson bug, $8.00; Transtenna, 102A, $35.00; DX35, $45.00; acetylin welding outfit (FB for tower work) $55.00; Ranger II and Drake 2B, $475.00. Want: KW Matchbox, Collins S/Line. Buy, sell or trade. WA4LXX, F. E. Coble, 251 Collier Ave., Nashville 11, Tenn.

WILL Trade only: Royal standard office mill, 11 in. carriage, FP model, 3 years old (orig. price, $249.00) for any commercially built ham gear, of approximate equal value. Dennis Miller, 901 Hoyt St., Michigan City, Ind.

COLLINS, late model KWM-2, with noise blanker PM2, suitcase, and Heath 12v/115 VAC inverter for mobile use. All in exclnt condx, for $1150.00. Hunter Bandit 2000A in top condx, $425.00. Together, $1500.00. Hugh E. Riggs, K1UDF, c/o L. E. Rodriguez, Wayne Ave., Stony Point, N.Y., or phone evenings area code 914-78-62815.

APACHE Transmitter. College expenses force me to sell. Only 20 hours use. In exclnt condx. $200 or your best offer. Bill, Thar, 135 Cedar St., E. Lansing, Michigan. Tel. 332-4390.

SX-101A receiver, 6N2 converter, Matchbox, Ranger I, all in exclnt condx and reasonably valued, make offer, sry, no shipping! Jack Didwell, WA2KXN, 10A Valley Road, Northport, L.I., N.Y.

I Need the following issues of QST in fine condx with both covers: December 1921 and January, March and December 1922. Elmore Fitz, Box 85, Lanesboro, Mass.

SX-111, approximately 25 hours, $200.00. Lafayette HE-50. Jim Cullen, 109 Thicket Rd., Baltimore, Md. 21212.

FOR Sale: Exceptionally fine DX-100. Latest modifications and new appearance, $120.00. Chas. Dutton, Rte. 1, Box 167, South Elgin, Illinois.

FOR sale: New Scott R.C.H. Navy Receiver 50 to 600 Kc and 1.5 to 24 Mc, in wooden export box, $125.00. 7½ ft. Par-Metal Deluxe rack with panels, 24" deep, $65.00. Lloyd Rondeau, 2436 Carney Ave., Marinette, Wis.

NEW Ultra sensitive R.F. milliammeter for transistorized applications. Ideal for antennas and matching networks, dummy loads, beacons, telemetry. Low internal resistance. Mil. specs. Price: $115.00. Free information. Write or call MED Electronics, Inc., 102 W. Jefferson St., Falls Church, Va. 22046.

WANTED: Gonset 3-30 Mc converter. WØBHA, Bird Island, Minn.

ULTRASONIC Generator. One KW unit complete, less tubes. 2500 VDC at 500 Ma., 400 VDC at 200 Ma., 150 VDC bias at 100 Ma., 6.3 VAC at 10 amps, 5 VAC at 30 amps, 115 VAC input, $50.00. Write for details. R. Weaver, McKean, Penna.

DRAKE 2-B users! Frequency read-out to one-tenth Kc with this calibrated dial and pointer. One minute to install. One dollar. G. Guter, 543 Lesterwest Way, Glendora, Calif.

METER Matching problem. Need General Electric Model DO-71 with 0-1 Ma. movement. Ed Ray, W1WWN/1, USNRS Cutler, East Machias, Maine.

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.

SELL: MM-2 analyzer, $70; Johnson KW 250-30 Matchbox, $65.00; 1 KW, AM, 2 KW PEP transmitter, pair 4-400 final, 600 watt modulator, pair 4X250B tunes, all pwr. supplies in 19" x 72" cabinet. Send for list. A. A. Farrar, W1CLS, 33 Lantern Lane, Weston, Mass.

HEATH Marauder, $350: SX-100 with spkr, $250; E-V 623 dynamic mike w/PTT stand, $30; all above with coax relay, SWR meter, coax, xclnt condx, $600; 10 KMC microwave 30" dish with swivel mount and feed, two 30 Mc. I.F. strips, mixer diodes, 723A/B Klystrons (4), misc. waveguide, all for $25.00. Transformers: 3200 VCT plate, 300 ma., $10; 6.3V, 10 amp., $3; 1250 VCT, 240 Ma., with choke, $10; capacitors: $4 ea. 6 mfd. 3 Kv., 8 mfd. 1500V, 4.5 mfd. 3 kv., 8 mfd. 2 kv., 4 mfd., 2 kv. $3. K1TWN, 833 Wapping Rd., Portsmouth, R.I.

WOW! Ham Trader, Ham's Hobby Mart now one! Cheapest rates! Buy, sell, trade with other hams. Next 10 issues, $1.00. Free sample. Ham Trader, Box 153A, Franklin Square, N.Y.

RETIRED, Going house-trailer, no room. Viking II professionally wired, excellent, all new tubes. Viking 122 VFO, both $140.00. SX-111 nearly new, perfect, $150.00. All with manuals. Two 5D22 tubes, brand new, both $40.00. About 160 QSTs and CQs back to 1946. Not all years complete. 30¢ each for the batch. Bowman, W6NJF, Sacramento, Calif.

TWO Meters. Heath Pawnee, excellent condx, spotless, used 20 hours, $175.00. K5TWD, Jim Hood, Box 432, Harrah, Okla.

SELL: Heath Mohawk, 6M converter, spkr, used 5 hours; Heath Seneca, used 1 hour; EV #7295 mike, used 1 hour; 110VAC coax relay, 6VDC coax relay, new; Cush Craft 6M Halo, new, Delta Radio desk. All equipment in xclnt condx. Best offer on pieces or lot. K. Kaiser, 83 Newport St., Arlington, Mass. 02174.

SELL: KWM-1, late serial, AC and DC pwr. supplies, mobile mount, E-V mobile mike (PTT), Hy-Gain trap mobile ant. Perfect electrically and mechanically. Best offer. G-76 w/AC supply. Used 4 hours. Perfect, $300. Will ship or deliver within 100 miles. K3KEO, Sam Moore, RD #1, Magnolia, Del.

SELL: T-60 phone/c.w. transmitter, $30; Knight VFO, $10; RF signal generator, $12. K2KGU, Tel: MO 6-8513, NYC.

MOVING TO St. Louis? Uniquely outstanding (literally) ham location and home. Hilltop, ten acres, unusual home, three fine towers, beams, etc. Available when purchaser desires to Spring 1965. Am moving to small town. Serious inquiries invited. C. Franz, WØNFA, 1 Finlay Road, Kirkwood 22, Mo.

SALE: GPR-90. Better than new. How much? W2ZUP.

RTTY Model nineteen, complete, $200: fifteen $100 RCA CV57 converter $100; chadless typing 14 reperforator with keyboard, new condition, $100; Kay $525 Markasweep cheap. Pickup deal, no shipping. Srv. Trade for R388 or 51J. Caskey, W8LEX, 13701 Wainstead Ave., Cleveland, Ohio. Tel: CL-10463.

HEATH MR-1, never mobiled, stored 2 years, cabinet drilled for alignment tool insertion, beautiful teflon wiring, $80. 20-mtr. HW-32 xcvr, mike, calibr. Never used, $135.00. Bill Bannon, 522 Cauthorn, Corvallis, Ore.

FOR Sale: AF-67, PMR7, M1070, vy gud condx. All for $175. Thad Enloe, 5314 E. Yale, Phoenix, Arizona 85008. K7QGT.

DRAKE 2-A, 2-AQ, spotless condition, $195; Johnson Ranger, excellent, $130. Must sell. K1NHR, Fairfield, Conn. Tel: 374-6955.

FOR Sale: Vy gud condx NC300, $180; Collins 310B, $95. Richard Larson, KØVTG, 1312 14th, Glencoe, Minn.

SELL: NC-98, complete with matching spkr, $75. Delivered in N.J. or E. Penna. Peter H. Kromayer, 2953 Cornwall, Bethlehem, Penna.

FOR Sale: DX-100-B, in exclnt condx, $130; HP-10, $30; Mosley MA-3, $10. D. L. Baird, K4VMA, 1408 Harvard Dr., Cocoa, Fla.

SELL: Two meter Gonset IV, in exclnt condx, with mike and both power cables. Best offer over $225.00. WA2JHR, 168 Morningside, Paramus, N.J.

SELL: SP-600, JX-28 (R-620), $395.00. Certified check or will swap for clean SX-101A plus $175. Koszeghy, 1129 Spy Run, Ft. Wayne, Ind.

COMCO Model 680 100-watt mobile radio on 35.90 Mc FM. In top condx, $250.00. Motorola 15W 150 Mc. FM base station, $100.00. Elmac PMR7 receiver, $55.00. Eico capacity bridge, $12.00. W. H. Vogel, W4NFS, 640 Capri Blvd., Treasure Isle, Fla.

SET Of four Viking II transformers, new, $25.00; B&W TR switch, $11.00; 1000 Kc xtals, $1.50; WE 275B Mercury wetted relays, $2.00; tubes: 6146s, $2.00; 5R4Gs, 70¢, 4D32s, $7.00, 2E26s, $1.50; 866s cartoned, $1.00. 4-125A, new, $15.00; 3E29/829B, $4.50; 807's, 90¢; 2C51s, 50¢. Many more tubes cheap. Send stamp for list. Samkofsky, 201 Eastern Parkway, Brooklyn 38, N.Y.

CALL And handle engraved on polished chrome cigarette lighter. Lifetime guaranteed, American made, gift boxed, $2.98 ppd. Check or M.O. B.L.M. Sales Co., Dept. T-4 Box 2305, Donelson, Tenn.

KWM-2, A-C, $695. C. Ham, W2KDC, 38 Radcliff, Huntington, N.Y.

CONSTRUCTED, Kits Ham, Hi-Fi, test equipment, etc. Professionally built and adjusted. Guaranteed. Immediate service. Average approx. 15% kit cost or write for information. Stephen Looney, 1328 Osage St., Sidney, Nebraska.

VIKING Ranger, factory-wired, exclnt condx, $140.00; Nc-109, xclnt condx, $80.00. Goodsell McCoy, Rt. 2, Waverly, Ohio, W8TSU.

FOR Sale: Viking Valiant, National NC-109, and Hy-Gain TH-4 Tri-band beam. All in xclnt condx. Doug Swanson, WA2KJP, 1408 Univ. Halls, Cornell U, Ithaca, N.Y.

AFRICA Mission needs ham equipment. Bishop Arnold Cotey, S.D.S. requests donations of new or used xmtrs and rcvrs for use by Catholic Missionaries in Diocese of Nachingwea, Tanganyika, East Africa. Needs several small mobile setups of 50 watts and one stationery unit of up to one kilowatt. Anyone willing to help should write to Bishop Cotey's stateside contact: Rev. Alfred Schmit, S.D. S., Salvatorian Center, New Holstein, Wisconsin 53062.

KWM-1, $295; ACPS, $80; 4-1000A amplifier; home brew transmitter VFO-4E27, wonderful c.w. rig, $65; vacuum variable, $45; KW amplifier, $45.00; $80 with PS, various high power supplies. B&W grid dipper, $25; coax, lowest prices; HD-11, $10; 829Bs, $5; 832As, $2.25; 4E27/5-125Bs $7.50; 4E27, $4; 4-125As, $5; 4X150As, $2.75; 750TLs, $22.50. Charles Jaeger, 204 Via Antibes, Newport Beach, Calif. OR 3-7056.

FOR Sale: Collins KWM-2 with AC and/or DC power supplies. Excellent condx and unmarred. Best offer. Major Roy D. Kelley, 7516 Wilson Park, Biggs AFB, Texas.

JOHNSON Invader 2000 recently returned from Johnson with all modifications and adjustments. Clean, new condx, $795. All replies answered. WITF, Elmer Turner, 2 Virginia Circle, Reading, Mass.

VIKING II, in exclnt condx, wired by engineer, $105.00, with spare tubes, manual, F.o.b. Burlington, Iowa. Larry Bos, WØUTG, 718 Ironwood St., Burlington, Iowa 52601.

WESTON Milliammeters and voltmeters excess to my needs. Models 301 and 506 in many ranges. Four for $5.00, plus postage. List for stamp. Etter, Box 717, Riverhead, N.Y.

SELLING: Heathkit DX-60 and HG12 VFO. Modified for 80 to 6 meters. Vy gud six meter rig, $90 for both you make an offer. I will pay shipping charges. Leland Wiren, 201 South 8th St., Chariton, Iowa.

COLLEGE Forces sale of my station: HQ-170, Ameco 6M preamp, S-47 spkr, Heath Q mult., Elmac A54H xmttr, w/fac auth, 6 M conv. and PSA500 AC supply, LW-50 2M xmttr, National 6 & 2 VFO, Telrex 5-el. 2M beam, 60% comp. 500W 6M amp. Advance Electric relay, plus mike, key, spare tubes, parts. $350.00. Craig Deidrick, K3HOZ, 1512 Olive St., Coatesville, Penna.

HAVE Approximately 100 radio, electronic, amateur and TV service books for sale at about ¼ cost. Send SASE for list. J. P. Willerton, 4182 E. Main St., Columbus, Ohio.

DALLAS Hams! For sale: HQ-110 with clock, $180.00; Eico 720, $70; Eico 730, $50.00; Hallicrafters HA-5 VFO, $60. All are in superb condx. Jim Moore, 7416 Mason Dells, Dallas, Texas, EM 1-1235.

COMPLETE Mobile and fixed station: AF-67, PMR-7, AC and DC supplies, mike, relays, antennas, etc. $160.00 F.o.b. Ann Arbor, Mich. or your best offer or will sell separately. George Kimeldorf, 117 West Hoover.

TOWER F-Z Way RBS 40G with GPK-S40 ground post; heavy duty crank-up tilt-over in new condx, $175. W3GUF/2, 21 Eleron Pl., Wayne, N.J.

UNUSED: Twelve Hy-Gain old-style traps. Perfect for homebrew antenna. Dave, K8RMT, 3536 Biddle St., Cincinnati 45220.

WANTED: Parts and tube, less power, to build 3-1000Z GG linear. W6WIE, 6920 Adams Ave., La Mesa, Calif. 92041.

SELL: 1 NC-303, also 1 SX-100, both mint condx. Need BC-221, rock bound transmitter and receiver for 160 M. W9VBU, Belvidere, Ill.

HQ-129X, crystal calibrator, 10" speaker, perf. condx, $130. Jonathan Weiner, K1VVC, 24 Brewster Rd., Waltham, Mass.

Index of Advertisers

THE DAYTON AMATEUR RADIO ASSOCIATION

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THE 13th ANNUAL

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SATURDAY, APRIL 25, 1964

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for attractive brochure, map, and list of accomodations.

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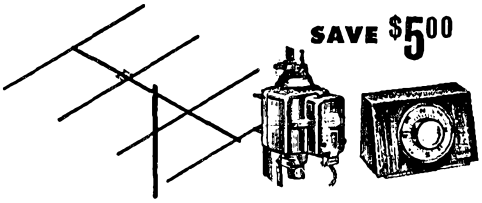
hy-gain 64B 6-Meter 4-Element Beam with Alliance U-100 Rotator System



SAVE $5.00

HERE'S THE MONEY-SAVING COMBINATION:

64B 6-Meter Beam. Regularly.....$21.50
Alliance U-100 System. Regularly.. 28.20
Regular Price $49.70
ALLIED'S SPECIAL PRICE, ONLY... **$44.70**

HY-GAIN 64B 6-METER BEAM—4 elements giving max. forward gain; Beta match handles 1 kw; 9'8" elements; boom, 10'; turning radius, 5'4".

ALLIANCE U-100 AUTOMATIC ROTATOR SYSTEM—Provides 8 compass points—just set the dial—antenna stops when desired direction is reached. Compact rotator (7¾ x 5¼ x 8"), weather-sealed and factory lubricated. 1-rpm motor reverses instantly; magnetic brakes prevent overshoot and drifting. Mahogany plastic automatic control unit (7 x 4½ x 4"). Less control cable. 110-120 v., 50-60 cycle AC.

No. 23 SU 169-2. SAVE $5.00! Combination 64B 6-Meter Beam & Alliance U-100 Rotator System. Shpg. wt., 20 lbs.
ALLIED'S SPECIAL COMBINATION PRICE, ONLY **$44.70**

hy-gain for MOBILE TIME!

NEW "TOPPER" ANTENNAS

Efficient top-loaded single-band antennas. Feature "Stabl-Fold" mast for low garaging and spring-loaded quick-disconnect for interchanging 6-ft. radiators (capsules) to shift bands. TM-36 3-ft. mast has std. ⅜"-24 stud. Fiberglas capsules have encapsulated coil and telescoping tuner rod for easy adjustment to resonant frequency. Overall ht. of capsule and mast is approx. 102".

Stock No.	Type	Description	Lbs.	Each
86 SX 250	TL-10	10M capsule	1	$ 7.95
86 SX 251	TL-15	15M capsule	1	7.95
86 SX 252	TL-20	20M capsule	1	7.95
86 SX 253	TL-40	40M capsule	1½	9.95
86 SX 254	TL-75	75M capsule	1½	11.95
86 SX 255	TM-36	mast section	2	7.95

6 AND 2-METER HALOs

HH6BK 6-METER HALO SYSTEM. Center-support type. With halo, bumper mount & mast. 52-ohm beta match. 6 lbs.
No. 86 SX 258. Only.....$16.50

HH2B 2-METER HALO. 14" dia. tubing. 52-ohm match. 3 lbs.
No. 86 SX 260. Only.....$5.95

No. 86 SX 263. HMB MAST. Takes halos singly or together. 5' high. 4 lbs. Only.....$5.95

No. 86 S 295. BPRS BUMPER MOUNT. Cadmium-plated; with stainless strap. 1½ lbs. Only.....$5.97

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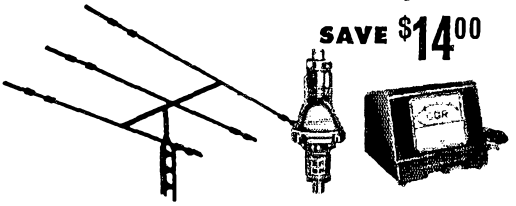
hy-gain Thunderbird Jr. Tri-Bander with CDR TR-44 Antenna Rotator System



SAVE $14.00

HERE'S THE MONEY-SAVING COMBINATION:

Thunderbird Jr. Tri-Bander. Reg...$69.95
CDR TR-44 Rotator. Reg... 58.75
Regular Price $128.70
ALLIED'S SPECIAL PRICE, ONLY... **$114.70**

THUNDERBIRD JR. TRI-BANDER. For 10, 15 and 20 meters. 3 elements. Handles 600 watts P.E.P.; takes up to 300 watts AM. Delivers maximum forward gain; up to 25 db front-to-back ratio; SWR of less than 1.5:1 at resonance. Turning radius 14'9"; boom 12'.

CDR TR-44 ROTATOR SYSTEM. Handles full-size 20-meter beams. Instant reversing; indicator readable with motor off. Weather-designed rotator; 50 heavy-duty bearings in two 6½" ball races; heavy die-cast aluminum housing. Control unit with large meter calibrated in compass points and 3" increments. For mast or pipe up to 2⅛" O.D. Less control cable. 110-120 v., 50-60 cycle AC.

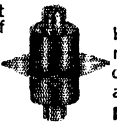
No. 23 SU 170-2. SAVE $14.00! Combination Thunderbird Jr. Tri-Bander & CDR TR-44 Rotator. Shpg. wt., 46 lbs.
ALLIED'S SPECIAL COMBINATION PRICE, ONLY **$114.70**

Combination Deal with TH-3 Tri-Bander

SAVE $20.00 CDR TR-44 Rotator System with TH-3 Tri-Bander: For 10, 15 and 20 meters. Less than 1.15:1 SWR. 3 elements. High gain. Boom 14'; turning radius 14'8".

No. 23 SU 171-2. SAVE $20.00! TH-3 Tri-Bander & CDR TR-44 Rotator. Shpg. wt., 57 lbs.
ALLIED'S SPECIAL COMBINATION PRICE, ONLY **$138.50**

New Sure Safe Lightning Arrester



Hy-Gain's LA-1 is the only lightning arrester on the market today that will safely by-pass to ground 10 or more direct lightning strokes! For installation in any 52 or 72 ohm coax feedline. 5 oz.
No. 86 S 566. Only..... **$19.95**

ALLIED STOCKS ALL HY-GAIN ANTENNAS AVAILABLE ON CREDIT FUND TERMS

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Ship me the following antennas: Nos. _____

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...need we say more?

Have been in amateur (and commercial) radio since the '20's, and the NCX-3 is the most enjoyable and interesting rig I ever owned. W7M--, Seattle, Washington

In comparison with a higher priced unit ur NCX-3 walked away with the honors. I am more than pleased with my NCX-3. K9U--, Rockford, Illinois

Amazed at the ease of operation and tuning. Fine quality signal reports. K6O--, Palo Alto, California

I have used SB gear commercial and amateur. NCX-3 tops even commercial. K5G--, Midkiff, Texas

I have always believed National to be the best; now I am sure. NCX-3 is best in the field. WN5F--, Vicksburg, Mississippi

Best I have used in 32 years. Excellent. W1G--, Framingham, Mass.

This is without doubt the best buy ever made. K6B--, Fresno, California

The advertising on the NCX-3 is completely misleading. The equipment looks considerably better than the pictures in the advertising. The performance and styling is much better than advertised. W4Y--, Grovetown, Georgia

Far better performance than anyone has a right to expect. W9K--, Park Ridge, Illinois

Best transceiver design in its price class. DJ5--, West Germany

Finest piece of communications gear of this type I have seen and used. W9W--, Taylorville, Illinois

Having a ball with it! Excellent reports audio wise and signal strength. W1H--, Merrimac, Massachusetts

I've had the NCX-3 just over a month now, and I must say that it does everything your advertisements say and then some. W1--, Portland, Maine

I get amazing signal reports on mobile op. Most fun I've had since I got on the air! Very excellent piece of electronic equipment. W6L--, Mission San Jose, California

NCX-3 is untouchable in its class. WN5F--, Vicksburg, Mississippi

How you did it I don't know. The rig is absolutely unbelievable, fabulous. WA2J--, Freeport, New York

This is one of the nicest pieces of equipment I have ever had the privilege to own. KØI--, Cedar Falls, Iowa

I have been in ham radio for about 9 years and I am sure that this is the best piece of radio equipment ever to enter my room. Keep up the good work. W9R--, Belleville, Illinois

Best VOX I've ever used! K5R--, Dallas, Texas

Words cannot express my ultimate satisfaction with the NCX-3. Thanks to National for putting such a rig on the market. K9M--, Peoria, Illinois

Am quite surprised and pleased with my investment in the NCX-3. SSB reception quality is best I've heard. Good job National! K9A--, Cicero, Illinois

This rig is the best rig I have run for general performance. The SSB audio is terrific. WAOA--, Delta, Colorado

Best investment in amateur equipment I ever made! WA4A--, Colonial Heights, Virginia

Couldn't be happier. Wouldn't trade this NCX-3 for the world! K7V--, Williams AFB, Arizona

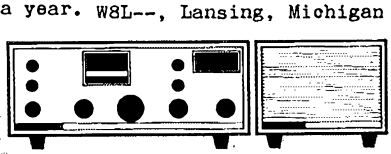
Best piece of amateur radio gear on the market for performance and price. W9R--, Indianapolis, Indiana

I wish to state the performance is beyond my expectations — the performance of the unit is excellent. Merriam, Kansas

Outperforms any other transceiver I have heard. National has done it again. K9L--, LaPorte, Indiana

You have a wonderful rig in the NCX-3! I wouldn't sell it for double the purchase price! Sure works fb on SSB and CW. Couldn't be more happy with the finest rig I've ever owned! WØP--, Independence, Kansas

The nicest piece of equipment I've had in many a year. W8L--, Lansing, Michigan



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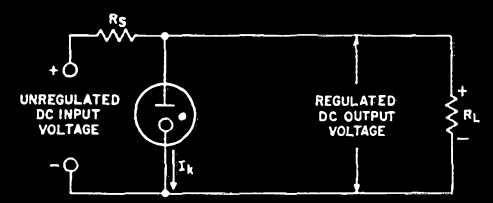

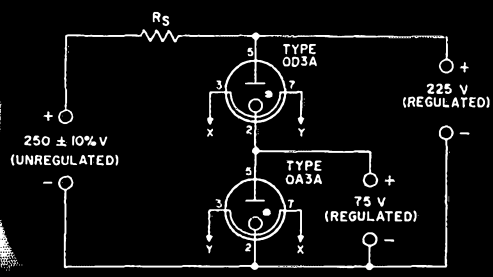

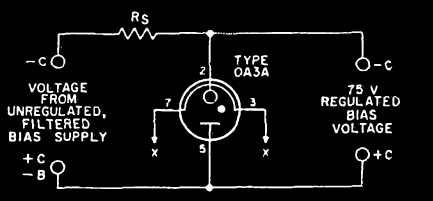

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Stability of transmitted and received radio signals requires good dc-supply-voltage regulation.

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Check the chart for the RCA VR Tube that meets your need. If your requirement calls for a higher regulated dc output voltage than that obtainable from a single tube, two or more tubes may be connected in series. Different types may be used, if the current is kept within the rating of the lowest-rated tube.

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	5 to 40	105	6.5	OA3 OA3A■
105	5 to 30	133	4	OB2 ▲
	5 to 40	133 127	4	OC3 OC3A■
150	5 to 30	185	6	OA2 ▲
	5 to 40	185 180	5.5	OD3 OD3A■

■ New RCA Type. Short version of Glass-Octal prototype
▲ 7-Pin Miniature

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