PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

LINEAR STANDARD

AUDIO TRANSFORMERS

UTC™ PIONEERS IN MINIATURIZATION

BROADCAST
HI-FIDELITY
HAM
COMMERCIAL

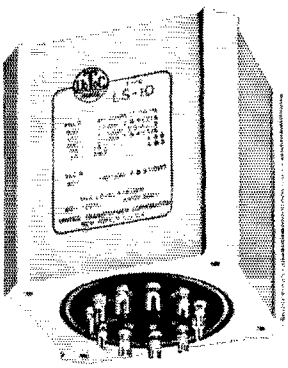
For over 30 years UTC has been the leader in advancing the art and technology of iron core inductance devices . . . The Linear Standard (LS type) units are the highest quality, non-hermetic, high fidelity transformers of their type. This series includes transformers designed for tube, transistor, hybrid, modulation and matching applications.

With the ever increasing use of wide range equipment, the point has been reached where the major limiting factor is the frequency range of the transformers employed. These LS components represent the closest approach to the ideal transformer from the standpoint of uniform frequency response, low wave form distortion, high efficiency, thorough shielding, and dependability.

LS SERIES

TRANSFORMER TYPES	Pri. Range Ω	Sec. Range Ω	Freq. Range ±1 db	Max. Level Range
Low Imped. to Grid and Mixing and Matching	2.5 to 5,000	50 to 120,000	7 ∿ to 50 KC	+ 15 dbm to + 23 dbm
Interstage and Driver	5,000 to 30,000	50,000 to 135,000	10 ∿ to 20 KC	100 mw to 40 W
Hybrid and Repeat Coils	150 to 600	150 to 600	20 ∿ to 40 KC	+ 15 dbm to + 18 dbm
Plate, Crystal, Photocell, and Bridging to Line	4,000 to 30,000	50 to 600	7 ∿ to 50 KC	200 mw to 400 mw
High Level Matching	50 to 600	1.2 to 600	10 ∿ to 40 KC	20 W to 40 W
Output to Line and Voice Coil	8 to 10K	500 to 1.2	7 ∿ to 50 KC	20 W to 60 W
Modulation	3K to 10.4K	6000 to 1.2	10 ∿ to 50 KC	20 W to 2500 W

IMMEDIATE DELIVERY
From Stock



LINEAR STANDARD
HIGH SHIELDING
DIE CAST CASES
TOP & BOTTOM MTG.

LS-1 CASE

Length	3⅛"
Width	2⅝"
Height	3¼"
Mounting	1⅝ x 2⅛"
Screws	6-32
Cutout	1⅞" dia.
Unit Weight	3 lbs.

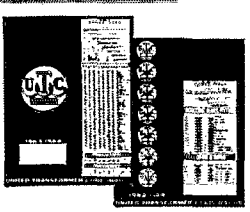
Write for latest catalog of over 1,200 STOCK ITEMS with UTC high reliability

UNITED TRANSFORMER CORP.

150 VARICK STREET, NEW YORK 13, N. Y.

PACIFIC MFG. DIVISION: 3630 EASTHAM DRIVE, CULVER CITY, CALIF.

EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y. CABLE: "ARLAB"



All this performance for only $650.00!

Full amateur band coverage, 80 through 10 meters • Hallicrafters exclusive new R.I.T. (Receiver Incremental Tuning) for ± 2 kc. adjustment of receiver frequency independent of transmitter, and AALC (Amplified Automatic Level Control) • Receiver AF gain and RF gain controls • SSB operation, VOX or PTT . . . CW operation, manual or break-in • 1650 kc. crystal filter . . .

SPECIFICATIONS

Frequency coverage: Eight-band capability — full coverage provided for 80, 40, 20, 15 meters; 10M crystals furnished for operation on 28.5 — 29.0 Mc. Other crystals may be added for full 10 meter coverage without adjustment. Available for operation on specified non-amateur frequencies by special order.

Front panel controls: Tuning; Band Selector; Final Tuning; RF Level; Mic. Gain; Pre-Selector; R.I.T.; Rec. RF Gain; AF Gain; Operation (Off/Standby/MOX/VOX.); Function (CW/USB/LSB); Cal.

General: Dial cal., 5 kc.; 100 kc. crystal cal.; VFO tunes 500 kc.; 18 tubes plus volt. reg., 10 diodes, one varicap. Rugged, lightweight aluminum construction (only 17½ lb.); size—6½" x 15" x 13".

Transmitter Section: (2) 12DQ6B output tubes. Fixed, 50-ohm Pi network. Power input—150W P.E.P. SSB; 125W CW. Carrier and unwanted sideband suppression 50 db.; distortion prod., 30 db. Audio: 400-2800 c.p.s. @ 3 db.

Receiver Section: Sensitivity less than 1 μv for 20 db. signal-to-noise ratio. Audio output 2W; overall gain, 1 μv for ½ W output. 6.0 — 6.5 1st I.F. (tunes with VFO). 1650 kc. 2nd I.F.

Accessories: P-150AC, AC power supply, $99.50. P-150DC, DC power supply, $109.50. MR-150 mounting rack, $39.95.

New SR·150 Fixed/Mobile Transceiver · hallicrafters

Overseas sales: Export Division, Hallicrafters • Canada: Gould Sales Co., Montreal, P.Q.

5th and Kostner Aves., Chicago 24, Ill.

1959
10
KWM-2
75S-3B
32S-3
30L-1
62S-1
312B-4

NUMBERS GAME!

You'll recognize most of the numbers as Collins S/Line equipment. The 1959 is the year the S/Line was introduced. And 10? That's the number of reasons why you still get more features from S/Line equipment than any other. Just look. 1. *Complete station compatibility.* 2. *Light weight.* 3. *Simplicity and styling.* 4. *Frequency stability.* 5. *Frequency calibration.* 6. *More QSO's per kilocycle.* 7. *Mechanical filters.* 8. *Dual or single PTO control.* 9. *Automatic load control.* 10. *Negative R-F feedback.* 11. *The sincerest form of flattery.* Four years ago each of these 10 points was exclusive with Collins amateur equipment. We can't make that statement today because many of these original exclusives have been incorporated as standard in all amateur rigs. However, Collins is still the only equipment which offers you *all* these features — and is still unexcelled in any of them. □ Get complete information on S/Line equipment and prices at your Collins distributor. See how little it costs to own the finest.

COLLINS

QST

JUNE 1964

VOLUME XLVIII • NUMBER 6

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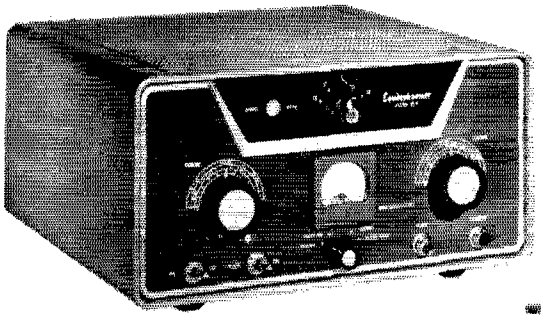
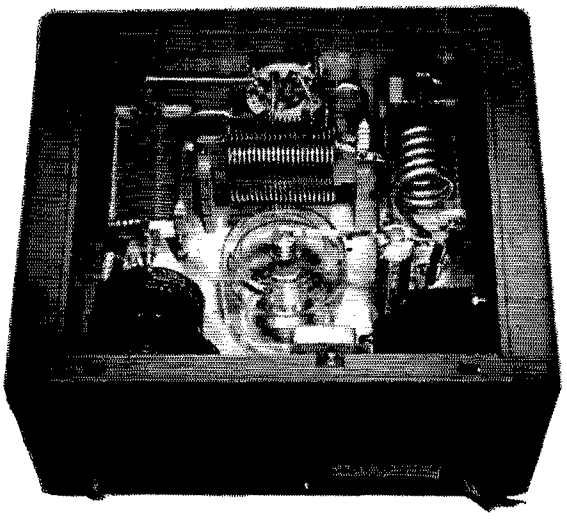
—CONTENTS—

EIMAC

3-400Z triode is featured in Hallicrafter desk-top HT-45 Linear Amplifier

Below you see the Hallicrafter HT-45 Linear Amplifier designed for one kilowatt service: continuous, key-down rating! This popular amplifier provides commercial service reliability and improved linearity, thanks to Eimac's 3-400Z zero bias triode. The original-design 3-400Z eliminates costly and bulky screen and bias power supplies. Power—Dependability—Quality! That's what you expect and get in the HT-45. And that's what you can get when you design your linear amplifier with Eimac's 3-400Z. For additional information on this tube—and its big brother, the 3-1000Z—please write: Amateur Service Department, Eitel-McCullough, Inc., San Carlos, California.





from 2 to 160 meters

relax...
for the BEST
in HF and VHF
listening

HAMMARLUND'S NEW HQ-170A-VHF

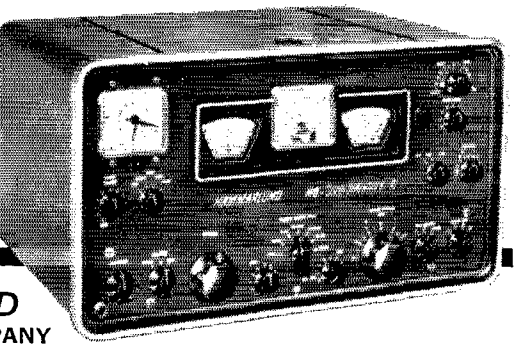
the only receiver capturing all popular Ham Bands.*

The exciting HQ-170A-VHF is the **first** and only Ham Band receiver that gives you **everything** you want. Separate NuVistor front ends (0.3μV for 10 db S/N) for both 6 and 2 meters completely eliminates the need for add-on converters or jury-rigged adaptations. Built-in 6 and 2 meter operation employs **matched circuitry** for outstanding performance.

Here is an SSB receiver that combines basic operating excellence with all of the extra features you want to make it a versatile, "fun-to-work-with" unit. Full coverage from 2 to 160 meters, excellent electrical and mechanical stability, expanded vernier tuning and a host of truly incomparable HQ-170A features makes this receiver the new **First Choice** for the amateur fraternity.

The HQ-170A-VHF is the most versatile, and most **complete** amateur band receiver now available on the market—one neat package contains all the flexibility you need—superlative AM, CW and SSB reception on **All** popular amateur bands.

Coming soon—Matching transmit accessories for the Fabulous HX-50.



*Except for the Hammarlund HQ-110A-VHF

Established 1910

HAMMARLUND
MANUFACTURING COMPANY
A GIANNINI SCIENTIFIC COMPANY
53 West 23rd Street, New York 10, New York

I'm intereRested. Please send HQ-170A-VHF info to:

Name_____

Address_____

City_____ Zone____ State_____

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in areas shown to qualified League members holding Canadian or FCC amateur license, General or Conditional Class or above. These include ORS, OES, OPS, OO and OBS. SCMs desire applications for SEC, EC, RM and PAM where vacancies exist. OES, v.h.f. bands appointment, is available to Technicians and Novice, as well as to full-privilege amateur licensees.

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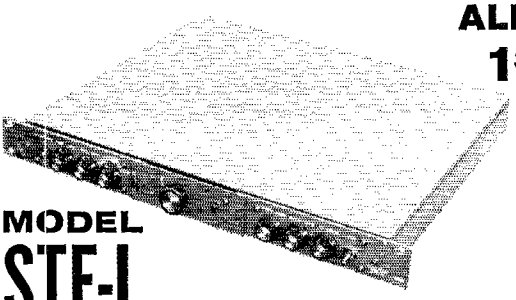
* Official appointed to act temporarily in the absence of a regular official

TRANSMIT / RECEIVE
SOLID STATE

LSB • USB • AME • CW • AFSK • AFAX

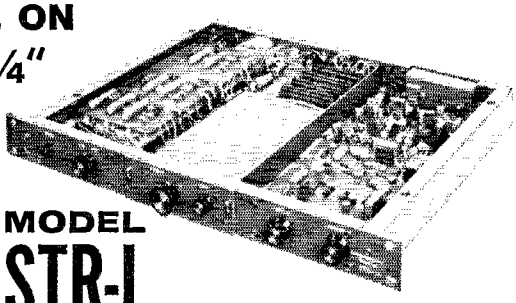
2—32 mc

ALL ON 1¾"



MODEL STE-I

SPECIFICATIONS



MODEL STR-I

SPECIFICATIONS

- **FREQUENCY CONTROL:** Crystals (oven controlled) in plug-in RF heads for 2-4, 4-8, 8-16 and 16-32 mc coverage. (Specify frequency when ordering.)

- **PUSH-TO-TALK • VOX and anti-VOX**
- **250 MILLIWATT RF OUTPUT** into 50 ohms.
- **OUTPUT IMPEDANCE:** Nominal 50 ohms unbalanced.
- **UNWANTED SIDEBAND REJECTION:** At least 60 db below full PEP output.
- **SPURIOUS & HARMONIC OUTPUT:** 50 db minimum below full PEP output.
- **CARRIER INSERTION:** Automatic compensation for carrier to side-band ratio is accomplished by the mode selector switch.
- **AUDIO RESPONSE:** Nominal 3 kc.
- **AUDIO INPUT:** 600 ohm line, carbon mike, hi and lo Z mike.

- **INPUT IMPEDANCE:** Nominal 50 ohms unbalanced.
- **SENSITIVITY: 1 microvolt for 15 db.** $\frac{S+N}{N}$
- **SQUELCH:** Threshold adjustable squelch. AGC activated relay has contacts brought to rear panel for remote indication of receiver signal activity.
- **AF OUTPUT:** 0 dbm to 600 ohms. 500 mw into 4 ohms.
- **SPEECH CLARIFIER:** Manually controlled front panel.
- **MONITORING:** By means of front panel phone jack.

- **SIZE AND WEIGHT:** 1¾" x 19" x 15". 10 lbs. • **POWER:** 115v, 60 cps, single phase, 3 watts.

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, NEW YORK

and Subsidiaries
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THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

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

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

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

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

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

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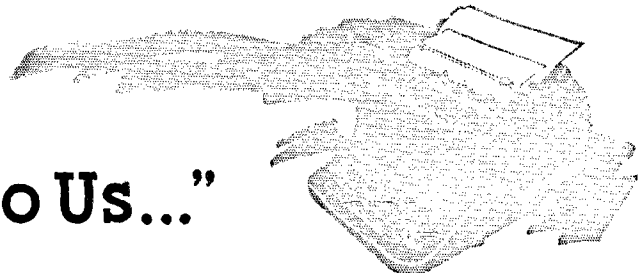
Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla. 73159



"It Seems to Us..."

REGION II IARU

ANOTHER important step in the unification of amateur radio interests worldwide was taken in Mexico City in April, when representatives of 16 societies in the western hemisphere met to form the Inter-American Union of Radio Amateurs — Region II Division of the International Amateur Radio Union.

Argentina, Bermuda, Canada, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Panama, Peru, U.S.A. and Venezuela sent delegates; Brazil, Chile and Jamaica were represented by proxy. Right from the start of the four-day conference sponsored by the *Liga Mexicana de Radio Experimentadores*, there was evident enthusiasm and determination to strengthen the ties between amateur societies in North, Central and South America. The scheduled two- and three-hour breakfasts and luncheons, so typical of Mexican hospitality, often had to take a back seat while committees continued their deliberations to work out agreements in all areas of organization. One hundred visiting non-delegate amateurs and their wives, however, participated fully in social, technical and operating discussions, toured the city and its surroundings, and observed some of the official sessions.

Special committees were appointed for credentials, finance, and constitution, the latter requiring particularly intensive effort as might be expected in forming a new organization of such widespread geographical scope. In all this preparation, the study groups had the benefit of experience provided in documentary form by the Region I Division of IARU, which has been functioning for a dozen years. The excellence of the work of these committees was demonstrated when the final meeting of the entire group of delegates gave approval to the proposed texts with only a minimum of changes.

It was decided that an Executive Committee of six persons would guide the affairs of the new organization, have authority to call the next assembly of delegates, temporarily have power to determine the financial assessments on each society, etc. It was further agreed that election to the Committee would be roughly on a geographical basis. Those chosen by acclamation were:

Chairman: Antonio Pita, XE1CCP
Vice-Chairman: J. Italo Giammattei, YS1IM
Secretary: Gustavo Reusens C., OA4AV
Treasurer: Noel B. Eaton, VE3CJ
Member-at-Large: Miguel A. Czysch, LU3DCA
Member-at-Large: Robert W. Denniston, WØNWX

Several other societies, although unable to send delegates, had by letter expressed their desire to join the new Union. All IARU member-societies in the western hemisphere are automatically eligible, and thus it is expected the roster will shortly grow to more than 20 national representatives, plus additional ones as new societies form and apply for IARU affiliation.

That the Region II organization had long been a common objective of amateur societies on this side of the world was fully evident from the number of countries represented and the cooperative enthusiasm with which the work was undertaken. The first step has now been accomplished. In succeeding months, under the guidance of its Executive Committee, the new Inter-American Union of Radio Amateurs will provide another and very important link in the strengthening of IARU to help meet the problems we amateurs face — and will be facing in the future — on a worldwide basis.

FIELD DAY — 1964

THE annual Field Day, long a favorite summertime activity of thousands of ARRL members, takes on an added significance this summer because of an action taken at the May meeting of ARRL's Board of Directors. The Board has established preparedness in emergency communications to be a primary objective of the amateur fraternity, in line with our increased emphasis on public service.

The ultimate goal of every amateur should be the capability to provide emergency communications at any time, at any place, under any condition. Many of us *think* we have this capability, but it takes an exercise like Field Day to iron out some of the bugs.

Emergency preparedness is a round-the-clock, round-the-calendar goal, and Field Day is our opportunity to go out in the field and test our preparedness and emergency operating skills before an actual disaster strikes.

Field Day — 1964. See you there? QST

COMING A.R.R.L. CONVENTIONS

June 12–14 — West Gulf Division, Brownwood, Texas
July 4–5 — West Virginia State, Jackson's Mill, W. Va.
July 11–12 — Rocky Mountain Division, Estes Park, Colo.
August 21–23 — ARRL National, New York City
September 5–6 — Maritime Province, Charlottetown, P. E. I.
September 11–13 — Southwestern Division, Palm Springs, California
September 25–27 — Pacific Division, Sacramento, California
October 2–3 — Ontario Province, London, Ont.
October 17 — Michigan State, Grand Rapids, Mich.

WEST GULF DIVISION CONVENTION

Brownwood, Texas — June 12–14

The West Gulf Division ARRL Convention will be held Friday through Sunday, June 12–14, at the new Brownwood Coliseum.

Registration, at $10 per person, will begin at 1 P.M. Friday. A Bar-B-Q buffet and party, for $2 per person, will be held at the coliseum at 6:30. Saturday's festivities start with a welcoming address by Mayor W. C. Monroe and response by Director Best. Activities include YL breakfast and luncheon with SWOOP initiation; MARS meeting; breakfast and luncheon meetings for DX, RTTY, mobile, v.h.f., RACES, and for QCWA members; FCC examinations; 6, 10 and 75 meter transmitter hunts; old equipment contest; QSL card contest; and a 75 meter mobile field strength contest. Saturday's program will conclude with a dance at 8 and the Royal Order of the Wouff Hong conclave at midnight. The banquet Sunday noon will be followed by entertainment of special interest.

Technical speakers will include Bud Drobish, W9QVA, of Hallicrafters; Hy-Gain's Robert Ruyle, W0FCH; C. S. Carney, W0GDJ, from Collins Radio; and Glenn Scott of Southwestern Bell Telephone. The League Forum on Sunday morning will feature ARRL President Herbert Hoover, Jr., W6ZH; Vice-President Groves, W5NW; General Manager Huntoon, W1LVQ; Director Best, W5QKF; and Les Harbin, W5BNG, SCM of North Texas.

Brownwood is located on highways 67, 377, 84 and 183, just 13 miles from the center of the state. Lake Brownwood and a state park nearby offer fine accommodations and aquatic facilities. For further information and reservations, write to: Brownwood Amateur Radio Club, P.O. Box 181, Brownwood, Texas 76802.

WEST VIRGINIA STATE CONVENTION

Jackson's Mill — July 4–5

The West Virginia State Convention will be held on Saturday and Sunday, July 4 and 5 at the State 4-H Camp, Jackson's Mill (near Weston) on U.S. Route #19. The program will include transmitter hunts, mobile judging, technical discussions and demonstration of electronic gear. Facilities are available for swimming, tennis, softball, and other outdoor activities.

Highlights of the schedule for Saturday will be the ARRL forum, SWOOP for XYL's, round and square dancing and the Royal Order of the Wouff Hong initiation at midnight. There will be meetings of the West Virginia phone and c.w. nets, WVN (PON)SSB Net, WACWV, Club and YLRL activity. Church services will be held at the Mill on Sunday morning and the presentation of West Virginia's Outstanding Amateur Award will be made at Sunday dinner. Children's activities will be supervised.

Full registration is $8.00 per person. These fees include lunch and dinner on Saturday, lodging Saturday night, breakfast and dinner on Sunday and admission to convention activities. Children eight years old and under, staying at the Mill, may have meals and lodging only for $4.00. Lodging is dormitory style, with separate cottages for men and women. Those desiring more privacy may stay at motels or hotels in nearby Weston or Clarksburg. Registration tickets which do not include meals or lodging may be purchased for $2.00 per person. Cottage and dining hall capacity is 400; therefore, full registration is limited. When ordering $8.00 tickets, state number of men and women in the party.

Requests for full registration should be sent to Dorothy Morris, 1136 Morningstar Lane, Fairmont; $2.00 tickets are available from Keith Chambers, W8SSA, Box 62, Bluefield, and from T. D. Foster, K8HID, Tornado. For additional information, contact Kay Anderson, W8DUV, Convention Secretary, 209 Childers Court, Huntington.

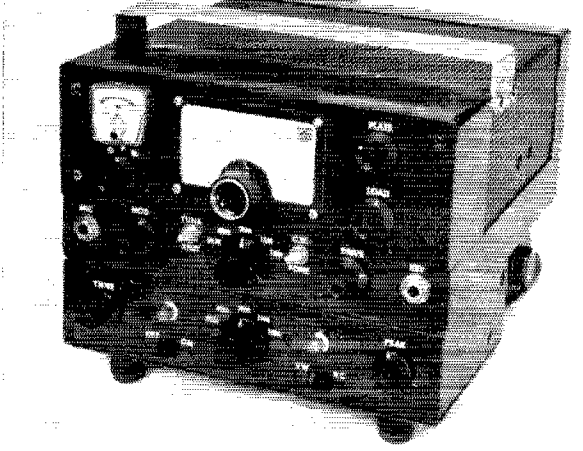
ROCKY MOUNTAIN DIVISION CONVENTION

Estes Park, Colorado — July 11–12

The Rocky Mountain Division ARRL Convention will be held Saturday and Sunday, July 11 and 12, at the Stanley Hotel, Estes Park, Colorado. The program will include technical discussions and special interest features on such topics as DX, v.h.f., RTTY, and s.s.b. FCC General and Extra class examinations will be given. An ARRL forum will feature an address by ARRL President Herbert Hoover, Jr., W6ZH; Prose Walker, W5KZA, will be a dinner speaker. Also scheduled are ARPSC, SCM/SEC and MARS meetings, as well as a QSL contest, c.w. contest, transmitter hunts and a dance on Saturday night. A special program is planned for wives and children to make the event fun for the entire family. There will be exhibits and displays by amateur equipment distributors throughout the convention.

Two amateur stations will be on the air during

(Continued on page 162)



The complete mobile package built by VE2AES. Across the bottom of the transmitter panel, from left to right, are the microphone jack, modulator gain control (to which the power switch S_2 is attached), the TUNE/TRANSMIT switch, PHONE/C.W. switch, drive control, and key jack. The meter switch is below the meter in the upper left-hand corner. The final-amplifier tuning and loading controls are to the left of the dial (a home-brew copy of a well-known manufactured item). From left to right on the converter panel below are the converter tuning knob, the converter filament switch with I_3 above, the band switch, the converter bypassing switch with I_2 above, and the antenna trimmer.

A Complete Mobile Package

Five-Band Transmitter Converter Unit with Power Supply

— Part 1 —

BY L. JACQUES FILION,* VE2AES/W6

Installation of this mobile unit requires only three connections — to the antenna, the car broadcast receiver, and the battery. The changeover system is built in. The package consists of a 25-watt plate-modulated transmitter covering 10 through 80 meters, a converter covering the same bands, and a transistor power supply for the transmitter. The converter operates directly from a 12-volt car battery.

WITHIN the past year or two, the trend from a.m. toward s.s.b. in fixed-station operation has extended into the mobile field. While it is certain that this trend will continue, it is probable that its pace will be slower. One reason for this is that the cost and complexity of an s.s.b. installation lies chiefly in the exciter, which must be essentially the same regardless of the ultimate power output of the transmitter. Thus the cost of a low-power s.s.b. transmitter, into which category most mobile rigs fall, and the complexity, are disproportionately high. Therefore, it may be some time before the would-be mobile ham with limited funds and know-how can afford thoughts of an s.s.b. installation. In the meantime, he cannot be ignored. The a.m system still offers low-power operation with relative simplicity and at a cost commensurate with the power level.

The mobile package shown in the photographs consists of three distinct units — a nominal 25-watt plate-modulated transmitter (with v.f.o. control) covering the five amateur bands 80 through 10 meters, a frequency converter from these bands to the broadcast band, and a transistor power supply for the transmitter. Any of these three units may, of course, be built so as to be used independently of the other two, should the complete package not be desired.

The complete assembly has over-all dimensions of 6¾ inches high, 9¼ inches wide, and 9¾ inches deep. For those who are interested in building the transmitter only, this unit has the same width and depth, but is only 4¾ inches high. At the outset, it was determined that the total cost was not to exceed $100 (in Canada), although additional dependence was placed on a liberal junk box, and a lot of shopping around with the beg-borrow-and-steal attitude. As it turned out, the actual cash layout was just about $60.

Transmitter Circuit

The circuitry of the three units comprising the package combines ideas taken from *QST* as far back as 1950, the ARRL *Mobile Manual*, and several other publications. No originality, except for the particular combination chosen, is claimed.

As shown in Fig. 1, the transmitter is a three-stage arrangement making use of a 6CL6 in a series-tuned Colpitts v.f.o. circuit. The frequency-determining portion of the circuit operates over the 3.5-Mc. band for 80-meter transmitter output, and in the 7-Mc. band for other output frequencies. The output circuit of this stage is tuned to 14 Mc. for 28-Mc. transmitter output,

* 16100 Sunset Blvd., Apt. 13, Pacific Palisades, Calif.

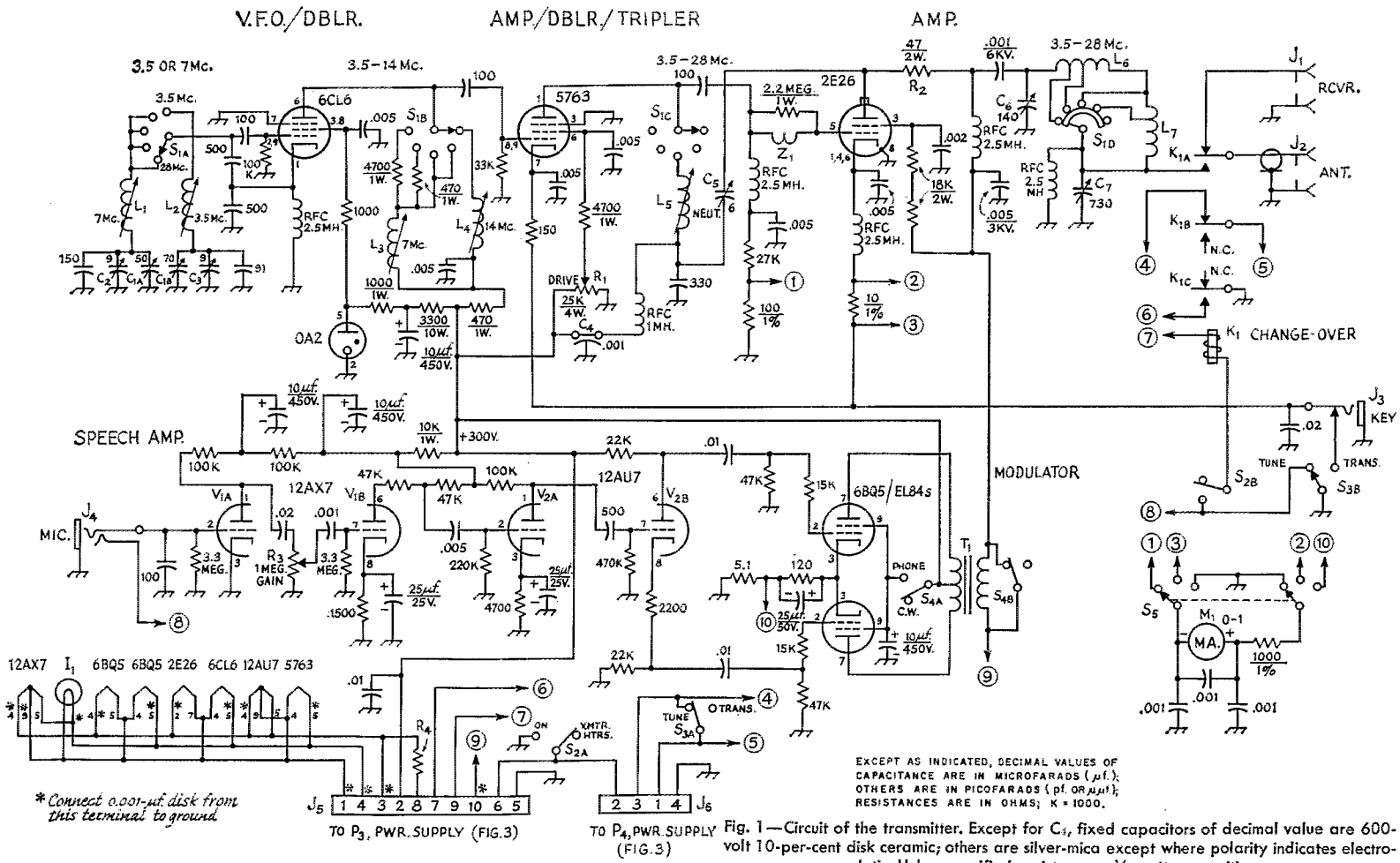


Fig. 1—Circuit of the transmitter. Except for C_4, fixed capacitors of decimal value are 600-volt 10-per-cent disk ceramic; others are silver-mica except where polarity indicates electrolytic. Unless specified, resistors are ½-watt composition.

C_1—Dual air variable, approx. 50 pf. for C_{1A}, and 70 pf. for C_{1B} (Etco JK-039, three rotor plates removed from one section; Johnson 167-53, 6 rotor plates removed from one section and 4 rotor plates removed from other section).
C_2, C_3—Miniature air variable (Johnson 160-104).
C_4—Feedthrough capacitor (Centralab FT-1000).
C_5—Tubular trimmer (Centralab 829-6).
C_6—Air variable (Etco JK-035; Hammarlund HFA-140-A).
C_7—365-pf. dual air variable (broadcast-replacement type, sections in parallel).
I_1—*Miniature lamp in meter, 6.3 volts, 40 ma. (see M_1).*
J_1—Chassis-mounting car-radio antenna receptacle (Cinch-Jones 81-F).
J_2—Chassis-mounting coaxial receptacle (SO-239).
J_3—Closed-circuit jack.
J_4—Three-circuit microphone jack.
J_5—10-contact male chassis-mounting connector (Cinch-Jones P-410-AB).
J_6—4-contact female chassis-mounting connection (Cinch-Jones S-404-AB).
K_1—12-volt d.c. relay, 3-pole double-throw (Globe Electronics 3500-015; Potter & Brumfield KA14DY).
L_1—Approx. 4.5 μh.: 25 turns close-wound in two layers.
L_2—Approx. 20 μh.: 60 turns close-wound in two layers.
L_3—Approx. 13.5 μh.; 47 turns close-wound in 1½ layers.
L_4—Approx. 3 μh.: 17 turns.
L_5—3.5 Mc.: Same as L_2.
— 7 Mc.: Approx. 13 μh.: 45 turns.
—14 Mc.: Same as L_4.
—21 Mc.: Approx. 2 μh.: 13 turns.
—28 Mc.: Approx. 1 μh.: 9 turns.
Above coils are close-wound with No. 22 enam. wire on ⅜ × 1¼-inch iron-slug forms.
L_6—10 turns No. 14, 1-inch diam., 2½ inches long, tapped at 3½ and 5¾ turns from plate end.
L_7—40 turns No. 20, 1-inch diam., 2¼ inches long, tapped at 25 turns from output end.
M_1—Illuminated miniature 0–1-ma. d.c. meter (Etco TE-138 or similar). Note: Omit R_4 if meter is not illuminated.
R_1—4-watt wire-wound control (Mallory M25MPK or similar.)
R_2—Carbon composition.
R_3—Composition control, audio taper.
R_4—Resistance equal to resistance of I_1; 150 ohms for 40-ma. lamp in meter specified. Omit if meter not illuminated.
S_1—Ceramic rotary switch: 3 sections, 4 poles, 5 positions (Centralab PA-302 index; S_{1C} and S_{1A} are on one PA-3 section, one position not used; S_{1B} is on one PA-2 section, one pole, one position not used; S_{1D} is on one PA-12 section, progressively-shorting, 5 positions not used).
S_2—D.p.d.t. switch on R_3.
S_3, S_4—Miniature d.p.d.t. toggle switch (Etco Armaco S-16; Lafayette SW-76).
S_5—Double-pole 3-position rotary switch (Centralab 1472).
T_1—Modulation transformer: primary 8000 ohms plate-to-plate, c.t.; secondary 10,000 ohms, 100 ma. (Stancor 3891 or equivalent).
Z_1—8 turns No. 20 plastic-covered hookup wire close-wound on 2.2-megohm 1-watt resistor.

and to 7 Mc. for all other output bands. On 80 meters, the 7-Mc. circuit provides sufficient impedance to assure adequate drive to the following stage. The v.f.o. screen voltage is held constant by a 0A2 regulator.

The v.f.o. is capacitively coupled to a 5763 buffer/multiplier, which operates as a doubler to 14 Mc. and to 28 Mc., as a tripler to 21 Mc., and as a buffer on the two lower-frequency bands. This stage is capacitively coupled to a neutralized 2E26 in a pi-network final amplifier. At this point some readers may wonder why the 2E26 was used instead of the famous 6146. The reasons are simple: the smaller size of the 2E26 was desirable and, more important, I happened to have a 2E26 in my junk box, and not a 6146.

For c.w. operation, all stages except the v.f.o. are keyed in the common cathode circuit. Keying characteristics are good.

The modulator uses a pair of 6BQ5/EL84s running in Class AB_1. These tubes provide ample audio to fully modulate the plate and screen of the 2E26. The low-level audio stages consist of a 12AX7 as a preamplifier, followed by one section of a 12AU7. This arrangement provides sufficient gain for the average-quality crystal or dynamic microphone. The second section of the 12AU7 is wired as a phase inverter to provide push-pull drive for the modulators. The selection of component values in the low-level stages is such that the general audio-frequency response for speech application is favored.

M_1 is a 0–1-ma. meter which is provided with multiplying resistors to provide full-scale readings of 10 ma. for final-amplifier grid current, 100 ma. for final-amplifier cathode current, and 200 ma. for modulator cathode current. The PHONE/C.W. switch, S_4, applies modulator screen voltage in the PHONE position, and shorts the secondary of the modulation transformer in the c.w. position.

Converter Circuit

The converter circuit, shown in Fig. 2, is a three-stage system and, unlike many mobile converters, includes an i.f. amplifier which more than compensates for losses in coupling the converter to the car receiver. It also contributes additional selectivity and image rejection (referring to the 262-kc. i.f. in the broadcast receiver). The tubes used in the converter are of the type that operate with a plate voltage of 12, which may be obtained directly from the car battery, thereby eliminating the need for a separate plate-voltage source.

The r.f. amplifier utilizes a 12EK6 pentode with its grid and plate circuits tuned to the band in use. This stage feeds a 12AD6 converter with an i.f. output at approximately 1600 kc. If the gain of the pentode is not needed in the i.f. amplifier, the tube may be wired as a triode by simply omitting the screen bypass capacitor, the 470-ohm screen resistor and the ground connection to the No. 3 grid, and connecting Pins 2, 5 and 6 together at the socket.

The trap in the antenna lead was needed at

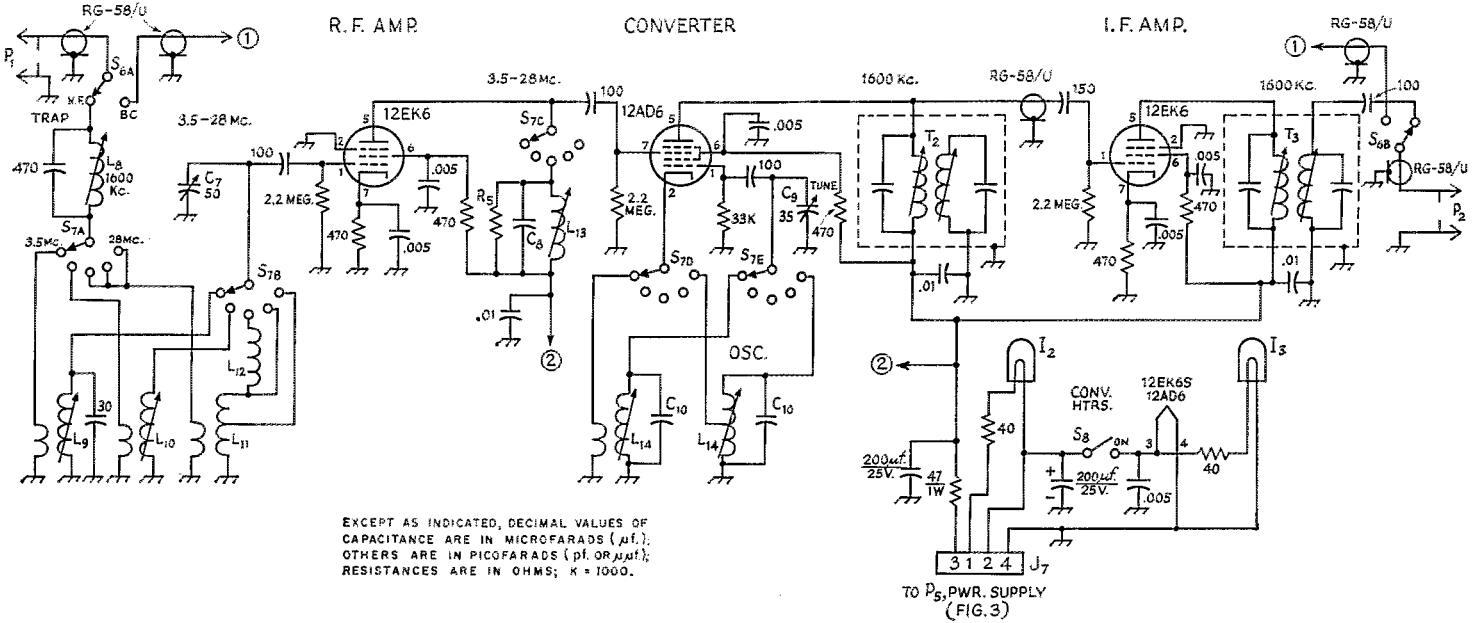


Fig. 2—Circuit of the converter. Fixed capacitors of decimal value are disk ceramic; others are silver mica except where polarity indicates electrolytic. Resistors are ½-watt composition if not indicated.

C_7—Air trimmer (Etco JK-032; Johnson 157-4).
C_8—See Table I.
C_9—Air trimmer (Etco JK-032, all but 4 rotors and 5 stators removed; Hammarlund MAPC-35-B).
I_2, I_3—Miniature 6-volt 200-ma. pilot lamp (Etco or Dialco 162-8430).
J_7—4-contact male chassis-mounting connector (Cinch-Jones P-304-AB).
L_8—25-μh. slug-tuned coil (Miller 4407 or equivalent).
L_9—Approx. 25 μh.—50 turns No. 36 enam., close-wound on 5/16 × 1¼-inch iron-slug form (see text). Link: 15 turns No. 36 close-wound at ground end.
L_{10}—Approx. 10 μh.—38 turns No. 20 enam., close-wound on 5/16 × 1¼-inch iron-slug form (see text). Link: 15 turns No. 36 close-wound at ground end.
Note: Forms ⅜ inch in diameter may be substituted, although in some instances a slight reduction in turns may be necessary.
L_{11}—17 turns No. 20 double-spaced, ½-inch diam. tapped at 12 turns from ground end (B & W 3003 coil stock). Link: 4 turns insulated wire interwound at ground end.
L_{12}—Full-length close winding of No. 20 enameled on 1-megohm 1-watt resistor.
L_{13}, L_{14}—See Table I.
P_1, P_2—Car-radio antenna plug (Cinch-Jones 13B).
R_5—See Table I.
S_8—D.p.d.t. slide switch.
S_7—Ceramic rotary switch: 3 sections, 5 poles, 5 positions (Centralab PA-301 index, 3 PA-3 sections. S_{7A} and S_{7B} are on one section; S_{7C} is on second section, one pole not used; S_{7D} and S_{7E} are on third section. One position of all poles not used.)
S_9—S.p.s.t. slide switch.
T_2, T_3—1600-kc. i.f. transformer (Globe 1205-001A or Lafayette HP-63).

my location to keep a 1550-kc. signal from a local broadcast station from riding through to the i.f. amplifier. In other localities it may not be needed. The antenna may be switched directly to the broadcast receiver by means of S_6.

The sensitivity of this arrangement is good, being of the order of 1 microvolt for a signal-plus-noise to noise ratio of 8 db. or better on all bands. The selectivity is principally that of the car receiver used, plus some contribution by the i.f. stage in the converter.

There are, however, two flies in the ointment. These are associated with the use of 12-volt tubes and their operation directly from the car battery. One of them is a tendency for the front end to overload on strong signals. There is little that can be done about this except to detune the front end by means of the r.f.-stage trimmer when overloading occurs. The other trouble is with ignition and other noise from the car's electrical system. I have found that a good series-gate noise clipper installed in the car receiver makes a marked improvement. The circuit described by W3BLC in the ARRL *Mobile Manual* could be used by substituting a 12AL5 for 12-volt operation. In my installation, the noise clipper and a b.f.o. unit are combined on one external chassis attached to the car receiver.

Power-Supply Circuit

The power-supply circuit shown in Fig. 3 is pretty much the standard type. A pair of 2N278/DS501 transistors, a Triad toroid-core transformer, and a silicon bridge rectifier are the main components. The high efficiency of such systems is well known, and the output is low in ripple content. The primary-circuit filtering shown is important, however, and should not be omitted. This filtering was found necessary to prevent power-generating-oscillator energy from modulating the transmitter circuits through coupling in the common impedance of the battery. This modulation was quite pronounced until the filtering was installed.

Power-Distribution and Control Circuitry

Plus high voltage for the final-amplifier plate and screen is obtained from the power-supply circuit of Fig. 3 via the modulation transformer T_1, Pin 10 on J_5, and Pin 10 on P_3. Plus low voltage for the modulator and exciter stages is obtained via Pin 2 on J_5, and Pin 2 on P_3. The common negative connection (ground) is made through Pin 5 on J_5 and Pin 5 on P_3.

Plus 12 volts is fed directly to the power-supply primary circuit, as shown in Fig. 3. The negative 12-volt primary connection (ground) is made via Pin 7 on P_3, Pin 7 on J_5, and K_{1C} when K_1 is in the transmit position.

In the relay-control circuit, +12 volts is fed to K_1 via Pin 9 on J_5, and Pin 9 on P_3. The relay-coil circuit is completed back to ground via S_{2B} when the transmitter-filament switch S_2 is in the ON position. With S_2 in this position, the relay is

(Continued on page 162)

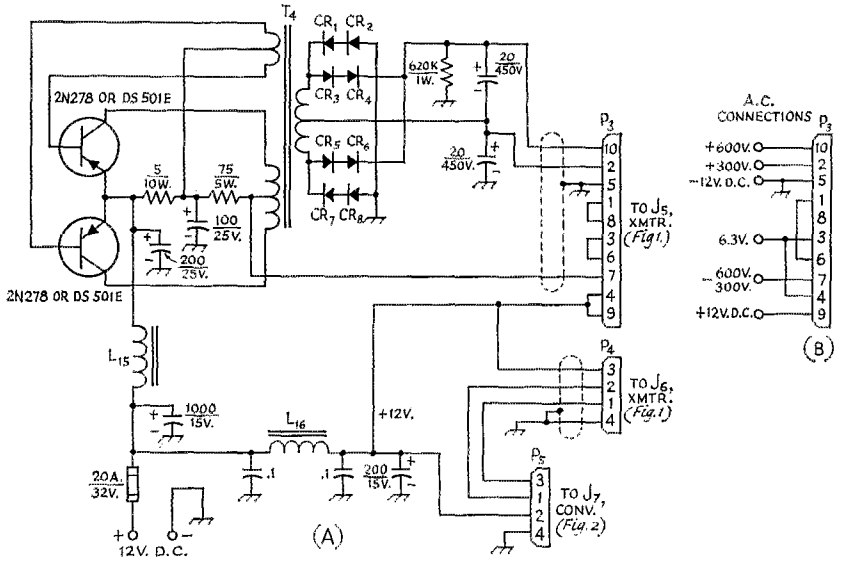


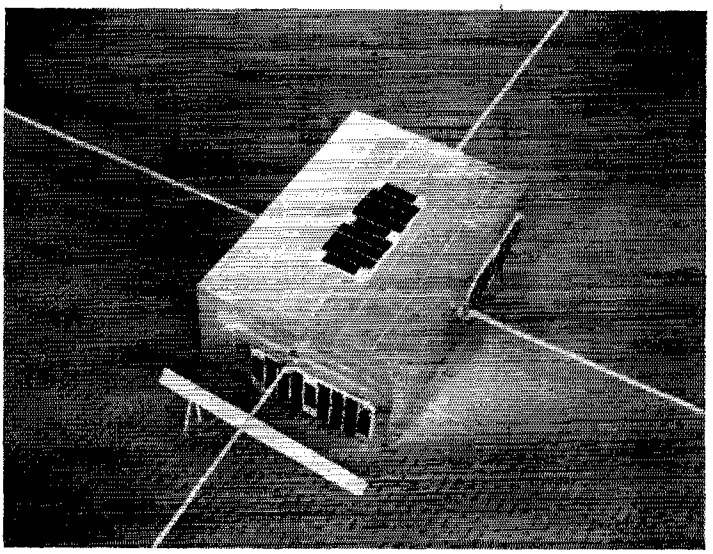
Fig. 3—Circuit of the transistor power supply. Capacitances are in μf. and resistances are in ohms (K = 1000). Capacitors of decimal value are disk ceramic; others are electrolytic. Detail B shows connections to P_3 for operating the transmitter from an a.c. supply.

CR_1-CR_8 inc.—600-p.i.v. 500-ma. or more silicon rectifier.
L_{15}—10-amp. iron-core hash choke, approx. 3 μh. (Globe Electronics part No. 1300-021A; Miller 5218).
L_{16}—5-amp. iron-core hash choke, approx. 9 μh. (Miller 5220), or same as L_{15}.
P_3—10-contact female plug (Cinch-Jones S-310-CCT).
P_4—4-contact male plug (Cinch-Jones P-304-CCT).
P_5—4-contact female chassis-mounting connector (Cinch-Jones S-304-AB).
T_4—Toroidal transistor power transformer: 600 volts, c.t. 200 ma. (Triad TY-94). Note: This is an epoxy-encapsulated unit; the open type used by the author is no longer available.

Oscar III—

Technical

Description



This is Oscar III, with its four antennas projecting from the sides of the case. Solar-cell batteries on each side will power a c.w. beacon transmitter. Main power is from a silver-zinc primary battery.

BY ARTHUR M. WALTERS,* W6DKH

OSCAR III will be the first active satellite that will allow amateurs to communicate on the two-meter band over path lengths in excess of 2000 miles. The satellite will be a frequency-translating repeater unit that receives a 50-kc. segment of the two-meter band, amplifies it, and translates it to another portion of the band for retransmission. A subsequent article [1] will discuss the telemetry circuitry of Oscar III. Note that this translator does *not* detect and remodulate. This device is *not* a receiver driving a transmitter. While we may seem to over-emphasize this point, there appears to be confusion as to how it operates. Many people have asked questions such as "Will it work with s.s.b.? with c.w.? with a.m.? with f.m.?" The answer is yes. All of these modes of communication and others such as f.s.k. or slow-scan TV may be relayed through Oscar III.

The translator will amplify any radio-frequency energy it hears in a specific segment of the two-meter band — including noise — and will retransmit with a maximum of 1 watt peak-envelope power in another segment of the band. It is a multiple-access device — any number can play, simultaneously. Within the bandwidth limitations of the system, any mode of communication is possible. Fig. 1 shows a simplified block diagram of the system used. Note that the signal is only amplified and is heterodyned from one frequency to another. There is no detection of the incoming signals and no demodulated audio appears in the circuitry. R.f. signals of any form within the passband will simply be amplified, translated in frequency and reradiated.

We expect the Oscar III package to have three separate transmitting systems aboard. The package is approximately the size of an "overnight" suitcase (17.5 × 12 × 6.5 inches) and will weigh approximately 30 pounds. The relative size can be judged from the 12-inch scale shown along one end of the package in the photograph. There are four antennas, one for receiving and three for transmitting.

Power Supply

The dark rectangles on the sides of the package are solar cells. Banks of cells are attached to all sides so that, regardless of the orientation of the assembly with respect to the sun, ample current output will be available. The solar cells are electrically separated into series-parallel

* 22 Doud Drive, Los Altos, California.

[1] To be published in a coming issue.

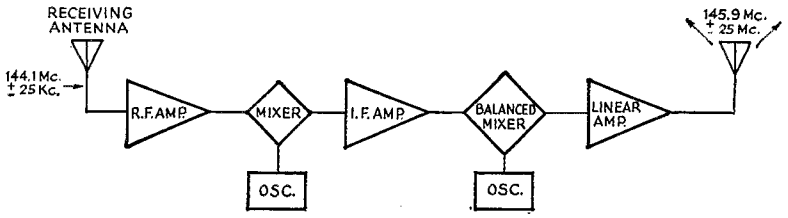


Fig. 1—Simplified block diagram of the frequency-translating repeater.

sections with disconnect diodes so that failure of one section will not short out the others. The output of the cells will be in the order of 150 ma. at 9 volts for each panel. The solar cells will charge a small nickel-cadmium storage battery of about 1 ampere-hour capacity to run the c.w. beacon transmitter when the satellite is in the shadow of the earth. This solar power supply is independent of the primary battery supply and will enable this beacon to continue to operate for the life of the satellite.

Frequency Translation

Fig. 2 is a frequency-spectrum plot showing the frequencies used in Oscar III. Starting at the low end of the international amateur space communications band, the satellite receives the 50-kc. segment from 144.075 to 144.125 Mc. All energy present in this segment will be "processed." Next, at 145.850 Mc. there is a telemetry transmitter. This signal will be useful as a marker, since it is located 25 kc. below the band occupied by any output signals from the translator. The spectrum of frequencies received at the low end of the band is heterodyned and retransmitted in reverse order of frequency within the segment from 145.875 to 145.925 Mc. For example, energy received at 144.075 Mc. is retransmitted as energy at 145.925 Mc. A station transmitting upper-sideband s.s.b. signals will be retransmitted as lower-sideband s.s.b. signals. Just above the upper limit of the translator output band is the solar-powered c.w. beacon at 145.950 Mc. This signal will also be useful as a marker for receiver calibration. When you hear this signal you will know that the translator output band is located 25 to 75 kc. lower in frequency.

Let's take a look at Fig. 3, the complete block diagram of the translator section of the satellite. Input signals are received on a separate antenna which feeds directly into a band-rejection filter. The filter has at least 70 db. of rejection at 145.900 ± .025 Mc., the translated signal output band. This attenuates the signal coming from the translator output so that it does not overload the receiving circuits and cause cross-modulation. There is additional attenuation between the transmitting and receiving antennas due to cross-polarization. This additional isolation is about 10 db. and eases the design requirements placed on the filter. As you might imagine, the isolation of the receiver input from the satellite transmitter output was one of the major problems encountered in the development of the Oscar III satellite.

The rejection filter has an insertion loss of 10 db. at 144.1 Mc., the center of the received band. Signals within the input band of frequencies are amplified and fed into a mixer. An oscillator at 114.1 Mc. feeds the first mixer to produce an intermediate-frequency band centered on 30 Mc. This i.f. band contains energy from 29.975 to 30.025 Mc., corresponding to the 50-kc. received-signal band. The i.f. signal is fed through a bandpass crystal filter at 30 Mc. to obtain a very sharp 50-kc. passband with high skirt selectivity. This band-pass filter sets the limits of the translator response band. The signal is then amplified in six stages and fed to a high-level balanced mixer. The second-mixer oscillator operates on the *high* frequency side of the output band. Signals at the high end of the i.f. passband become signals at the *low* end of the output band.

Fig. 4 shows the relationship of nine received signals spaced 5 kc. apart. Note that signal S_1 at 144.080 Mc. appears at the translator output on a frequency at 145.920 Mc. Also note that the signal going into the satellite at exactly band center, 144.1 Mc, will come out on 145.9 Mc. which is the center of the transmitting band. Signals near the high end of the input band come out near the low end of the output band. This frequency reversal was incorporated to minimize the total Doppler shift at the receiving station by causing the frequency shift which occurs between the transmitting station and the satellite to oppose the frequency shift which occurs between the satellite and the receiving station. Unfortunately, not all paths between ground stations and the satellite will encounter equal

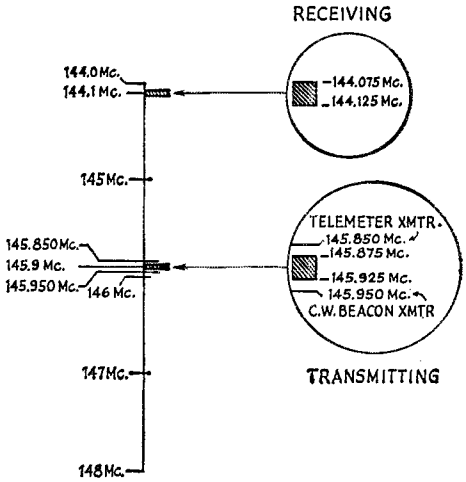


Fig. 2—Oscar III receiving and transmitting frequencies in relationship to the 144-148 Mc. band.

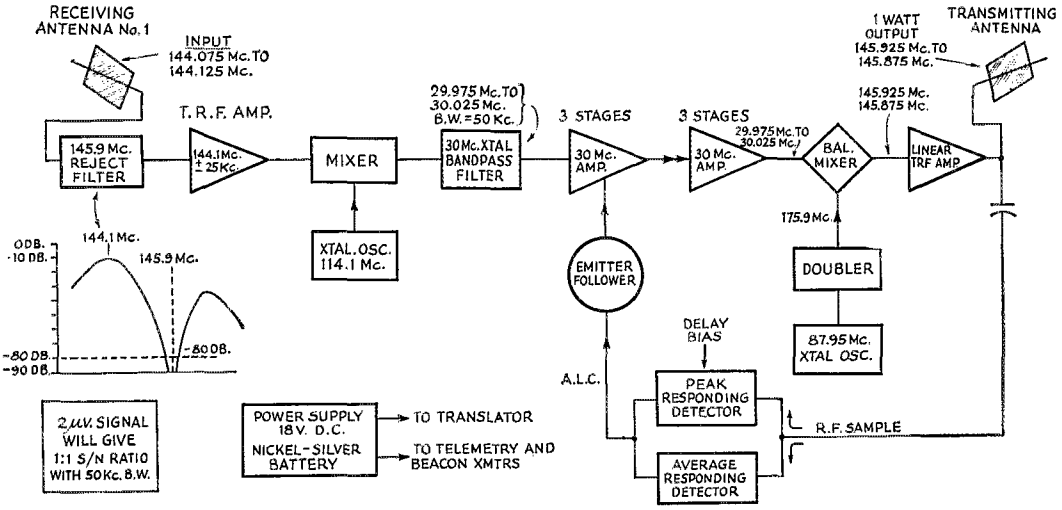


Fig. 3—Block diagram of the Oscar III 2-meter frequency-translator system.

frequency shifts, so a residual Doppler shift will be the usual situation. The shift observed at the receiving station will be less than 8 kc. and may trend either higher or lower in frequency.

Level Control

An important part of the translator system is the Automatic Level Control (a.l.c.) circuitry. The a.l.c. system consists of two separate detector circuits which sample the r.f. output voltage. A peak-responding output detector will sample the *peak* value of the output and, whenever the signal level exceeds a fixed delay voltage, will apply a bias voltage to the early stages of the 30-Mc. i.f. amplifier to reduce their gain. This circuit has a rapid response to prevent large signals from causing more than a momentary overload condition.

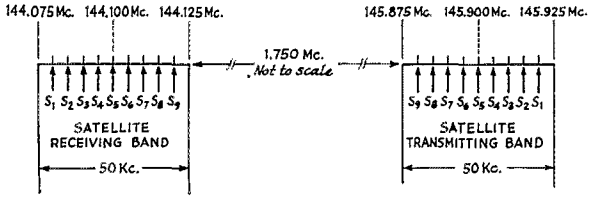


Fig. 4—Frequency relationships of nine signals in the translator input and output channels, showing inversion of relative frequencies.

In addition to the peak-responding detector, an average-responding detector is provided. This circuit senses the *average* voltage at the translator output and alters the system gain to prevent "pumping." The circuits are designed to keep the peak envelope power as close to 1 watt as possible, but with over-ride circuits to insure that at no time will the signals reach overload values. The entire frequency translator system uses linear amplifiers. A great deal of effort has been expended to make all of the amplifier circuits as linear as possible, so that many stations will be able to communicate simultaneously with a minimum of interference from cross modulation.

Operating limitations will result from the a.l.c. circuit. The maximum available peak envelope power is 1 watt, which must be shared by all stations present in the passband. If a 10-watt signal is using the system alone and a 1-kw. signal appears in the passband of the receiver, the a.l.c. will immediately adjust the system gain to maintain the translator output at 1 watt. The repeated signal from the 10-watt station will drop about 20 db. in the retransmitted output band.

As a matter of operating courtesy, please use as little power as is necessary to maintain communications. Ten watts of r.f. power into a three element beam should work the satellite adequately at moderate ranges. Use of a "rock crusher" signal would be unsportsmanlike, to say the least, and shouldn't be necessary except when the satellite is out at extreme range (1000 miles or more) and the passband is occupied with carriers from other stations which are closer to the satellite.

Because of the narrow passband available, c.w., s.s.b. and other narrow-bandwidth techniques will allow the largest number of usable signals to pass through the satellite at the same time.

A block-diagram description of the operation of the telemetry system will be discussed in a following article. QST

Strays

K4WVX, long-time secretary of the QRP ARC International, has resigned that post for business reasons. The new secretary is K8DZR, to whom all membership matters should be sent.

Low-Drain 6-Meter Mobile Receiver

An All-Transistor Unit for the 50-Mc. Band

BY HOWARD J. HANSON,* W7MRX

This unit uses six inexpensive transistors in a superheterodyne circuit with a superregenerative second detector. The latter is a simple means of obtaining highly effective noise suppression, as well as a.g.c.

The 6-meter transistor mobile receiver. Perforations in the top of the box serve as a grille for the loudspeaker.

Of the many problems in v.h.f. mobile communications, two really stand out. One is noise — mainly ignition — and the other is current consumption from the car battery. The first has been attacked in a variety of ways, including noise limiters, spark-plug suppressors, shielding of ignition harness, the use of horizontally polarized antennas such as the "halo" and, as a last act of desperation, the use of f.m. The problem of battery drain has been met, after a fashion, by idling the motor continuously during a QSO (which usually aggravates the first problem) and/or by the use of battery chargers after the car is garaged for the night. A few hams have given up the fight and simply make it a point to park on a hill every time.

The item described in this article is the receiver portion of a low-current-drain mobile installation. It pulls about 35 milliamperes from the 6-volt ignition system of my 1955 Ford, which compares quite favorably with the 10 *amperes* or so that the combined power supply and filaments of my previous receiver required.

This job is also highly resistant to ignition interference — even that from my own car, which used to knock out all but the strongest signals on my vacuum-tube receiver equipped with a *Handbook* noise limiter. When this receiver is used with a 6-volt dry-cell battery, the ignition from my own engine is difficult to detect — you have to listen carefully to spot it. When I run the receiver from the car battery, the ignition is noticeable but not objectionable.

A third unusual characteristic of this receiver is the high degree of a.g.c. stability. It is an odd sensation to drive along and hear the voice level remain constant while the background noise rises and falls as you pass between buildings and power lines.

The secret of the ignition rejection and a.g.c. characteristics of this receiver lies in the use of the superregenerative detector. Superregeneration was popular in the 1930s for v.h.f. because of its sensitivity and simplicity, but detectors of this type suffered the handicaps of broad response and the radiation of "hash." It was sometimes said of the little two-tube transceivers that you could hear them at a greater distance when they were on receive than when they were on transmit. These deficiencies are largely obviated when the superregenerator is used as the second detector stage of a superheterodyne circuit, rather than being coupled directly to an antenna. This receiver has the selectivity not of one 50-Mc. tuned circuit but of two, plus two additional tuned circuits at 4.5 Mc. either of which will usually have a response less than 1/11 as wide as that at 50 Mc. As for radiated hash, what little there may be is generated at 4.5 Mc., and such of that as does manage to fight its way backward from the detector to the antenna will be very poorly radiated by a 6-meter antenna.

Circuit

Let's look, then, at the circuit details of the

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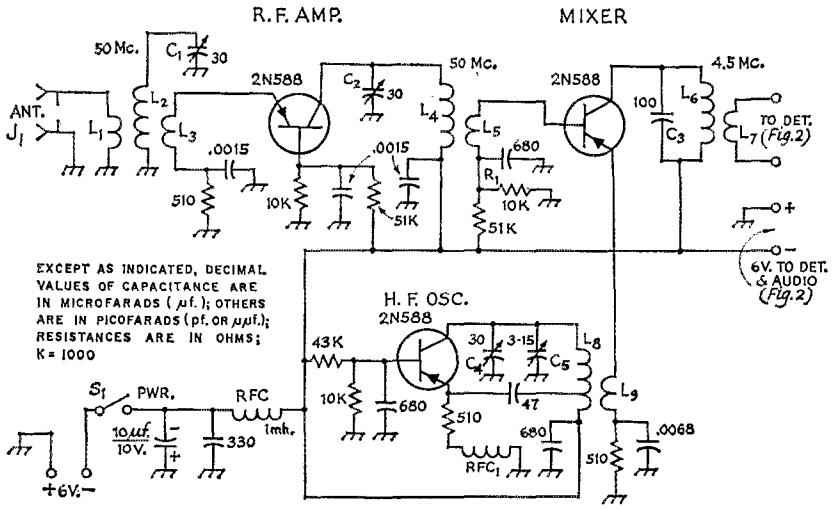


Fig. 1—Converter section of the transistor 50-Mc. mobile receiver. Capacitors of decimal value are disk ceramic; other fixed capacitors are silver mica or NP0 ceramic, except where polarity indicates electrolytic. Resistors are ½ watt.

C_1, C_2, C_4—Ceramic trimmer.
C_3—See text.
C_5—Midget variable (Hammarlund MAPC-15-B).
J_1—Phono jack.
L_1—Three turns adjacent to L_3.
L_2, L_4—Ten turns, ½-inch diameter.
L_3—Three turns adjacent to ground end of L_2.
L_5—Three turns adjacent to low-potential end of L_4.
L_6—40 turns, ½-inch diameter.
L_7—Five turns, adjacent to low-potential end of L_6.
L_8—8 turns, ½-inch diameter, tapped at 2 turns from low-potential end.
L_9—2 turns over low-potential end of L_8.
All coupling coils are wound with No. 24 plastic-covered wire. Others are close-wound on plastic forms with No. 22 enameled wire except L_6, which is wound with No. 28.
R_1—See text.
RFC_1—22 turns No. 24 enameled, close-wound on 100,000-ohm one-watt resistor.
S_1—S.p.s.t., attached to R_3, Fig. 2.

receiver. Basically it consists of an r.f. stage at 50 Mc., a local oscillator at 45.5 Mc., a mixer to combine these two to give 4.5 Mc. (Fig. 1), and a superregenerative detector at 4.5 Mc. followed by two audio stages (Fig. 2). Most transistor r.f. stages I've seen for v.h.f. have been of grounded-base configuration and, since they do seem to be the most stable, that is what I used here. The mixer and local-oscillator circuits are quite conventional. The superregenerative detector is similar to one for 29 Mc. that I saw in *QST* several years ago, except that I adapted it to 4.5 Mc.

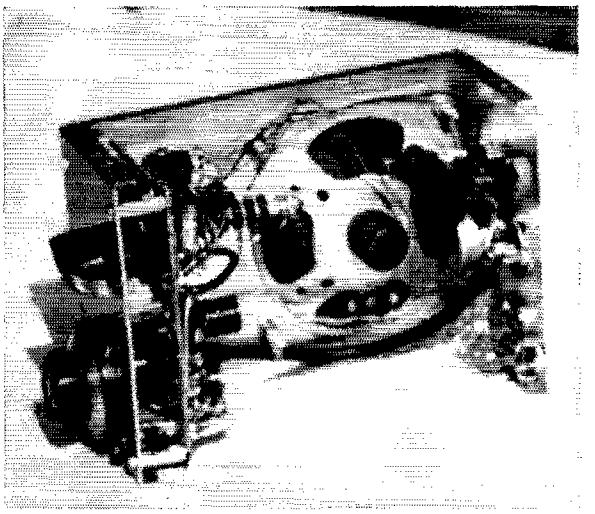
The choice of intermediate frequency was dictated by the two conflicting requirements that it should be high enough for good image rejection and yet low enough for reasonable selectivity. I finally chose 4.5 Mc. because the detector harmonics would fall out of the band, the 11th harmonic being at 49.5 Mc., and the 12th right on 54 Mc.

The audio amplifiers are quite conventional except for the method of controlling volume, and the 0.1-μf. bypass from the base of the first audio stage to ground. This bypass, paradoxical as it seems, jumps the audio output up four or five times. The only explanation I can give for this phenomenon is that the detector generates a strong quench signal around 15 or 20 kc., and that this signal tends to overload the audio stages. The 0.1-μf. capacitor, along with the 0.01-μf. bypass from the bottom of the detector tuned circuit, attenuates this quench frequency enough to allow effective operation of the audio stages. The strong a.g.c. characteristic of the detector seems to render an r.f. gain control unnecessary, so none was used.

Construction

It should be pointed out that since lead length usually constitutes a significant portion of the inductance in 50-Mc. circuits, exact coil dimensions are difficult to specify. In each circuit, the resonant frequency should be checked with a grid-dip meter, and the coil adjusted as required.

The first step in construction of this receiver is to build the local oscillator. Follow the diagram, keeping the leads short, and check the approximate frequency of its tuned circuit with a grid-dip meter (it will be necessary to remove the transistor to find a dip). Next, tune the station receiver to 50 Mc., or a little below, apply voltage to the oscillator, and see if you can pick its signal up on the station receiver. This gives you a chance to check the quality and stability of the oscillator. If your station receiver tunes 45.5 to 49.5 Mc., you can check the output of the oscillator over its entire range. If your receiver goes down only to 49 Mc., as mine does, you will be able to check the oscillator performance only over the upper half megacycle of its range and will have to cross your fingers about the lower 3½ Mc. until later. If your station



Most of the components are mounted on a perforated board spaced from the panel.

receiver has a b.f.o., the monitoring job will be easier.

The second step is to build the mixer stage. As with the oscillator, construct it according to the diagram, keeping all leads as short and direct as possible. Two departures from the diagram may be of advantage. The first is the substitution of a variable capacitor of equivalent value for the fixed capacitor C_3. The other is the temporary substitution of a 10,000- to 15,000-ohm variable resistor for the fixed resistor at R_1. The purpose of the latter is to allow you to adjust for maximum conversion efficiency, once the mixer stage is operating. When the optimum value of R_1 has been found, the variable resistor may then be disconnected, its resistance checked, and a fixed resistor of that value substituted.

After the mixer stage is wired up, put a 6-meter signal into the front end of it, and couple the 4.5-Mc. output circuit into the station receiver, using a 3- or 4-turn link. Set the station receiver to 4.5 Mc., and check to see if you can pick up a 6-meter signal as the local oscillator is tuned across the band.

The next step is the construction of the r.f. stage. As in the two other stages, keep the leads as short and direct as possible. When this stage is wired up, couple the station receiver to the mixer output as before, set the receiver at 4.5 Mc., and introduce a 6-meter signal into the front end of the r.f. stage. Then peak up the two r.f. tuned circuits for maximum mixer output as indicated on the station receiver. This completes the converter half of your receiver.

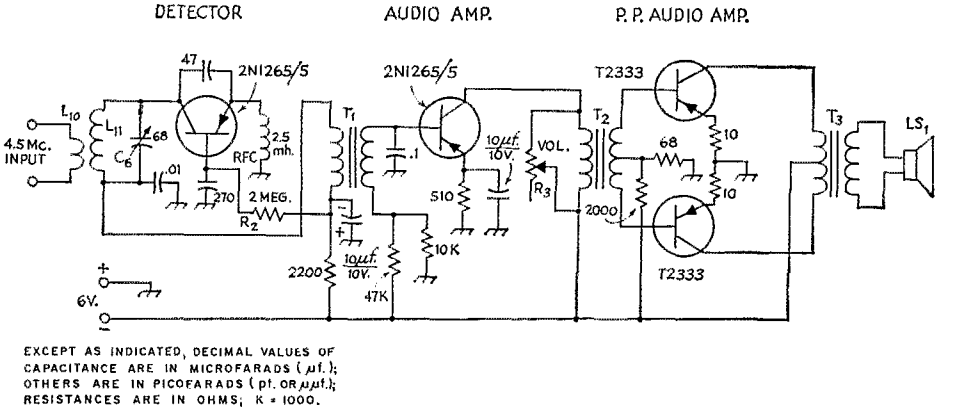


Fig. 2—Detector and audio circuits. Fixed capacitors and resistors are as indicated under Fig. 1. Type 2N187A transistors *may be substituted for the type T2333 without change in circuit values.*

C_6—Ceramic trimmer.
L_{10}—5 turns No. 24 plastic-covered wire adjacent to low-potential end of L_{11}.
L_{11}—40 turns No. 28 enameled, ½-inch diameter, close-wound.
LS_1—4-inch speaker.
R_2—See text.
R_3—10,000-ohm audio-taper control.
T_1, T_2—Transistor/driver/interstage transformer (Lafayette TR-118 or equivalent).
T_3—Transistor output transformer, 100 ohms, c.t., to 8 ohms (Lafayette TR-119 or equivalent).

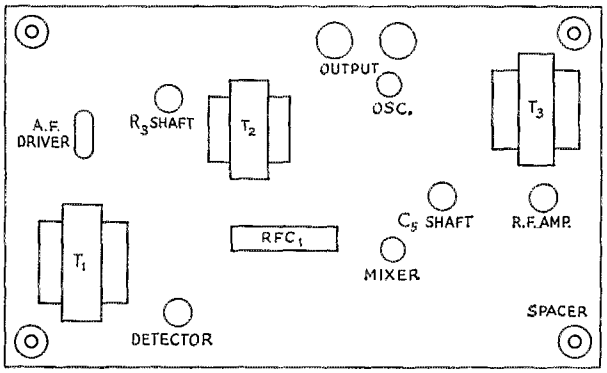


Fig. 3—Sketch showing approximate location of major components on the panel side of the perforated board.

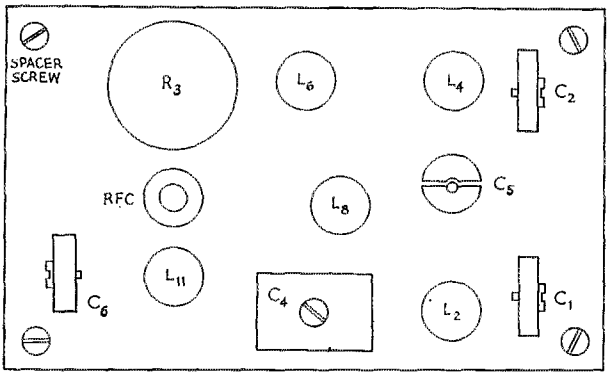


Fig. 4—This sketch shows approximate placement of components on the reverse side of the board shown in Fig. 3.

Construct the superregenerative detector (including T_1), following the diagram of Fig. 2. Here, at last, you don't have to be quite so fussy about keeping leads short. For the 2-megohm base resistor R_2, substitute temporarily a 2- or 3-megohm variable, such as the volume control from an a.c.-d.c. receiver. Temporarily hook a headphone to the output winding of T_1, and turn on power to the stage. Set the variable resistor to its maximum resistance. You should hear a faint hissing or rushing sound along with a high-pitched tone. This latter is the quench frequency. As you slowly reduce the resistance, the pitch should go up while the rushing noise gets stronger. As you continue to reduce the resistance, a point should eventually be reached where both the quench frequency and the rushing sound suddenly cease, indicating that the receiver has gone out of superregeneration. A little experimentation will establish the potentiometer setting just before the detector goes out of superregeneration. The variable resistor can then be disconnected without changing the setting, the resistance measured with an ohmmeter, and a fixed resistor substituted.

As a final test, listen in the headphones for the rushing sound (the quench frequency may or may not be above the audible range) while you swing an r.f. signal generator or a grid-dip oscillator through the 4.5-Mc. range. As the signal generator sweeps through 4.5 Mc., the rushing sound should diminish and any modulation on the r.f. signal should come through faintly. This quieting effect of a signal, even when the signal is too weak for the modulation to be readable, is characteristic of superregenerators. For the above test, the signal generator does not have to be coupled into the detector coil; just sitting on the same bench will usually do fine. This detector is very sensitive.

Type 2N588s may be used in this circuit, but will require a different value of base resistor for optimum performance.

Now that the detector stage is working, all that is necessary is to wire up the two audio stages, check once more to see that the rushing sound quiets with a 4.5-Mc. signal, and couple the detector tuned circuit into the mixer output tuned circuit by means of a link with about 5 turns on each end. A quick test should now show that 50-Mc. signals will produce the same quieting effect as did those on 4.5 Mc.

And that finishes the little rig. It may not have quite the sensitivity of a double superhet, and certainly not the selectivity, but it will give a good account of itself under present 6-meter mobile conditions, and is far ahead of any mobile receiver I know of in operating economy and ignition-noise rejection. Try it and see. QST

An Electronic Storm Finder

BY THOMAS P. LEARY,* WØVTP

Few hams can afford their own radar weather stations, but weather is an active interest for many of us, as evidenced by the "storm nets" operating in many parts of the country. It is possible, with relatively simple equipment, to survey an area with a radius of more than 500 miles, and find the bearing of the electrical disturbances associated with lightning. While the equipment to be described here will not alone produce highly accurate *range* readings, two such stations, separated by 50 miles or more, can triangulate their azimuth readings and thus produce fixes on centers of severe weather.

This device operates in the e.l.f.-v.l.f. portion of the radio spectrum, at what may be more commonly called audio frequencies. A lightning stroke in the atmosphere radiates an enormous amount of radio-frequency power in a few microseconds, and an appreciable fraction of this energy is concentrated at the longest wavelengths. These signals propagate to great distances and their direction of arrival can be instantaneously indicated on the face of an oscilloscope tube.

Basically, the system consists of two shielded loop antennas, crossed at right angles and erected vertically, aligned north-south and east-west. A vertical loop antenna has zero signal response to energy arriving from a direction at right angles to the plane of the loop. The response increases gradually as the loop is rotated, and becomes maximum when the plane of the loop points at the signal source. The north-south loop is connected, through push-pull resistance-coupled amplifiers, to the vertical plates of the scope tube, while the east-west loop drives the horizontal plates. With this elementary arrangement, the bearing line produced has a 180-degree ambiguity. In order to resolve this it is necessary to apply the amplified signal from a vertical antenna to the grid of the cathode ray tube to intensity-modulate the electron beam. The line pointer on the tube face will then indicate the true direction of the "sferic" signal. The face of the tube should be marked off in degrees, with north at the top. The various types of indications produced are shown in Fig. 1.

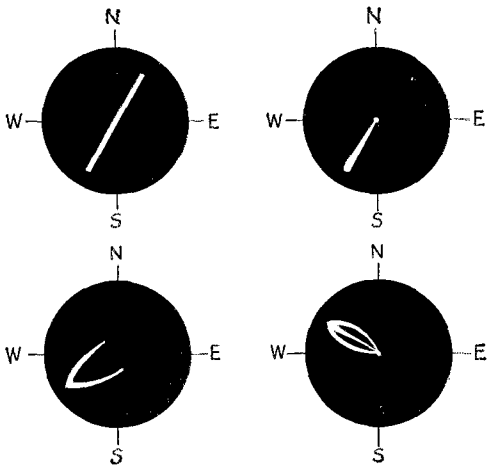


Fig. 1—Typical scope presentations of lightning discharges. Upper left: Bearing without sense indication. Upper right: Same bearing with sense modulation added. Lower left: Horizontally-polarized signal (cloud to cloud discharge.) Lower right: Combined ground wave and ionosphere-reflected wave ("night effect").

Loop Construction

The sensitivity of the loop antennas is a function of the number of turns and the diameter of the loop. Adequate pickup is realized by a loop with 50 turns of No. 20 Formvar, three feet in diameter. These coils may be wound on forms made of 4-inch plastic plumbing pipe, or on "hula hoops" if any of these can still be found. A section about a half-inch wide was cut out of the perimeter of the pipe to provide a space for winding the antenna. The ends of the wire are brought out and connected to phono jacks mounted on a metal plate and attached to the loop. The entire loop is then wrapped with strips of aluminum foil about two inches wide and grounded to the metal plate. It can then be wrapped with masking tape to keep the shielding from coming loose. Diametrically opposite the connections to the loop a cut, about ¼ inch wide, is made in the foil so that the electrostatic shield will not act as a shorted turn. The com-

Here is an off-the-beaten-path activity that is not only interesting in itself, but which also offers an opportunity for an unusual type of public service by the amateur. Storm nets using equipment of this kind could provide valuable storm-warning information.

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pleted loop is shown in Fig. 2. The loops should be accurately aligned north-south and east-west about 20 feet high; the attic is a good location. The vertical antenna, about 25 feet or more long, can be placed anywhere within 50 feet of the loops.

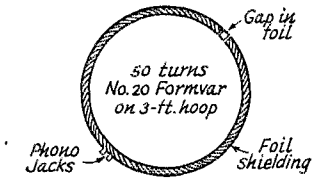


Fig. 2—Essentials of loop construction. The support can be a piece of plastic pipe or hose formed into a circle, with a lengthwise slit to allow wire to be wound in it. Outside is covered with aluminum foil, except for the gap shown, for shielding.

Connection between the antennas and the loop amplifiers is made with four equal lengths of small-diameter coaxial cable such as RG-58/U. Plugs and phono jacks are also provided at the receiver to facilitate switching the inputs around in order to properly orient the complete system. Means is also provided at the loop input to connect both amplifiers in parallel across one of the loops; this is necessary in order to equalize the gains of the two amplifiers as will be described.

Amplifiers and C.R. Tube

The push-pull amplifiers, two of which are required, are of straightforward design and cover a range of about 100 to 12,000 cycles. The mechanical layout of the parts is not critical but, as in any high gain audio amplifier, all ground connections for each stage must be made at the same point and the input and output circuits separated as much as possible. The complete circuit is shown in Fig. 3. Any well-filtered power supply which produces 250-300 volts at about 100 ma. and 6.3 volts at 5 amp. can be used. A separate filament winding is required for the cathode ray tube. All tubes should be shielded.

The sense amplifier is shown in Fig. 4. The series input capacitor and 50,000-ohm potentiometer provide the proper phase shift to intensity modulate the cathode-ray tube grid; this control also permits the signal strength to be attenuated for very strong sferics. A lightning arrester should be connected to the sense antenna.

A complete 2700-volt power supply and 3JP1 tube circuit is shown in Fig. 5. The tube and a shielded mount and socket are available surplus. With the high post-anode accelerating voltage used, the 3JP1 produces a bright green trace which can be viewed in subdued lighting. The high-voltage transformer should produce 2500-3000 volts a.c. at at least 2 ma. It should be remembered that these voltages, stored in the filter capacitors, are very dangerous; pull the line cord and short the capacitors before working on the equipment. The centering controls, the two 300K potentiometers, can be mounted at the rear of the chassis; they are adjusted only when a tube is installed or replaced.

The focus and brightness controls operate at high potential and should be mounted under the chassis on insulated mounts with insulated coupling to shafts brought out to the front panel. The 1.25-megohm section of the voltage divider should be made up of four or five 2-watt carbon resistors in series to prevent voltage breakdown. Power transformers should be mounted behind the base of the cathode ray tube or on a separate chassis to avoid modulating the electron beam with an a.c. magnetic field.

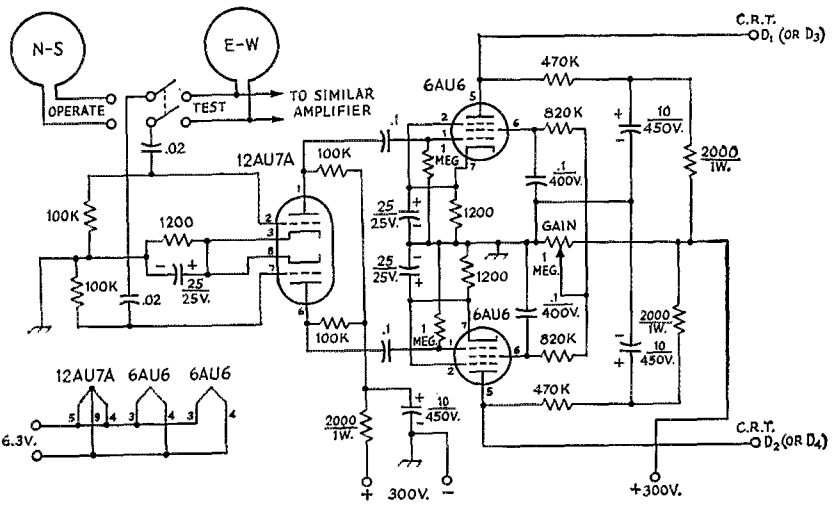


Fig. 3—Push-pull amplifier between loop and c.r. tube deflection plates. Two of these are used, one for each loop and deflection-plate set. Capacitances are in uf.; capacitors are paper (400-volt rating unless otherwise indicated) except those with polarities marked, which are electrolytic. Resistors are ½ watt except as indicated; resistances are in ohms, K = 1000. Controls are linear taper.

High-voltage insulated wiring should be used in the 2700-volt supply and in the high-potential leads to the cathode ray tube.

All amplifiers should be tested for self-oscillation at maximum gain with an oscilloscope before use. Sometimes a signal pulse with a steep initial gradient will cause a transient oscillation above the audio range which can only be detected by this means.

Preliminary Adjustments

The loop connections to the amplifiers are initially made at random, being certain only that the north-south loop drives the vertical plates of the oscilloscope and the east-west loop drives the horizontal plates. The coax shield should be electrically connected at both ends of the four lead-in cables and grounded to the receiver and to a water pipe.

Once the equipment seems to be operating properly, connect up all antennas and wait for thunderstorm weather. The first adjustment to make is to equalize the gains of the loop amplifiers. Turn both loop gain controls to maximum and connect both amplifiers in parallel across one loop by means of the d.p.d.t. toggle switch in the antenna circuit. A sferic signal should produce a line across the tube face from 45° to 225°, and the gain of one of the amplifiers should be reduced until it does. Then turn the switch to the opposite, or operating, position.

Now the observer has to determine by some other means what the true bearing of a thunderstorm is. Most of the United States is covered by weather radar stations, and a call to the local Weather Bureau office can usually get you up-to-the-minute reports of thunderstorms within 200 miles if you explain why you need the information. Failing this, radio range stations operating between 150 and 350 kc. give continuous reports of weather conditions within a 250-mile radius of the station, and reports of thunderstorms in progress are given. As a last resort, visual observation of an isolated distant thunderstorm can be used. At any rate, once the true bearing of a storm is known the lead-in cables from the loop antennas should be switched around until the sferic signals from the storm produce line indications on the cathode ray tube in the proper direction. The process should be repeated and the bearing of another known storm, about 90 degrees removed from the first, should be checked. Bearings from any direction can then be assumed to be accurate if the loops are correctly oriented, but the amplifiers should be realigned for equal gain occasionally.

Distance Range

The lengths of the bearing lines on the scope indicate only signal strength, but after a little practice it is possible to guess whether the storm is at long, medium or short range. The pips for a storm at 500 miles average about ¼ inch long; for 200 miles, about 1 inch long; and at about 100 miles the line indications will begin going off the face of the tube. Gain should be reduced and re-equalized when this happens.

Access to weather reports on low-frequency radio-range stations can also be very helpful in determining the approximate range of lightning radiation. Hourly reports of the progress of frontal systems and squall lines are given and, since many thunderstorms occur along the line of a cold front, strong azimuth indications on the scope in the direction of a known front can give reasonably accurate fixes. The weather around my own location (Omaha) most often approaches from the west or south-west in summer so maximum attention is devoted to these directions. If an isolated storm, not connected with any major front, is observed over a period of hours, it can be determined whether or not it is moving in your direction. The sferics signals will grow in intensity and the azimuth of the storm will remain the same if it is headed toward you. Most cold fronts move at about 20–25 m.p.h. in summer so some estimate of the time of arrival of bad weather can be made.

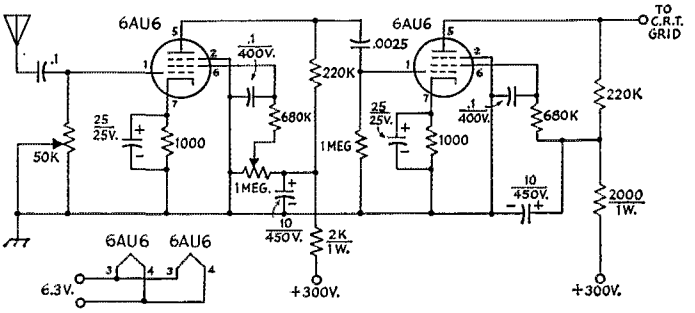


Fig. 4—The sense amplifier circuit. Component values and types same as in Fig. 3.

The intensity, or brightness, control is ordinarily set so that the beam spot is barely visible in the absence of any signal and it should be accurately centered with the centering controls. Optimum positions of the sense input potentiometer and the sense gain control depend on the closeness and intensity of the signals radiated by lightning, and their operation will be learned with a little experience. Maximum resistance of both controls, with respect to ground, produces maximum gain.

Signal Characteristics

The rate of flashing in a particular storm is a

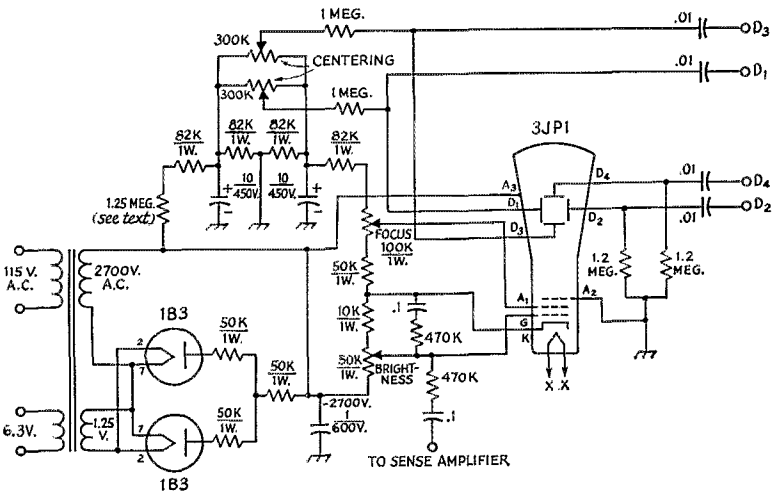


Fig. 5—Cathode ray tube and power supply. Component values and types same as in Fig. 3. Of the commonly-available power transformers, the Thordarson 26R29U and Stancor P-8151 have approximately the correct voltages. With these transformers the 1B3 filaments should be connected in series for operation from a 2.5-volt winding.

measure of the probable intensity of the severe weather to be expected. Bearing lines repeated at the rate of about 20 per minute usually indicate that a storm is in progress — the repetition rate may go over 100 per minute and such a storm is inclined to be dangerous, with high winds and hail. A "giant thunderstorm" may also occasionally be detected; these enormous thunderheads often give rise to tornadoes. The height of clouds in such a disturbance may reach 12 miles into the stratosphere and they may be seen approaching over 150 miles away; these may produce sferics pips too rapid to count visually.

A sferics storm net, consisting of two or more such stations, could give much more accurate fixes on severe weather centers, if communication between them can be established. Unfortunately, the static produced by lightning washes out most of the lower-frequency ham bands. Six-meter stations with beam antennas and coverage of fifty miles or more would be least likely to be affected by static. Because of the v.h.f. radio horizon, radar stations on the ground cannot detect low-altitude precipitation at more than about 100 miles, so the broad coverage of an amateur radio sferics net could provide a real public service for short-term severe-weather forecasting. It should also be noted that a sferics fix may be more valuable than some radar weather reports because radar does not distinguish between electrically active and inactive weather cells.

A note on polarization, or night effect, error: The reception pattern of a loop antenna is altered when the signal arrives at an angle, as when it has been reflected from the ionosphere. Such signals produce an elliptical pattern which may not point in exactly the same direction as the source of the signal. However this is not serious in ordinary practice because it can be recognized by the oval pattern, produced by the sky wave, superimposed on a straight line, caused by the ground wave, and the latter is the only reliable direction indication.

A great deal remains to be learned about this subject and the best reference for the amateur is *Atmospheric Electricity*, by J. A. Chalmers (1957, Pergamon Press, New York City). Photographs of cloud-to-ionosphere lightning strokes now exist, and some scientists are speculating that the real source of the electric power dissipated in huge quantities by thunderstorms is the ionosphere itself. The field is wide open for original research, and in such areas the ham has always excelled. Good hunting! QST

Strays

Col. Dave Danser, W4GVQ, was presented its Distinguished Service Award by the Confederate States ARC at a recent meeting at Fort Belvoir, Va. Presentation was by Chief Rebel K3MAU assisted by CSARC president K3LMM and WA4GDT, president of the Ft. Belvoir ARC, host club for the joint meeting. Pictured are WA4JLN, WA4PYU, K3LMM, W4TDT, W4GVQ, K3PAP, K3MAU, WA4MME, and WA4GDT. (Photo by W4KSA, K3ROS, K3FDV).

Board Meeting Highlights

RM-499 Overwhelmingly Reaffirmed
$100,000 Voted for Conference Preparation

THE Board of Directors of the American Radio Relay League, Inc., held its annual meeting at Hartford, Connecticut, on May 1, 1964. The paramount topic, both at the formal meeting and during two days of informal discussions, was the long-term preservation of amateur radio, particularly as concerns direct and indirect preparation for the next international allocations conference tentatively projected for 1968 or 1969.

The Board created a special reserve of $100,000 for conference preparation and associated work in the protection of amateur radio and granted President Hoover full authority to speak for the Board in any matter which may arise in this field. The Board heard reports of officers on steps already taken. Plans were thoroughly discussed to strengthen amateur radio world-wide through the International Amateur Radio Union where it has societies, and through special projects elsewhere. The ARRL observers at the IARU Region I Division meeting at Malmo, Sweden, and at the formation of the Inter-American Union of Radio Amateurs at Mexico City, made reports to the Board, which ratified affiliation of the League with the latter group (see editorial this issue). It was agreed that *QST* would accent coverage of IARU affairs and encourage exchange of articles between society journals. The Board commended the Radio Operators Association of Rotary and the Society for the Preservation of Amateur Radio Communications Services (SPARCS) for their programs which will equip amateur stations in the new and developing countries. The Goldwater bill for reciprocal amateur operating privileges was reported as progressing toward early passage by the House and signing by the President.

Domestic programs of the League were also reviewed. Increased public service by radio amateurs, particularly in the field of emergency communications preparedness, was declared to be the primary objective of the ARRL efforts. The actions of the Executive Committee in carrying out the League's plans to strengthen the licensing structure, particularly through the filing of RM-499, were endorsed strongly by the Board. The officers reported on their regular and special visits to various governmental agencies, remarking on the cordiality and helpfulness of the personnel toward amateur radio in general and the League in particular. Formal commendations of the special cooperation shown by the FCC Field Engineering Bureau, the Amateur and Citizens Division, and the Telecommunications Division of the Canadian Department of Transport, as representative of the agencies with which amateurs deal most often, were rendered by the Board.

The Board gave attention to local legal matters and heard plans for future *QST* coverage to emphasize amateurs' rights, obligations and tactics in such cases. The Board commended the General Counsel for his work in assisting the attorneys of the amateurs within a framework of legal ethics.

The Board commended the Executive Committee for its adoption of plans to modernize and enlarge the Hiram Percy Maxim Memorial Station W1AW. It voted to approve the holding of an ARRL National Convention in Montreal, Canada, in 1967. Studies, with power for interim action, were ordered by the Board concerning new ARRL sections adjacent to Los Angeles and in Florida; for travel by regional, area and transcontinental officials of the National Traffic System; for the setting up of mechanics to accept gifts and bequests made to the League after completion of the Building Fund; and for changes in contest rules, including v.h.f. multipliers.

President Hoover, Vice Presidents Groves, Reid, and Handy, Secretary Huntoon and Treasurer Houghton were unanimously re-elected for two-year terms. Directors Compton, Denniston and Eaton were re-elected and Director Chaffee elected to one-year terms on the Executive Committee. Vice President Handy and Treasurer Houghton were renamed as special (non-voting) members of the Committee; President Hoover, First Vice President Groves and General Manager Huntoon remain members by virtue of their office.

The gift of equipment from the Mummy Mountain station, K7LJA, to the League, offered by Mrs. Thorne Donnelley in memory of her late husband was gratefully accepted by the Board. The Board also expressed its warm thanks to Lloyd Colvin, W6KG, for setting aside a fund for an annual award program to recognize meritorious amateurs.

The Board established a Hiram Percy Maxim award to recognize exceptionally meritorious service of individual amateurs from time to time, only by vote of the Board. It unanimously conferred the first such honor upon John L. Reinartz, K6BJ, particularly for his pioneer work in predicting, planning, designing and building equipment for the opening of the short waves during the early twenties. The Board voted to hold its next annual meeting in Quebec on May 14, 1965. The formal session was preceded by two days of information discussions, inspection of the new Headquarters facilities, and the like. Full minutes will appear in the next issue of *QST*. QST

A Look Inside

Petition RM-499

BY WILLIAM I. ORR,* W6SAI

TO EXPLORE Petition RM-499, and to know the facts as to what has been filed in this proceeding, one must go to the Docket Reading Room of the Federal Communications Commission, located on the seventh floor of the Post Office Building, Pennsylvania Avenue and 13th Street, in Washington, D. C. During a recent trip to Washington, I had the opportunity to spend some time in this room, scanning the controversial Petition, which a pleasant young lady behind the desk supplied to me upon request.

Much information (most of it erroneous) has appeared in print concerning the contents and comments on file in this Petition. It is the purpose of this article to discuss the contents of RM-499 as they appeared to me. Generalizations are difficult and dangerous; and it is always tempting to interpret what one sees in the light of one's beliefs. That such interpretation has been made in the past was painfully obvious to me when RM-499 was read in detail. My view of the RM-499 file follows, with my personal comments indicated in italics.

Extent of the Petition

RM-499 consists of 13 "volumes", or bound files,[1] in which repose all correspondence relating to the so-called Incentive License Proposal submitted to FCC by the ARRL. The material is arranged roughly in order of receipt by the FCC, and is bound in volumes so it cannot be removed. Postal cards, telegrams and other small communications are stapled to 8½" × 11" pages bound in the volumes.

In general, the contents consist mainly of letters and petitions, pro and con. The petitions (when signatures are totalled) are about equal in number of signers, both for and against RM-499, to a total of approximately 5000 names. In addition, there are about 850 separate communications which run roughly 42 per cent in favor of, and 58 per cent against the proposed petition.

Thus, nearly 6000[1] radio amateurs have expressed their views on the incentive proposal. As there are approximately 265,000 licensed amateurs in the United States, this represents an expression of opinion by only 2.3% of the amateur body. Even so, this number of signatures and volume of individual comments received in RM-499 probably exceeds by several times the number of comments ever before received in amateur rule-making proceedings.

Nature of the Objections

The communications opposing RM-499 were carefully examined, and classified in ten groups. The following breakdown gives the percentage of objections falling into each group.

1) "The ARRL Proposal (RM-499) is undemocratic and not representative as no poll was taken among League members before RM-499 was presented to the F.C.C." 29%
Comment: League members are represented by their duly elected Directors and no poll was necessary because the League's Constitution and By-laws do not require it. The U.S. Congress is not known to poll voters before decisions are taken by that body. This unrealistic objection demonstrates an ignorance of a basic democratic process fundamental to our representative form of government.[2]

2) "Amateur Radio is only a hobby, and a ham is not expected to be a professional radio engineer. In fact, many amateurs have vocations that have no connection with the field of electronics and do not have the background to pass a difficult examination." 14%
Comment: It is not expec ed that the amateur be a professional engineer. Moreover, it is an invalid assumption that any proposed examination would require professional knowledge to pass it. While many radio amateurs participate in no more than a hobby activity, amateur radio is defined both by the International Telecommunications Convention and the FCC as a Radio Service.

*48 Campbell Lane, Menlo Park, Calif.

[1] Another magazine recently reported 3000 comments in nine volumes. Either the investigators were unfamiliar with simple FCC file procedures, or it was a deliberate attempt to mislead readers. — EDITOR

[2] Further, the Commission has stated, "The ultimate decision . . . will be based on the Commission's determination . . . as to whether such action would be in the public interest, and not based on any poll of popular opinion." — EDITOR

Because of formal affirmation by the Board of Directors of the League's filing in Petition RM-499, this analysis of comments by amateurs to FCC should be of particular interest.

To view otherwise is dangerou to amateur radio; for we have no international recognition as a "hobby," but only as a Service.

3) "The Incentive License proposal will cause many radio amateurs to lose interest in the hobby. Many hams have much money invested in radio gear, and will lose their investment either through depreciation of the equipment or by being unable to use it in certain bands." . . .12%
Comment: This selfish view is an outstanding reason why RM-499 should be promptly passed. Too many quasi-amateurs place their personal comfort and their financial investment above the public welfare.

4) "Proposal RM-499 will disrupt Civil Defense Communications, RACES, and traffic nets." 12%
Comment: There is a very limited validity to this complaint. At present, most emergency traffic is handled on the lower frequencies. It should be possible for those amateurs engaged in such activities to upgrade themselves, as RM-499 does not affect the lower frequency bands for several years. RACES stations moreover, may be operated in all RACES bands by novices and technicians (as well as higher classes), except those segments which are telegraphy only, without regard to the normal restrictions on these classes. Further, 28 Mc., 50 Mc., and 144 Mc. are available for all local Civil Defense traffic.

5) The ARRL does not represent me. I am not a member." 8%
Comment: This is a statement of fact, and not an objection to the merits of RM-499. The ARRL does not number all amateurs among its members, and all amateurs have the right to express their comments to the FCC. Such non-members of the League should, in good faith, state their own position.

6) "The proposal RM-499 is unfair to phone men, as it contains a code test." . .6%
Comment: Untrue. RM-499 contains no code test. These complaints seem to derive from "on-the-air" rumors which appeared soon after RM-499 was announced by W1AW bulletins, possibly confusing Advanced and Extra Classes.

7) "The proposal RM-499 is unfair as it takes away my rights." 6%
Comment: What "rights?" No "rights" are involved. Part 97 of the FCC Regulations refers to amateur operating privileges. These are granted amateurs by the FCC and may be revoked or changed to meet changing conditions, whenever FCC finds such changes to be in the public interest. Read the back of your license!

8) "The proposal RM-499 is unfair to phone men, as it takes away phone frequencies and does not subject c.w. operators to an upgrading." 6%
Comment: Frequencies are not "lost"; they remain available to every amateur willing to advance. RM-499 does not concern itself with c.w.; it simply provides phone privileges for those who have demonstrated phone qualification.

9) "The Conditional Class amateur should (should not) be reexamined before the FCC with a stated period." 6%
Comment: Many amateurs feel real concern over the abuse of the Conditional license, and many Conditional amateurs are fearful that they may be called up to prove their knowledge of the Morse code. It would seem that any amateur should be willing to demonstrate his qualifications to an FCC Examiner at any time. If not, why should he have the privileges that go with the license?

10) "The proposal RM-499 is unfair, as old timers cannot catch up with modern techniques." 1%
Comment: A small number of "old, old timers" are opposed to RM-499 on the basis that they had neither the time nor the desire to study for an examination and felt that they deserved to be "grandfathered" to a higher grade license, or that the idea should be abandoned. Had this argument been followed in the past, some old timers would still be using spark sets. A greater number of "old, old timers" stand in approval of RM-499.

Some of the communications in RM-499 were forwarded to the FCC by Congressmen, the letters clipped to a note from the Congressmen asking for information on the outcome of the proposed ARRL request. Contrary to rumor, no congressional letters were on file opposed to RM-499. One congressman expressed concern at possible disruption of emergency nets as some of his constituents had informed him that the RM-499 petition would "decimate" the nets.

Other miscellaneous comments in opposition to RM-499 could be roughly grouped as follows:

"RM-499 is unfair as it will make amateurs waste time studying."

"RM-499 will empty the phone bands, and will put me off the air."

"Why doesn't the FCC just expand the amateur bands?"

"Handicapped amateurs will have an unjust burden placed on them."

Interesting Side Observations

I think that the FCC should add one extra element to any radio amateur examination, which would consist of a spelling test! The word "amateur" was consistently misspelled on a large number of letters, and the general grade of spelling exhibited throughout the RM-499 file spoke poorly of the radio amateur's attempt to communicate by writing.

Various remarks were common throughout the letters written in opposition, giving rise to the idea that many of the communications were form letters, or were prompted by agitation from a few sources. Some of these remarks were:

"My license was obtained by blood, sweat and tears." (Many XYL's used this term.)

"The ARRL proposal is a BIG LIE!"

"RM-499 will put 80% of us off the air!"

"ARRL is taking away my rights!"

"I spent $2000 (or some such sum) on my ham gear!"

"Dictatorship!"

"I suggest the FCC cut out homemade transmitters!"

And so on.

A remarkable letter in the file was from a Conditional Class amateur living in a large city. (!) He stated he had held this class of ticket for 15 years and was therefore an old timer and bitterly resented the fact that RM-499 would cut him off the air unless he took an examination! Happily, the number of letters from the "lunatic fringe" of amateur radio were in the minority, although the contents of these violent and vitriolic letters would make the reader ashamed to be a member of the same fraternity.

Interestingly enough, a surprisingly large percentage of the letters opposing RM-499 were signed, but the call letters of the amateur who wrote the letter were not given! I cannot imagine why this reticence to identify the writer was exhibited, but the omission occurred enough times to be readily apparent to a casual observer.

Being an ardent supporter of RM-499, I was heartened by the sincerity and good will exhibited by those amateurs who took the trouble to write the FCC in support of this measure. Some amateurs protested that RM-499 did not go far enough, and that all amateurs should be subjected to a new, inclusive examination. Running like a common thought through the letters was the concern that the Conditional Class license had been grossly abused, and that immediate steps should be taken by the FCC to correct these abuses.

Some Conclusions Drawn

It would seem to me after perusing the contents of RM-499, that this file illustrates that today's radio amateurs are divided into "two breeds of cats." On the one hand are those amateurs holding licenses for 10 years or more. These amateurs seem generally concerned about the state of amateur radio, are responsive to the demands imposed upon amateur radio as a Service and have a genuine desire to upgrade the requirements for licensing. In general, these amateurs have the older "W" and "K" calls.

On the other hand, a considerable group of amateurs exist who view amateur radio as a hobby uniquely suited to their own personal interest, and have no interest in the Service connotation. These amateurs are interested in the personal communications aspect of amateur radio and have little technical interest or desire to advance themselves in the field of electronics. In general, these amateurs have been licensed in the past decade.

In passing, it is interesting to note that apparently none of the protestants to RM-499 ever thought of the idea of *actually taking* an incentive examination! Over and over, the thought was expressed that "rights would be lost" — "that equipment would be worthless" — "that amateur radio business would be ruined." The unique thought of studying, improving one's technical knowledge, and *passing* the examination was completely absent.

It is dangerous to draw conclusions from incomplete data, or from observations casually derived from an examination of incomplete data, especially when the examiner has definite views on the subject. Even so, I conclude, in my own mind, that — although the opposition to Petition RM-499 is strong and vocal — it has failed utterly to show that the League's proposal in RM-499 is not in the best public interest. Instead, opposition to RM-499 has shown that many amateurs are convinced that amateur radio is an electronic hobby on a par with stamp collecting and hot-rod racing. If this view prevails, it is my opinion that we are living in the twilight period of the Amateur Radio Service. QST

June 1939

The editorial in *QST* for June 1939 pulled out the stops, blasting away at BC radio manufacturers who were cutting design corners to lower their prices. Hams were being blamed for the high incidence of BCI, although the fault was with the "cheap" home radio.

W1KK was working DX on five and ten from his car, largely thanks to a compact converter for those bands. In our lead article in June '39, he shared the design details with *QST* readers. Other technical articles of note were about W1IPL's five-meter transmitter, W1JEQ's 112-Mc. "packset," using the 1852 as a mixer, W9IGF's tri-tet oscillator circuit, and a *QST*-size superhet by W3GFZ.

. . . Nontechnical articles were present in unusual numbers and were led off by By Goodman's "fashions in antennas" articles, a survey of skywires being used at the leading DX stations of the day. W2JHB was named winner of the Maxim Memorial Trophy for 1939, the Seventh ARRL Field Day rules were announced, W3EEW poked fun at DXers with a piece called "90 Plus," and an agreement between Western Union and the ARRL's new Emergency Corps was detailed. In addition, W2AOE recorded the results of a Tri-County RC (N.J.) experiment with kite-suspended 5-meter antennas. "Naval Reserve Communications Notes," a regular feature through the forties, debuted in June, 1939; and amateurs were invited to congregate at W2USA at the World's Fair in New York, and W6USA at the Fair in San Francisco.

. . . The vociferous editorial in April had paid off, and the pre-legal broadcasts by a French station, "Paris Mondial," were taken off the 40-meter band (only to return in September when the band was opened to European BC).

. . . And there were exactly 133 DXCC memberships in the CD books. QST

Modulation patterns represent simply an extension of the basic principles of pattern formation as outlined in March and April QST.[1] *The presence of the radio frequency in the pattern need not be allowed to obscure the similarity.*

The Flying Spot—III

Modulation Patterns and Their Relationship to Simple A.C.

BY GEORGE GRAMMER,* WIDF

*Technical Director, ARRL.

LINEAR and a.c. sweeps for the oscilloscope have one thing in common: the higher the ratio of the frequency on the vertical deflection plates to the frequency on the horizontal plates, the greater the number of cycles displayed along the horizontal axis. Fig. 5, page 40, in March *QST*, and Figs. 4A and 4D, April *QST*,[1] illustrate this.

In those figures the vertical/horizontal frequency ratios are very low. As the ratio is made higher the vertical cycles come closer and closer together, for a given sweep width. With very high vertical/horizontal frequency ratios there are so many vertical cycles displayed that they blend together into a mass of light on the screen.

The resolving power of an ordinary scope tube is less than 50 cycles per inch of horizontal deflection. In terms of a 60-cycle linear sweep two inches wide, this means that a frequency in the neighborhood of 4000 to 5000 cycles applied to the vertical plates will give the appearance of a lighted rectangle on the screen. Only by careful adjustment of the focus and intensity controls, and by close inspection of the pattern, can individual cycles be picked out — and then only when the vertical frequency is an exact multiple of 60 cycles so the pattern is motionless.

In amateur testing, a common combination is radio-frequency vertical deflection and an audio-frequency sweep. The ratio of even the lowest radio frequency in the amateur bands to the highest audio frequency in the voice range is always extremely large. When the audio frequency is used either as the horizontal sweep or for triggering a synchronized linear sweep, individual r.f. cycles cannot be distinguished. Under these circumstances the r.f. always produces a lighted *area* rather than a pattern of distinguishable lines.

Fig. 1 gives three examples. The only difference between the three is that the vertical/horizontal ratio is different. The vertical traces become so squeezed together at a very high ratio that they cannot be distinguished. Nevertheless, in each case the pattern is traced out cycle by cycle just as described in the preceding two articles. The cathode-ray tube works the same way whether the vertical/horizontal frequency ratio is high or whether it isn't.

Radio-Frequency Patterns

A plain, unvarying (that is, unmodulated) radio frequency applied to the vertical plates simply produces a rectangular block of light when the horizontal sweep is in the audio range. The lowest drawing in Fig. 1 is typical. Since the cycles merge together and since each one has the same height as the cycle preceding it and the one following it, the pattern appears to form straight horizontal lines at top and bottom.

The illumination over the surface of the rectangle is not uniform. The light intensity at any part of the pattern depends on the speed with which the spot is moving at the time. With a

[1] Grammer, "The Flying Spot," Part I, March, 1964, *QST*; Part II, April, 1964, *QST*.

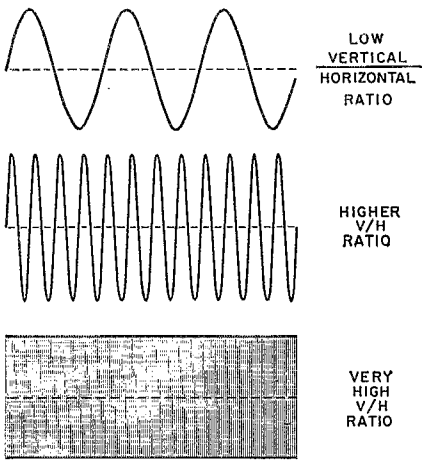


Fig. 1—The appearance of the pattern changes from a recognizable waveform (top) to a simple block of light (bottom) as the frequency applied to the vertical plates is made higher in comparison with the horizontal sweep frequency.

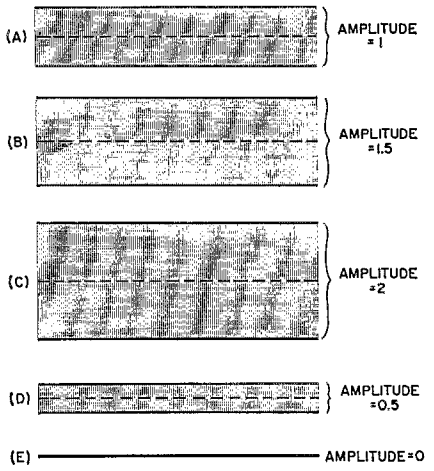


Fig. 2—Amplitude modulation by manual adjustment of carrier level will give a series of patterns such as these. The pattern grows or shrinks vertically both above and below the horizontal sweep axis, the position of which is indicated by the dashed lines in the four upper pictures. When the r.f. amplitude is zero the pattern is merely the horizontal sweep line.

reasonably pure radio frequency — i.e., a sine wave — the spot is moving most rapidly when it crosses the center horizontal axis and least rapidly at the top and bottom of the pattern. Consequently the pattern is more bright at the top and bottom than at the center. This effect is particularly noticeable when the intensity control is backed off to the point where the center of the pattern is about to disappear. With a linear sweep this is the only intensity variation, but with a sine-wave sweep the left and right ends are similarly brighter than the center.

Intensity variations of this sort are quite common in modulation patterns.[2] In most cases they are merely the expected result of variations in spot speed and can be interpreted in terms of the waveforms applied to the plates. Conversely, brightness variations can at times be a clue to features of the waveform that might explain unexpected pattern shapes.

Aside from these shades of illumination in the pattern, a pure radio frequency — i.e., one without appreciable harmonics and without modulation — will, as stated, give a simple rectangular pattern with straight lines at the top and bottom. It will have the same general appearance whether the horizontal sweep is linear or sinusoidal. This type of pattern is of interest principally because it tells us that we have a clean carrier (free from plate-supply hum and such aberrations) when the top and bottom are perfectly straight lines.

Amplitude Modulation

Now suppose that we have a transmitter whose carrier output can be varied over a wide range — by means of an excitation control, for example. If some of the r.f. output voltage is applied to the vertical plates of the scope, adjustment of the output might result in a pattern of medium height as at A in Fig. 2. This height (amplitude) we can call "1" and use as a reference. The sweep frequency could be anything convenient, such as a 60-cycle voltage. Now if we increase the transmitter's output voltage by 50 per cent the pattern height also will increase 50 per cent, as shown at B. If we double the r.f. output voltage the height will double, as at C. Or if we cut the output voltage in half, the pattern height will be one half the reference height, as at D. Finally, if the output voltage is reduced to zero, nothing will be left of the pattern except the horizontal sweep line, E.

This is amplitude modulation at an extremely slow rate, so at each output level a stationary simple-carrier-type pattern results. But note that in each case the pattern extends just as far *below* the horizontal axis (indicated by a dotted line, since it does not show in the actual pattern) as it extends *above* it. The pattern expands or contracts symmetrically about the axis with each change in amplitude.

If the rate at which the amplitude varies is speeded up into the audio frequencies, the pattern will no longer be rectangular, since the variation frequency — i.e., the modulation frequency — is now comparable with the horizontal sweep frequency. The top and bottom edges will begin to form patterns like those shown in the earlier articles.

There is one important difference: we are not looking at the audio signal which is causing the modulation, but rather at the *resultant* of applying that signal to the r.f. carrier. And since the varying carrier expands equally in both directions from the horizontal axis, the top and bottom edges of the pattern *both* show the modulation picture, as in Fig. 3. The bottom edge is simply the mirror image of the top one. The two do *not* represent upper and lower sidebands, as some occasionally think.

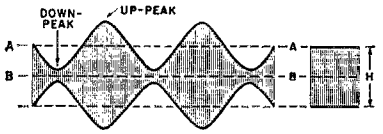


Fig. 3—Amplitude modulation by a sine-wave modulating signal. *H* is the height of the unmodulated carrier pattern, and establishes the reference axis for the modulation. The heights of the modulation peaks can be obtained either by measuring the distance between the upper and lower edges at the peak points or by measuring the height with reference to the zero-signal line, *BB*. If the latter reference is used, the carrier height is also measured from *BB*.

Except that the bottom one is inverted, the two edges have to have the same shape, regardless of the kind of modulation or the type of horizontal sweep. This follows from the fact that

[2] The photographs of modulation patterns in Chapters 10 and 11 of the *Handbook* show this quite plainly.

a sine wave (the r.f.) applied to a set of plates will always deflect equally on both sides of the axis. If the bottom edge of a modulation pattern is not an exact mirror image of the top one, there are two possible explanations: Either the scope tube is not linear in its deflection characteristics, or the radio-frequency wave contains harmonics causing unsymmetrical deflection. The former is unlikely. The latter is not out of the question, but can be avoided either by transmitter design or by taking precautions in the measurement setup.

Modulation Envelope

Once the significance of the top and bottom outlines of the modulation pattern (together they form the *modulation envelope*) is realized, the interpretation of the pattern follows almost automatically from the principles discussed in the preceding two articles. The same considerations apply throughout. It is necessary only to look at one edge of the pattern — usually the upper one, because it is "right side up" — to establish the relationship between the modulation and the horizontal sweep. The horizontal reference axis for the modulation is now on the line where the upper edge of the unmodulated carrier lies. It is the dotted line *AA* in Fig. 3, for example.

With regular amplitude modulation the upper edge tells the whole story; the remainder of the pattern can be ignored. The picture formed by this edge never can go below the line *BB* in Fig. 3, because this is the line on which the trace falls in the absence of any vertical deflection. This restriction, which does not exist in a.c. patterns where modulation is not involved, is inherent in the amplitude-modulation process. It represents the position of the spot when the vertical-deflection voltage is zero — that is, when the transmitter's output is zero. Since the output cannot be less than zero, the spot cannot cross the center line during the intervals when there is no output.

Modulation Percentage

The peak-to-peak height of the pattern formed by the upper edge, in relation to the height of the line *AA* (the unmodulated carrier height above *BB*, the center line) is proportional to the percentage of modulation. If the modulation percentage is small the edge will show only small "wiggles." As the percentage approaches 100, the downswing of the edge pattern approaches the line *BB*, and at 100 per cent modulation the down peak just touches it. Fig. 3 shows approximately 80 per cent modulation. If the modulating voltage applied to the transmitter is increased *beyond* the 100 per cent mark, the down peak cannot swing down any farther than *BB*, and so a carrier modulated by the same audio signal as in Fig. 3 might look like Fig. 4 when overmodulation is taking place.

The pattern formed by the upper edge of the picture in Fig. 3 will be recognized as being similar to Figs. 4 and 5 in the March article.

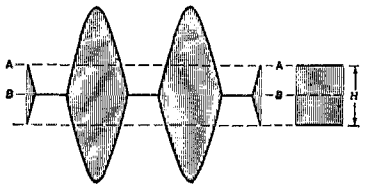


Fig. 4—Overmodulation by a sine-wave modulating signal. The output is cut off during part of the modulation cycle, clipping the modulation down peak. In patterns of this type the upper peaks probably also would be flattened, although not clipped as sharply. Flattening at the top results when either the modulator or modulated amplifier is incapable of supplying the peak power needed to preserve the waveform.

That is, it is formed by having a linear horizontal sweep and applying a sine wave to the vertical plates, with an integral relationship between the sweep frequency and the vertical frequency. To get a pattern of this type, the scope must have a linear sweep circuit and the transmitter's audio system must be driven by a sine-wave signal. Some of this signal will have to be supplied to the sweep synchronizing circuit in the scope in order to lock the pattern on the on the screen to show a desired number of modulation cycles.

The A.C. Sweep

A corresponding pattern can be formed by using an a.c. horizontal sweep instead of the linear sweep. If the same audio signal that modulates the transmitter is applied to the horizontal deflection plates of the scope (suitably adjusted in amplitude for the desired deflection width) while the modulated r.f. is applied to the vertical plates, the pattern is a trapezoid as shown in Fig. 5. Again the pattern is symmetrical about the axis *BB*, for the same reasons given in connection with Fig. 2. Again, too, the upper edge corresponds to a simple type of pattern discussed earlier — in the case of Fig. 5, to Figs. 1A or 2A in the April issue.

The percentage of modulation determines the distance that the pattern edge in Fig. 5 extends *above or below* the line *AA*, the upper edge of the unmodulated carrier. This line is again the "zero" axis for the modulation, like its mirror image below the center of the screen. If the modulation exceeds 100 per cent, the edge pattern again hits

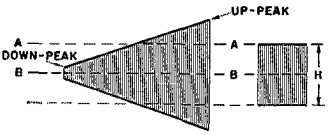


Fig. 5—The trapezoidal modulation pattern results from applying the modulated r.f. to the vertical plates and the modulating audio signal to the horizontal plates. The resulting edge patterns duplicate those of simple a.c. signals with the same frequency applied to both horizontal and vertical.

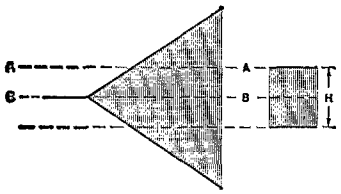


Fig. 6—Overmodulation with the trapezoidal pattern

bottom at the center, giving a picture like Fig. 6. The reason, again, is that the amplitude of the transmitter's r.f. output cannot be less than zero.

Modulation Distortion

Trapezoidal patterns such as these have a very definite advantage over the wave-envelope type of Figs. 3 and 4. Small amounts of distortion are much more visible. It would be hard to tell, by simple inspection, whether there is distortion or not in the pattern of Fig. 3. However, in the trapezoidal pattern any departure from straightness in the top and bottom edges means that the modulated wave is not reproducing the modulating signal exactly. Fig. 7 is typical of distorted modulation, and the reason is easily appreciated by referring to Fig. 3A in the April issue. The two cases are alike. The modulation on the signal, although generated by a sine wave, has been extended on the up-swing and flattened on the down-swing during the modulation process.

Furthermore, it does not matter what kind of modulating signal is used — sine wave, voice, or anything else. If the modulation envelope reproduces the modulating signal exactly, the pattern edge will be a straight line. If the line is curved, the type of distortion can readily be deduced by assuming that the horizontal deflecting signal is a sine wave (even though it isn't) and reconstructing the corresponding distorted wave from the shape of the trace. This can be done by working backwards, observing the principles used for constructing the pattern of Fig. 3A in April *QST*.

Audio Phase

From the discussion in the April article it will be recognized that the patterns of Figs. 5, 6 and 7 represent the case where the modulation (vertical deflection) variations and the horizontal sweep voltage are exactly in phase. If the two are

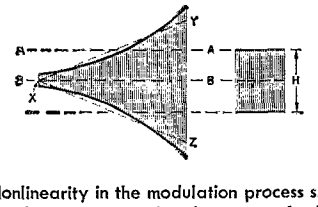


Fig. 7—Nonlinearity in the modulation process shows as a departure of the pattern edge from a perfectly straight line. If there were no distortion, the pattern in this illustration would be the triangle formed by the dotted lines *XY* and *XZ*.

exactly 180 degrees out of phase the pattern will slope downward from the left. In many practical cases the two have some intermediate phase relationship. When this happens the pattern edges are not straight lines but take on the elliptical shapes shown by the simple a.c. patterns of Figs. 1 and 2 of the April article.

Fig. 8 is typical of this condition. The upper and lower pattern outlines show the (by now, we hope) familiar evidence of a phase shift between the vertical and horizontal deflection voltages. Again the interpretation is exactly the same as in the case of the simple a.c. patterns, except that the phase relationship displayed is that between the modulation on the r.f. signal and the modulating-signal voltage as transferred to the horizontal deflecting plates. Depending on the actual phase relationship, the ellipse can vary from very narrow to fat and almost circular. Interpretation tends to become a little more difficult — especially when there is modulation distortion leading to wrinkles or lopsidedness in the ellipse — but the topmost height of the pattern is the maximum peak of the amplitude modulation, and the low point (i.e., nearest the pattern axis *BB*) is the down peak. These two peaks do not occur at the

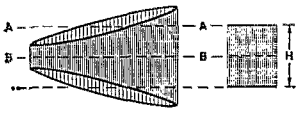


Fig. 8—A small phase shift between the modulation and the audio horizontal sweep makes the edges of the trapezoidal pattern become elliptical. A relatively small phase shift is shown in this picture.

extreme edges of the pattern as they do when the two deflection voltages are in phase, but move toward a median vertical line as the phase difference increases. In the extreme case, 90-degree phase difference, the maximum and minimum points are at the center of the pattern, as in Fig. 9. Fig. 9 may look entirely different from Fig. 5, but the fact is that, except for the phase difference, the two patterns have exactly the same story to tell.

In modulation checking it is best to try to avoid such phase differences and strive for a pattern with single-line edges. Getting such a pattern is easiest if the horizontal deflection voltage comes directly from the point where the modulation takes place in the transmitter. For d.c. isolation it is usually necessary to use a blocking capacitor; also, if the audio voltage at the modulation point is too high for the desired width of pattern, an adjustable voltage divider is needed. The time constant of this *CR* combination must be large compared with the lowest audio voltage in the modulation, if phase shift is to be minimized.

In some cases the audio voltage may not be large enough for the desired deflection, requiring amplification before it can be used. The amplifier must be one that has much wider frequency re-

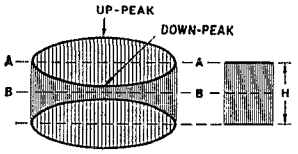


Fig. 9—With a 90-degree phase shift between modulation and horizontal deflection voltage, the modulation peaks occur at the center of the pattern.

sponse than is needed for the frequencies actually present in the modulation, in order to preserve the original phase relationship between the modulating signal and the modulated r.f.

The equipment setups that produce patterns of the types described here will be taken up in a subsequent article. The purpose in this one has been to show that there is a very intimate relationship between amplitude modulation patterns and the basic shapes that are generated with ordinary a.c. voltages. If you understand the latter, modulation patterns need cause you little trouble, however bizarre actual ones may appear when contrasted with the ideal ones generally offered for discussion. A few minutes spent in analyzing the situation should lead to a reasonable explanation for the observed shape, and this in turn should point the way to the steps that need to be taken to make it look like the ones in the books.

(The next article in this series will appear in a coming issue. — *Editor.*) QST

California—The 8th annual hamfest-picnic of the San Fernando Valley RC will be held June 21 at the Sunset Farms in Sylmar, Calif. It's a family affair, and more than 2000 will attend. Scheduled are games, contests, swimming, MARS and equipment exhibits, plenty of free parking and picnic tables. Tickets, maps, information from W6SD Hamfest, Box 3151, Van Nuys, California.

Colorado — See New Mexico listing.

Connecticut—Hamfest and old New England clambake June 21 at the Chester Fair Grounds, Chester, Conn., sponsored by the Shoreline ARC. Write Francis Heck, Spencer Plains Rd., Westbrook, Conn., for details. Seafood and chicken cooked in the traditional clambake way.

Florida—The Whip-Snappers Mobile ARC of Okaloosa County will join the Billy Bowlegs Festival at Ft. Walton Beach June 14 with a "Hidden Transmitter Treasure Hunt." Information from W4UXW.

Indiana—The Clark Co. hamfest will be held June 7 in Henryville State Park, Henryville, Ind. Full line of hamfest activities slated. Contact K9SVD, 21 Wildwood Rd., Jeffersonville 17 130.

Indiana—The Clinton County VHFRC hamfest will be held June 7 at the Shady Acres Ranch, rain or shine. Preregistration is a dollar; send to K9FUE or W9URS. Family program, 200 will attend. Plenty of parking space.

Iowa—Webster City will be the scene of the Iowa 160-Meter Net Picnic June 7. Contact KØQBU, 1416 Third St., Webster City, Iowa 50595.

Kansas—June 21 is the date set for the annual hamfest of the Ham Butchers Net. The lake and picnic area in Warsaw, Kans., is the spot, and in case of inclement weather, it all moves inside. Indoors or out, there's lots of room, a full program, a barbecued pig, covered dishes and all drinks free. Advance registration $1; at the door it's $1.25. Camp-out area nearby, motel and hotel reservations if desired. Information from WØPMB, tickets from WØQJU.

Kansas—The Central Kansas RC hamfest will be held June 7 at Kenwood Park in Salina. Games, contests, exhibits, free drinks. Rain or shine. KØJKA has the details.

Kentucky—The 5th annual Breaks Interstate hamfest will be held at Breaks Interstate Park June 14. No additional information available.

Maine—The annual Augusta hamfest features a full line of meetings, games, entertainment, YL and net programs, transmitter hunt, and dinner and dance. It's Sunday, June 21, this year, at the Calumet Club on Highway 104 North. Tickets $3.00 until June 17, then $3.50; kids $2. Motel reservations via W1VXU, information and tickets from W1VXU or W1JTH. Talk-in to be on 3960 kc., 50.38 Mc., and 147.3 Mc.

Maryland — The Anne Arundel Radio Club's surfside hamfest will be held June 7 at the Kurtz Pleasure Beach Club near Pasadena, Md. (Directions available on request, or tune to talk-in frequencies 3820, 28.8, 50.4, 52.525 or 146.94). Registration starts ten A.M. Lunch available or bring your own. Details and tickets from W3DTN.

Maryland, D.C.—The Confederate States Rebel Hamfest will be held June 21 at the Marshall Hall, Md., Amusement Park southeast of Washington, D.C. In case of rain it will be June 28. Contact W4GVQ.

Mississippi—July 4 is the date set for the Biloxi hamfest. Plans are being made by W5SPX, K5UBU, W2FSF/5, W5RZP.

Missouri—The Mid-Mo Radio Club will again host the picnic and hamfest of the Missouri Net. The June 7 event, one of the state's main hamfests, will be held at Memorial Park in Jefferson City. Details from KØJJS.

Montana—The Northeastern Montana hamfest will be at Malta June 21. Seventy-five or more hams expected to attend. Pamela Linn, K7MXW, has the information.

Nebraska—The NE Nebraska RC's annual family picnic will be held Sunday, June 14, on the fairgrounds at Stanton. Contact KØKQE.

New Mexico, Colorado—The Totah ARC hosts its annual summer picnic June 20–21 at Vallecito, Colorado. Saturday dinner and Sunday pancake breakfast, $2.50 a person over 15 years old. Reservations via Box 24, Farmington, New Mexico.

North Carolina — Gus Browning will be guest speaker at the Charlotte hamfest July 5 in the Army National Guard Armory at Douglas Municipal Airport. Dinner July 4 at the Airport Dogwood Restaurant. Sponsored by the Mecklenburg ARS, Inc.; details from W4FHI.

Nova Scotia—No details available, but the Nova Scotia Campfest is slated for July 4.

New York—The Rome hamfest will be held June 7, not June 4. See last month's Calendar for details.

New York—The Antique Wireless Association's W2ICE and EPA SCM W3ZRQ will be among the celebs speaking at the hamfest on June 20 at the Lincoln Street School in Waverly, N.Y. Contests, xmtr hunting, dinner, entertainment. Talk-in on 50.4 Mc. and 3945 kc. s.s.b. Swap shop. Write Penn-York Hamfest Assn., Box 81, Elmira.

Ohio, International—The Buckeye Belles will be hostesses to the 4th YLRL International Convention June 19–21 at the Nationwide Inn, Columbus, Ohio. Details from last several "YL News" columns, or from Toni Chapman, K8PXX.

Pennsylvania — Pennsylvania Net Picnic at Hershey Park, Hershey, June 21. Registration a dollar a family. Information on 3850 kc., 2230 GMT, Mon. — Fri.

Saskatchewan — The 1964 Saskatchewan hamfest will be held July 3–5 at Regina. Canadian Director Eaton will address the ARRL meeting there. Liars contests, games, transmitter hunt, and a full program around the theme "50 years of organized amateur radio" will be presented. Host club is Regina ARA, VE5NN; and VE5SC has details.

Tennessee—The Memphis hamfest June 20–21 will feature a hootenanny Sat. night at the Women's Building, the Fairgrounds.

Texas — Odessa Swapfest at the Coliseum Exposition, Barn, 42d and U.S. 385, June 7. Contact K5UCT.

Strong, Lightweight Construction for the Three-Band Quad

BY L. GENE CLARK,* WA4FRY

AND PAUL G. MARSHA,** K4AVU

* 2531 Midland Drive, Columbia 4, S. C.
** 2417 Ervin St., Columbia 4, S. C.

THE quad antenna is simple electrically — just a few loops of wire. The big question mark in quad design is how to suspend these simple loops in mid-air — and keep them there! The problem is intensified with tri-band design, especially if it is desired to maintain optimum element spacing on each band.

After studying the mechanical designs that have been described from time to time in various publications, we decided to try a slightly different approach, as shown in Fig. 1. The features of this design are light weight, a boom length of only 4½ feet, and all-metal (almost) construction using standard materials available in most localities.

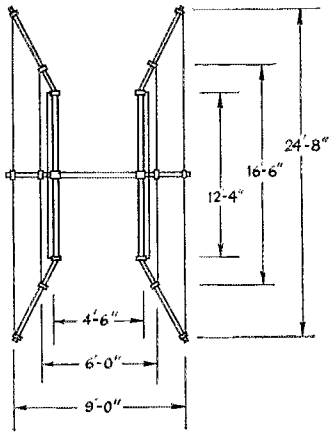


Fig. 1—This quad uses a "dish" type of construction to allow optimum element spacing for each band. The horizontal dimensions show the element spacing. The vertical dimensions showdist ances between anchor points on opposite spreader arms—not element dimensions.

The construction of each of the two sets of spreaders, which are identical, is started by welding 2½-foot lengths of ¾-inch i.d. electrical conduit to the four sides of a short section of 2-inch (inside) square aluminum tubing having a ⅛-inch wall, as shown in Fig. 2A. The square tubing was picked up at a local junk yard, but similar tubing measuring at least 2 inches *outside* should be obtainable at places where structural aluminum is used or stocked. This should also be satisfactory.

Four diagonal braces of conduit are welded between adjacent 2½-foot lengths, as shown in Figs. 2B and D.

Referring to Fig. 3, 3-foot lengths of ¾-inch hardwood dowel are forced 6 inches into the ends of the aluminum conduit and fastened with machine screws. The 3-foot dowels are followed by 3-foot lengths of conduit bent at the center 21 degrees off vertical. An electrician's conduit bender was borrowed for this job.

The spreaders are completed by adding 2-foot sections of dowel, 3-foot sections of conduit, and a final one-foot length of dowel, all with 6-inch overlaps. All dowel sections should be soaked in melted paraffin or coated with glyptal.

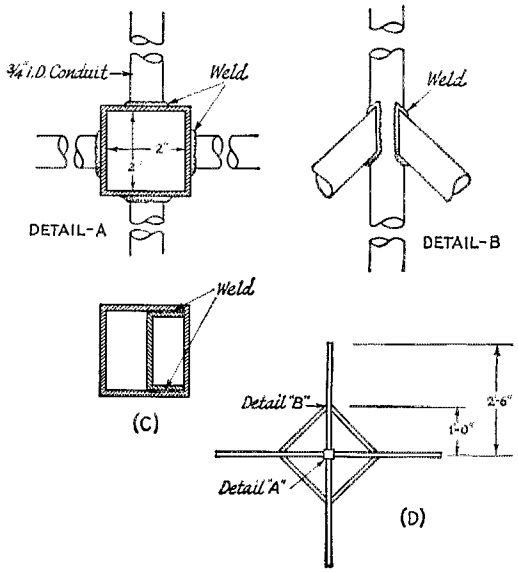


Fig. 2—These sketches show details of the spreader mounting. Sections of aluminum conduit are welded to the square aluminum core, and diagonally braced with shorted sections of conduit. The ends of the boom are welded inside the core as shown in C.

The quad loops are of 7 × 22 stranded wire (Belden 8000) and were cut to approximate size using the formula

$$Length_{ft.} = \frac{251}{f_{Mc.}}$$

for the length of one side. The reflectors and driven elements have the same dimensions, but 30-inch stubs with 4-inch spacing were inserted at the lower corners of the reflectors. The wire was attached to, and insulated from, the spreaders by the method indicated in Detail A of Fig. 3.

The boom is a 4½-foot length of 2-inch aluminum channel which fits inside the square aluminum tubing at the junction of the spreaders, where it is welded, as shown in Fig. 2C. (Standard 1¾ × ¾ × ⅛-inch channel will fit inside 2-inch *outside* square tubing.) The boom can be clamped to a standard 1¼-inch rotator mast by means of a U bolt with a serrated yoke.

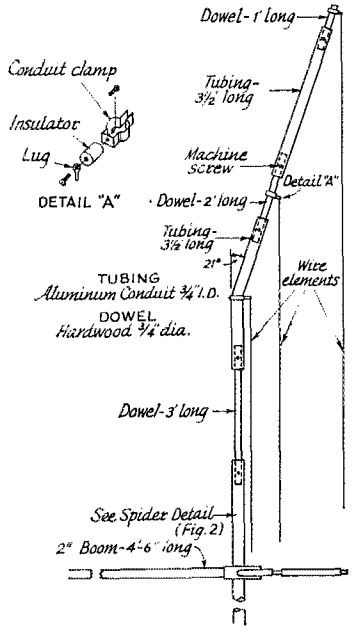


Fig. 3—This drawing shows one half of one spreader, made up of alternate sections of aluminum conduit and wood dowel. There are four of these assemblies in each set of spreaders.

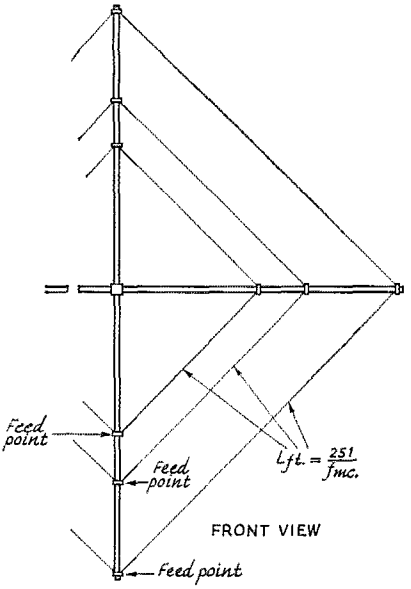


Fig. 4—Front view of the three-band quad. The driven elements are fed at the lower corners. Reflector stubs are attached at corresponding points in the parasitic elements.

Separate feed lines (RG-11/U or RG-59/U) were used for each band.

The driven elements were adjusted to resonate at the desired operating frequency, using a grid-dip meter; the reflector stubs were adjusted for a minimum reading on the S meter of a receiving station off the back of the antenna. After this adjustment had been made for each band, the excess stub length was cut off.

This design has proved to be stronger than others we have tried. It should be of interest to the boys up north where ice is a problem.

QST

Strays

W3DVO transmits code practice Saturdays at 1800 GMT on 7035 kc. at 15, 20, 30 and 35 w.p.m.

— • • • —

We've learned that the first Earthman to communicate with a spaceman anywhere in outer space *except Mars* will get $20,000 from the estate of a Frenchwoman, Mrs. Marc Guzman, who died in 1908. W1YLB, who sent the item in, wonders how to get the QSL to confirm the contact. (Why, via the bureau, of course — air mail.)

— • • • —

QST author W4DFR (right) receives the QST Cover Plate Award Plaque from Delta Division Vice-Director W4WBK, in March ceremonies at Oak Ridge, Tennessee. The Cover Plate Award is voted by the ARRL Directors to the author of the best article in each issue of QST. W4DRF won January's honors with "A Junk-Box Frequency Standard."

V.H.F. QSO Party Announcement

June 13-14

HERE's your chance for real v.h.f. fun in the June V.H.F. QSO Party, scheduled for June 13 and 14. This gala operation, open to all amateurs who can work any band or bands 50 Mc. or above, gets under way at 2 P.M. (1400) your local standard (*not* daylight) time Saturday, and continues until 10 P.M. (2200) local standard time Sunday.

To raise other participants just call "CQ V.H.F. QSO Party" or "CQ Contest." The only exchange required during contact is ARRL section (see page 6, this *QST*). Score one point for completed exchanges made on either 50 or 144 Mc., two points or exchanges on 220 or 420 Mc., and three points for exchanges on higher v.h.f. bands. To derive final score, the sum of these points is multiplied by the number of different ARRL sections worked per band. You may work the same stations on different bands to increase both your contact points and multiplier.

A certificate will be awarded to the top scorer in each ARRL section, plus VE8, as well as a certificate to the highest scoring Novice, and multiple-operator station in each section from which at least three entries in that special category are submitted.

Please follow the log and summary form as shown in the example. You can get these logs free by writing to the ARRL Communications Dept., 225 Main Street, Newington, Connecticut 06111. Reports should include your call and ARRL section, as well as times, calls, and sections of stations worked. Your entry must be postmarked by July 6, 1964, for *QST* listing.

Rules

1) The contest starts at 2:00 P.M. Local Standard Time, Saturday, June 13, and ends at 10:00 P.M. Local Standard Time, Sunday, June 14. All claimed contacts must fall within this period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation.

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

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

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

5) A contact *per band* may be counted for each station worked. Example: W2BLV (S.N.J.) works K1CRQ (Conn.) on 50, 144 and 220 Mc. for complete exchanges. This gives W2BLV 4 points (1 + 1 + 2) and also 3 section-multiplier credits. (If W2BLV contacts other Connecticut stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

6) Each section multiplier requires a complete exchange with *at least* one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

7) Awards: A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to to top Novice in each section where three or more such licensees submit logs. Award Committee decisions will be final.

8) Reports must be postmarked no later than July 6, 1964, to be eligible for awards. Follow the sample log for correct form, or a message to Headquarters will bring printed blanks for your convenience. QST

SUMMARY OF CONTACTS, V.H.F. QSO PARTY

STATION...W1AW.....ARRL SECTION...CONN.....

Freq. Band (Mc.)	EDST Date Time	Station Worked	Section	Record of new Sections for each band: 50	144	220	420	other 1215	Contact Points
50	1501	W1MEH	CONN	1					1
	1505	WA2BAH/2	ENY	2					1
	1515	W1MHL/1	NH	3					1
	1520	W1YDS	CONN						1
144	1600	W2GKR	NNJ		1				1
	1605	W1MHL/1	NH		2				1
420	1800	W1YDS	CONN				1		2
1215	1900	W1HDQ	CONN					1	3

(Enter below on last sheet used)

Band	Contacts	Points	Mult.
50 Mc.	4	4	3
144 Mc.	2	2	2
220 Mc.			
420 Mc.	1	2	1
Other	1	3	1
TOTALS	8	11	7

Check one: [✓] Single operator [ ] Multiple operator

Calls of operators having a share in above work.....

Power input.....

Transmitter.....

Receiver.....

Antenna.....

CLAIMED SCORE: ..... (Points) X ..... (Mult.) = 77 FINAL SCORE

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Signature ..... Call ..... Address .....

Sample log and summary form giving an example of how to score. Count one point for contacts on 50 and 144 Mc. two points for 220 and 420 Mc. contacts, and three points for higher v.h.f bands. Multiplier is sum of sections per band. You can obtain these log forms free by writing to ARRL Communications Dept., 225 Main Street, Newington, Conn. 06111. Logs must be postmarked by July 6.

A Completely Flexible Transmatch for One Watt to 1000

Wide-Range Matching with No Frills

BY LEWIS G. McCOY,* W1ICP

Even if you are not a Novice, this unit may be just the thing you have been looking for. Here is a transmatch that will handle an extremely wide range of matching conditions, no complicated switching arrangements, and has a full kilowatt rating.

PROBABLY the first question a newcomer will ask is, "What's a transmatch?" Actually, a transmatch is several things, but basically it is a tunable circuit that goes between the transmitter/receiver combination and the antenna system. In transmitting it will aid considerably in reducing harmonic output. If you are a Novice who has received an FCC or ARRL Official Observer citation for second-harmonic emission from your 80-meter signal, you should know how important a transmatch can be. A properly-adjusted transmatch will attenuate your low-frequency harmonics to a point where they should cause no trouble. Of course the same holds true for the General Class ham; even though your harmonics may fall inside an amateur band, rather than outside, they are just as undesirable.

Another function of a transmatch, and probably its basic one, is that of acting as a matching network which permits your transmitter to work into a load that the rig was designed for. Nearly all transmitters these days use pi-network tank circuits designed to work into 50- to 70-ohm loads. In fact, many commercial rigs are designed so that they will work properly only with a 50-ohm load. With anything else, the transmitter will not work the way it was designed to. Not that we are going to get into a mess of antenna theory, but there is one basic fact which many amateurs don't seem to know: simply feeding an antenna with 50-ohm coaxial cable doesn't mean that the load automatically is 50 ohms. In fact, few amateurs actually have such a load, and then only on *one* frequency. If you have a transmitter that is designed to work into 50 ohms only, then you are practically compelled to have a transmatch in your setup to insure that your rig will operate at maximum efficiency. Of course, if you have a system that has been matched for a single frequency, and you don't QSY, then you don't need a transmatch — for matching, anyhow.

Another advantage of using a transmatch is that it will add selectivity to your receiver. We don't want to mislead you — it won't separate signals in a crowded band — but it will reduce or eliminate image interference.

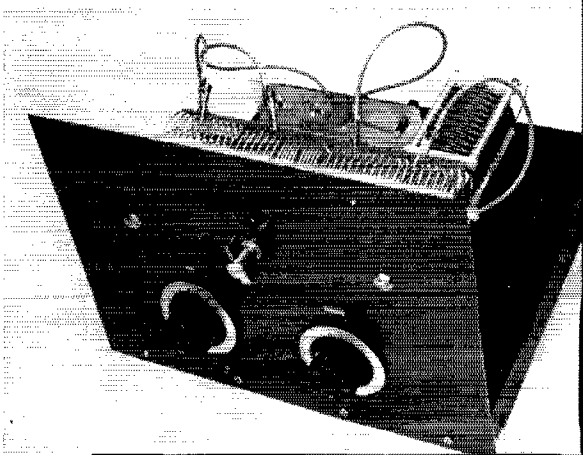
What kind of antennas or feed lines will the transmatch handle? Inverted Vs, random-length wires, long wires, dipoles, beams — you name it, practically any.

Circuit Details

Fig. 1 is the circuit of the transmatch. The input circuit consists of L_1, L_2 and C_1. On 80 and 40 meters, the two coils are connected in series to provide a 10-turn link that is tuned by C_1. On 20, 15 and 10, the two links are connected in parallel by means of S_1, providing the over-all equivalent of a link of about 2 turns.

* Technical Assistant, *QST*.

Here is the completed transmatch ready for use. The knob at the left is for C_1 and at the right, the knob for C_2.



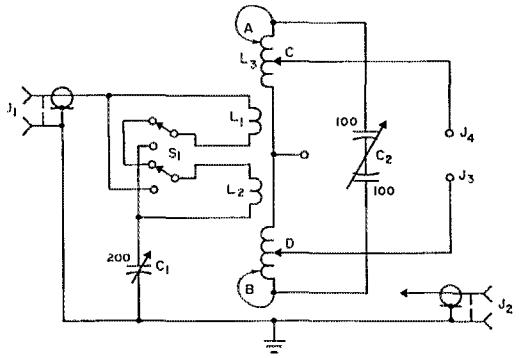


Fig. 1—Circuit diagram of the transmatch.
C_1—200-pf. variable (E. F. Johnson 200L15).
C_2—100-pf. per section, dual variable, 0.125-inch plate spacing for 1000 watts, 0.030 plate spacing for 250 watts (E. F. Johnson 100LD15 for 250 watts, 100ED45 for 1000 watts).
J_1, J_2—Coax chassis receptacles, type SO-239.
J_3, J_4—Binding posts (E. F. Johnson type 111-102)
L_1, L_2, L_3—See Fig. 2.
S_1—Two-pole, five-position ceramic switch, two positions used (Mallory type 173C).

A 100-pf.-per-section split-stator variable is used to tune L_3. When designing a multiband transmatch, the builder usually thinks in terms of a band switch to short out unused portions of the secondary coil, L_3 in our case. Such a design usually results in an overcomplicated "horse" of a unit, and having fixed taps on the secondary coil limits the matching range the unit can handle. Another problem in band switching is finding a switch that will handle any appreciable r.f. voltage without arcing over. The unit shown in Fig. 1 eliminates this problem by using shorting clips which can be easily changed. (Also, it's much cheaper than a switch.) Admittedly, it may take a few more seconds to change bands with this system but once you know where the clips are to go, it is only seconds. Clips A and B are used to short out unused portions of the coil and C and D are used to obtain the correct tap setting for the feed line.

The terminals J_3 and J_4 are used for feed lines such as open wire, Twin-Lead, any balanced type line or, in some cases, one of the terminals alone for single wire feed. J_2 is used for coax feeders.

Building It

Construction of the unit is quite simple and the job can be completed in just a few hours. We made no attempt to "package" the unit, but if desired, it could be built in a cabinet. If you do use a cabinet, be sure that the enclosure gives easy access to the clips. Some hams have the mistaken idea that a transmatch must be shielded to prevent TVI. This isn't so. (Would you want to shield your antenna, too?) There is no reason to shield the unit. If your transmitter is shielded and you use a low-pass filter, harmonics that could cause TVI can't get past the filter, so there is no point in shielding the transmatch for TV harmonics.

The components for the unit are mounted on a wooden chassis that measures 13 by 13 inches, and the front panel is a piece of aluminum sheet 10 by 13 inches. The coil is supported from the front panel by two 2-inch standoff insulators. The coil connections to the link switch provide additional support.

Plate spacing in the variable capacitor, C_2, is 0.125 inch, which will easily handle 1000 watts on c.w. or s.s.b. Of course, a Novice doesn't need large spacing in the capacitor and for lower power a less expensive capacitor with smaller spacing can be used. The smaller capacitor specified in Fig. 1 will easily handle powers up to 250 watts. There is no point in changing any of the other components to a smaller size because the saving in cost would be negligible.

Fig. 2 gives the details for making L_1, L_2, and L_3. After you have made the cuts in the coil wire to make the two links, lay the coil on a flat surface. Using a pair of long-nose pliers, start at one end of the coil and indent each turn as shown in the photograph of the unit. Note that every other turn is indented in one quadrant of the coil and then in the adjoining quadrant the other turns are indented. This makes it possible to get at any given turn with the shorting clips without shorting to adjacent turns. Don't indent the link turns as it isn't necessary.

When making up the shorting leads be sure to use solid copper clips. Either the alligator or three-sided mesh type is suitable, but be sure the

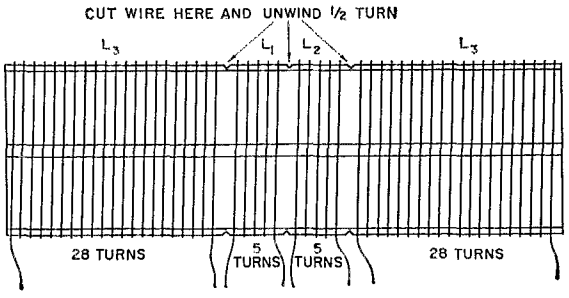


Fig. 2—Drawing of link and secondary coils. The coils are made from a single length of B & W standard coil stock type 3906-1, 2½-inch diameter, 8 turns per inch, No. 14. Approximate ranges shorting out turns from the outer ends of L_3 with leads A and B are:
3.5 Mc.— 4 turns shorted.
7.0 Mc.—16 " "
14.0 Mc.—28 " "
21.0 Mc.—29 " "
28.0 Mc.—30 " "
Be sure to wire the leads from L_1 and L_2 the same as shown in Fig. 1. In other words, the two adjacent leads from L_1 and L_2 are connected to the arms of S_1.

clips are copper. In fact, any hardware such as mounting screws or nuts should be of non-magnetic metal. We used a high-voltage type wire for the shorting leads; this is usually catalogued as "flexible test-prod wire" and has a 5000-volt rating.

How To Use the Transmatch

Fig. 3A is a block diagram showing the hookup for a typical station. An important accessory is the "monimatch," which is a matching indicator. You can adjust the transmatch without a monimatch, but it is a much simpler job with the indicator. Details for building a monimatch — and it is a simple unit to make — are given in *Understanding Amateur Radio.*[1]

Let's assume we have a dipole antenna fed with either open-wire line or 300-ohm Twin-Lead, and the dipole is at least 60 feet long over-all. With the transmatch, this system can be used on any band from 80 through 10 meters. If you don't have a monimatch, then you'll need a simple output indicator. Fig. 3B is the simplest type that will serve our purpose. It consists of a 6-volt 150-ma. (type 47) dial lamp with two clip leads, each about 1 foot long. Clip the bulb onto one of the feeder wires with the clips about a foot apart. As we tune up, a small amount of current will be shunted through the bulb to give a visual output indication.

Set up the transmitter on 80 meters and resonate the final stage. If you have some means on the rig of reducing the output it is best to start your tuning procedure with only a small amount of power. Set clips A and B to short out the required number of turns as indicated in the caption for Fig. 2. The figures given are only approximate and your particular antenna system may require more or less turns shorted out; this is something you can only determine for yourself. However, the figures are close enough to give you a start. Start off with clips C and D near the center of the coil, each clip an equal distance from the center.

Set both C_1 and C_2 to maximum capacitance, plates fully meshed, and turn S_1 to the position that puts the links in series. If you are using the dial lamp indicator, start turning C_1 and C_2 toward minimum capacitance, and look for the lamp to light up. You may have to look close because it may be quite dim to start with. The object is to get the bulb as bright as possible (without burning it out!) by adjusting C_1, C_2, and shorting clips C and D, *while keeping the power input to the final stage of the transmitter constant.*

With the dial lamp indicator as you increase the transmitter loading the lamp will get brighter. You may have to move the clip leads from the lamp closer together on the feeder so that less current is shunted through the lamp, to keep it from burning out. Keep one thing in mind: the brighter you can get the lamp by adjusting the controls for a given power input on your final, the better the transmatch is adjusted.

If you use an s.w.r. bridge in the coax line between the transmatch and the rig, set it in the reflected power position. You should get some reading when you close the key or turn on the rig. The object is to get settings of the two capacitors and shorting clips that will give a reflected power reading of zero. If you cannot reach zero with the first setting of the clips, and you probably won't, move taps C and D out a couple of turns on each side and adjust C_1 and C_2 again. As you move the taps out you'll find a spot that will show a match, as indicated by the zero reading in the reflected position. If you experiment, you'll probably find that there are several positions of C and D that will give a match. The best position is the one with the taps as far from the links as possible. The reason for not starting with the taps near the outside of the coil is that the circuit tunes very broadly under this condition. By starting with the taps near the center, the indications are sharper. Always keep the taps an equal distance from the center.

Once you obtain the correct setting of the taps and capacitors to give zero reflected reading, you can then load up the amplifier to full power. *Don't* change the transmatch settings. Make all loading adjustments at the transmitter. You may have to adjust C_1 and C_2 slightly to get a zero reading when full power is applied, but the adjustments will be very small. Try changing frequency to see

[1] *Understanding Amateur Radio*, published by ARRL, pages 210, 267.

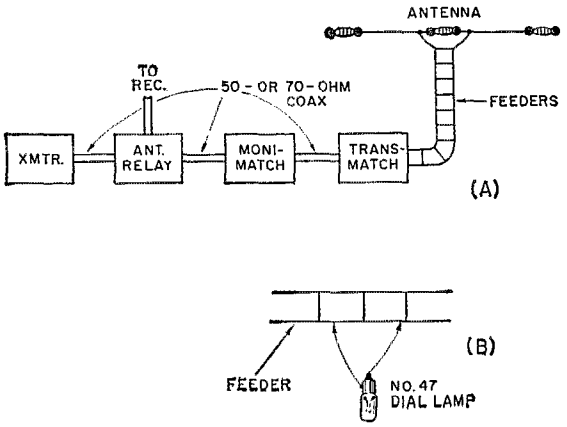
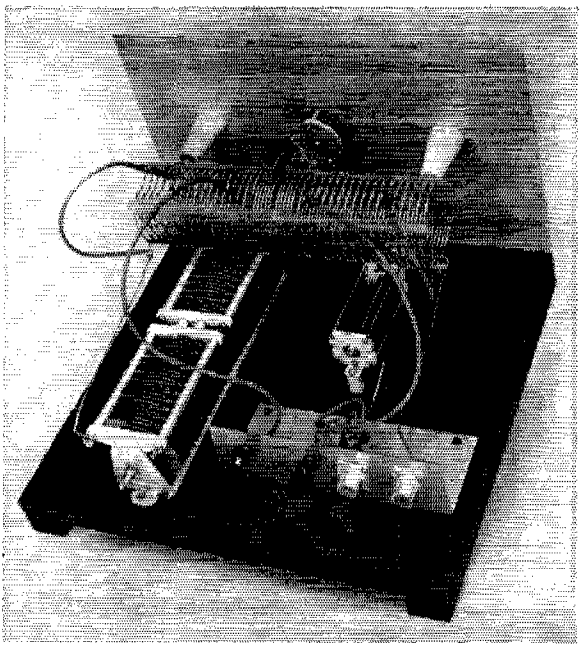


Fig. 3—At A is a typical setup showing the arrangement of the units. If a low-pass filter is used it should be inserted between the relay and transmatch. Either 50- or 70-ohm coaxial cable can be used between the units, but it should all be of the same type and the monimatch should also be designed for the same impedance. Shown at B is the dial lamp indicator.



This view shows the arrangement of the components in the transmatch. At the left is C_2 and at the right, C_1. The coax connector at the right is for connections to the transmitter. Next to it is the connector for coax feed lines. The clip lead is coiled up in this view.

how far you can move without having the zero reading change appreciably. This will give you some idea of how far you can QSY without changing the transmatch settings.

Make some notes on the dial readings of C_1 and C_2 and the placement of the different taps so that you can return to the same settings when you change bands. One ham we know uses two different colored paints on the coil, spots of one color to indicate the shorting clips and of another color to indicate the taps. This is quicker than counting off turns.

The tune-up procedure is the same on the other bands, using Fig. 2 as a guide for the tap settings. Be sure to change S_1 to parallel connections for 14 Mc. and higher. A commonly used antenna is a random length of wire, fed at one end. With this type of antenna connect the wire to J_3 and an earth ground connection to J_4. The clip attached to J_4 should be connected to the center of the coil. For matching, start off with the tap lead connected to J_3 near the links, just as you would with the balanced system. The dial lamp indicator should be shunted across a foot or so of the antenna lead. Make your adjustment tests by moving the tap farther out from the links until you find the correct setting.

For coaxial-fed antennas, connect the feed line to J_2, an earth ground connection to J_3, and the clip from J_3 to the center of the coil. Start off with the tap lead from J_2 tapped near the links and go through the same procedure as previously discussed. Incidentally, with a monimatch in the 50-ohm coaxial line between the rig and the transmatch, when the monimatch or s.w.r. bridge indicates a match your transmitter is then working into a 50-ohm load. For those readers using transmitters designed for fixed 50-ohm loads and coax-fed antennas, this setup is ideal. The dial lamp indicator described for the other types of line won't work with coax. However, there is a simple device described in *Understanding Amateur Radio*[1] called a "band checker" that has a dial lamp indicator built in that can be used with coax.

As you'll find out by experimenting, the transmatch will work and match without an earth ground connection when using balanced feed lines. However, having an earth ground connection may or may not improve the harmonic attenuation. The only way to find out is to have a nearby ham listen on your harmonic frequency to see if there is any difference. Don't have a ham who lives within a few hundred feet of you do the checking, but rather one who is at least a mile away. If the ham is too close, his receiver is likely to overload from your signal and this can produce false readings.

We tested the transmatch on three different antennas, all at the full kilowatt level. The antennas were a 45-foot long end-fed wire, which would present a wide range of matching conditions to the transmatch, an inverted V fed with 300-ohm transmitting-type Twin-Lead, and a coax-fed 20-meter ground plane. In all cases we were able to match without any difficulties. Incidentally, if you use 300-ohm Twin-Lead, you may find the matching conditions different when the line is wet. This merely means that the transmatch should be readjusted. QST

Strays

Boy Scouts World Bureau station VE3WSB in Ottawa was presented a complete Heathkit station in February 22 ceremonies. The kits were assembled by one of the scouts, and presentation was by J. H. Baldwin, President of Daystrom, Ltd., of Canada.

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The U.S. Army Electronic Proving Ground has established twenty-six field transmitting sites near Gila Bend, Ariz., as part of an r.f. interference measurement and analysis program. Testing will be on various frequencies, 1430 to 2230 GMT weekdays, using the call AA7XY. Information concerning these transmissions should be sent to the Signal Officer, Fort Huachuca, Arizona. If possible give all of these: date, time, RST, frequency, receiver and antenna types, and location of reception.

The ARRL National Traffic System

The Traffic Division of ARPSC and Its Importance in the Picture

BY GEORGE HART, W1NJM

National Emergency Coordinator, ARRL.

TRAFFIC handling was the basis for the original organization of ARRL, and methods of handling it have always been a favorite topic in the League's annals. Old timers will shed a tear of nostalgia for the original "trunk lines," which served the purpose well in the beginning and for many years thereafter. As coverage distances increased and first crystal, then the v.f.o. came into their own, "relaying" became a matter of operating in organized nets rather than receiving a message and looking for someone closer to its destination to send it to. Oh, we still relay, but now the relaying is done to a station in the proper net, which is usually, but not necessarily, closer to the destination than the relaying station.

Well, we wish we could tell you the whole story of the trunk lines and how NTS was formed. Maybe we can, in another article. Right now, our intention is to explain the National Traffic System, formed in 1949 as an entirely new ARRL-sponsored traffic system, later superseding the trunk lines.

Principles

It has been said, probably rightly so, that the National Traffic System is the tightest organization within the ARRL framework. One reason for this is that it was created as an ideal, then implemented on that basis. This is contrary to the usual procedure, which is to survey what you have, then see what you can make it do. NTS was not a system devised to suit its prospective participants, but a system devised to do a job, and participants were then sought for it. This is a very difficult organizational procedure, fraught with obstacles, full of pitfalls, and subject to the strongest opposition from those whose convenience it does not suit. The first couple of years of NTS's existence were shaky ones. Once most of the positions were filled by stations and operators in a position to fill them the sailing became smoother. Changes have been required and made from time to time, but the basic principles are as sound to-day as when formulated. Here they are, in broad outline:

1) A maximum number of operators is provided for. Any operator may work in the system provided he can spend about two hours per week minimum, because the system is based on an individual-weekly *rather than an individual-daily* function.

2) Any or all modes may be used. The system selects the mode to suit the need, within availabilities for each. There is only one NTS, not separate ones for each mode, and all work together through liaisons.

3) Although systematization comes before individual or group convenience, the system is set up to operate during the evening hours when the greatest number of operators are available.

4) The system purports to handle *all* traffic in an efficient, systematic fashion. No special treatment is given any particular message unless it qualifies for and actually bears a precedence above "routine." Nets meet in a time sequence designed to provide origin-to-delivery in a minimum of time consistent with mass-traffic-handling concepts.

5) In order to promote maximum network efficiency, nets are kept large enough to do their jobs, small enough to avoid unwieldiness; each net sticks to its own job and concentrates on doing it well. All nets use a standard NTS operating procedure; net managers and control stations are selected with great care for best leadership and net-know-how qualities.

6) Unauthorized stations are discouraged from reporting into certain NTS nets, but all traffic reported in is handled if possible.

7) NTS is a daily-operating system, completing one "cycle" of operation each 24 hours. It operates all week ends and all holidays. There are no "days off."

8) Official coverage of the system includes all parts of the ARRL field organization (U.S. and Canada). Other points are not covered by the system, although individual stations may from time to time attempt to provide such coverage.

9) NTS is a limited-load system. (So is any communications system, when you come right down to it.) Participants are not held longer than the normal net meeting period, traffic overloading being handled by volunteer stations by special schedules or funneled into non-NTS nets. *In any emergency situation*, steps are taken to increase the load limit, as we shall see.

How NTS Operates

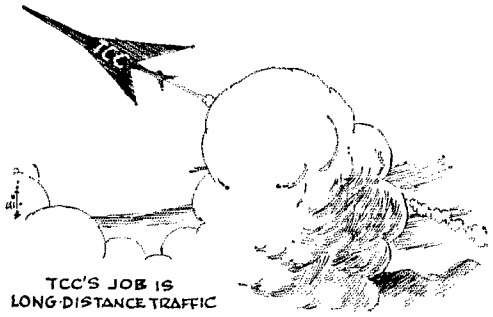
Perhaps the best way to understand NTS operation is to compare it with air travel. *Local*

NTS nets get the traffic to section level by regular liaison stations, just as you must get to a point where ground transportation is available to the airport. *Section* NTS nets centralize the traffic in certain stations to be carried to regional level, just as the airport bus takes you to the airport. *Region* NTS nets centralize the traffic again, this time to be carried to area level, just as your local feeder airline takes you to the airport of a large city.

At this point you catch a transcontinental jet airliner to take you to another large city airport, just as your *Area* NTS net centralizes traffic in the hands of a Transcontinental Corps station who shoots it by special out-of-net schedule to a TCC station in the destination area. When you arrive at the large city near your destination, you may have to take another feeder airline to your actual destination airport, another bus trip to your destination city, and perhaps a taxi ride to your actual destination. In exactly the same way, NTS traffic funnels down from TCC to area net, to region, section and local net for delivery.

While the air travel schedules may or may not be arranged to make your connections swift so you arrive in the best possible time (usually not, in the writer's experience!), NTS schedules are arranged with *precisely* this in mind. In the normal course a message originated on a given afternoon or early evening should be within delivery range the same evening.

Of course not all messages (nor travelers) are transcontinental, and this keeps the load at each level more or less constant. For example, a message going from a point in one section to a point



in another section in the same region would "get off" at regional level and never reach area or TCC level at all.

Although the basic concept of such a system is very simple, a number of imponderables often complicate the picture. Chief among these is that old bugaboo, operator convenience. For example, the NTS timetable calls for the Illinois Net, a section-level net, to meet at 0100 GMT. This works out to 1900 CST, or 2000 CDST, or anyway early in the evening. But let's say experience has shown that most Illinois traffic men are not available at that time, they prefer to meet at about "six o'clock." Their problem then becomes, should we meet when most of the traffic men want to meet, or should we meet at the time called for and *find* operators who can meet then? Very often, the concession to convenience is made, the NTS timetable is deviated from, the sequence is disrupted, some confusion is caused and the overall system is one notch less efficient.

Now please refer to the master diagram of Fig.

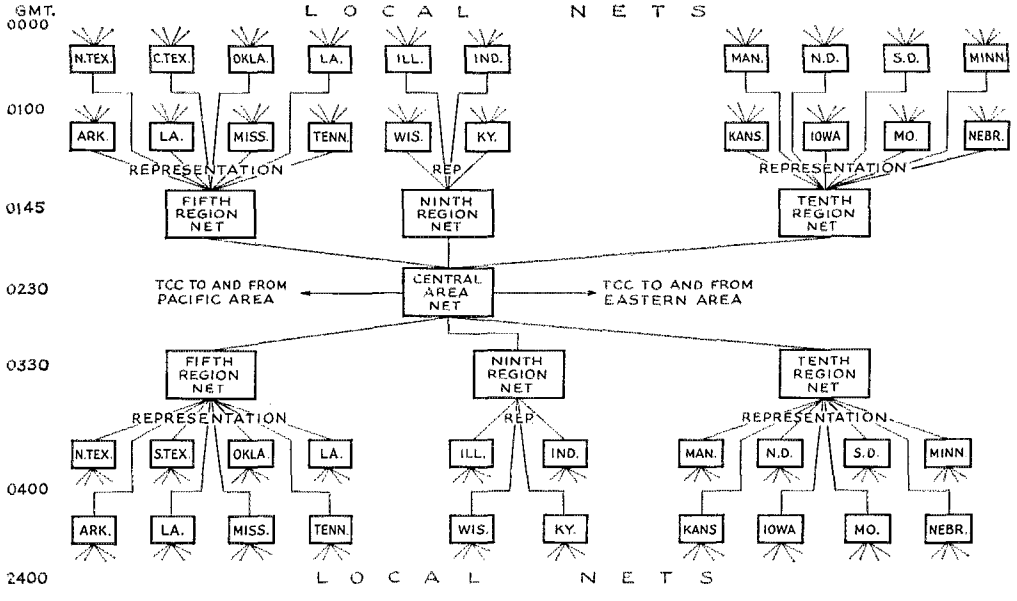


Fig. 1—A diagrammatical portrayal of the NTS setup in the Central Area, showing times of net meetings at the various levels in GMT. Note that the early and late functions of local nets are combined at 2400/0000. Some of the other net echelons have alternatives not shown above.

1. This is an attempt at a graphic portrayal of the operating organization of one entire NTS area, the Central Area. There are two others, Eastern Area and Pacific Area, divided roughly in accordance with local standard time zones, Pacific Area covering both the Mountain and Pacific Time Zones, plus Alaska and Hawaii. Note that in daily normal operation the cycle begins, in this particular area, at 0000 GMT, which works out to 6:00 P.M. CST, 7:00 P.M. CDST. This is the nominal time for Local Nets to meet. An hour later, at 0100 GMT, local net representatives and other amateurs representing parts of the section where no local nets are organized, meet on a section net frequency to swap traffic. At 0145 GMT, Section Net representatives (perhaps two of them when traffic is heavy) meet on the Region Net frequency, and at 0230 GMT Region Net representatives meet on the Area Net frequency.

Before we continue, let's consider what happens in one of these nets. First of all, it should be noted that the so-called "local" net is usually an AREC net operating on v.h.f., meeting a minimum of once per week to qualify as a part of NTS. They are usually in high-population areas in which any one of the stations *could* make delivery by toll-free telephone of any message for the area; however, in an emergency situation telephones are often out of service, so the practice in making "neighborhood" delivery is valuable. The local (AREC) net control knows the localities for which messages might be destined and dispatches messages received to the nearest station, from which point delivery can be made in person, if necessary, or perhaps by Boy Scout messenger. Thus, a local net is usually primarily an emergency net, but is included in the NTS framework as an operating entity for training purposes. In some section organizations, these local nets are called "intercom" nets.

Secondly, section nets themselves are aimed at *coverage*, even though some of the participants are representatives of local nets. Generally speaking, *all* section amateurs are invited to participate, so that coverage of the section will be as complete as possible; where participation from heavy population areas is by representation of local nets, this naturally has the effect of keeping the net from being too large and unwieldy and is a desirable procedure.

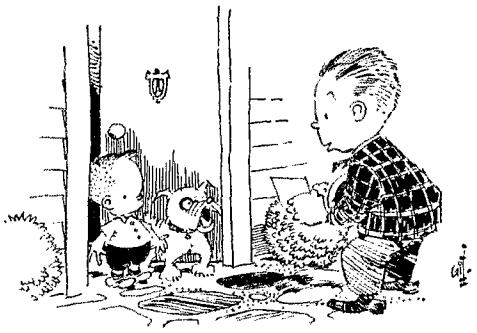
The pattern is very similar in all nets at all levels. A net manager lines up net control stations and liaison stations for each net session — different stations if they are available, otherwise some doubling up is necessary. When the net meets, stations "report in" (QNI) at the NCS's direction, give their traffic list, and the NCS directs them to whom to send it and on what frequency, if different from the net frequency.

Local Nets perform liaison to and from Section Nets, Section Nets to and from Region Nets (covering roughly a call area) and Region Nets to and from Area Nets.

At Area level, the procedure is subject to slight variation, because coverage areas larger than complete continental time zones are not practical. Out of this problem came the Transcontinental Corps.

The TCC is not a net but, as the name implies, a corps of crack operators whose specific duty it is to get the traffic from one Area Net to another Area the same day it appears. The job requires participation in nets at all levels, ability to handle traffic by c.w. with accuracy and speed, and a signal strong enough to make the long hops that are required.

Within the requirement for maintaining the NTS timetable, the TCC has every leeway to do the job in whatever manner, on whatever frequency and at whatever times are best suited for the purpose. It is administered by three directors appointed by the ARRL Communications Manager, one for each of the areas. The diagram of Fig. 2 portrays its operation.



LOCAL NETS CAN PERFORM PERSONAL NEIGHBORHOOD DELIVERY IF NECESSARY

Note that wherever practicable, out-of-net relay is preferred, and in most cases this is indeed necessary; nothing slows down a net more than the presence of a weak station with a lot of traffic that nobody on the net can copy, and too often this is precisely what happens when a station from far away tries to report directly into an Area Net. In individual schedules, however, there is complete latitude as to frequency and partial latitude as to time and the "batting average" is a great deal higher. Note also, as we have tried to show diagrammatically, that TCC stations "on duty" are encouraged to "short circuit" NTS channels, if feasible, for transmitting traffic only, in order to get traffic more speedily to its destination. Other stations are discouraged from doing this as a matter of policy.

But let's get back to Fig. 1. The Area Net has concluded, all Region Net raps have the traffic for their regions, the TCC functionaries have scurried off to keep their schedules with far-distant counterparts. The Region Nets now meet for the second time, at 0330 GMT, this time mainly for the purpose of distributing traffic received in the Area Net. Then at 0400 the Section Nets meet for the second time, mainly to distribute traffic received in the Region Net. Since these late sessions are primarily distributive in function, they are usually shorter. Anyway, it's getting pretty late in the evening for some of the boys and gals. In actual practice, not very many

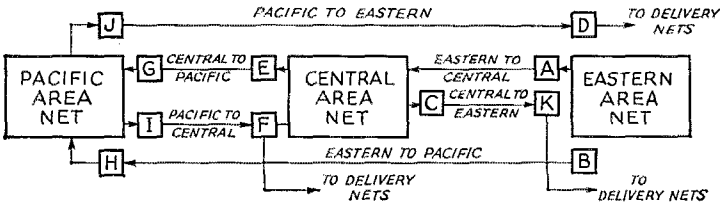


Fig. 2. How the TCC works. Small letter blocks denote daily station functions, station A being the only one that reports into an Area Net other than its own. Note that traffic from east to west goes into area nets while traffic from west to east may go into delivery nets to save time.

section nets have a late session. As propagation conditions improve, we should like to see more of them having late-evening meetings to put most of our traffic in same-night delivery range.

By the time the second session of the Section Net is cleared, it's usually too late to hold a second session of local nets, and because traffic at this level is usually not great in normal times, we combine the distributive function at local level with the originating function and set the nominal time at 2400, or 0000 GMT.

Bear in mind that this is an example of the Central Area only. In other areas, the times would differ — an hour earlier in the Eastern Area, two hours later in the Pacific Area.

In Emergency

The above is strictly normal-time procedure. When an emergency arises, NTS goes into complete or partial emergency operation depending entirely on the extent of the emergency situation and the extent of its effect. The discussion and diagrams above outline the NTS cycle on a once-per-every-24-hour basis. When an emergency arises, the cycle may be stepped up, in accordance with the needs of the moment, so that more traffic can be handled and so that it can be handled more quickly. In the extreme case, the cycle can operate bi-hourly, following the same sequence but completing it every two hours instead of every 24. In such a case, operation would in effect be continuous, with normal representation present in each net at all times, stations replacing each other as others are dispatched to the higher or lower nets with which they are making liaison.

ARRL emergency coordinators in disaster areas determine the communications needs and make decisions regarding the disposition of *local* communications facilities, in accordance with the need and in complete coordination with agencies to be served. Section emergency coordinators study the situation on a section-wide basis and make recommendations to NTS managers at section and/or region levels. These latter officials make the decisions as to the extent of NTS activation, based primarily on such recommendations, and in turn make recommendations to NTS net managers at higher levels and TCC directors regarding any extraordinary activation of wider areas that might be deemed necessary.

We are not so naive as to think that when such an emergency arises unexpectedly, everything will go like clockwork. ARPSC officials, like everyone else, will get excited, will be prone to make hasty and not-too-well-thought-out decisions and recommendations, and the all too familiar disorganized scramble of unprepared amateurs now magnanimously offering their obviously superior skills and equipment to the cause will add to the confusion. But we have to have a basis for planning, and outlining specific duties and functions for each ARPSC official is a good way to start. By "ARPSC official" we mean the EC, SEC, NTS manager and TCC director appointed specifically to perform their specialized functions. In an emergency situation, *these officials in the disaster area should be the bosses of our amateur radio facility.* Elected administrative or policy-making officials should in such a case follow orders, like anybody else. There is no use appointing such officials if we are not going to permit them to perform.

The ARRL precedence system classifying messages as "emergency," "priority" or "routine" was established for determining how certain types of messages should be handled. This is something so new in amateur traffic handling that it is taking our nets quite some time to get used to using it properly. ARRL CD Form 3 contains this and other useful information; this form is in the back of every ARRL log book or is available separately without charge to whoever wants it.

How You Fit In

You can participate in NTS by participating in your local or section net, regardless of mode or band, and helping to make it a part of NTS by conforming to the system's standards. There are very few sections which do not have traffic or emergency nets of one kind or another. They are in the ARRL Net Directory. You start at the bottom, improve your proficiency and net "savvy," eventually "graduate" to a higher level and if you acquire the proper c.w. proficiency level you could wind up as a regional or area representative or even in the TCC, where we don't fool around with the traffic or the operators, but get the job done.

Try it. You might just find that doing something useful is enjoyable. QST

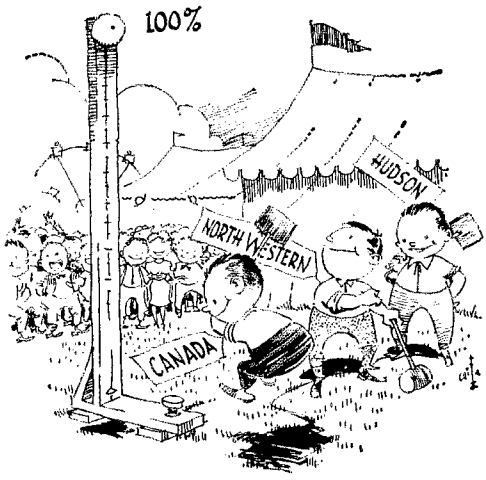
Building Fund Progress

WHICH will it be? Canadian, Hudson, or Northwestern? These three divisions are running neck-and-neck down to the wire, each striving to be the next one to reach 100 per cent of quota. It's going to be close! Canada needs only $930 to reach the mark, while Northwestern and Hudson respectively need $936 and $998. Because of the matching funds agreement, this means that the fellows in these three divisions need actually raise only $465, $468, and $499. We know it can be done, because just last month the Hudson Division alone turned over some $2500 to the Building Fund. Nice going, gang!

Our eyes are going to be on these three front-runners, but don't overlook some of the other divisions who are breathing down their necks. Roanoke, for instance, jumped from 9th to 6th spot, and with another couple of months like last month will be in the 100% bracket.

The division standings at the end of April were as follows.

Dakota	**116.7%**	Midwest	78.2
New England	**114.9**	Delta	70.2
Hudson	96.6	Pacific	69.2
Northwestern	88.3	Rocky Mountain	61.5
Canada	86.8	Atlantic	61.4
Roanoke	83.5	West Gulf	59.9
Southwestern	81.9	Great Lakes	50.6
Central	81.6	Southeastern	50.3



Every division has now reached at least half of its assigned quota. Those old reliables, Dakota and New England, continue to contribute, and are still way out in front and oversubscribed by some 15%.

Let's go!

Members Are Saying

I treasure all that ARRL has done for the amateurs, and so hope that things continue to progress with your work for the fraternity in the years ahead. I think your present program to upgrade the amateur ranks is needed. However, I hear a lot of fellows complaining about it, and guess the shoe pinches them. I'll be glad to cooperate in any way I can, even to getting another license examination, if that is required. — *W9MG*

The League has served me well since my first entry into amateur radio in 1919 and I know, like thousands of others, that I would not be enjoying this wonderful hobby forty-five years later except for the efforts of the American Radio Relay League. — *W4TAZ*

Ham radio has brought me a lot of pleasure in life, a wife, friends of long standing here and abroad. I am sure anything ARRL does and has done for the amateur is appreciated by those who *think*. — *W5CRM*

Here is a contribution from the XYL, K5UIM, and myself toward the ARRL building fund. We stand 100% behind the League. — *K5UIM*

I have passed my General and would like to thank you from the bottom of my heart. I am sure I would never have passed without your theory guides, and code messages from W1AW. My code speed is about 25 w.p.m. The enclosed contribution is probably very small, but it's all an eleven-year-old can pull from his pocket. — *WA4RLI*

Enclosed is our club's second contribution to building fund. We do appreciate the good work the League is doing. Keep it up. — *Amateur Radio Technical Society of St. Louis*

I am enclosing a check for the building fund in recognition of the work of Ted Crosby and his friends on the HBR receiver. After reading his article in the April issue of *QST* I felt more strongly than ever that Ted's efforts represent amateur radio at its very best. — *John W. Hancock, Jr., Roanoke, Va.*

Enclosed is a check toward the building fund for the new headquarters. If it was not for the good work of the League, amateur radio as we enjoy it today would be unknown. — *K0GJR*

I have been thinking how embarrassing it would be if I met Hiram Percy Maxim in heaven and had to tell him I reneged on the donations. Believe me, Hiram dug down deep to save amateur wireless for us. — *K6DV*

The Northwest Amateur Radio Club wishes to express its sincere thanks to the League and to General Manager John Huntoon for his excellent talk on the history of ARRL, the new building at Newington, and incentive licensing. Please accept the enclosed check to assist in your building fund. We wish you every success in this effort. — *W9LM*

Maybe this will buy a brick or two. I thank the ARRL for the help it has given me. — *K5GGV*

1964 ARRL Field Day Rules

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

GET ready for Field Day, June 27–28. Thousands of amateurs in the ARRL Field Organization are busily readying generators, planning operating schedules, allocating assignments and otherwise impatiently awaiting this official radio-amateur way to start the summer.

Each year the ARRL Field Day test renews and demonstrates our individual and collective ability to set up radio communications in an emergency. Civil defense as well as natural disaster, such as the recent one in Alaska, require *all* the communications equipment and facilities that can be developed. You can participate with a club or non-club group portable; one- or two-man portable station; mobile, emergency powered home station or as a regularly powered home station. Whatever your class of participation, you're sure to gain valuable operating experience under field conditions as well as have a grand time.

Here are examples to assist score calculations:

Example 1

Assume a 25-watt rig wholly on batteries, not originating or relaying any messages, and not having more than two operators.

40 points (40 stations worked)
× 3 (power below 30 watts)

120
× 3 (*all* radio equipment independent of commercial mains)

360
× 1.5 (If Class B or C and everything on batteries)

540 claimed score

Example 2

Same as Example 1 but one Field Day Message to the SEC or SCM is originated and passed in good form.

65 points (40 QSOs + 25 points for FD message)
× 9 (3 × 3 = power multiplier multiplied by independence-of-mains multiplier)

585
× 1.5 (everything on batteries)

877.5 claimed score

(Copies of all messages originated and relayed must accompany Field Day reports.

Example 3

The Podunk Hollow Radio Club (or any group of three or more licensed operators), portable at its FD site, operates two transmitters simultaneously. Each rig runs 75 watts input and batteries or generators furnish power. One message is started in good form (25 points), 1 is received and relayed onward (2 points), and 230 stations are contacted.

257 points (230 QSOs + 25 + 2)
× 2 (power input over 30 and under 150 watts)

514
× 3 (all gear independent of mains)

1542 claimed score

(No battery multiplier for either clubs or groups.)

Mobiles are an important part of Field Day too, and clubs should strive to get all member-owned mobile units on the air during Field Day and report their mobile scores for the mobile aggregate scores to appear in the final results. Mobile units are the key to any emergency work.

FIELD DAY TIMETABLE

Time	*Start*	*End*
	June 27	June 28
GMT	2100	2400

(Operate no more than 24 *consecutive* hours out of the total 27-hour period)

Log forms and summary sheets are now available on request from ARRL, 225 Main Street, Newington, Connecticut 06111. Your best bet is to send for some, the sooner the better. You may also use the summary on the next page, or prepare a facsimile. All reports should include starting and ending time of operation, bands used, dates and contact times, calls of stations worked, signal reports sent and received, and locations of stations worked, as well as power sources and inputs, location and call of station, number of transmitters in simultaneous operation, number of persons participating, club name (if any), and score computations. Results must be postmarked no later than July 27 for *QST* listing.

Portable stations are reminded to be sure they comply with FCC regs in signing portable. C.w. stations follow their calls with a slant bar followed by the numeral of the area in which they are operating; phone stations follow their calls with their geographical location. See Sec. 97.87(b), old Sec. 12.82, of the amateur rules for details.

Check these FD rules, which follow below, very carefully; a scan of last year's FD results (December, 1963, *QST*) may give you some hints.

Rules

1. Eligibility: The Field Day is open to all radio amateurs in the sections listed on page 6 of this issue of *QST*.

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

3. Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Contest Committee.

4. Entry Classification: All entries will be classified according to number of transmitters in simultaneous operation. They will be further classified as follows: "A," club or nonclub group portable stations; "B," unit or individual portable stations; "C," mobile stations; "D," home stations operating from emergency power; "E," stations operating from commercial power sources. Thus a club or group running three transmitters simultaneously will be in the 3A classification, or a mobile station with one transmitter will be in the 1C classification.

Portable stations are those installed temporarily, for FD purposes, at sites away from customary fixed-station locations. Portable equipment or units must be placed under one call and the control of one license, for one entry. All control locations for equipment operating under one call must lie within a 1000-foot diameter circle.

Group participation is that portable-station work accomplished by three or more licensed operators.

Unit or individual participation is that portable-station work accomplished by either one or two licensed operators.

Mobile stations are complete installations including power source and antenna, mounted in or on vehicles and capable of being used while in normal motion. If they utilize antenna supports not normal or suitable for use during motion, installations must be classified as portable instead of mobile. Each mobile entry call must be different from any other FD station participating.

Home station participation is that work by fixed amateur stations not operating portable or mobile.

A transmitter used to contact one or more stations may not subsequently be used under any other call during the Field Day period (with the exception of family stations where more than one call is assigned to one location by FCC).

5. Field Day Period: All contacts must be made during the period indicated elsewhere in this announcement. An entry may be operated no more than 24 consecutive hours of the 27 hours available.

6. Bands: Each phone and c.w. band is regarded as a separate band. A2, radio-teletype and frequency-shift keying are grouped with A1, in the bands where they are allowed. All forms of voice transmission will be grouped with A3, in the bands where they are allowed. (In Canada the respective phone bands apply.)

The use of more than one transmitter at one time in the same band is not allowed.

7. Exchanges: Signal reports and ARRL section (or specific location) must be exchanged in proof of contact.

8. Valid Contacts: In Class A, B and C, a valid contact is a complete exchange with any amateur station. In Classes D and E, a valid contact is a completed exchange with any station in Class A, B or C. Cross-band contacts are not allowed. Contacts by mobile stations may be made in motion or from any location(s). A station may be worked more than once only if the additional contacts are made on different bands.

9. Field Day Message: A Field Day Message is one originated by a Class A, B, or C station and addressed to the SEC or SCM (see address in *QST*, p. 6) stating the number of operators, the field location, and the number of AREC members at the Field Day station. Only one Field Day Message may be originated.

10. Scoring:

Message Credit: Credit for handling messages may be obtained only as follows: 25 points for originating one Field Day Message to SEC or SCM. In addition, each Field Day Message received for relay will score 1 point when received by radio and 1 point when sent onward by radio. No FD Message may pass through the same station twice. There will be a deduction of 10 points for omission of handling data or for defects in form. Copies of all messages originated and relayed must accompany Field Day reports.

Multipliers:

Power: Output-stage plate input 30 watts or less: 3. Output-stage plate input between 30 and 150 watts: 2. Output-stage plate input between 150 and 1000 watts: 1. The plate input of a grounded-grid amplifier is its plate input plus the plate input to the driver stage.

Independence-of-Mains: All radio equipment independent of commercial power source: 3. All radio equipment not independent of commercial power: 1.

Battery Power: (applies to Class B and C only): 1.5. The battery capacity or size shall in all cases be adequate to permit one hour's continuous operation of the station. Charging batteries from commercial mains while batteries are connected to transmitter or receiver voids the "independence-of-mains" and "battery power" multipliers.

Multipliers do not apply to Class D and E entries.

Final Score: The final score equals the total "points" multiplied by the "power multiplier" multiplied by the "independence-of-mains" multiplier (multiplied by the "battery power" multiplier, if applicable.) Where different multipliers apply during the Field Day period, points are multiplied by the multiplier in effect at the time the points were earned.

11. Club Aggregate-Mobile Scores: Entries under Class C may be combined to form a "Club Aggregate-Mobile Score." The club name must be noted on the individual reports, and the club secretary must submit a claimed aggregate score. Credits to the extent supported by the reports submitted to ARRL will be allowed. Only bona fide members of the club, residing in the club territory, may contribute to the aggregate-mobile club listing.

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

Entries must be accompanied by this summary sheet. You may obtain the summary shown here plus log forms free on request from ARRL; or you may use the very one shown here or prepare a facsimile. Attach logs of all Field Day contacts and copies of all messages originated and relayed with your entry.

ARRL FIELD DAY SUMMARY

STATION CALL..... FD LOCATION.....
(indicate / where applicable)

CLASS OF ENTRY (check only one)

- ☐ A. Club or group portable.
- ☐ B. Unit or individual portable.
- ☐ C. Mobile
- ☐ D. Home -- Emergency power.
- ☐ E. Home -- Commercial power.

ENTER NUMBER OF TRANSMITTERS IN SIMULTANEOUS OPERATION IN THIS BOX: ☐

If club entry, name of club.....

If Class B entry, call(s) of operator(s).....

Number of people participating at this station.....

Period of FD operation: Starting time..... Ending time.....

POWER SOURCE (check)

☐ Generator. ☐ Commercial Mains. ☐ Battery. ☐ Other.

Description of power source (generator type etc.).....

Bands	Nr. stns. worked	Multiplier	Score	Transmitter	Input
3.5 Mc. CW		X			
3.5 Mc. A3		X			
7 Mc. CW		X			
7 Mc. A3		X			
14 Mc. CW		X			
14 Mc. A3		X			
		X			
		X			
		X			
FD message points	[2]	X			
TOTALS	[1]	X	CLAIMED SCORE	Enter total number of stations worked here (should equal box [1] minus box [2])	

This certifies that the station whose call appears above was operated in accordance with the current Field Day rules and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

..... (Date)

..... (Signature of club secretary or licensee of station whose activities covered in this FD entry)

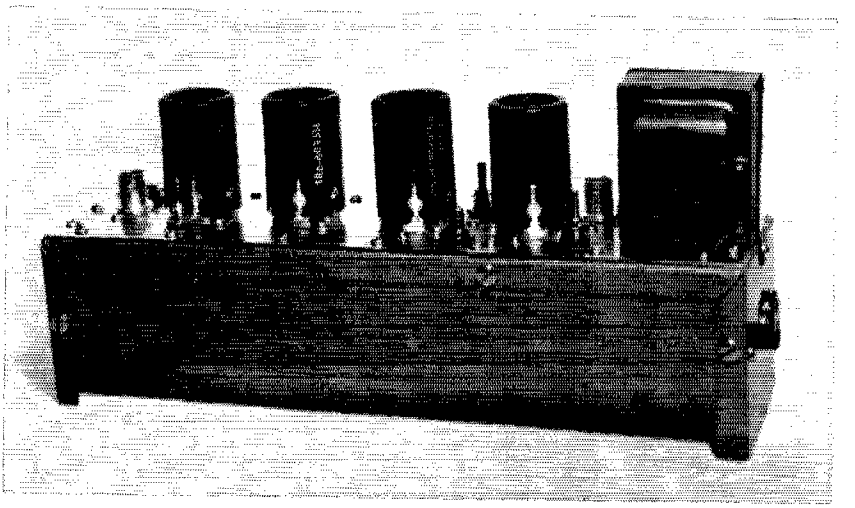


Fig. 1—The 2-meter 417A converter is built on the outer portion of a standard Minibox. Sides of the enclosure are cut down to 1½ inches in height. Bottom is perforated, and ends of the box, left at full height, support the assembly above the table, for convective cooling. Power supply is built into the right end of the assembly.

A High-Performance Two-Meter Converter

BY GERALD S. GIBBS,* W2LVQ

THE converter pictured and described here is basically the old cascode type, originally designed by Wallman, one of many built at W2LVQ. The circuit remains the same because, despite the many versions built, it has been found impossible to improve on it. The principal difference from a similar converter described by W2AZL [1] is in layout.

During endless experimenting with v.h.f. converters it was found that layout and wiring techniques are extremely important if the last possible improvement in noise figure is to be achieved. The wireman must be a frugal type, and wires carrying v.h.f. currents must be kept to the absolute minimum. Working in this direction has resulted in a design wherein "wiring" in the usual sense hardly appears at all — a true "wireless set," as one wag put it.

Extensive shielding and filtering are employed to keep interaction between stages to the absolute minimum. These steps have proved to be extremely important, though they hardly lend themselves to mass-production methods, and the converter is not one that can be thrown together in an evening. The painstaking work involved is well worthwhile when you experience the thrill of being able to hear 2-meter signals from the extreme outer edges of the potential operating range consistently, night after night.

Electrical and Mechanical Features

Experimentation with layout indicated the possibility of considerable miniaturization, compared with most v.h.f. converters of the home-built variety. This one is built into a modified Minibox, 9 by 2¼ by 1¼ inches in size, including power supply. The top of the box was hacked out and replaced by a silver-plated brass plate, which is used as the basic chassis of the converter. The shielding is also silver-plated brass. Details of the various shield items are given in Fig. 4. R.f. coils are wound with silver-plated wire.

Various circuit and layout features of this converter, taken one at a time, would offer little

* 5415 Netherland Ave., Bronx 71, New York, N. Y.

[1] Scheideler, "A Two-Meter Converter with a Noise Figure Under 2 Db.," *QST*, Dec. 1959, p. 23. Copies of this issue are no longer available from ARRL Headquarters.

measurable proof of their worth, but together they add up to the lowest noise figure obtainable without using a parametric amplifier or perhaps a 416B stage. Here are the principal ways in which this design departs from its popular and effective predecessor in *QST*:

The input capacitor, C_1, is an 18-pf. glass piston-type trimmer. For reasons unknown this gave a lower noise figure than the 45-pf. ceramic trimmer originally used. The cathode bypass, C_2, was reduced to 25 pf., in place of the original 50. Experimentation with this value is in order, if the builder has a noise generator and is capable of using it effectively. Layout and the type of capacitor used may have some effect on the optimum value.

Proper grounding of the center post of the first r.f. tube socket was not possible, due to the inductive reactance of even the shortest wires. Removal of the center post entirely helped to stabilize the amplifier. In the grounded-grid second stage the center post is grounded to the small interstage shield. Isolation was improved by making a complete box of the shield, including a top cover. See Fig. 4.

The neutralizing coil, L_9, is mounted so that it can be adjusted after the entire unit is assembled. Adjustments made to this coil before the shielding was completed had to be redone when the converter was buttoned up.

The power supply, consisting of a 125-volt transformer, silicon diode rectifier and RC filter, was included on the main chassis. IERC black tube shields are used to keep temperatures down, resulting in longer tube life. This is important, not only because good 417As are expensive, but the converter must be completely readjusted if optimum noise figure is to be achieved after a tube change.

The crystal frequency shown in Fig. 2 is for an i.f. tuning range of 30.5 Mc. to 34.5 Mc., the special v.h.f. converter band provided in some communications receivers. Coil values are given for 14 to 18 Mc. in the parts table, if the builder wishes to use that range. The crystal for 14 to 18 Mc. should be 32.5 Mc.

Another substitution some builders may wish to make is the use of some more-readily-available tube than the 404A for the mixer. A 6AK5 or any similar pentode should work satisfactorily in this stage.

Adjustment

When the converter is completed, connect it to the receiver input with coax. With power applied, adjust the turn spacing in the second r.f.

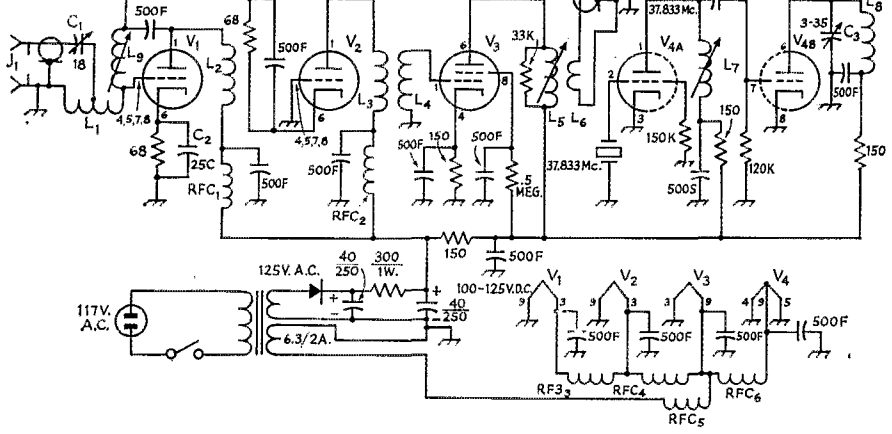


Fig. 2—Schematic diagram and parts information for the low-noise 2-meter converter. Capacitor types are indicated by a letter following the value: C for ceramic, F for feedthrough-type button, S for standoff-type button. Capacitors with polarity indicated are electrolytic. Resistors are ½-watt composit on. 68-ohm cathode resistors should be 5 per cent; others 10 per cent. Power supply may be anything that will deliver 100 to 150 volts d.c. at 50 ma., and 6.3 volts a.c. at 1.2 amp. or more.

C_1—18-pf. glass precision trimmer (Corning CGW-602901). Mount in 5/16-inch hole with Teflon shoulder washers.

C_2—25-pf. ceramic. See text.

C_3—35-pf. miniature trimmer.

J_1, J_2—Coaxial receptacle, BNC type.

L_1—4 turns 5/16-inch diam., ½ inch long, tapped 1 to 2 turns from ground end.

L_2—5 turns ⅜-inch diam., ½ inch long.

L_3—7 turns ⅜-inch diam., ⅝ inch long.

L_4, L_8—4 turns 5/16-inch diam., ⅜ inch long. All above coils No. 16 silver-plated wire.

L_5—14 to 18 Mc.: 40 turns No. 28 enam., close-wound on ⅜-inch iron-slug form.
30 to 35 Mc.: 13 turns No. 22 enam., close-wound on ⅜-inch iron-slug form.

L_6—14 to 18 Mc.: 5 turns No. 26 d.c.c. on B-plus end of L_5.
30 to 35 Mc.: 4 turns No. 26 d.c.c.

L_7—15 turns No. 22 enam., close-wound on ⅜-inch iron-slug form.

L_9—14 turns No. 22 enam., close-wound on ¼-inch v.h.f. iron-slug form.

RFC_1, RFC_2—No. 30 enam., close-wound full length of high-value ½-watt resistor.

RFC_3–RFC_6, incl.—6 turns No. 22 enam., close-wound on high-value ½-watt resistor.

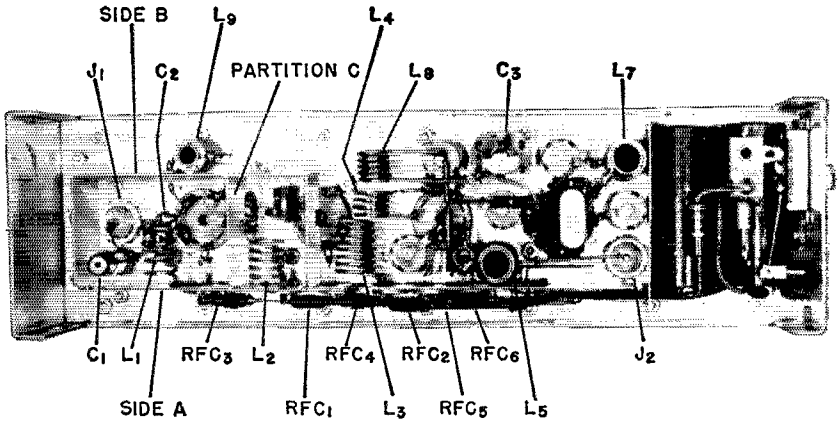


Fig. 3—Interior view of the W2LVQ 2-meter converter. Shielding enclosure for r.f. circuits at the left is shown with cover removed. Principal components are indicated where placement is important.

coil and the slug in the mixer coil (L_3 and L_5) for smooth noise output as the receiver is tuned across the desired i.f. range. A 50-ohm resistor should be connected across J_1 as this is done. Now disconnect the heater lead from the first 417A. With a local signal (not too high a signal level) coming through, tune L_9 carefully for minimum response. This adjustment can be made with the antenna connected if the signal is not too strong. A signal source in the immediate vicinity can be used if the 50-ohm resistor is the only source of signal pickup. Reconnect the heater.

Unless a good noise generator is available, you will now have the converter operating about as well as you can expect to get it. With the aid of a noise generator, however, it may be possible to optimize the value of L_1, the setting of C_1 and L_9, and the value of C_2 for lowest noise figure.[2] Lacking a noise generator, you can do the job by noting carefully the margin that a signal of a given strength provides over the noise. This can be determined by noting the swing of the receiver S meter on a fairly weak signal, or by listening to the strength of a modulated signal with respect to the background noise. Note that *margin over noise*, rather than maximum indicated signal strength is the objective here.

If the laboratory equipment he specifies is available, the alignment procedure detailed by W2AZL [1] may be followed.

A Bit About Noise Figure

Though we hear the term "noise figure" being bandied about often on the v.h.f. bands, it may be apparent from the way the expression is used that the speaker does not have a good appreciation of its meaning. Noise figure is a term, usually expressed in decibels, that indicates how far a receiving system deviates from the ideal receiver that would make no noise at all. Such a receiver would make no sound whatever without an antenna connected, even if its audio output rating was 100 watts and the gain was wide open. However, the mere connecting of a 50-ohm resistor across the antenna terminals would cause enough noise to drive you out of the room.

[2] For detailed information on construction and use of noise generators, see Feb. 1964, *QST*.

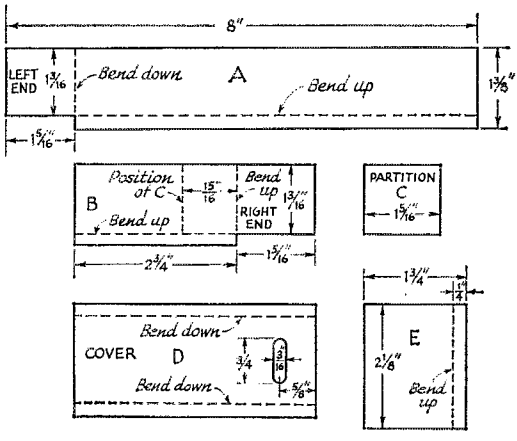


Fig. 4—Details of the shielding used in the 2-meter converter. Material is 22-gage sheet brass, silver-plated. Plating can be done with silver nitrate powder sold under the trade name, "Cool Amp," and a damp cloth. Referring to Fig. 3, Side A comprises the left end and long side of the assembly (lower portion in the picture). Side B is the upper side and right end. C is the partition, D the cover (not shown in the picture), and E the partition that separates the power supply from the r.f. portion of the converter. Its edge is just visible, between the filter capacitor and L_7 and J_2. The hole at the right side of D permits adjustment of turn spacing and position of L_3, L_4 and L_8 when cover is in place.

So, if you want to find out how good your receiver is, adjust the controls so that you can just hear a bare minimum of noise, with no antenna connected. Now put a 50-ohm resistor across the input. You should be able to hear the noise increase perceptibly. A similar test can be made by setting the threshold of noise with the resistor connected. Then replace the resistor with your antenna. The noise should rise markedly, even if your location is a quiet one, and you make the test at 3 A.M., when man-made noise is close to zero.

The converter described passes these tests with flying colors. It will also show an increase in noise when the antenna is aimed at the sun, over the noise level when it is aimed at quiet areas of the sky, or at an unpopulated section of the horizon. Use of this converter has been a real joy to the author. It is a worthwhile companion to the pair of 4CX250Bs used in the 2-meter transmitter.

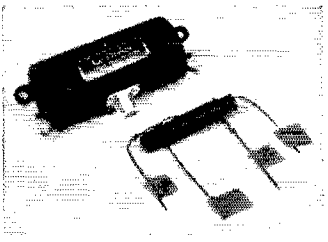
One last bit of advice: the 417A does not take kindly to large doses of r.f. power. Better install a relay to short the converter input when transmitting! QST

• New Apparatus

Q-Tran Balun

THE Q-Tran balun is designed to match an unbalanced 50- or 70-ohm coaxial feed line to a balanced 50- or 70-ohm load. Applications would be for dipoles, inverted "V" dipoles or beams.

The mechanical construction of the Q-Tran is such that it can serve as the center insulator for the dipole. A look at the photograph shows the high-impact plastic housing and the two metal "ears" that project from the cylinder for attaching the dipole wires. Electrical connections to the wires are made to the lug terminals at both ends. The coaxial feed line attaches to the SO-239 connector. Two small holes at the bottom of the case (connector side down) act as breather holes so that moisture can't collect inside the cylinder.



The photograph also shows what's inside the balun: a ferrite core with a bifilar winding of heavy wire. The frequency response is broad-band, from 3 to 30 Mc., and the device is rated at one kilowatt a.m. and c.w., and 3 kilowatts s.s.b. The assembly is coated with an epoxy dielectric paint. The finished unit measures only 2 inches in diameter and is 4 inches long. It weighs 7 ounces.

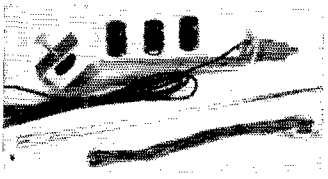
Although the balun is designed for 50- or 70-ohm installations, it will handle mismatches of up to 5 to 1. The Q-Tran is manufactured by Allinger Products, 1 Linden St., Norwalk, Conn. — *E. L. C.*

B & W Portable Emergency Antenna

WITH the coming of spring, warm weather, and vacation time, a ham's fancy turns to the open road and portable operation — which usually means setting up the station in motels, hotels, or summer cottages. An antenna called the "Vacationer" solves the antenna problem for those one-night stands. The Vacationer is designed to work on six bands: 2, 6, 10, 11, 15 and 20 meters.

The antenna kit weighs only three pounds and, when disassembled, is only 18 inches in its longest dimension. The photograph shows the Vacationer as it appears ready for traveling.

A base-loaded radiator on 10, 15, and 20 meters, the antenna consists of a 57-inch telescoping whip that attaches to an arm clamp and base assembly. The base assembly is a plastic cylinder with two machine screws attached. A loading coil for the desired band of operation is slid over the cylinder and held fast by the machine screws, which also make the necessary electrical connections from the coil to the whip and the feed line. The window mount has a thumbscrew clamp for attaching the entire antenna to a window sill, bottom of the window sash, or other convenient point



that will allow the antenna to project outside the building. In the case of metal windows and sills, the antenna must be insulated from the metal and should be clamped to the glass part of the window.

On 6 meters, a shorting bar is placed across the loading coil screws and the antenna is extended to 57 inches to make a quarter-wave radiator. On 2 meters, the whip is retracted to 19 inches.

Also associated with the antenna is a counterpoise consisting of a length of insulated wire with an alligator clip at one end. With some installations, it will be necessary to clip the counterpoise to the thumb screw on the clamp and dress the counterpoise along the floor adjacent to the antenna for the best "match." The instruction sheet furnishes suggested counterpoise lengths for the various bands. It should go without saying that an s.w.r. bridge is a necessity when using this antenna! A ten-foot length of RG-58 feedline is furnished with the antenna.

The Vacationer is a product of Barker & Williamson, Inc., Bristol, Pa. — *E. L. C.*

Strays

W. T. Jeffers of New Frontiers of Faith, P.O. Box 7129, Tulsa, Oklahoma, is raising funds to set up a ham station at the Culion Leper Colony in the Philippines (and four other colonies later). Gifts of gear and parts will be welcomed.

—•••—

Murphy Strikes Again!

Concerning the November SS, as reported in May *QST:* W4CKB should have appeared in the "clean sweep" tabulation after an FB effort of 74 sections in just 74 QSOs; KN3YOP won the EPA Novice award; OT W1CMW erroneously wound up in the phone results and he's a 99% c.w. man; W3MBS should be K3MBS; W6MLD mysteriously appeared in Santa Barbara although operating in S. F. and K4HUU should appear in the phone, not c.w., Virginia results with 10,280.

• QST Article Contest Winner

Your Emergency Obligation

BY JEFFREY LOESCH,* KØUNK

In the fun of operation or the heat of competition for DX or high contest scores, the radio amateur often forgets the primary reason that he is given the frequencies from which he derives the enjoyment of his leisure. It is due to the fact that amateur operation is useful and beneficial to a larger part of the population that amateur radio gains its privileges. If amateurs did not provide the benefits, the public in general might realize more from amateur frequencies as broadcast frequencies.

It is therefore the responsibility and obligation of every amateur to provide or make available certain services for any who need them. Probably the greatest of these services is communications in times of emergency.

In the past, amateurs have provided communications when those of all other services were ineffective. In almost innumerable storms, floods and other disasters, amateurs have provided efficient communications.

In recent years, it has become increasingly easy to sit in a soft chair before high-powered but delicate and immovable equipment and operate with no thought of emergency portability or duty. *Every amateur should remember that his license personally obligates him to provide what help in communications during an emergency that is most useful and helpful.*

Every amateur with an operating station should have one station, including an antenna, that is capable of portable operation without undue trouble or failure, whether it is his only station or one of several. The more bands it covers, of course, the more useful it will be, in other uses as well as in emergencies.

A rig need not have a handle and a battery to be portable. It should, however, be capable of being loaded into a car from its usual position in a short time, say ten minutes, and set up in a portable position, even inside a car, in another ten. Amateur equipment, if it is the operator's only station, should not be tied up to the shack so that only major modification would allow it to be moved. Even equipment that is set in a built-in space can, if not bolted or in some other difficult-to-remove way held in, be removed in ten minutes. Any dipole, trap vertical or piece of wire with the proper coil or antenna tuner will serve as an emergency antenna.

The success of any emergency communications will to a large extent depend on the organization of the effort. Responsibility for this, particularly in local disasters, is that of the local club. It would be a heavy burden for each amateur to provide his own emergency antennas, generator, and van or operating position. A club, however, can build antennas and obtain a suitable generator and cables with much less difficulty. Club antennas set up in an advantageous position provide not only a position for emergency operation, but for tests, Field Day, and even operation in other contests. A club antenna farm can include some special antennas that most of the members would not themselves have room for, giving the club antennas real DX desirabilities and capabilities. A central point of operations provided by a club antenna farm affords a club a definite advantage in emergencies.

While it is desirable to have commercial power for such a central point of operations, emergency power is a necessity. One large reliable generator with cables to reach all rigs in the antenna area is desirable, especially if a spare is owned or can be borrowed during an emergency by the club. A trailer-mounted generator is usually the most convenient and generally useful, lending itself to many non-emergency uses.

Operating positions in the antenna area can be provided by the cars or station wagons of members, small buildings that are kept at the area, or even by club members' campers or camping trailers.

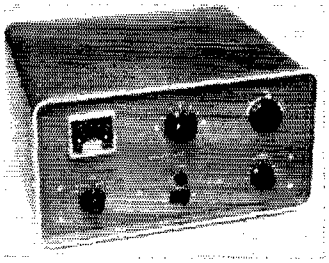
While a central location is important in emergency preparation, it is of little use by itself in a localized disaster. For this reason, it is advisable for a club or several individual members to own small power units which can be easily moved and used by single stations operating from portable positions. A van for one or more portable stations is also very useful. A used school bus is one of the best and cheapest sources of such a van.

Mobile stations are the quickest and probably the most useful type of portable station. Most clubs will have some members with mobile stations. These stations should be taken full advantage of in the club emergency plan. There is another source for inexpensive mobile rigs that can be used in communications for local emergencies. Utility companies usually replace their mobile equipment every few years. This equipment can usually be converted quite easily to the six- or two-meter band. If the company con-

(Continued on page 170)

* P.O. Box 157, Montrose, Colorado.

• Recent Equipment —



The Hammarlund

HXL-1 Linear Amplifier

THE recent popularity of transceivers has led logically to an increased interest in linear amplifiers to go with them. Hammarlund has obliged with the HXL-1, a linear amplifier that includes its own built-in kilowatt power supply. It is bandswitching and covers the amateur bands 80 through 10 meters.

Two fan-cooled 572A zero-bias power triodes[1] are used as r.f. amplifiers; these are the United Electronics graphite-anode type which can be used as direct replacements for the 811A. However, the tube manufacturer rates them with an ICAS plate dissipation of 225 watts each. Hammarlund runs the pair of these tubes at 1000 watts d.c. input on c.w. and RTTY. On s.s.b., the amplifier is rated at 1500 watts p.e.p. input. About 60 to 70 watts of drive are necessary to push the amplifier to full output. The manufacturer's confidence in the amplifier and its power supply is such that the key-down time may be as much as ½ hour when running 1000 watts d.c. input!

A grounded-grid circuit is used with drive fed to the 572A cathodes, which are isolated from the rest of the circuit by a bifilar choke in the filament leads. The choke is tapped and drive is introduced to the proper tap by the panel-controlled BAND SELECTOR switch. This input circuit presents an almost constant 50-ohm impedance on all bands.

A pi network in the amplifier plate circuit is designed to match loads over the range of 40 to 80 ohms. Ganged to the before-mentioned band selector is a switch section that chooses the correct taps on the pi-network inductor. On the 40- and 80-meter bands, fixed values of capacitance are also selected by the switch to supplement the 1150-pf. loading capacitor.

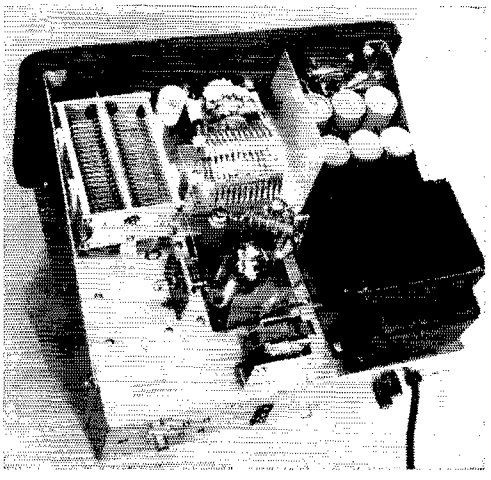
The dominant section of the HXL-1 is the power supply, which is quite evident when one goes to lift the unit. A husky transformer, which has a dual primary for use either on 120 or 240 volts, supplies the high voltage for the amplifier. A full-wave voltage doubling circuit using semiconductor rectifiers provides the high-voltage d.c. A bank of electrolytic capacitors in series has an effective filtering capacitance of 33 μf.

Both the voltage and amplifier plate current can be monitored by a panel meter on the HXL-1. A panel METER switch allows for switching between plate current (0-1000 ma.), plate voltage (0-2500 volts), r.f. volts (2-250 volts — roughly accurate when working into a 50-ohm load), and linearity. R.f. volts are measured by sampling r.f. through a resistive divider at the output of the pi network. The meter scale calibration is accurate to about 20 per cent.

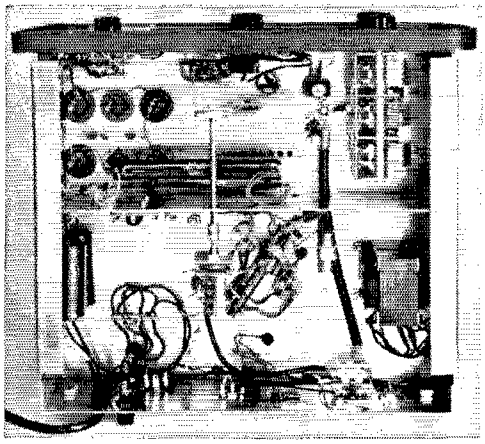
The LINEARITY meter position allows the operator to tell at a glance if there is a proper relationship between the input and output r.f. voltages. Fig. 1 is the circuit used for linearity checks.[2] The indicating meter is a basic 0 to 1.2 ma., with zero about two tenths upscale. When the amplifier's plate circuit tuning and loading are adjusted properly to show the correct

[1] Wolfe, "UE572s in Grounded Grid", *QST*, May 1961, page 16.

[2] Recent Equipment, *QST*, November 1961, p. 67.



The complete HXL-1 kilowatt linear amplifier with its cabinet removed. At the right in the photograph are the plate power transformer and filter capacitors for the power supply section. The two 572A triode amplifiers with cooling fan are in the foreground and the r.f. amplifier tank circuit and band switch are at the center top. The large variable capacitor is the 330-pf. plate tuning capacitor. Just to the left of the tubes is the 1-pf. neutralizing capacitor. Rear apron components visible are, from left to right, antenna output connector (SO-239), external relay terminals, r.f. input connector (SO-239), fuses, and line cord.



Bottom view of HXL-1 linear amplifier. That's a brute-force line filter at the lower left of the photograph.

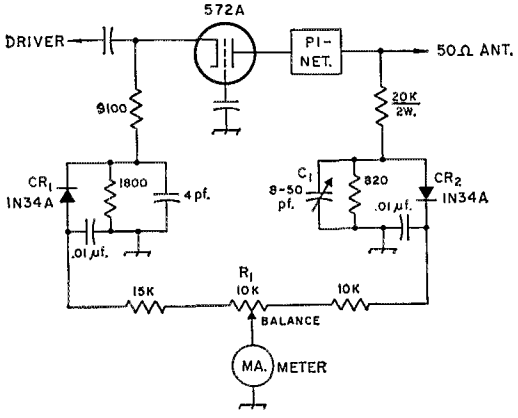


Fig. 1—Circuit of the linearity bridge used in the HXL-1 amplifier. Input and output r.f. voltages are compared and if they show the correct relationship, and thus good linearity, will give a zero indication on the meter. The BALANCE potentiometer, R_1, is a panel control.

load impedance to the power amplifier plates, the input and output r.f. voltages through the resistive voltage dividers in Fig. 1 will be the same. With equal and opposite voltages appearing at the meter, it indicates zero, and thus good linearity. Diodes CR_1 and CR_2 rectify the r.f. voltage for use in the d.c. meter circuit. Capacitor C_1 is for calibration and is factory set. The BALANCE potentiometer, R_1, is a panel control and is provided to compensate for slight unbalances due to the frequency sensitivity of the bridge. The meter is adjusted for zero with the BALANCE control when the amplifier is being driven by an unmodulated carrier.

A relay built in the HXL-1 amplifier allows for exciter-only use for crosstown contacts or other low-power applications. Relay contacts are d.p.d.t. and connect the exciter output directly to the antenna or to the linear amplifier input. In the latter case, the amplifier's output is connected to the antenna. In straight-through operation, the d.c. ground return for the amplifier grids is open, making the amplifier inoperative. Two terminals at the rear of the HXL-1 are for control of the relay. When the amplifier switch is on and the terminals are shorted, the relay closes and the amplifier is in the circuit. The exciter is automatically switched directly to the antenna when the amplifier's power switch is turned off.

In trying out the HXL-1 here at the ARRL lab we found the amplifier easy to hook up, tune, and use. There were no indications of instability and the amplifier showed a gain of about 10 db. over the design frequency range.

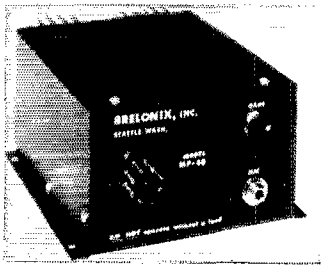
The HXL is housed in a grey perforated wrap-around cabinet. The panel is also grey and contains the meter, BAND-SELECTOR, TUNING knob, LOADING knob, METER switch and "rocker" type ON-OFF switch. Physical dimensions and styling of the HXL-1 are similar to that of the Hammarlund HX-50.[3] — *E. L. C.*

[3] Recent Equipment, *QST*, March 1963, p. 50.

Hammarlund HXL-1 Linear Amplifier

Height: 9⅛ inches.
Width: 17½ inches.
Depth: 15 inches.
Weight: 66 pounds.
Power requirements: 110/120 volts 50/60 cycles, 220/230 volts 50/60 cycles.
Price class: Under $400.
Manufacturer: Hammarlund Mfg. Co., 53 West 23rd St., New York 10, New York.

Brelonix MP-40 Modulator Kit



THE Brelonix modulator kit, MP-40, is a good example of the logical application of transistors to amateur radio equipment. The kit is a transistorized modulator capable of outputs in excess of 40 watts (50% duty cycle), which means it can modulate transmitters in the 75-to-100-watt r.f. class.

A completely transistorized modulator for mobile service certainly has advantages over its vacuum-tube counterpart. Standby current drain on the vehicle's primary power supply is practically nil, there is no long wait for the heaters to warm-up, and the device is extremely efficient, especially when you consider the saving in heater power.

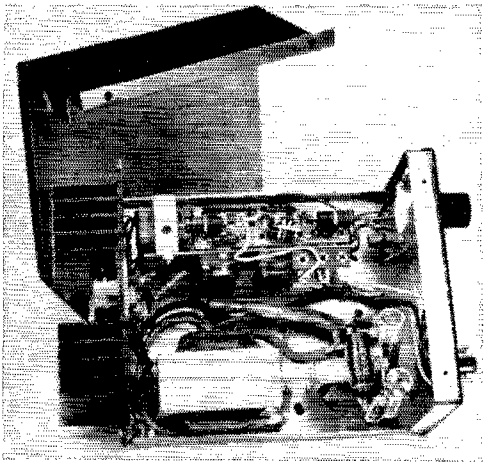
The MP-40 circuit is somewhat similar to the one described by Harper [1] several years ago in *QST*. The input circuit to the speech amplifier is designed for a 50-ohm single-button carbon microphone. However, an auxiliary 15,000-ohm input tap is available. Audio is transformer-coupled to a pair of push-pull 2N669 driver transistors that in turn drive the push-pull 2N277 modulators. The output impedance of the modulation transformer will match Class-C loads of about 3000 to 7000 ohms. A separate winding on the modulation transformer provides low-impedance output for driving a 4-ohm speaker, as for paging applications. Maximum d.c. voltage and current to the Class-C load should not exceed 600 volts d.c. at 150 ma.

An item which is available as an accessory for the MP-40 is a modulation limiter and filter which restricts the frequency response to 300 to 3000 cycles. At 4000 cycles, the signal is down 30 db. or more. This concentration of voice frequencies in a narrow range reduces the chances of splatter and gives the speech a good "communication sound."

The MP-40 is housed in a package which makes it convenient for use in the mobile station. All of the connections to the modulator, except for the microphone, are made to an 8-prong octal plug. The microphone connector is a standard ¼-inch 3-conductor jack. The push-to-talk circuit from the microphone returns to the octal plug for connection to an external relay or control circuits. The instruction manual furnished with the modulator includes several suggested hook-ups involving control circuits, the power supply, and the transmitter.

The modulator shown in the photographs was supplied to us already wired. However, the 17-page wiring and instruction manual shows that it shouldn't be a difficult job to wire and test the unit. Step-by-step instructions are given for construction and wiring, along with operating instructions and testing tips. — *E. L. C.*

[1] Harper, "A 12-Volt 50-Watt Transistor Modulator," *QST*, June 1960, page 46.



This view of the Brelonix modulator shows most of the components that are mounted inside the chassis-box. The two output power transistors are located between the cooling fins at the left of the photograph. The two driver transistors are attached to a panel inside the box just above the modulation transformer in this view. Except for the microphone, all of the connections to and from the modulator terminate at the 8-pin octal plug. The gain control is also visible in this shot.

Brelonix MP-40 Modulator Kit

Height: 4¾ inches.
Width: 4¼ inches.
Depth: 6¾ inches.
Power requirements: 12 to 14 volts d.c. (negative ground only); 500 ma. no signal, 8 amps at 40 watts output.
Price class: $50.00.
Manufacturer: Brelonix, Inc., 5415 26th Ave., N.W., Seattle, Washington.

Strays

Sorry, but templates are *not* always available for equipment described in *QST* articles. If templates have been made up, we will mention that fact in the article. If the article doesn't mention templates, we haven't got 'em.

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W1ETF/1 will offer Rutland Co., Vt., QSOs June 4–7, 80 through 15, mostly 20-meter s.s.b. (14,325 and 14,260) and c.w. (14,020 kc.).

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W6ZPX took top spot in the QCWA QSO Party in February. His 225-QSO tally was closely followed by W8NBK's 223. W6ZPX and W4FNQ have won twice and are tied for trophy award honors.

A 64-page cumulative index to *QST* is available for 25¢ postpaid, covering the years 1950–1962. Request your copy from ARRL Hq., 225 Main St., Newington, Conn.

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The Navy MARS technical information messages are now being sent the second and fourth Sundays of each month at 2200Z on 13975.5 kc., 2245Z on 7380 kc., 2330Z on 4015 kc., and 0015Z (Monday, GMT time) on 2744 kc.

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During the c.w. section of the DX Competition in March, KA2LD QSOed both W9GIL and K6GIL simultaneously.

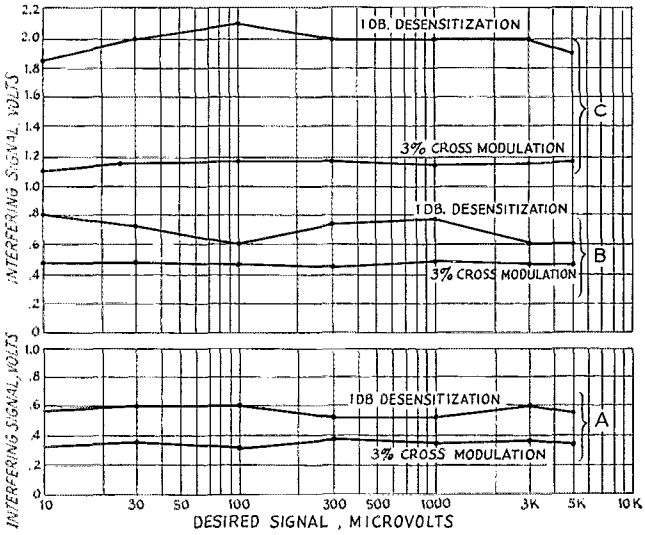


Fig. 1—7360 mixer, desensitization and cross modulation under three sets of operating conditions. (A) Cathode bias; bias resistor bypassed for r.f. only; 3 volts r.m.s. oscillator injection per deflection plate. (B) Same as (A), except cathode also bypassed for audio. (C) Bias —1.88 volts; oscillator injection 7.5 volts r.m.s. per deflection electrode.

CROSS MODULATION AND DESENSITIZATION

Technical Editor, *QST*:

There is a great deal of confusion among the amateur fraternity as to just what cross modulation is. My comments are made in an attempt to clarify some recent statements in *QST* which have further clouded the issue.

The article, "A New Approach to Receiver Front-End Design," by W. K. Squires, W2PUL, in the September, 1963 issue gives some test results and the method by which they were obtained. The description, though brief, appears to be that of a test for desensitization, not strictly cross modulation. These two receiver maladies, although somewhat related, are not the same. It is my purpose to point out the difference and give some additional data to clarify the point for the record.

Cross modulation is the transfer of modulation from an undesired signal to a desired signal. The test is made with an unmodulated signal of low strength. This represents the desired signal, and the receiver under test is tuned to peak this signal. A separate modulated signal is introduced into the receiver at a frequency to which the receiver is not tuned; this is the undesired or interfering signal. When it is made sufficiently strong, the modulation will appear in the output of the receiver. If the output results from true cross modulation, removal of the desired signal will remove the audio output, and a variation of a few kilocycles in the frequency of the interfering signal will produce no change in audio output.

To obtain quantitative measurements, the procedure is as follows: a reference audio output is established which usually is the output level when the desired signal is modulated 30 per cent. The modulation of the desired signal is then removed and the interfering signal is modulated 30 per cent with the same audio frequency. The level of the interfering signal is then increased until the audio output is at

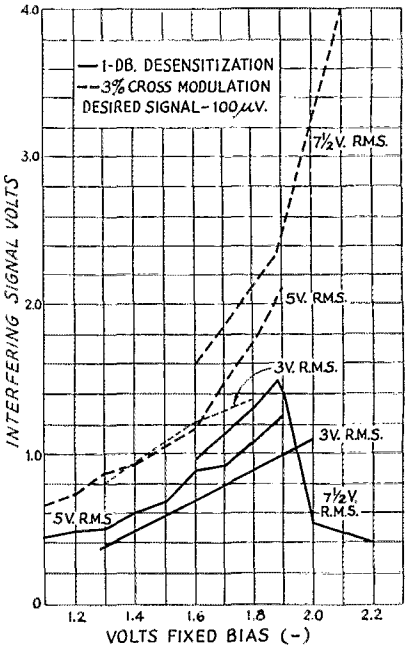


Fig. 2—7360 mixer, desensitization and cross modulation against grid bias and oscillator injection voltage.

some arbitrary level less than the reference level. Three per cent cross modulation is a level often used and the audio output in this case would be 20 db. less than the reference level. A plot of r.f. signal level required to produce this much interference versus frequency separation from the desired signal is often seen for military receivers. If a single stage is to be measured, no input tuned circuit need be used, since the level required at any frequency re-

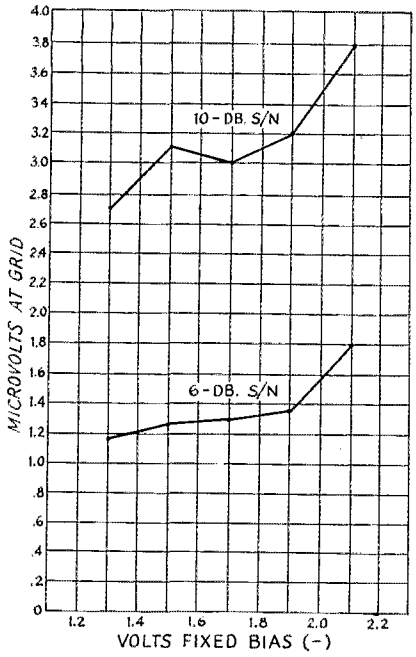


Fig. 3—7360 mixer, sensitivity vs. grid bias; oscillator injection 5 volts r.m.s. per deflection plate; approximately 3-kc. bandwidth. Signal voltage does not include step-up of antenna coil with tuned input circuit.

moved from the desired signal can be deduced from a knowledge of selectivity characteristics of the coil or coils intended for use ahead of it.

Desensitization is a simpler measurement. An output level is established from the desired signal, which is modulated. The interfering signal, which is not modulated, is increased in level until the audio output decreases some arbitrary amount. One db. is about the smallest increment perceptible to the human ear and was used in the measurements that produced the curves shown in Figs. 1, 2 and 3.

From this, we can easily see that both signal generators cannot be modulated at the same time if meaningful results are to be obtained, and that definite levels of interference should be stated if results are to be useful for comparison with other receivers or circuits.

All of the above discussion does not detract from the conclusions drawn by Mr. Squires in his article. In fact, my measurements, made as described, substantiate his contention that a very high order of performance is obtainable without an r.f. amplifier using the 7360. Some experimenting with bias levels and oscillator injection showed further improvements over the circuit conditions outlined by Mr. Squires, at least for the particular tube tested.

In evaluating these curves, it must be kept in mind that no input circuit was used. Therefore, sensitivity will be improved by the voltage step-up available in an input tuned circuit. Interfering signals will also be stepped up if they are close enough in frequency. — *R. K. Jeffers, W2ALL, General Dynamics/Electronics, Rochester, N. Y. 14601.*

PHASING NETWORK CONNECTIONS

Technical Editor, *QST*:

For the past several months I have been in correspondence with Jay Gooch, W9YRV, author of the article in October, 1963, *QST* on the s.s.b. six-meter rig. The following has been confirmed experimentally by Mr. Gooch and myself:

The B & W 2Q4-350 phase-shift network does not require balanced (amplitude) drive for correct operation, as stated in the Feedback item in January *QST*. It must have the inputs unbalanced in the ratio of 2/7 as do the Millen and C-E units. The difference is that the B & W unit has an input impedance of 500 ohms maximum and therefore will not be matched properly if the input circuit shown in the article is used. (The B & W people caused this confusion in a letter to Mr. Gooch.) Since the B & W unit is a popular one, I think the readers of *QST* would appreciate the accompanying simple matching circuit for the 2Q4 network. It costs less than the 500-ohm AB potentiometer that should be used if a variable matching circuit is desired.

The trouble with the adjustable-potentiometer method is that there are two points where the ratio is 2/7, one of which is incorrect. This control, often

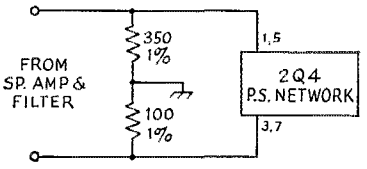


Fig. 1 — Phasing network connections.

called the audio phasing control, is really just an amplitude balancing control, required because the phase-shift networks offer different attenuations in the process of giving the wide-band 90-degree phase difference. It should be remembered that audio amplitude balancing is an important factor in maintaining the 90-degree phase difference.

There is no control of the phase shift in the commercial units; only the amplitudes can be balanced externally by the "phase" control and the control in the following audio amplifier. The latter control should be adjusted without the p.s.n. in the circuit and with equal-amplitude audio signals fed directly to the grids. The control is then adjusted for equal-amplitude signals at the balanced modulator. Then the p.s.n. is plugged in and the audio signal is fed into the microphone jack. The circuit shown requires no adjustment, but if a potentiometer is used, it should be adjusted for equal signals at the balanced modulator. I hope this clears up some of the confusion over the adjustment of the 2Q4 network. The same circuit can be used with the Millen and C-E networks if the resistors are made 1400-ohm and 400-ohm one per cent. Works just fine. . . . — *Steve Silverman, W1ZPT, Box 2007, Johns Hopkins University, Baltimore 18, Md.*

MULTI-STAGE R.F. AND I.F. NOISE LIMITING

Technical Editor, *QST*:

The well-known full-wave i.f. limiter with floating bias, connected across the last i.f. transformer is reasonably effective for clipping high-amplitude short-duration noise pulses (Fig. 1). However, under severe conditions a noise pulse can have an amplitude of many volts, compared with a few hundred microvolts of desired signal, at the input to the narrow-band filter in the first i.f. stage. Hence the pulse causes the filter to "ring," which lengthens the pulse and lessens the effectiveness of the floating i.f. noise limiter.

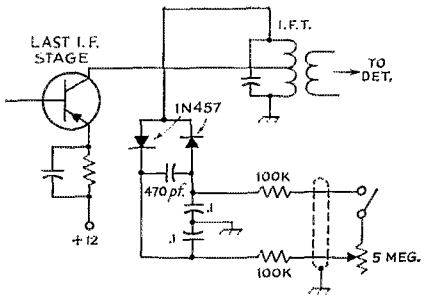


Fig. 1—Floating-bias i.f. diode limiter.

A simple full-wave diode limiter, without floating bias, connected across the i.f. transformer that feeds the filter will hold down the noise pulses at the filter input to one or two tenths of a volt, without affecting the signal at all (Fig. 2). In fact, such a limiter can be applied across *every* tank circuit in the chain, from the antenna tank to the second-last i.f. transformer. Suppose a noise impulse of several volts amplitude enters the front end. The limiter across the first tank cuts the amplitude back to 1 volt peak-to-peak. This limited pulse is then amplified to 20 volts p.-p., say, and chopped back again by the next limiter, and so on through the stages.

Not any diode will do. Germanium diodes are very unsatisfactory since they rectify down to the microvolt level. Silicon diodes have the required property of showing megohms of *forward* resistance (as well as tens of megohms of back resistance, of course) up to a forward bias of about 0.5 volt, after which level they suddenly conduct heavily. Hence a pair in full wave hooked across a tank will behave as if they weren't there at all for signals less than 1 volt peak-to-peak (except for about 10 pf. of additional capacitance, which can be tuned out). For signals greater than this, the tank is short-circuited for both polarities.

Not all silicon diodes are satisfactory, though. Small power-rectifier types have too much capacitance, too low Q, and too long recovery times. High-speed computer diodes are not good for an entirely different reason — their recovery times are too short. One should use a silicon diode with a recovery time of 5 to 10 microseconds, say, which is long enough to damp the tank circuit after the "big bang" is over, and thus to prevent it from ringing. The alloyed silicon general-purpose diodes seem to have the right characteristics; for example, the 1N457, though other types might be found with similar recovery times but with smaller capacitances. Measured values of the capacitances of a few 1N457s lay in the range 5 pf. (the value specified by the manufacturer) to as large as 25 pf. The higher-capacitance units perform equally well but impose a lower limit on the tank capacitance. In most receivers the existing minimum tank capacitances, from i.f. up to 11 Mc. or so, are usually in excess of 50 pf., so it is easy to trade off trimmer capacitance for diode capacitance, but at higher frequencies the C/L ratio may have to be increased to accommodate the diodes.

If a strong local signal causes cross modulation (assuming that it didn't before the limiters were installed) the cure is to use floating bias on the limiter located just before the narrow-band i.f. filter. A fixed 5-megohm resistor without the switch, in the circuit of Fig. 1, will do the trick. Cross modulation by limiters nearer the front end is unlikely to occur, except by an undesired signal strong enough to cross-modulate anyway, in the absence of the limiters.

Multistage limiting has some secondary benefits as well. In a transistor receiver, the limiter across the first r.f. tank will save the r.f. transistor from breakdown or burnout due to r.f. from one's own transmitter. Also, break-in c.w. operation on frequency becomes much easier on the eardrums, even without an audio limiter. While no limiter system is really as good as a true noise silencer, still this multistage limiting system is a less expensive and more easily installed way of holding down high-amplitude impulse noise. — *D. W. R. McKinley, VE3AU, 38 Dunvegan Road, Ottawa 7, Ontario, Canada.*

AUDITORY METER DIAL

Technical Editor, *QST*:

Some months ago I volunteered for the pleasant task of building an audio meter reader,[1] or "Comparator," as we now commonly refer to it, for my ham buddy, Charlie, K3VYO. Another ham, Tom, K3WFN, had put together the first model, and although it was a satisfactory and valuable instrument, Charlie wanted a spare in case the original conked out for some reason. About the only modification that Charlie wanted was that the dial be a little larger. The original dial was a piece of stiff plastic about 2 by 2 inches, with half a dozen Braille dots pasted around its circumference as touch reference points.

Blaney's basic circuit was not changed, but a few innovations were tried that produced gratifying results.

First, for ease of connecting and disconnecting the instrument from the transmitter, a female Amphenol 80PC2-F connector was mounted both on the comparator and on the side of Charlie's Eico 720 transmitter. These connectors are possibly a little more costly than some others, but they are dressy looking, easy to connect, and always connect firmly, plus the added advantage that once they are correctly polarized with the transmitter's meter, a wrong connection can't be made. A shielded cable about three feet long was made up with matching male connectors (80MC2-M) on each.

Second, the 4000-ohm adjustment potentiometer was mounted inside the box to protect it from accidental bumps, once adjusted.

Next, a standard ¼-inch closed-circuit phone jack

[1] Blaney, "Meter Reading by Sound," *QST*, Oct., 1960; Blaney, "An Audio Meter Reader for the Sightless," *QST*, Apr., 1963.

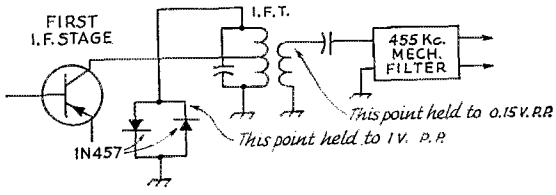


Fig. 2—Low-level i.f. diode limiter.

was mounted on the back of the box. Then one of the leads going to the speaker was broken and the ends connected to this jack. There are at least three worthwhile uses for the jack: first, with earphones to tune up the rig in a noisy shack; second, with a key or bug as a code-practice oscillator; and third, with a phone plug connected to test prods or alligator clips it becomes an auditory continuity checker, and will even check for open resistors if the resistance doesn't exceed 10,000 to 20,000 ohms!

Last, and most important, was the arrangement of the "tune by touch" dial. Charlie likes to be as exact as possible — he wants to know he is using 5 mils grid drive and not 4½ or 5½. The dial plate arrangement finally arrived at was made of aluminum, thick enough to be quite durable and thin enough so raised dots could be punched from its opposite side. The arc is the same as the sweep of the potentiometer's pointer knob would make, and the closest easily-readable distance between dots is used. Once the position of each dot was marked, it was stamped out from the opposite side with a modified awl and a scrap of hardboard behind the aluminum to give the appropriate amount of raised effect. Dots were spaced evenly around the circle, at 5-mm. intervals, beginning about a quarter-inch before the pointer's counterclockwise position and ending at about the same relative position clockwise. At the 5th, 15th, 25th, etc., dots a second dot was added on the radius, slightly inside. Then, at the 10th, 20th, etc. dots, two additional dots were added.

With this arrangement, it is easy to feel exactly where, say, 95 ma. appears. Once Charlie's comparator was calibrated with his transmitter, he could actually determine settings more accurately and more rapidly than my 20/20 vision and the transmitter's D'Arsonval meter!

Charlie and I want to make available one of these dials to anyone who wishes to mount it on such an instrument — or for that matter, any other instrument — for a blind friend. We have patterns to make 3 × 3-, 4 × 4-, 5 × 5-, and 6 × 6-inch dials. Charlie uses the 6 × 6 size for extreme accuracy, although he tells me the smaller sizes are just as accurate, if used carefully. We have on hand several pounds of this "dial" aluminum, or enough to make many, many dials. Should you want to make transmitter tuning a pleasure for your visually handicapped friend (please do), provide him with a slightly modified comparator and send a print or Braille request to my pal Charlie [2] for a *free dial* to go with the instrument. All we ask is the postage to mail it — ten cents. Stamps are fine. — *Jack Davis, K3DKE.*

[2] Charles Renner, K3VYO, 7432 Perrysville Ave., Ben Avon, Pittsburgh, Pa. 15202.

[Subsequently, at the suggestion of VE3KF, the writer changed the design to put the index dots outside, rather than inside, the scale. Also, thicker aluminum (18.5 mil) and heavy gauge (20 mil) steel have been tried in addition to the original 13.5-mil aluminum. Except for the 6 × 6-inch aluminum dial, which is available only in the thinner material, all sizes can be furnished in the heavier metals. In requesting a dial, specify size, material and thickness, and include 10 cents postage for all sizes except the 5 × 5 and 6 × 6 steel dials, which cost 20 cents to mail. — *Editor.*]

GRAPHICAL SOLUTION OF L NETWORKS

Technical Editor, *QST:*

The values of inductive and capacitive reactance required for an L network to match resistive impedances can be found graphically.

A graphical solution for X_L and X_C will be accurate enough for practical purposes, and completely eliminates the danger of decimal-point errors that some of us commit when using a slide rule.

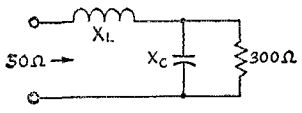


Fig. 1 (Johnson).

Suppose we want to match a 300-ohm load to a 50-ohm source, using an L network as shown in Fig. 1. Using a sheet of graph paper, draw a horizontal line having a length equal to the larger of the two resistances, using any convenient linear scale for resistance. In the example of Fig. 1, the line is 300 ohms long. With this line as the diameter, draw a semi-circle as in Fig. 2A. From the left-hand end of the 300-ohm base line, measure off the smaller resistance, 50 ohms in this case. At this point on the base line, draw a perpendicular up to the circle, Fig. 2B. The length of the perpendicular line is the value of X_L required, using the same ohms scale as was used for the base line.

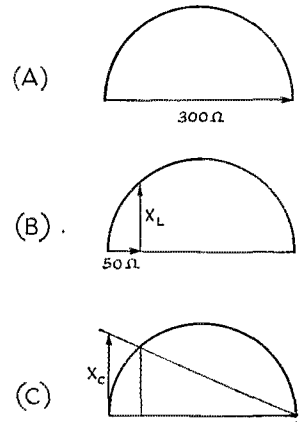


Fig. 2 (Johnson).

Now draw a diagonal line from the right-hand end of the base line through the top of the X_L line, continuing it to the left as shown in Fig. 2C. At the left end of the base line draw another perpendicular up to the diagonal line. The length of the last perpendicular, to the same ohms scale, is the value of X_C required.

The values of L and C can be obtained (also graphically) from *Handbook* charts. — *J. R. Johnson, K2YXB, 464 Dutchess Turnpike, Poughkeepsie N. Y.*

SYMMETRICAL CLIPPING

Technical Editor, *QST:*

One of the commonly used diode clippers takes the typical form shown in Fig. 1. I have used clippers

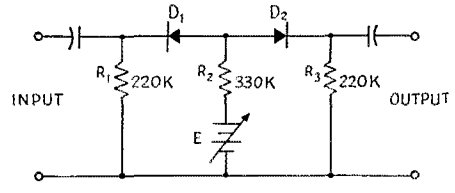


Fig. 1 (Rowland).

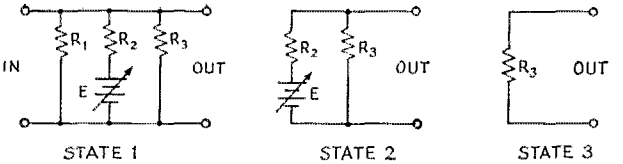


Fig. 2 (Rowland).

of this type in my station for some time, but recently, when I constructed a master microphone preamp for the station, I noticed that the clipped output was *not* symmetrical as purported in all the literature. Indeed one peak was clipped nearly 50 per cent (6 db.) before the opposite peak began to show clipping. A simple analysis of the circuit showed why, and how to cure the problem. In my analysis I made three assumptions: first, that when the diodes were "on," they had zero resistance; second, the variable biasing supply has low impedance compared to the resistors; and last, that there was no load on the output.

Basically this clipper has three modes of operation: (1) both diodes conducting, (2) D_1 open, D_2 conducting, (3) D_2 open, D_1 conducting.

The condition with both diodes conducting (1) is the linear state where output is proportional to input. The steady-stage voltage across R_3 establishes the zero point about which the audio signal varies.

With the assumption that the coupling capacitors serve only to shift the d.c. level of the input and output. The steady-state voltage across R_3 establishes the equivalent circuits of each state.

Examination reveals that state (3) establishes the negative peak clipping point and that it is obviously zero volts. State (2) must be the positive clipping point. The positive point is therefore

$$\frac{ER_3}{R_2 + R_3}$$

The condition necessary to have symmetrical clipping, then, is that the operating point in State (1)

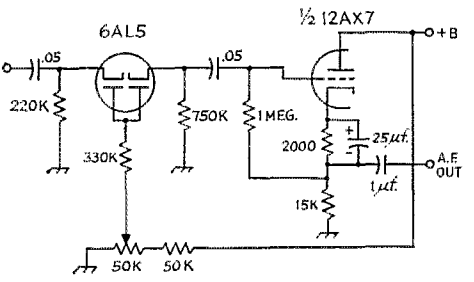


Fig. 3 (Rowland).

be halfway between the two clipping points: or if R_E is the equivalent of R_2 and R_3 in parallel,

$$\frac{R_E}{R_2 + R_E} = \frac{1}{2}\,\frac{R_3}{R_2 + R_3}$$

This equation has three unknowns and is, of course, unsolvable by itself. However, it is very simple to assume a value for R_3 and solve for R_2 in terms of R_1. For general use, the following values are satisfactory:

$$R_1 = 220\text{K}$$
$$R_2 = 330\text{K}$$
$$R_3 = 750\text{K}$$

In other words, the output resistor is simply increased to 750K in the circuit of Fig. 1 in order to provide symmetrical clipping. This change was checked experimentally and found to be effective.

The "break-point" analysis above assumes no loading on the clipper. Under dynamic conditions, the output resistor, R_3, is effectively in parallel with the input resistor or impedance of the following stage. It is desirable to feed this clipper into a cathode follower of the type which has high input impedance. Fig. 3 is the circuit in use at W8DHS. — *Richard M. Rowland, W8DHS/6, 520 Carina Drive, Lompoc, Calif. 93436.*

SOME NOTES ON THE W3OPO ELECTRONIC KEY

Technical Editor, *QST:*

The original model of the W3OPO electronic key, described in *QST* for December 1962, has worked flawlessly since it was made in its final form in 1960. However, I have heard from a few who have run into difficulties, usually with the self-completing feature. Further experience with transistors in other applications has disclosed some lack of uniformity in characteristics, even between transistors of the same type and brand, and also changes in characteristics with aging. This applies particularly to some of the earlier types of transistor used in the original keyer. If I were rebuilding the keyer today, I would use 2N404s at Q_1, Q_2, Q_4 and Q_5, 2N585s at Q_3 and Q_6, a 2N445A at Q_7, and 2N306s at Q_9 and Q_{10}. At present I am using a 2N118 at Q_8, and a 2N398 at Q_{12}. For the diodes, I suggest 1N483As or 1N270s.

If the dashes are not self-completing, I would suggest replacing transistors Q_1 through Q_6, one at a time (or two at a time in the case of the multivibrators). The next step would be to replace the diodes. Be sure that the diodes are properly oriented as to polarity, and that the circuit is wired correctly with no imperfect soldered joints. As stated in the original article, the 18K and 22K resistors, and the 0.01- and 0.47-μf. capacitors in the base circuits of Q_3 and Q_6 provide the self-completing feature.

If it is desired to lower the speed by adding capacitance in parallel with the one-μf. capacitors in the free-running multivibrator circuit, be sure to add equal amounts to each of the two capacitors; otherwise, the mark-space control may not function properly. Incidentally, if electrolytic capacitors are used, the positive terminals should go toward the bases of Q_1 and Q_2.

For those desiring to switch higher voltages, I would suggest a check of some of the more recent articles in *QST*, particularly the one by K1IZZ in the issue for November, 1963. The 2N398A may switch more than 105 volts, as stated in *QST*'s "Hints & Kinks" column for July 1963, but I would not want to go so far as to guarantee this for all cases.

Although the covering circuit label of Fig. 1 in the original keyer article states that all capacitances are in μf., most readers will realize that this does not apply to the capacitors labeled 330 and 560, which are in pf. — *James MacFarlane, W3OPO, Washington, D. C.*

Hints and Kinks For the Experimenter

TEN-METER VERTICAL

THE antenna shown in Fig. 1 is a very efficient, yet inexpensive and simple, omnidirectional antenna. The antenna is made of 1¼-inch aluminum TV masts, 8 feet, 2½ inches long. These masts are obtainable at local electronic-supply stores in 10-foot sections for under two dollars each. The two elements are separated ⅜ inch from each other by a center insulator made of nylon, polystyrene, bakelite, or even wood that has been boiled in paraffin. This center insulator should make a tight fit inside the masts. If necessary, put some slits on the ends of the masts, insert the insulator, and then clamp the section around the insulator.

The antenna is center fed by passing RG-59/U coax up through the inside of the lower section of the mast and out through a hole drilled in the center insulator. The outside shield of the coax is connected to the lower mast and the coax inner conductor is connected to the upper mast section. A 1½-inch brass bolt through each section of the mast serves the double purpose of providing a tie point for the coax and holding the mast firmly to the insulator.

The bottom of the mast is supported by a glass or plastic bottle. It will be necessary to drill a hole in the side of the bottle so that the coax can be fed through. A hole in the bottom of the bottle is also recommended to avoid any accumulation of water. It would also be advisable to cover the top of the mast with a small glass, plastic jar or cap, to keep water out of the mast.

For best results, the antenna should be mounted as much as possible in the open. The mast may be guyed, using nylon or plastic guy wire, or mounted directly to a chimney with an insulated chimney mount.

— *James P. Gillespie, W4LQC/W8BKK*

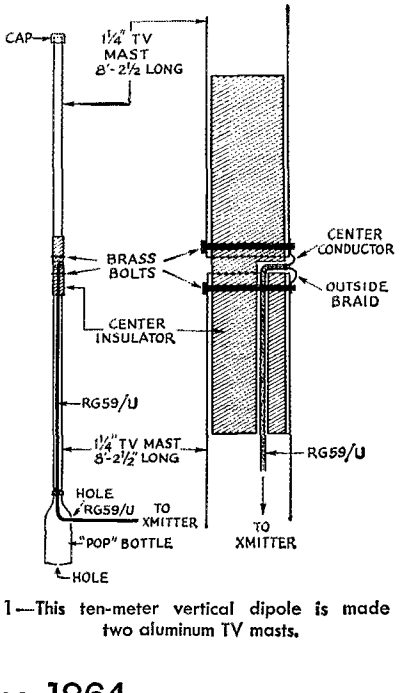


Fig. 1—This ten-meter vertical dipole is made from two aluminum TV masts.

FAHNESTOCK PHONE JACK

IF you need a phone jack for a breadboard experiment, try the scheme shown in the sketch in

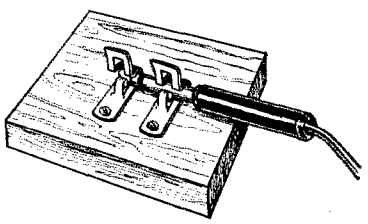


Fig. 2—Fahnestock clips used as a phone jack.

Fig. 2. Mount two large Fahnestock clips parallel to each other, the distance between them being determined by the length of the plug to be used.

— *Leonard Prescott, WA9CHG*

NEON LAMP FIRING VOLTAGE

IF HAVE NOTED that neon glow lamps, when used in voltage-regulation applications, show a different voltage plateau if the leads are reversed in the circuit. For example, an NE-83 gave me 64 volts (at 4 ma.) when connected one way and 76 volts (at 4 ma.) when reversed. When using neon lamps for VR applications, it would be wise to try the lamp in the circuit both ways and choose the hookup that gives the voltage closest to the desired value.

— *David H. Atkins, W6VX*

PLUG-IN MECHANICAL FILTER

THE popular Collins mechanical filter, type FA-21, will fit a standard transistor socket. In fact, Collins has even shortened the input and output pins of the filter to 7/32 inch to facilitate this type of mounting. The use of a transistor socket enables rapid replacement of a suspected faulty filter and removes the worry of heating the filter while soldering directly to the input and output pins.

— *W. S. Baker, K2LZF*

I.A.R.U. News

REGION II ORGANIZATION FORMED

At copy time, amateur representatives from 16 nations were just returning from a meeting in Mexico City, where they formed the Inter-American Union of Radio Amateurs; this is to constitute the Region II division of the IARU, and is another step forward in solidifying member society relationships as well as strengthening the Union's position as a whole. More complete information is on our editorial page.

TEMPORARY OPERATING PERMISSION IN BELGIUM

The Union Belge des Amateurs-Emetteurs has obtained confirmation from the Belgian authorities that any foreign radio amateur may obtain a temporary license there, without examination, for a 12-month period. (A special 6-month extension may be granted under certain circumstances.) It is also possible for visiting amateurs to obtain a temporary mobile license for a few days; there is no fee. To apply, in either case, one must simply submit a photocopy of his home license and his address in Belgium to Mr. le Directeur General des Radiocommunications de la RTT, rue des Palais, Brussels 3. Amateurs wishing to operate in Belgium for more than the maximum 18 months must take an examination.

GUAYAQUIL RADIO CLUB 40TH ANNIVERSARY

Congratulations to the Guayaquil Amateur Radio Club of Ecuador, which celebrated its 40th anniversary in May, 1963. To commemorate the event, the club held an anniversary contest, awarding a medal to the first station in each country who contacted the club station, HC2GRC; others received certificates.

SOUTH AFRICAN V.H.F. EXPERIMENT

The January issue of *Radio ZS* reports that experimental v.h.f. work with tropospheric propagation is now being conducted by professor F. L. Clark of Johannesburg, using the specially assigned experimental call ZUM262. Transmissions are on 50.02, 50.05, or 50.09 Mc., at antenna outputs of 10 watts or less. Amateurs with equipment on this band are urged to report reception of these signals to professor Clark at his home address: 49 Sixth Street, Lower Houghton, Johannesburg.

RADIO BARCELONA ANNIVERSARY

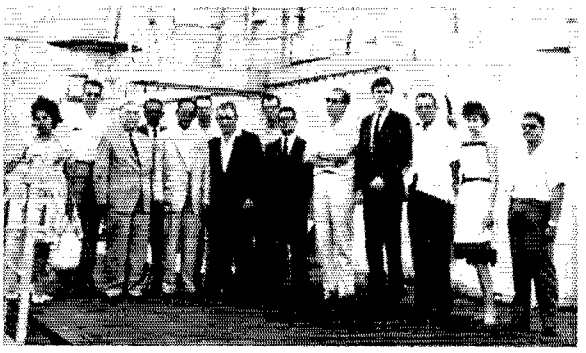
In connection with the 40th anniversary of the first Spanish broadcasting station, EAJ-1 Radio Barcelona, the Union de Radioaficionados Españoles is sponsoring an award for those amateurs contacting certain EA stations between June 1 and November 30, called the "Diploma Radio Barcelona." Details may be obtained by contacting the Delegacion de U.R.E., Diploma D.R.B., Apartado Postal 5041, Barcelona.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: *e.g.*, cards for VP8s go to RSGB in Great Britain. W, K, VE and VO stations only may send foreign cards for which no bureau is listed to ARRL. See "How's DX?" for QSL information on specific stations.

For service on incoming foreign cards, see list of domestic bureaus in most *QST*s, under "ARRL QSL Bureau." **Bold face listings indicate corrections or additions.**

Aden: J. M. Hern, VS9AAA, 114 M. U., B. F. P.O. 69, London, England
Algeria: G. Deville, FA9RW, 21 Blvd. Victor Hugo, Alger.
Angola: L. A. R. A., P.O. Box 484, Luanda
Antarctica: KC4AA cards go to the Office of Antarctic Programs, National Science Foundation, Washington 25, D. C. KC4US cards go to K1NAP, COMCBLANT, USN, CBC, Davisville, R. I.
Argentina: R.C.A., Carlos Calvo 1424, Buenos Aires
Australia: P.O. Box 41, Box Hill, E., 11, Victoria



When the hospital ship *S.S. Hope* visited Ecuador last year, the Guayaquil Radio Club station, HC2GRC, maintained contact with other amateur stations in several cities to facilitate communications. Shown are a number of club members on the *Hope*, arranging details for the operations with John Smith, W8BZB.

Austria: Oe. V.S.V., Box 999, Vienna 1/9
Azores: via Portugal
Bahama Islands: D. R. Thompson, VP7NS, Box 48, Nassau
Bahrein: (All MP4) Ian Cable, MP4BBW, P.O. Box 425 Awali
Barbados: **Highgate Signal Station, Highgate, St. Michael**
Belgium: U.B.A., Postbox 634, Brussels 1
Bermuda: R.S.B., P.O. Box 275, Hamilton
Bolivia: R.C.B., Casilla 2111, La Paz
Brazil: L.A.B.R.E., Caixa Postal 2353, Rio de Janeiro
British Guiana: D. E. Yong, VP3YG, Box 325, Georgetown
British Honduras: **VP1RL, P.O. Box 463,** Belize
Bulgaria: Box 830, Sofia
Burma: B.A.R.T.S., P.O. Box 800, Rangoon
Burundi: **via Congo (9Q5) QSL Bureau**
Canton Island: Phil Preece, KB6CB, Postmaster, Canton Island, USPO 06-5000, Phoenix Group, via Honolulu, Hawaii
Cape Verde Island: Radio Club de Cabo Verde, CR4AA, Praia
Caroline Islands: Father Jack Walsh, Xavier High School, Truk
Cayman Island: via Jamaica
Ceylon: **4S7WP, P.O. Box 907, Colombo**
Chagos: via Mauritius
Chile: Radio Club de Chile, P.O. Box 13630, Santiago
China: M. T. Young, P.O. Box 16, Taichung, Formosa
Colombia: L.C.R.A., P.O. Box 584, Bogota
Congo: (TN8) QSL Bureau, P.O. Box 2239, Brazzaville
Congo: (9Q5) U.C.A.R. QSL Bureau, B.P. 1459, Leopoldville 1
Cook Island: **ZK1 QSL Bureau, % Radio Station Rarotonga, Rarotonga**
Costa Rica: Radio Club of Costa Rica, Box 2412, San Jose
Cyprus: C.A.R.S. QSL Bureau, P.O. Box 216, Famagusta
Czechoslovakia: C.A.V., Box 69, Prague 1
Denmark: E.D.R. QSL Bureau, OZ6HS, Ingstrup
Dominica: VP2DA, Box 64, Roseau, Dominica, W.I.
Dominican Republic: R.C.D., P.O. Box 1157, Santo Domingo
Ecuador: Guayaquil Radio Club, P.O. Box 5757, Guayaquil
El Salvador: YS1O, Apartado 329, San Salvador
Ethiopia: Telecommunications Amateur Radio Club, P.O. Box 1047, Addis Ababa or via APO 843, New York, N. Y.
Faeroes Islands: via Denmark.
Fiji Islands: P.O. Box 184, Suva
Finland: S.R.A.L., Box 306, Helsinki
Formosa: (BV1 only) Taiwan American Radio Club, USARSCAT, Box 8, APO 63, San Francisco, Calif.
France: R.E.F., Boite Postale 26, Versailles (S & O)
France: (F7 only) F7 QSL Bureau, MARS, Headquarters U.S. European Command, APO 128, New York, N. Y.
Germany: (DL2 only): G. D. Griffiths, DL2OX, 212 (Hohenzollerm) Str., Moenchen-Gladbach
Germany: **(DL4 & DL5 only) QSL Bureau, Capt. Theisen DL4RT, APO 403, New York, N. Y.**
Germany: (Other than above): D.A.R.C., Box 99, Munich 27
Ghana: 9G1CW, Hans Suess, P.O. Box 3773, Kumasi
Gibraltar: **RAF Amateur Radio Club, New Camp, RAF**
Gilbert and Ellice I.: **Charles W. Adams, VR1A, % P. and T. Dept., Betio, Tarawa**
Great Britain (and British Empire): R.S.G.B. QSL Bureau, G2MI, Bromley, Kent
Greece: George Zarafis, P.O. Box 564, Athens
Greece (SVØs only): Signal Officer, Hqtrs. JUSMAGG, APO 223, New York, N. Y.
Greenland (OX calls only): via Denmark
Greenland (KG1 calls only): All KG1F's to MARS Director, 2004 Comm. Sqdn., APO 121, N. Y., N. Y. All other KG1's to MARS Director, 1983 Comm. Sqdn., APO 23, N. Y., N. Y.
Guam: M.A.R.C., Box 445, Agana
Guantanamo Bay: Guantanamo Amateur Radio Club, Box 55, Navy 115, FPO, New York, N. Y.
Guatemala: C.R.A.G., P.O. Box 115, Guatemala City
Haiti: Radio Club d'Haiti, Box 943, Port-au-Prince
Honduras: Jacobo Zelaya Jr., HR1JZ, Bo. Buenos Aires, 13 Calle 505, Tegucigalpa, D. C.
Hong Kong: Hong Kong Amateur Radio Transmitting Society, P.O. Box 541
Hungary: H.S.R.L., P.O. Box 214, Budapest 5
Iceland: Islenzkir Radio Amatorar, Box 1058, Reykjavik
India: A.R.S.I. QSL Bureau, P.O. Box 534, New Delhi 1
Iran: Joseph L. Mattingly, EP2BN, American Embassy, APO 205, New York, N. Y.
Ireland: I.R.T.S. QSL Bureau, 24 Wicklow St., Dublin 2
Israel: I.A.R.C., P.O. Box 4099, Tel-Aviv
Italy: A.R.I., Viale Vittorio Veneto 12, Milano 401
Jamaica: Alec A. Hugh, 6Y5AH, 38 Brentford Road, Kingston 5
Japan (JA only): J.A.R.L., Box 377, Tokyo
Japan (KA only): F.E.A.R.L. -M-, APO 925, San Francisco, Calif.
Johnston Island: **QSL Bureau, APO 105, San Francisco, Cal.**
Kenya: RSEA QSL Bureau, Box 30077, Nairobi
Korea: Korea Amateur Radio League, Central Box 162, Seoul
Korea: **(HL9) HL QSL Bureau, Signal Officer, U. S. Forces in Korea, APO 301, San Francisco, Calif.**
Kuwait: **Alhaf Nasir H. Khan, 9K2AN, P.O. Box 736, Kuwait, Persian Gulf**
Laos: **Houmphanh Saignasith, XW8AL, P.O.B. No. 46, Vientiane**
Lebanon: **Varoujan Calinian, OD5CS, P.O. Box 4848, Beirut**
Libya: 5A QSL Service, Box 372, Tripoli, or via Box 1281, APO 231, New York, N. Y.
Liechtenstein: via Switzerland
Luxembourg: R. Schott, 35 rue Batty Weber, Esch/Alz.
Macao: via Hong Kong
Madeira Island: via Portugal
Malagasy Republic (Madagascar): P.O. Box 587, Tananarive
Malaya: QSL Manager, M.A.R.T.S., Box 777, Kuala Lumpur
Malta: R. F. Galea, ZB1E, "Casa Galea," Railway Road, Birkirkara
Mariana Islands: see Guam
Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, Navy 824, FPO, San Francisco, Calif.
Mauritius: Paul Caboche, VQ8AD, Box 467, Port Louis
Mexico: L.M.R.E., P.O. Box 907, Mexico 1, D.F.
Midway Island: Midway Navy 3080, Box 23, KM6CE, Naval Security Group Activity, FPO, San Francisco, Calif.
Monaco: Pierre Anderhalt, 3A2CN, 49 rue Grimaldi
Mongolia: **J'T1KAA, Box 639, Ulan Bator**
Morocco: A.A.E.M., P.O. Box 2060, Casablanca
Morocco: (CN8FA-JZ only): American QSL Service of Morocco, Box 2104, APO 30, New York, N. Y.
Mozambique: **CR7LU, P.O. Box 161, Beira**
Netherlands: V.E.R.O.N., Postbox 400, Rotterdam
Netherlands Antilles (Aruba): VERONA, P.O. Box 392, San Nicolas, Aruba, Netherlands Antilles
Netherlands Antilles (Curacao): P.O. Box 383, Willemstad, Curacao, Netherlands Antilles
New Zealand: N.Z.A.R.T., P.O. Box 489, Wellington
Nicaragua: **YN1LH, P.O. Box 52,** Managua
Nigeria: Dr. M. Dransfield, 5N2JKO, Agricultural Research Station, Samaru, Zaria, Federation of Nigeria
Northern Ireland: via Great Britain
Northern Rhodesia: N.R.A.R.S., P.O. Box 332, Kitwe
Norway: N.R.R.L., P.O. Box 898, Oslo Sentrum, Oslo 1
Nyasaland: ZD6RM, P.O. Box 472, Blantyre
Okinawa: O.A.R.C., APO 331, % Postmaster, San Francisco, Calif.
East Pakistan: Mohd, AP5CP, Tiger Amateur Radio Club, Dacca Signals, Dacca 6
West Pakistan: Ahmed Ebrahim, AP2AD, P.O. Box 65, Lahore
Panama, Republic of: L.P.R.A., P.O. Box 1622, Panama City
Paraguay: R.C.P., Casilla de Correo 512, Asuncion
Papua: VK9 QSL Officer, P.O. Box 204, Port Moresby (or via Australia)
Peru: R.C.P., Box 538, Lima
Philippine Islands: P.A.R.A. QSL Bureau, 1546 Requesens, Santa Cruz, Manila
Poland: PZK QSL Bureau, P.O. Box 320, Warsaw 1
Portugal: Rua de D. Pedro V., 7-4°, Lisbon
Rodriguez Island: via Mauritius
Roumania: Central Radio Club, P.O. Box 95, Bucharest
Rwanda: **via Congo (9Q5) QSL Bureau**
Samoa (American): Clark Browne, KS6AX, Comm. officer,

(Continued on page 172)

Happenings of the Month

SEAMAN CASE

In this department last month we reviewed the Seaman Case up to press time for that issue. K3IOP's operation on six meters as a Technician had brought forth claims of television interference from his neighbors. The affair had — in spite of FCC pronouncing the rig clean — quickly become a political hassle. When K3IOP passed the General Class test, he was given a General license, contingent on his not operating in the six-meter band. He applied for a hearing to obtain full privileges, and is being represented voluntarily without charge by three attorneys, W3WFR, W3RSB and W3KDR. The League has joined the case as an intervenor and is represented by its General Counsel, W3PS.

Last month we reported that the Safety and Special Radio Services Bureau and the Borough of Elizabeth, Pa., had appealed a ruling of the Hearing Examiner against introduction of evidence concerning the content of Mr. Seaman's transmissions. The FCC Review Board has now confirmed the Examiner's ruling thus restricting the hearing to technical evidence concerned with the alleged TVI.

Hearing Examiner Walther W. Guenther then ordered all parties to exchange summaries of factual data by May 4, and scheduled a further prehearing conference for May 22.

AMATEUR RADIO WEEKS

For the eleventh consecutive year, Ohio's Governor has proclaimed Amateur Radio Week in Ohio for the week ending in Field Day (1964 dates are June 21–27). In the proclamation forwarded to us by W8VHO, Governor James A. Rhodes singles out the valuable potential emergency communications system provided and maintained by amateurs at their own expense, and praises amateurs for their diligent and sincere efforts.

As this issue of *QST* goes to press, headquarters has received a radiogram from K3SGD with the news that Maryland, too, will observe June 21–27 as Amateur Radio Week.

In Texas, Amateur Radio Week will be observed June 8–14, the last three days being the dates of the West Gulf Division Convention at Brownwood. Joining Governor John B. Connally at the signing were K5VGY, Convention Chairman; Ben Barnes, State Representative; and Homer Tanner, Brownwood Chamber of Commerce.

GOLDWATER BILL

The Goldwater Bill, S.920 and its House companion, H.R.9035, which would provide for reciprocal operating agreements for amateurs, have been reported out of the House Commerce Committee, and now go to the Rules Committee. Action there is expected within a couple of weeks from our *QST* deadline. Late breaking news on these bills will be transmitted from W1AW and other Official Bulletin Stations on the regular bulletin schedules.

STATEMENT OF HERBERT HOOVER, JR.

Before the
House Committee on Interstate & Foreign Commerce

My name is Herbert Hoover, Jr., and I reside in Pasadena, California. I am the President of the American Radio Relay League, a nonprofit organization whose headquarters are at Newington, Connecticut, and which has approximately 100,000 members in the United States and Canada. Our membership comes almost entirely from among the more than 250,000 amateur Radio Operators who are licensed by the United States and Canadian Governments. The League was founded some fifty years ago by the late Hiram Percy Maxim.

It is also my privilege to be President of the International Amateur Radio Union, an organization made up of the 60 national societies who represent Radio Amateurs in most of the other countries of the world.

In private life, I am a consulting engineer. I have held an amateur radio license for the past 45 years and my call is W6ZH. From 1953 to 1957 I served in the Department of State, most of the period as the Undersecretary.

As the national association of amateur radio operators, the League wishes to record with your Committee its support of S.920 and companion bills introduced in the House. It is my understanding that the bill has been cleared by all of the executive agencies concerned. The purpose of this bill is to permit the United States to enter into reciprocal agreements whereby our amateurs can receive authority to operate in selected foreign countries in return for granting their amateurs a similar privilege here. Such action is now prohibited by the Communications Act of 1934, which allows only U. S. citizens to operate within our boundaries. The sole exception is Canada, with whom we have had a most successful reciprocal arrangement over the past twelve years, the arrangement having been the result of an amendment to the Communications Act in 1952. Indeed, the amendment now under consideration is patterned on the Canadian arrangement.

Amateur radio has extensive international aspects. This service is specifically provided for by international agreements, the most recent of which was the 1959 Geneva Conference of the International Telecommunications Union, as amended by

the 1963 Geneva Space Communications Conference. One of the bases and purposes of the amateur service, as specified in regulations of the Federal Communications Commission, is "continuation and extension of the amateur's unique ability to enhance international good will." Under this concept, U. S. amateur radio operators by the thousands daily make contacts with amateurs in foreign countries, the perfect example of an effective people-to-people program in continuous operation.

A few countries, purely as a unilateral courtesy, occasionally issue amateur licenses to visiting or resident American citizens; and such privileges have been very much appreciated by our amateurs abroad. While relatively rare, operation of American stations at remote missionary or medical outposts, or by personnel on educational, professional or diplomatic assignments have been especially welcomed. Hardly a day goes by but word is received of some new humanitarian or good-will service they have performed. Since they have been able to enjoy their scientific avocation to the fullest while overseas, these Americans have returned with undoubtedly a better impression of the host country than otherwise would have been the case.

Such arrangements are not reciprocal, however. Foreign amateurs visiting the United States are denied the privileges of amateur communications because of the present restrictions in the Communication Act of 1934. This has been the source of irritation and ill will over a period of many years.

A good example is Mexico. This is a most friendly country and it already allows a few U. S. citizens to operate their amateur stations within its border. But our Mexican friends cannot comprehend why, in view of our protestations of good-neighborliness, we will not extend the same privileges to them. The citizens of Mexico who would like the privilege of operating here are for the most part substantial, responsible people who have considerable influence in their government and their home communities. They are individuals who may be on the diplomatic staff in Washington, New York, or elsewhere; or they are professional men, publicists, educators, or students temporarily residing in this country. The fact that we will not grant Mexican citizens such privileges in the United States is well known in Mexico, and it is difficult for them to understand. It is doubly difficult when they are told that the reason we will not do so is because of our concern for our national security and to prevent espionage. The fact that we give full reciprocal privileges to Canadians gives rise to suspicions and recriminations. The Mexicans are proud people and they do not like to be discriminated against. I cannot blame them. The same attitude is expressed in many other Latin American countries, as well as elsewhere in the free world.

It is interesting to note that we already have bilateral agreements with some 18 nations, mostly in Latin America, permitting our radio amateurs to exchange non-commercial third-party messages with amateurs licensed in their territories. In view of this free flow of information back and forth, it seems only logical to them — and to us — that when our amateurs are visiting in their countries, or theirs in ours, operation should be permitted under temporary and reasonable restrictions. Our Department of State has negotiated the message-handling agreements through regular diplomatic channels and they have received full concurrence from all other agencies of our government. I believe the Department is fully competent to negotiate reciprocal operating agreements with these and other friendly countries if authorized to do so.

The League is aware that national security is a factor which must be considered in connection with the proposed amendment. We believe, however, that a practical examination of the proposed procedures will remove to all intents and purposes, this concern.

The present proposal does not in any way alter the real problem of national security. Whatever security problem there may be in the radio spectrum exists already, and has for many years. It would not be compounded by adoption of the present proposal. If a person wished to engage in espionage, it is most doubtful he would (1) obtain a permit for an amateur station from our federal authorities, with all detailed procedures involved, (2) use call letters which immediately identify his citizenship, and (3) operate in the amateur bands where the suspicions of thousands of amateurs might be aroused. If a foreign agent wished to engage in subversive communication, he may buy transmitting and receiving equipment on the open market, from an unlimited number of sources, without any need for identification. He may operate such equipment at any spot of his choice in the frequency spectrum. He runs the risk of immediate detection, of course, because of the efficient surveillance and monitoring system operated by our Government, a program in which the amateur body cooperates by helping to police its own frequency assignments. To the best of my knowledge, no espionage or other subversive communication has ever taken place in the amateur bands. But the license itself is no deterent, and it seems absurd to envision a subversive agent calling attention to himself by the process of application for an official amateur authorization.

The benefits of the proposed legislation will be much greater to the United States and to United States amateurs than to amateurs of other countries, as indicated by the following figures: During the year ending March 31, 1963, 1272 United States amateurs obtained authorizations to operate in Canada. During fiscal year 1963, ending June 30, 1963, only 453 Canadian amateurs obtained authorizations to operate in the United States. Based upon the relative number of amateurs in various countries and far more extensive travel by United States citizens, I expect many more authorizations will be issued to United States amateurs than the United States will issue to foreign amateurs.

In brief, we believe that by enactment of this legislation amateur radio will become an even greater and more positive force for international understanding and good will without creating any additional hazards to our National Security.

We hope your Committee will look with favor upon the proposed legislation.

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 298

March 23, 1964

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Statler Hilton Hotel in New York, New York, at 9:40 A.M. March 23, 1964. Present: President Herbert Hoover, Jr., in the chair; First Vice-President W. M. Groves; Directors Charles G. Compton, Robert W. Denniston, Noel B. Eaton and Morton B. Kahn; General Manager John Huntoon; Vice-President F. E. Handy. General Counsel R. M. Booth,

(Continued on page 166)

Some Anniversary Greetings

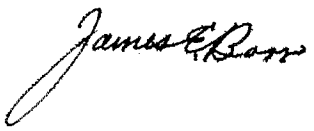
From JAMES E. BARR, Chief, Safety & Special Radio Services Bureau, FCC:

I extend my sincere good wishes and congratulations to the American Radio Relay League on the occasion of its fiftieth birthday.

The League membership and the many individuals who have contributed over the years to its advancement and growth are due congratulations and the heartfelt thanks and appreciation of the entire Amateur Radio fraternity.

To many, the terms Amateur Radio and the ARRL have been synonymous. The achievements of one have been the achievements of the other. I sometimes wonder if all who love and enjoy this most rewarding pursuit are fully appreciative of the part played by the ARRL in its development, and of the fact that without the League there would be no Amateur Radio.

May the spirit of The Old Man and an appreciation of the full meaning of the word Amateur continue to guide the League and the fraternity along the course that has been so well chosen in the past.



A resolution adopted by the National Association of Broadcasters, April 8, 1964:

WHEREAS, the Broadcasting Industry had its beginnings more than forty years ago in the cellar studios of the nation's young radio amateurs, and

WHEREAS, many of the personnel past and present of the industry received their own early enthusiasm and training from amateur radio, and

WHEREAS, a substantial number of broadcasters here present still delight in "busman's holidays" by amateur radio and take pride in keeping up their own amateur licenses, and

WHEREAS, amateurs have many times performed outstanding public service through vital emergency communications in time of disaster, as most recently exemplified in the Alaskan earthquake, and

WHEREAS, the radio amateurs of the United States and Canada celebrate and observe during this year of 1964 and particularly on May 18 the fiftieth anniversary of the founding of the American Radio Relay League, the amateurs' combination trade association, scientific society and close-knit fraternity, now therefore

BE IT RESOLVED, by the National Association of Broadcasters in convention assembled this 8th day of April, that we do hereby offer our hearty congratulations to the American Radio Relay League and our thanks for the contributions of its members to the broadcasting industry, together with our warmest wishes for a bright, prosperous and challenging future for the League and its members.

From ADMIRAL E. J. ROLAND, Commandant, U.S. Coast Guard:

It has come to my attention that the American Radio Relay League is celebrating its 50th anniversary this year.

For many years Coast Guard ships, aircraft and shore-based commands employed communication techniques and equipments which were developed by radio amateurs. Additionally, our communications-electronics personnel received their early training and motivation through amateur radio and the publications of the American Radio Relay League. During World War II, numerous radio amateurs, including you and your predecessor, performed valuable service in the Coast Guard Reserve.

Today, the Coast Guard has 9 ships, 34 isolated shore stations and 20 non-isolated bases licensed and equipped with amateur radio stations for recreation under military auspices.

During these past fifty years the American Radio Relay League has represented the radio amateurs of this country. My congratulations for your many worthwhile accomplishments.

From LEONARD H. GOLDENSON, President, American Broadcasting Company:

It has been brought to my attention that the American Radio Relay League is commemorating its 50th anniversary this year. There is no question of the many contributions by amateur radio to the public health, safety and welfare of our people. The broadcasting industry itself

must credit its very beginning to amateur radio operators whose experimental transmissions led to the first regular broadcasting in this country, and from the ranks of the radio amateurs have come many of the leaders of our industry today.

So I am extremely proud to salute the American Radio Relay League on its 50th anniversary. I am certain that in the next fifty years your members will contribute to the national welfare in an equally outstanding manner.

Leonard H. Goldenson

From C. J. BRINGLAND, President, Canadian Radio Technical Planning Board:

On behalf of the Canadian Radio Technical Planning Board members, it is a real pleasure to extend through you our warm congratulations to The American Radio Relay League, on the occasion of its 50th anniversary.

Since the formation of the relatively young Canadian Radio Technical Planning Board in 1944, the Canadian Division of The American Radio Relay League has been a charter member and has continued as a most faithful and valued member. Personally, I can not recall an annual meeting not supported by Vice President Alex Reid. As you are well aware, many "Hams" have turned to communications for a career and are making valuable contributions in this field. We are privileged to have such representation among our sponsors and these still find time, in addition to their regular duties, for ARRL and CRTPB activities.

Again our congratulations and may your prestige both in the recreational area and as a valuable contribution to communications continue to grow at the same rate for the next fifty years.

C J Bringland

From FRANK STANTON, President, Columbia Broadcasting System, Inc.:

On behalf of CBS and the large number of American Radio Relay League members in our family, I congratulate the ARRL on its 50th anniversary. The significance of this event could not have been more forcefully dramatized than it was by the prompt action of amateur radio operators following the Alaskan earthquake disaster. With commercial communications out or overburdened, the hams stayed at their posts relaying vital messages hour after hour. That the American Radio Relay League, after a half-century of service, can point to such a striking, current reaffirmation of its nature and purposes reflects great credit on the organization. In the deeds of its members and its continuing stimulation of interest in communications and electronics, the contributions of the American Radio Relay League have been, and will continue to be, of immeasurable value to the nation and to all broadcasting.

Frank Stanton

From CLARENCE H. LINDER, President, Institute of Electrical and Electronic Engineers:

The radio amateurs who have joined themselves together in ARRL for the protection and promotion of their common interests have, through the years, contributed much to the art and science of radio. Indeed, many of us who are professionals in this field started out as amateurs, and many of us have continued with the avocation parallel to our vocation.

There seems to be little doubt that the electronics industry in the United States is the most vigorous and successful in the world. Can it be merely coincidence that the United States — in its economics and in its laws — has always given its amateurs more freedom to grow than any other nation? The intense, personal drive which first bridged the Atlantic for two-way, high-frequency communication is the amateur spirit. It is the same enthusiasm which prompted the government to permit and encourage launching the first private satellite — "OSCAR" — not for gain but simply because the challenge was there.

May there always be an American Radio Relay League, may there always be amateurs, may their enthusiasm and ideas always help inspire the "professionals."

Clarence Linder

From C. F. HORNE, President, Electronics Industries Association:

On behalf of the members of the Electronic Industries Association I take pleasure in extending congratulations and best wishes to the American Radio League on its 50th anniversary.

Hiram Percy Maxim and his associates probably built better than they knew when they organized a few hundred wireless amateurs in 1914. They could not foresee the substantial contributions which radio amateurs have made since to the growth of the electronics industry as pioneers in expanding the radio spectrum.

The American Radio Relay League can well be proud of its long record of service to the nation in peace and war and its membership in Government and industry.

EIA hopes ARRL will continue to grow and prosper while serving the public interest during the years to come.

C F Horne

ARRL:

The Boom Years

AT NO POINT *in the story of amateur radio has either the necessity for leadership among the amateur body, or the effectiveness of the leadership enjoyed by that body, been more clearly demonstrated than in the transition period from the liberality of 1928 to the restrictiveness of 1929. In point of actual fact, the change was only nominally noticeable to the progressive amateur who had kept abreast of the technical development provided by the ARRL leadership. Of even greater importance than the technical factor itself was the psychological attitude involved. This was expressed in several ways. The expectation of tougher operating conditions in 1929 caused amateurs generally to pull in their belts and spit on their hands and set themselves grimly for a tough struggle to come; when the time arrived, and the situation was not as bad as they had expected, there was a pretty general feeling of relief and satisfaction. True, there was some discontent. A few perpetual objectors, a few chronic malcontents, a few congenital trouble-makers, and a few sincere amateurs honestly convinced that they had been unjustifiably short-changed, refused to accept the new order of things.*

On March 21, 1928 the Senate ratified the Washington treaty, ending an abortive and disorganized attempt on the part of a few amateurs, notably in the Middle West under the Amateur Radio Protective Association and in the West under the Santa Clara County Amateur Radio Association, to effect senatorial rejection of the treaty. Amateurs generally, although disappointed at the outcome of the conference, supported the Board of Directors of the ARRL in its decision to accept the terms of the treaty.

On March 9, before the treaty had even been ratified, the ARRL, seeking expansion of the domestic frequency assignments, took up with the (new Federal Radio) Commission the possibility of securing the assignment on the North American continent only of a band in the regional frequencies, below 6000 kilocycles. It was planned to use this band, tentatively called the "American Eagle band", as supplementary domestic territory. The idea was, however, discovered to be impossible of adoption under the treaty.

The process of readjustment and acclimatization was not so difficult as had been anticipated. Four stations were required to work where one had worked before. Could it be done? Trial showed that it could. The ingenuity of amateur radio—expressed through the ARRL Technical Development Program—had conquered the problem, as it had conquered other problems before. For one thing, the development of sharp, stable transmitters and selective, bandspread receivers, resulting in the reduction to a fraction of its former value of the normal transmission band required for radiotelegraphic transmission, was basically adequate to cope with the stringency of the new requirements. For another, it had long been recognized that amateur use of the old frequency assignments had been unbalanced, inefficient; in the 7000–8000-kilocycle band, for example, 80 per cent of the stations congregated near the low-frequency end. Crowding the remaining 20 per cent into the 300 kilocycles remaining did not add greatly to the interference.

It was not Utopia; it never had been. Interference was bad; it always would be. But the restrictions were not throttling. Work could

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

go on, subject to little more than added inconvenience. Amateur radio could forge ahead to new accomplishments. For the most part, amateurs simply went about their routine amateur radio, operating every day as much as was possible in that day, enjoying it all to the utmost, and not bothering themselves about situations beyond their control or active interest.

There was one quite pronounced change, however. Realizing that, while the international bands had been severely cut, the domestic bands remained substantially the same, amateurs forgot a lot of the DX-craze that had held sway for four years or more, and turned back to a more solid form of internal communication, the backbone of the art. Message-handling saw an impetus, as did experimentation. From that viewpoint the Washington treaty was a distinct advantage to amateur radio. It saw the renunciation of the unhealthy distance urge and, indirectly, it provided the solid background on which was to be builded the greatly expanded amateur radio structure of the decade to come.

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Just a few months before the international allocations conference was held in Washington in the fall of 1927, Congress had finally replaced the Wireless Act of 1912 with the Radio Act of 1927. In so doing, it created a new regulatory body, The Federal Radio Commission, having control over all radio stations.

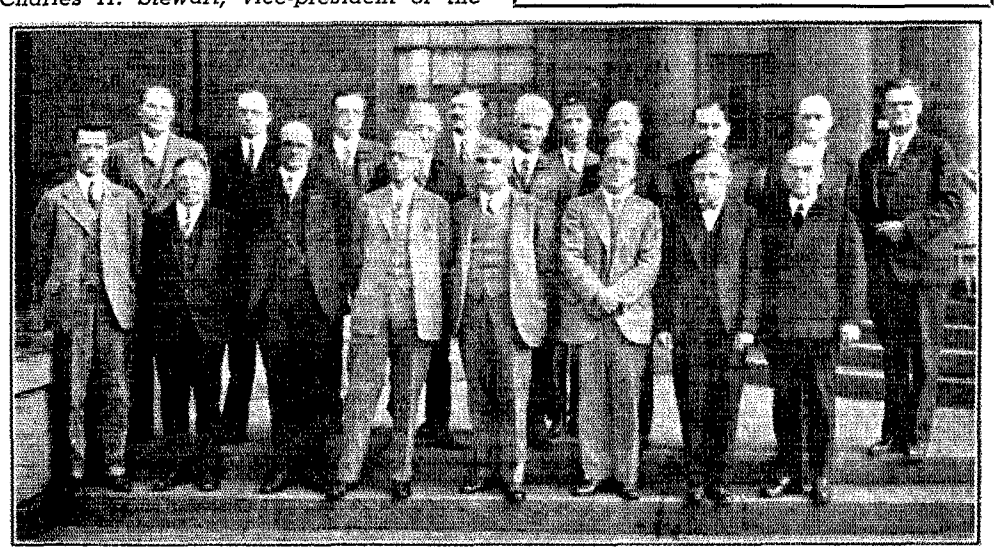
Amateur radio, through the ARRL, sought representation on the five-man commission, and urged upon President Coolidge the appointment of such men of proved amateur spirit as J. C. Cooper, Jr., of Jacksonville, wartime ARRL director; Colonel John F. Dillon, sixth district Supervisor of Radio, Charles H. Stewart, vice-president of the League, and C. M. Jansky, Jr., Dakota Division director. Of these, the only successful candidacy was Colonel Dillon's. Jansky, while actually appointed, failed of confirmation due to adjournment. On Col. Dillon's decease in the autumn of 1927, the appointment of A. H. Babcock, Pacific Division ARRL director, was unsuccessfully urged. Even though it did not have any of its own number on the Commission, the amateur body fared well at its hands, and little difficulty was experienced in securing the continuation of the old Department of Commerce regulations, with suitable alterations as changing conditions necessitated.

Although no amateur served as a Commissioner in those days, Paul M. Segal, 9EEA, did serve as Assistant General Counsel of the FRC for nine months in 1929–1930, keeping his post as Director of the Rocky Mountain Division, but temporarily abandoning the position of ARRL General Counsel to which he had been appointed in 1928.

The transition from Department of Commerce to Federal Radio Commission was practically undetectable as far as amateurs were con-

U. S. Frequency Allocations Before and After the International Conference

1928	*1929*
1500– 2000 kc.	1715– 2000 kc.
3500– 4000 kc.	3500– 4000 kc.
7000– 8000 kc.	7000– 7300 kc.
14,000–16,000 kc.	14,000–14,400 kc.
28,000–30,000 kc.	28,000–30,000 kc.
56,000–64,000 kc.	56,000–60,000 kc.
400– 401 Mc.	



The ARRL Board of Directors for 1928, above, authorized the Technical Development Program, asked for restoration of the Extra First Class license, and took other steps to fit 16,000 hams into the narrow new bands of 1929.

cerned. The FRC picked up the rules and allocations laid down by the fourth Hoover conference and continued these in force, with minor modifications, until it had to comply with the international allocations which became effective on January 1, 1929. The table on page 71 shows the startling contrast between the domestic allocations in force in 1928 and the new international bands of 1929.

As if to demonstrate that, domestically at least, restriction had not clipped their wings too badly, the radio amateurs of the country proceeded to turn in a record-breaking performance in the Governors-President Relay of 1929. At 5:00 P.M. on March 3rd, eleven Washington, D. C., amateurs set about receiving the congratulatory messages sent from all over the country to President Hoover. At 5:00 P.M. the next day they closed down, with a total of 41 official messages received, in addition to numerous private messages of greeting and felicitation. That all the governors did not send messages was not the fault of amateur radio; some apparently found political considerations overpotent.

Past Governors-President Relays had been held primarily to acquaint the newly elected president with amateur radio; in 1929 this was hardly necessary, for who should know more of amateur radio than Herbert Hoover, after four national radio conferences? Indeed, his son, Herbert, Jr., was then a licensed amateur and a member of the Washington Radio Club! But it was a worthwhile operating activity, nonetheless.*

The annual report to the Secretary of Commerce of W. D. Terrell, Chief of the Radio Division, showed a slight decrease in the number of licensed stations during the 1928–29 fiscal year, probably due to Washington Treaty reaction. On June 30, 1929, there were 16,829 stations, against 16,928 at the same time the previous year, a difference of 99.

Upon petition by the ARRL, the Federal Radio Commission on November 6, 1929, reopened the amateur sub-band from 14,100 to 14,300 kilocycles to amateur radiotelephone operation, for use by operators holding Extra First Class amateur licenses or who displayed technical qualifications sufficient to merit a special endorsement.

At the beginning of 1930 there was pending in the United States Senate a bill introduced by Senator Couzens of Michigan which would have created a national communications commission to control all forms of wire and wireless communication. Pursuant to instructions by the ARRL Board, Hiram Percy Maxim on January 31, 1930, testified at length before the Interstate Commerce Committee concerning the value of amateur radio, and the desirability of perpetuating it in any contemplated legislation. This statement is one of the strongest documents ever written in behalf of amateur radio; the Couzens bill, S.6, failed of passage, but no member of that committee who heard the statement will forget the worth of the radio amateur.

Although the basic radio law was not changed, the regulations of the Federal Radio Commission with respect to amateur radio were revised effective April 5, 1930. The principal alteration lay in the structure of the regulations; in practical effect, the changes included a new regulation concerning the use of adequately filtered direct-current plate supply for the avoidance of modulated or broad signals, transferring the 56- and 28-megacycle bands from a "shared

* Now of course W6ZH and President of ARRL.

Whitehurst v. Grimes

No history of amateur radio in the late 20s would be complete without mention of the first Federal court case, pursued relentlessly by the League's long-time General Counsel, Paul M. Segal. The story is best told in *Paul M. Segal — A Tribute:**

"In the middle twenties, a number of communities all over the country passed ordinances restricting, licensing, taxing or prohibiting operation of amateur radio stations. The board grew concerned about this harassment and asked Segal to pick out a test case to defeat these ordinances once and for all. The first case he picked, involving Portland, Oregon, collapsed after Segal had filed suit in Federal Court, when the town fathers amended their ordinance so that it would not apply to any stations licensed by the federal government. Segal then brought suit against the city of Wilmore, Kentucky, and its chief of police, J. W. Grimes, on behalf of R. B. Whitehurst, 9ALM, seeking to overturn the city's ordinance requiring a license costing $100 a year for the operation of an amateur radio station within the city. After several weeks of intensive on-the-scene effort in Kentucky, Segal had the case blocked out to his own satisfaction and went back home to Denver, leaving a local attorney to mop it up. In September, 1927, Judge A. M. J. Cochran of the U. S. District Court for Eastern Kentucky handed down the decision: amateur radio is interstate commerce, even though no compensation is involved and even within a single state because of its effect on other communications between states, and as such must be regulated only by the federal government. The case, known as *Whitehurst v. Grimes*, is today a cornerstone of amateur defense against local attacks on our right to operate."

* *QST* for January, 1962, page 40.

experimental" to an "exclusive amateur" basis, the compulsory keeping of station logs, and the definition of quiet hours.

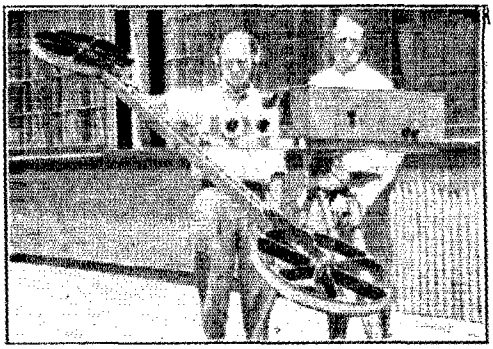
The Washington International Radiotelegraph Convention went into effect on January 1, 1929, and continued in force for five years. Prior to its termination, a new treaty, the International Telecommunications Convention regulating wire as well as radio communications, was concluded in Madrid on December 9, 1932.

Despite numerous adverse preliminary proposals, notably by Japan which proposed harmonically related amateur bands beginning with 100 kilocycles at 80 meters, this conference made no changes in amateur frequency assignments, and preserved substantially similar operating regulations. The status of amateur radio had changed mightily since the Washington conference; instead of being regarded as dangerous interlopers, amateurs were accepted as one of the definite phenomena of the radio art, and it was evident that the international communications world recognized the amateur as an accepted part of the radio picture, to be preserved and perpetuated.

The conference itself was much larger than Washington. Seventy-seven nations were represented, and nearly a hundred international associations and operating companies, with a total attendance of more than six hundred persons—probably the biggest and most important international conference ever held.

The amateur delegation to this conference consisted of two groups. The American Radio Relay League was represented by Secretary Warner and General Counsel Paul M. Segal; Clair Foster, also appointed by the ARRL Board, had refused the appointment. Representing the International Amateur Radio Union were Kenneth B. Warner, its secretary, Arthur E. Watts, vice-president of the Radio Society of Great Britain, and Miguel Moya, president of the Association E.A.R. *The active work was done by Warner, Segal and Watts, assisted by members of the* Red Espanola.

Of the attack on the amateur bands, that directed against the low-frequency bands was most intensive. The 1715-kilocycle band, in particular, was the object of concerted attack on the part of European nations, who wanted it for the small-boat service for which it had been demanded at Washington as well. Great Britain, Canada and the United States, after strenuous fighting, successfully frustrated this attempt, however. In connection with the 3500-kilocycle band, the American delegation, supported by Canada, attempted to make the assignment exclusive to amateurs; general opposition, led by Great Britain, eventually defeated this plan. Prior to the conference a number of nations *had submitted proposals*



Apparatus used in radiolocation of minerals, described in QST for June, 1928.

threatening the 7000-kilocycle band. During the Conference the Netherlands made a proposal similar to that by Japan, limiting the 3500-kilocycle amateur band to 100 kilocycles and that at 7000 kilocycles to 200. Counteracting these was the proposal by Canada, withdrawn shortly after the opening of the conference, for widening of the band to 7000–7500 kilocycles and a similar proposal made after the conference was under way by the delegate from Honduras, who was Angel Uriarte, a Spanish amateur, then secretary of the Red Espanola. *In the end, the Dutch and the Japanese withdrew their proposals for narrowing and the* status quo *was preserved. There was no attack at all on the 14,000-kilocycle band; and the 28- and 56-megacycle bands, although questioned, were also preserved. The general sentiment with relation to amateur matters seemed to be to preserve the* status quo *at all costs; attempts to decrease and attempts to increase amateur privileges were equally resisted by the great body of delegates.*

In mid-1932 a new magazine devoted principally to amateur radio was inaugurated in Hollywood, Calif., by K. V. R. Lansingh, W6QX, as the successor to a regional sheet called The Oscillator, *which had ceased publication at the end of 1931. Excepting for numerous regional and local publications, this was the first magazine for amateurs outside of* QST *since the general desertion to the broadcast field in the early 20s. The new magazine was called* R/9, *and outlined its purpose as being to provide an open forum for amateur radio, in which the "inside workings" of amateur politics and policies were to be aired. To this program there was added, about the first of 1933, a certain proportion of technical information for the provocation of wider amateur interest.*

Effective with the July, 1933, issue of the magazine Radio—*which, it will be recalled, started out as an essentially amateur publication entitled* Pacific Ra io News *in 1917,*

Sidelights, 1928–1930

Members of the Experimenters Section and ORSs — as skilled and neutral observers — were asked by the Federal Radio Commission to conduct a survey of broadcast reception, particularly from the standpoint of heterodyne interference. — *January, 1928, QST* . . . Readers complain of rubber-stamp messages, poorly addressed traffic, failure to QST, poorly adjusted "bugs", and stations crowding the low edge for DX.—*February, 1928* . . . Murphy has been around for a while: "Antenna comes down, 203-A burns all to blazes, new Jewell milliammeter likewise annihilated and my dog dies of nothing in particular, all in the space of forty minutes." — *1BFX in the March, 1928 issue* . . . Editor proposes gentlemen's agreement for division of 40 and 80 into segments for North America, Europe and the rest of the world. — *April, 1928* . . . Editor urges amateurs to use the 10-meter band. — *May, 1928* . . . Radio prospecting equipment for the detection of minerals was the subject of an article in *QST*. — *June, 1928* . . . Ten-meter scatter communications postulated by Warner. — *July, 1928* . . . Jenkins Labs in D.C. started a weekly TV show for amateurs on 6420 kc. — *August, 1928* . . . Canadian licenses issued after April 1 bore VE calls, in preparation for the 1929 rules; the U.S. also started issuing calls beginning with W and K. — *August, 1928* . . . Amateur Extra First Grade license restored at League request, with 20 w.p.m. and a special examination required. — *September, 1928* . . . A formal agreement between the U.S. and Canada was signed, permitting third-party traffic handling between amateur stations of the two countries, effective January 1, 1929. — *March, 1929* . . . The question, "Why will operation of the station be in the public interest, convenience or necessity?" on the FRC application blank need not be answered by amateurs. At League request it was agreed by the Commission that amateurs as a class met this requirement! — *April, 1929* . . . An amateur reports increasing his code speed 8 w.p.m. during a month of sleeping with the headphones on copying a "non-stop" commercial station. — *August, 1929* . . . Transmitter hunts, already popular in Great Britain, should be tried here, an editorial says. — *June, 1930* . . . Editor answered readers' complaints that "*QST* is getting too technical." — *August, 1930* . . . The Wouff Hong, already well established in amateur radio, was likened to a garrote appearing on Commodore Decatur's flag, in an article by The Old Man. — *August, 1930* . . . The Board of Directors asked that the authorities start applying legal penalties to those amateurs operating out-of-band, for the good of the fraternity as a whole as it faces future international conferences. — *August, 1930* . . . Readers complained the QRM on 80 phone was so bad the band was becoming useless. — *August, 1930* . . . Ham radio station W1ESE was operated from the Junior Achievement Hall of the Eastern States Exhibition. — *December, 1930*

entered the more profitable popular broadcast field in 1923, and became a trade journal in 1929—H. W. Dickow, its current publisher, announced another change of policy which would again make it a magazine intended primarily for amateur consumption. Emulating R/9, the policy was to provide a preponderance of technical material, accompanied by an editorial viewpoint concerning itself almost entirely with amateur politics, purporting to represent the minority viewpoint in amateur affairs as administered by the American Radio Relay League.

Effective October 1, 1933, a complete revision of the Federal Radio Commission's regulations respecting amateurs was made. In detail, the changes were numerous; the effect upon actual operating was, however, slight. Three forms of amateur licenses were established, Classes A, B and C. The radiotelephone sub-band in the lowest frequency amateur band was increased from 1800 to 2000 kilocycles; radiotelephony was also permitted in the low frequency quarter of the 28-megacycle band. Only filtered direct-current power supply was permitted. Mobile operation on the ultra-high frequencies and informal portable procedure under all amateur station licenses was permitted. An entire new plan of amateur-operator licensing was evolved, with a requirement for appearance for personal examination at all points within 125 miles of 32 examining centers. In line with these regulations, on June 22, 1934, amateurs were authorized to operate at will in the entire region above 110 megacycles, for experimental purposes.

The five years between 1929 and 1934 were the boom years of amateur radio. During that period the number of licensed amateur stations snowballed to tremendous figures. First evidence of this came with the publication of the annual report of the Director of Radio of the Department of Commerce for the fiscal year ending June 30, 1930. During the twelve months preceding there had been an increase of 2165 amateur stations—from 16,829 in 1929 to 18,994 in 1930. But this was only the beginning. On June 30, 1931, the Federal Radio Commission reported approximately 22,739 stations licensed, 3745 more. In 1932 there were 30,374, an increase of 7635. Even this growth was overshadowed in 1933, however, when the figure jumped to 41,555—11,181 new stations added! The next year the boom began to taper off, the net growth being 4835 to a total of 46,390 in 1934. Then the curve began to flatten off definitely, with a total of 45,561 licensed stations on June 30, 1935, and 46,850 on June 30, 1936.

A variety of reasons have been ascribed for this growth—almost 300 per cent in five years. Of course some of it is "paper" growth. It was in this time that the govern-

ment changed the life of amateur licenses to three years, during which period there were almost no deletions through expiration. The early portion of this period was also the time when many amateurs took out separate licenses for portable work, making for misleading duplication. Aside from these considerations, undoubtedly the principal contributing factor was the depression. This operated to induce growth in amateur numbers in several ways. Leisure time was greatly increased; men and boys who previously had had no time to spare for radio now took up the art in active earnest. The radio broadcasting and associated merchandising fields had been hard hit by the depression, and purchasing power was down; manufacturers, realizing that a boom was occurring in amateur radio, turned to the amateur field to sell their products. Cutthroat competition lowered prices; intensive applied research improved quality; and correspondingly the amateur boom expanded to still greater proportions. In 1934 an amateur station could be installed for 50 dollars that would have cost three times that figure in 1929. The result: many impecunious school lads, as well as depression-hit leisure-timers who still retained some financial resources, bought this new cheaper and better radio gear and got on the air. One new recruit told another, and still another, and the circle grew.

Operating Trends

JANUARY 1st [1929] marks the dividing line between the old and the new in amateur radio . . . We now enter the new days with our new methods, with the new spur to accomplishment and with enough things to do to keep us busy and excited for five years." So read the editorial in the January, 1929, issue of *QST*.

The editor was right.

There were new amateur regulations, new equipments, new activities. And amateur radio was growing. The five years between 1929 and 1934 were the boom years in the amateur radio population growth. In 1929 there were 16,829 amateur licenses. By 1934 this figure had grown to 46,390 — an increase of some 300 per cent.

First, there were some old problems to be solved. Off-frequency, out-of-band operation continued to be a source of complaint. Amateurs were violating the edges of the bands and interfering with Navy and commercial stations. There were even reports of interference with aircraft distress traffic. The official concern over this problem was mirrored by the number of editorials devoted to the subject, the number of technical articles telling how to build frequency-measuring gear, the identification of marker signals near each band edge so that amateurs would know when they were straying.

The new regs required better signals, but the bands continued to have too many rough notes. In order to call attention to this problem, *QST* each month for a while listed the "prehistoric" signals heard during the previous month. On the other hand, *QST* also carried a regular listing of high-quality signals, obviously hoping that the one list would become smaller and smaller and the other list would become larger and larger.

Besides encouraging better signals, there was an effort to encourage better operating practices, and so there was founded the A-1 Operators Club, a select group to which you could gain entrance only through nomination by your peers.

Operating activities continued to grow with the growth in the size of amateur radio. There were the DX Contest, Governors-to-President Relay, work with expeditions, Sweepstakes, Field Day, frequency-measuring tests, and so on. The first Sweepstakes, held in January, 1930, was won by W1ADW, who worked 153 stations in 43 sections during the two weeks of the contest. This obviously was a stellar performance for 1930, but it demonstrates so clearly how times and standards change, because present-day SS champs work 153 stations in the first two or three hours of the contest.

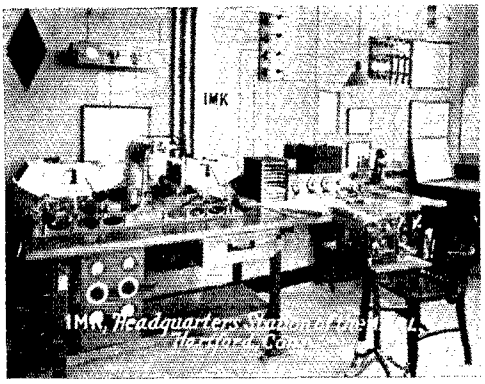
The first Frequency Measuring Test was held in late 1931, with sixteen stations sending the "unknown" frequencies on two bands. The winner was the late Boyd Phelps, then W2BP, who achieved an accuracy of 99.99 per cent.

The present ARRL QSL Bureau system also dates back to this period. The scheme was given a trial run in the second call area during 1932, and then in 1933 was set up to cover the whole United States. Then, as now, the problem was in getting all hands to send in stamped, self-addressed envelopes.

In 1933 we also had the first Field Day, an activity which over the years has become one of the most popular amateur activities. W4PAW, on the air continuously for the 27 hours of the contest and using six operators from the Indian Rocks Beach, Fla., location, worked about 60 stations in 28 sections.

All phases of amateur radio grew during this period, but especially worthy of note was the growth of phone work. Technical advances had made high-quality phone operation possible for any amateur who so desired, and the phone sub-allocations were increased to accommodate this increased activity. The Official Phone Station appointment was announced, phone operators proved their worth in transcontinental tests, and there was a special *QST* column headed "With the Phones."

All bands, all modes were being utilized by



This was W1MK, the headquarters station of the ARRL in the 20s and early 30s, located at Brainard Field, Hartford, Connecticut.

amateurs. Two new areas of exploration were the 28- and 56-Mc. bands. Amateurs dug into the 28-Mc. band hoping that it would turn out to be a super 14-Mc. band, but were sadly disappointed. It was not for a number of years that the effect of the sunspot cycle was recognized and the band achieved usefulness.

Two Hundred Meters and Down tells the story of the 56-Mc. exploration.

In the early part of that year it occurred to a few individuals that there was a definite place, not only in amateur radio but in all branches of the art, for communication limited to just a few miles, or, as was first supposed, "line of sight" distances. In the summer issues of QST *James J. Lamb and Ross A. Hull of the ARRL headquarters staff described the construction and operation of thoroughly reliable and effective 56-megacycle apparatus. The equipment itself was a great improvement over that used in the early experiments; the transmitters were simple, low-powered, easily adjustable, and practically foolproof. The receivers, based on a revival of Edwin H. Armstrong's superregenerative circuit which had waited ten years since its invention for widespread adoption, were marvelously effective. The order of performance given by this equipment was entirely disproportionate to that of the 1924–27 brand. Immediate amateur interest hailed its introduction. Especially in the metropolitan areas, where many stations were audible within the range of the equipment, local radiotelephone systems mushroomed into amazing proportions. In a few months hundreds of stations were actively on the air on five meters in the New York, Boston, and Philadelphia areas; interest, although slower, was nonetheless widespread in other regions. Before a year had elapsed there were thousands of five-meter stations, some owned by old-time amateurs who sought new thrills, some by ordinary traffic-handlers or DX men seeking a sideline interest, many by brand-new amateurs, attracted by this fascinating local phone work with simple, inexpensive, compact gear.*

But despite the pioneering aspects of amateur radio, despite the "state of the art," despite the efforts that had been made by responsible amateurs, there was still much room for improvement. Self-policing of the ham bands was not entirely effective, policing by the Government almost nonexistent. Quoting from an editorial in the April, 1934, issue of *QST:*

> "For many years there was almost no enforcement of the amateur regulations. Most amateurs realized that these regulations were for our common good and willingly complied, but there were always those who through carelessness, inexpertness or perversity failed to comply — and enough of them to detract seriously from the enjoyment of the rest of us . . . Late last year the Federal Radio Commission commenced a general policing of the high-frequency services, including the amateur service, from ten monitoring stations. Amateurs observed in an apparent violation are now served with a "discrepancy report" requiring them to make an explanation for the Commission's information. For successive *proved* offenses, increasing penalties are to be meted out. Out-of-band operation and inadequately filtered plate supply are receiving chief attention . . ."

This period of amateur radio history had brought great strides in amateur operating activities, but there was more to come. There *had* to be more to come, for the size of the 1934 amateur population required the utilization of at least 1934 operating techniques.

Emergency Communication

In mid-December of 1929 a heavy sleet storm hit western and northern New York State, bringing down telephone and power lines and isolating many cities. Western New York's SCM, W8PJ, organized amateurs in the area who did an outstanding job for telephone and power companies and railroads. In the northeastern part of the state, W8DQP went almost without sleep for 72 hours to take care of badly needed communications in Glens Falls.

New regulations for the Army Amateur Radio System, effective in November of '29, detailed

New Zealand's earthquake in 1931 showed officials of that country that amateurs are useful, and emergency-consciousness is still apparent today among the ZLs.

definite AARS procedures to be followed in the event of emergencies.

Mr. Maxim's testimony before the U.S. Senate committee on Interstate Commerce in 1930 made prominent mention of amateur operation in emergencies. "For many years," he pointed out, "not a single major breakdown in general communication has occurred that amateurs have not played a major part." He then went on to give details of amateur service in numerous emergencies, finally asking "Is it worth preserving, or no?"

The U.S. Naval Reserve started getting into the act in May, 1930, when it held a nationwide emergency drill, mostly on Navy frequencies. Shortly thereafter, a cooperative agreement with the Red Cross was announced. Thus, 1930 can be seen as the year when military services became actively interested in organizing amateur radio for emergency communications purposes.

Another sleet storm, in November 1930, hit the north midwest, wiping out all communications between Jamestown and Fargo, N. Dak. W9CBM and W9DGS were the principals in filling the gap.

In September 1930 a hurricane approaching the Virgin Islands brought a QRR from K4AAN, who made contact with W3CAB in Washington. Amateurs throughout the southeast were alerted, but the hurricane never did get around to hitting the U.S. mainland.

In 1931, amateurs began to get into emergency work with a vengeance; after that, almost every month reports were received of emergency work by amateurs somewhere. The New Zealand earthquake received "up front" *QST* treatment in the May issue, thanks to special efforts by ZL2AC in writing it up and transmitting it by radio to W1SZ, *QST*'s managing editor. Other 1931 emergencies can receive only mention: sleet storms in Nova Scotia in February; shipwreck off Newfoundland in March; snowstorm in Maryland in March; earthquake in Nicaragua in April; power line failure in New Hampshire in April. These are just a few of the reported emergencies in which amateurs assisted in our growing awareness of our potential for public service.

It would be pointless here to rehash each and every emergency as it occurred, throughout the years. There were floods and earthquakes and storms, fires and explosions, train wrecks and airplane crashes — much the same pattern as today. You cannot name a disaster in the annals of history of that time in which amateurs were not taking part. The California earthquake of 1933? W6BYF was on the air ten minutes after the first shock, telling the world about it when no one else could. Storm followed storm in 1932–33–34 — snowstorms, blizzards and sleet storms in winter, tornadoes in spring and summer, hurricanes in the fall, and amateurs were on the job everywhere.

Meanwhile, thinking amateurs and ARRL (one comprises the other) were beginning to think along lines of preparedness and getting organized, and herein lies the *real* story of amateur radio emergency communications. We have already mentioned early efforts on the part of railroads to organize amateurs, first under the Pennsylvania Railroad with the rallying call "PRR," then the use of "QRR" to signify a railroad emergency, and later the use of QRR to signify *any* emergency involving amateurs. Other railroads and the armed services also showed interest in organizing amateurs for emergencies, the Army in connection with its AARS (Army Amateur Radio System) and the Navy as a part of its reserve training program.

Early in 1933, ARRL started thinking in terms of "preparedness," and an article in *QST* with that title appeared as a lead in the Communications Department, calling attention to the ex-

A big job was done by amateurs like these operators of W6BYF in the 1933 California earthquake.

FEDERAL RADIO COMMISSION
Washington, D. C.

March 18, 1933

The American Radio Relay League,
38 LaSalle Road,
West Hartford, Conn.

Attention: Mr. K. B. Warner

Dear Sir:

The Commission takes pleasure in informing you that it has received information commending the amateurs of Southern California for the splendid work done by them in handling communications in the recent earthquake area.

The names of the individual licensees who coöperated in this work are not known to the Commission. However, it is known that amateurs have always rendered every possible assistance during times of such emergencies, and it is hardly necessary to add that the Commission believes such service to be of the highest order of importance.

It will be appreciated if you will express through the medium of the American Radio Relay League the Commission's appreciation of the prompt and efficient action which was taken by amateur licensees in bringing aid to the stricken area.

Very truly yours,

/s/ HAROLD A. LAFOUNT,
Acting Chairman.

istence of a number of networks organized for that purpose. "Far-seeing amateurs," said the article, "are organizing in order that amateur radio will be prepared when the elements go on a rampage."

Emergency work received editorial mention in 1933, in the same issue of *QST* in which Clinton B. DeSoto's article on the California earthquake appeared. A copy of a letter from the acting chairman of the Federal Radio Commission commending the amateurs also appeared in this article. Lessons were learned from the earthquake operation which were duly summarized in subsequent issues, along with supplementary reports.

Late that year, QRM in emergency work first reared its ugly head, as W4ACB decried some of the superfluous tactics of amateurs engaged in emergency work and also inimical practices of those not taking part.

Early in 1934, the Federal Radio Commission called a conference to discuss a plan to concentrate all emergency communications on certain frequencies, to be strictly controlled by government agents. ARRL attended the conference and pointed out that such a plan would throttle the amateurs' ability to render spontaneous on-the-spot assistance as required. Although the conference resulted in certain provisions being made for emergency operations by all services, the amateurs were not specifically affected by it, and our ability to render maximum public service was preserved — *entirely* because ARRL was on the spot to see that it was.

Meanwhile, amateurs continued to perform. In California, in Canada, and in the Pacific Northwest amateurs went to work on floods, storms, lost fliers, railroad emergencies and every kind of emergency imaginable, still without specific preparation, but attracting wide public attention nevertheless.

But preparations consciousness was there. The November '34 issue of *QST* contains a description by Michigan's SCM, W8DYH, of the arrangements between amateurs and the Detroit police. And in 1935 the ARRL Emergency Corps was formed — about which more next month.

Technical Progress — 1926-1929

IDLE speculation may be profitless, but it is sometimes interesting. One cannot help but wonder, in the light of later knowledge, whether the early amateur achievements in long-distance communication and short-wave work would have had the same chronology if the matter had been simply one of progress in technology. Coincidence or not, the early transatlantic successes occurred during the minimum period of a sunspot cycle — just when conditions would be most favorable for propagation on the frequencies in use at the time.

One thing is certain: In the immediately succeeding years the theories proposed for explaining the behavior of short waves were strongly colored by the fact that all of the data were obtained during and shortly after a sunspot minimum. The connection between the sunspot cycle and the maximum usable frequency was not at first suspected; in fact, the idea that there was a *maximum* frequency that would be refracted by the ionosphere was just gaining acceptance by the end of 1925.

The early 5-meter experimenters were not among the believers; they held fast to the tenet that since experience at 80, 40, and 20 had shown that the shorter the wave the better the DX, by logical extension "5" should be a super-DX band. The physicists, on the other hand, were inclined to put the upper frequency limit in the vicinity of 30 Mc., based on such knowledge of the ionosphere as was in existence.

The DX will-o-the-wisp inspired the 5-meter men — never more than a handful, in numbers — to battle the technical problems of getting equipment to work satisfactorily with the tubes and components then available. It cannot be said that any great success followed their efforts, although there were scattered reports — difficult of verification at this late date — of 5-meter

signals being heard at transcontinental and even transatlantic distances. Actual two-way work was confined to 10 or 15 miles, in most cases, although there were at least two instances that deserve mention as foretelling what was to come much later: In July 1926 *QST*, communication over a distance of 120 miles, between 1OA and 2EB, was chronicled; from the behavior of the signals it appears that the work was done during a favorable temperature inversion. Then in the June 1927 issue a 5-meter crystal-controlled transmitter, 2XM, was carried to a mountain top from which a distance of 150 miles was covered — the first reported mountain-top expedition for line-of-sight work.

In the meantime, the non-amateur world — of physics, in particular — was busy with the problem of the ionosphere. The newly devised pulse method of ionosphere sounding was providing data that began to bring order into the propagation picture. Pickard, in 1927, showed a correlation between radio propagation and sunspots, and the now-familiar relationship between the cycle and high-frequency propagation began to take form. By 1929 the upper limit of ionospheric propagation was set, in most minds, in the neighborhood of 30 Mc., under favorable sunspot-cycle conditions. By this time, also, amateurs had an international assignment at 28–30 Mc., and some long-distance work had been done by the few stations that managed to get on the band. But the cycle had gone through its peak, a rather low one, in 1927–28, and the favorable period did not last long. As for frequencies above 30 Mc., they had come to be considered good only for line-of-sight.

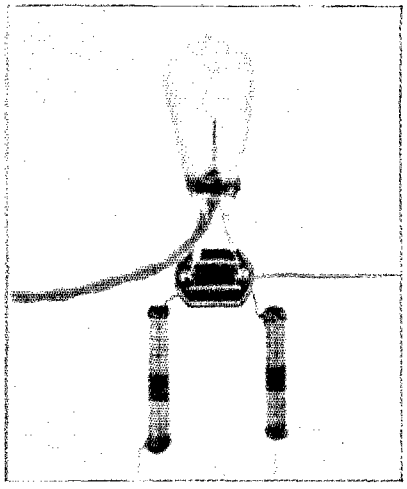
It was a nice, clean-cut picture. But like most tidy theories about natural phenomena, it was far too simple. It was to be shattered, just as the 200-meter myth had been a few years earlier, by amateur activities to be taken up in a later part of this series.

Receivers

Throughout the latter part of the 1920s the regenerative detector plus one or two audio stages continued as the standard receiving setup. There were occasional attempts at using superregeneration — an interesting set of this type was built by 6GD for use with a loop antenna in some airplane tests — but without any lasting result. Selective or "peaked" audio amplifiers were advocated as a means for improving c.w. selectivity, and now and then the radio-frequency amplifier was revived — again without much effect. Without effect, that is, until a really radical innovation came along — the screen-grid tetrode, announced in December 1927. Here, at last, was a tube that promised to overcome the shortcomings of the triode.

The first version of the screen-grid tube, the UX-222, was made for battery operation, as were the other receiving tubes up to that time. The same *QST* issue that announced the 222 also carried articles by H. P. Westman, then Assistant Technical Editor of *QST*, and R. B. Bourne, 1ANA, on receivers using the tube for r.f. amplification. The r.f. was followed by the usual regenerative detector and audio, the whole being shielded and filtered to prevent interaction and instability. A short time later *QST* also carried a description of a broadcast receiver using several r.f. stages, again with thorough shielding and filtering. Possibly because of these constructional complications, the tube did not get much of a play in amateur receivers — or possibly because it was universally believed that the good old regenerative detector would bring in anything that an r.f. stage would, anyhow. In point of fact, the 222 was a rather poor performer, judged by the a.c. model, the 224, that followed within a year or so. In the interim, curiously enough, its chief application was as an untuned coupling stage between the antenna and the detector. This had the desirable effect of reducing the influence of the somewhat unpredictable antenna constants on the oscillating detector, but invited cross modulation — especially with local broadcasting stations.

By the end of 1929 the new "a.c." tubes were beginning to spell the demise of the storage "A" battery — to no one's regret! "B" substitutes were by this time well established, so complete powering from the a.c. line was finally within grasp. And with a.c. operation a new era in receiver design shortly would open.



THE OSCILLATOR

A UV-202 tube with a short stem. The fixed stopping condenser is a Sangamo 10,000 pfd. or .01 μfd. receiving condenser. The lead to the right is the antenna feed lead, the twisted pair at the left supplies the filament current. The two chokes are in the positive plate supply and grid-leak lines. Note their method of winding. The end sections are effective at ¾-meter and are loaded by the center section so as to be effective at 5 meters also. Having a spaced portion at both ends permits connecting them in either way. The chokes are so effective that if one is put in each filament supply lead the grid may be grounded but the oscillator will continue oscillating.

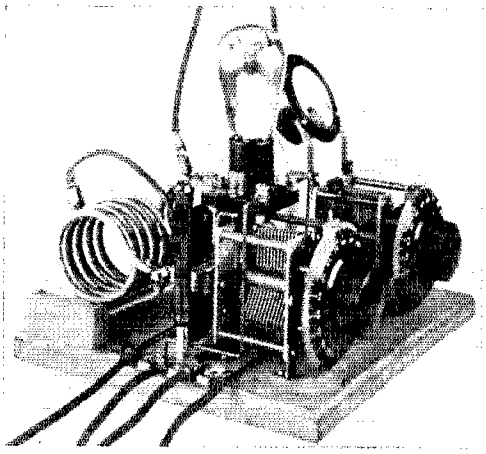
Transmitter used in the first amateur ¾-meter communication. Oscillation was actually at 1½ meters, the antenna being tuned for transmission of the harmonic. (From August 1927 QST.)

Transmitters

In 1926 the main transmitter topic was crystal control. The next two years saw a good deal of information published on processing quartz to secure oscillating crystals and on using those crystals in practical transmitters. Crystal cutting with the muck saw and the diamond saw were described, and one article in *QST* (May 1927) suggested lapping a number of crystals simultaneously between two large flat disks, a scheme later used by many crystal manufacturers. Ready-ground crystals began to get into circulation, and the beginnings of the crystal-controlled era were in sight.

Today's generation, conditioned from the beginning to crystal control and multistage transmitters, would take in stride — so it thinks — the problems that confronted the early crystal converts. (How many of the younger generation has ever used triode oscillators and neutralized triode amplifiers?) Some lessons had to be learned — among them the important one that a crystal could stand just so much and no more. Although attempts were made to use crystals in high-power oscillators, those who tried it quickly learned better, even though the early crystals were able to handle much more power than the little fellows we have today. So amplifiers became essential if more than a few watts output was wanted. Here was unfamiliar ground, although the master oscillator-power amplifier had been used sporadically for about as long as there had been tube transmitters. The old method of simply hooking in an extra tube and calling it an amplifier didn't work; the result of the inevitable self-oscillation was a blown crystal.

And so out of necessity came the neutralized amplifier. The circuits had been in existence for several years, as we noted earlier in this series.



The "1929 Hartley", a 210 oscillator featuring heavy tank construction for handling the high circulating currents that accompanied high C, and towel-bar supports that allowed sliding the antenna coil toward or away from the tank for coupling adjustment. The breadboard construction was typical of the period; metal chassis came along some years later. (From August 1928 QST.)

Now they began to be used. But neutralizing, then as now, was a puzzling procedure to those not accustomed to it. Careful explanations were in order, and continued to be so from then until the present day. Those who were successful at it had transmitters with outstandingly steady signals.

Along with crystal control and neutralized amplifiers there entered a new technique — frequency multiplication. To those brought up on simple oscillators coupled to an antenna, this was the beginning of an age of complications. But the reward — a stable signal on a known frequency — was worth it.

However, the simple oscillator transmitter was by no means through. (It was not until the mid-1930s that it began to be outnumbered by the crystal-controlled sets.) The example set by crystal control focussed more and more attention on the instability of "conventional Hartleys" and the like. More emphasis was being put on using a large C/L ratio in the oscillator tank; on using loose coupling to the antenna to overcome the instabilities that tight coupling introduced; and on using good d.c. plate supplies to sharpen up the signal. By 1926 these principles had had plenty of exposition, but they were not widely applied. It took a real jolt, the 1927 Telecommunications Conference in Washington, and the aftermath of facing narrowed bands beginning in 1929, to bring home the lesson that better signals were becoming a necessity and not just a matter of individual pride.

In preparation for 1929 the League undertook a technical development program aimed at improving equipment to the point where amateurs could accommodate themselves in narrower bands without creating intolerable QRM. Under the direction of Ross A. Hull, a study was made of transmitter stability, with the result that for the first time, so far as we are aware, some actual numerical data on stability of transmitters were accumulated. The over-all result was a confirmation of the existing principles, carrying them to what at the time seemed like the nth degree. From this work the term "high C" was born.

One of the hardest lessons to swallow was that an oscillator transmitter simply would not be stable until the antenna coupling was loosened to the point where a large part of the possible power output was sacrificed. Acceptance of the unpalatable truth probably had much to do with hastening the trend to crystal control, since it did not apply to amplifiers.

The latter half of the 20s saw the introduction of transmitting tubes designed with high-frequency use in mind. The first of these was the DeForest "H" tube, introduced early in 1926. With no base, and with plate and grid leads brought out at widely spaced parts of the bulb, it represented an attempt to reduce interelectrode capacitances and high-frequency losses. It was followed about a year later by the 852, using much the same general idea but rated at higher power, and provided with a standard four-prong base for the filament connections.

After the introduction of screen-grid receiving tubes, a screen grid was added to the 852 structure to make the 860, which made its appearance in the latter part of 1928. Concurrently, several transmitting tube types were being developed primarily for the broadcast service, and audio power amplifiers (all triodes) were being added to the receiving-tube collection. Notable among the latter was the 250, which was widely used by amateurs both as an oscillator and modulator.

The tube shortage was over.

Phone

A large proportion of the amateur fraternity has always wanted to do its communicating by voice, and this was just as true in the '20s as at any other period. But the state of the phone art was not very far advanced, and too many amateur phones could only be described by the word "awful." Loop modulation, a species of grid modulation, and vague attempts at Heising modulation were the rule; nothing else was known. The relationship between the modulator and the modulated amplifier was a mystery to most. Modulation percentages were low, distortion was high — and worst of all, modulation applied to an oscillator, the universal method, gave rise to more frequency modulation than amplitude modulation. Picturesquely termed "wobbulation", the f.m.-a.m. combination got progressively worse at the higher frequencies, resulting in excessively broad signals that gave phone a bad name.

The same problems faced the broadcasters, so a great deal of professional attention was focussed on modulation. By 1928 some basic principles were emerging. Tubes were developed that would give respectable amounts of audio power by the only method known at the time — what we now call Class A_1 amplification. Circuits were devised which permitted modulating an r.f. stage 100 per cent with a minimum of distortion. The modulated oscillator was discarded in favor of the modulated r.f. amplifier; furthermore, it was found that a buffer amplifier was needed between the oscillator and modulated stage to protect the former from reactions that would vary its frequency.

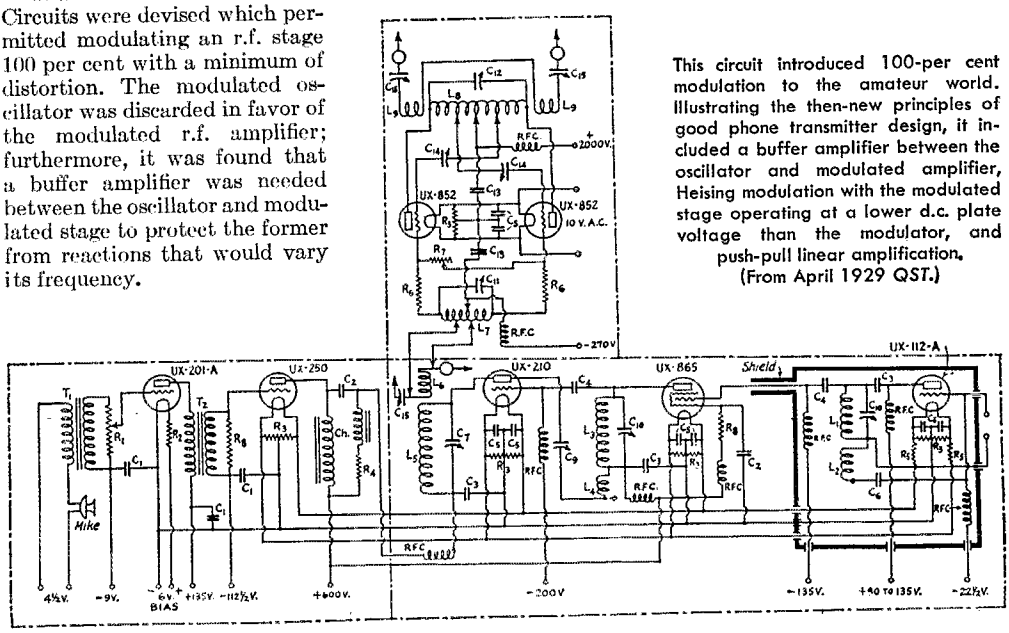
These things were not long in penetrating the amateur world. One of the projects of the League's technical development program was the design of a modern phone transmitter incorporating the same principles. It resulted, in April 1929 *QST*, in the description of a phone transmitter that, for the first time in amateur practice, had 100-per cent modulation. Using a 112 master oscillator, an 865 (then just announced) screen-grid buffer amplifier, and a 210 modulated amplifier, it provided the necessary oscillator stability and isolation. For increased power the set had a pair of 852s in push pull as linear amplifiers, capable of about 100 watts carrier output. This was about the highest power an amateur could hope to get, with 100 percent modulation. Phone was neither easy nor economical.

Nevertheless, the principles of proper phone operation began to sink in. With high modulation percentages and a stable carrier, a good low-powered phone proved to be more effective than a high-powered splatter generator. Phone had at last achieved respectability.

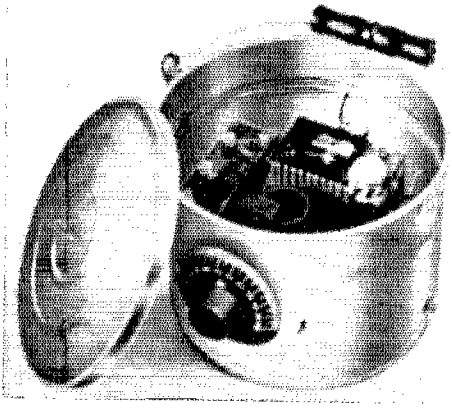
Transmitter Monitoring and Measurements

The unshielded regenerative receivers of the 20s were useless for checking the quality of the transmitter's signal, and they gave only a vague notion of what the frequency might be. Dependence had to be placed on reports from distant stations — these were as reliable then as they are now! — and on absorption-type wavemeters. Something better obviously was needed, especially after the 1927 conference when narrower bands were in prospect. And so the transmitter "monitor" came into being.

The original suggestion for a monitoring scheme seems to have been made by J. K. Clapp



This circuit introduced 100-per cent modulation to the amateur world. Illustrating the then-new principles of good phone transmitter design, it included a buffer amplifier between the oscillator and modulated amplifier, Heising modulation with the modulated stage operating at a lower d.c. plate voltage than the modulator, and push-pull linear amplification. (From April 1929 *QST*.)



An early transmitter monitor—a 199 oscillating detector, complete with batteries, installed in a "growler" for shielding. (The younger generation is not expected to recognize the container, familiar in a bygone era.) The picture is from July 1927 QST.

in December 1926 *QST*. Utilizing a separate oscillating detector circuit, shielded well enough to reduce the transmitter's strength to manageable proportions, the device enabled the operator to hear his signal as others heard it — a boon to transmitter adjustment. The same article also pointed out the utility of the oscillator for "zeroing" on the other fellow's wavelength. In the succeeding years increasing emphasis was placed on the necessity for a monitor, and in time no station was considered adequately equipped unless it had one.

It shortly became obvious that the monitor had another valuable property. Properly calibrated, it became a heterodyne frequency meter — more accurate and more satisfactory to use than the absorption-type meter which always had been a somewhat uncertain crutch for the amateur to lean on when he wanted to know whether or not he was inside a band. The construction and calibration of the combination frequency-meter-monitor was a favorite subject in *QST* articles for the remainder of the "self-excited" transmitter era. It would be hard to overestimate the value of this one piece of equipment in the campaign to clean up transmitter notes and keep them inside the assigned bands.

Although space has not permitted dwelling on the subject particularly in this series, measurements have always been very much a part of the amateur scene. However, even a brief history should note one piece of equipment that has survived practically intact — the grid-dip meter, first described by Hoffman of 9EK in August 1926 *QST*. A versatile device, indeed, to last as long as it has! Even this, though, had a long-forgotten progenitor — an oscillator using a plate milliammeter which kicked up instead of down when coupled to a tuned circuit on the same frequency. Such a "plate-kick meter" was written up in a 1919 issue of *QST*.

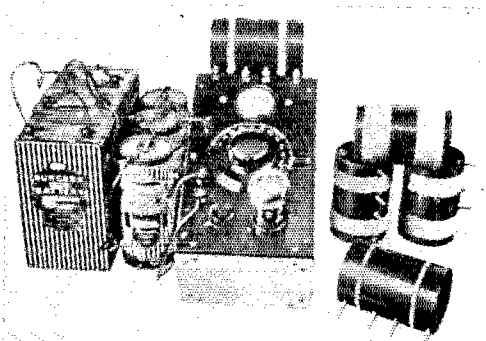
Near the end of the decade, the increasing role of phone earned recognition in amateur measurements. The "modulometer", described by J. J. Lamb in August 1929 *QST*, made use of the by then well-known peak-reading v.t. voltmeter to perform both r.f. and audio measurements in the phone transmitter — the first such instrument designed specifically for amateur use.

Antennas

Last month we mentioned that the amateur was beginning to free himself from the antenna-and-ground concept that had dominated antenna thinking for so long. The process was greatly accellerated with the publication of a report by Kruse in February 1926 *QST* on polarization experiments performed by Pickard. This work showed that short-wave signals were mostly horizontally polarized at the receiving point even when they were vertically polarized on leaving the transmitting antenna. Coming at a time when interest in the Hertzian oscillator or linear half-wave antenna was rising, the article was influential in shifting attention to horizontal wires. In turn, this led to more use of radio-frequency transmission lines and more demand for information on how to operate them.

The Zepp and a single-wire feed system of more-or-less uncertain characteristics were known. Both single-wire and two-wire tuned lines got a thorough going-over in July 1926 *QST*. Windom, 8GZ, described a method of adjusting the position of the single-wire line on a half-wave antenna for maximum power transfer and minimum line radiation. This was later amplified by the same author in the September 1929 issue, the single-wire feed system thereafter being popularly known as the "Windom" (a name misapplied to a quite different off-center-fed antenna of later vintage, although we suspect it may have been done by some discerning gent who appreciated that it *worked* the same way as the real Windom on some frequencies).

Two-wire lines were of the tuned variety — that is, no attempt was made to reduce standing waves — and explanations of their operation were in terms of current and voltage distribution



The original grid-dip meter, described by W. A. Hoffman in August 1926 QST. The plug-in coils covered the range from 12 to 800 meters.

similar to the distribution on the antenna itself. It was not until January 1928 that a mention of a matched termination appeared, in an article by W. van B. Roberts describing a matching network to be used between the line and the antenna. This was before the days of low-impedance lines; a direct match by the antenna itself was precluded because home-constructed lines had characteristic impedances of the order of 400 to 600 ohms. Although the higher efficiency of a matched system was recognized, few amateurs wanted to have their operation confined to a single frequency. Hence the tuned line, with its flexibility in respect to band changing, was preferred — together with single-wire feed, which also offered flexibility.

Along with a better understanding of transmission lines, the directive properties of antennas were beginning to be appreciated. This, too, was the beginning of the beam period, and the now-familiar Yagi began to get a little use on the higher frequencies, 28 Mc. and above. The real blossoming of the beam, though, is a later part of our story.

Surplus and Single Signal

IN THE SPRING OF 1930, *QST* advertising began to take on an appearance that was somewhat schizophrenic. The personality of the advertising pages was split between new amateur equipment, components and tubes on one hand, and a rash of surplus houses on the other. The surplus situation worsened (as they say in G-land) during the next two years. When a store, Hatry & Young, felt it had to advertise "New standard parts only. No surplus, dumps or tricks" it was unhappy evidence that something had to be done. Something was done, in April 1933, and the something was of greatest importance. However, before we examine the solution to the surplus problem, let's see what advertisers in more desirable categories were doing.

Important equipment announcements were made by two present-day friends — National and Hammarlund. In October of 1931 National first advertised the SW-3, following with the HFC 5-meter converter in August 1932, the AGS in October 1932, the FB-7 in March of 1933.

Hammarlund first advertised the Comet Pro in April of 1932.

The modest crystal transmitter announcement by Arthur A. Collins in January 1932 was the forerunner of a selection of some forty transmitters to come from Cedar Rapids during the thirties. These included such different models as the 32B, which used a pair of 46s, and the 213C, a 1000-watt rig.

The first ad on Shure Brothers microphones came out in February of 1932.

Tubes? A plethora. Between April 1930 and December 1931 de Forest brought out thirteen tubes ranging from the 430 and 431 receiving audions to the 507, a 10,000-watt water-cooled monster.

Cunningham, a subsidiary of RCA, announced ten receiving tubes; and RCA brought out three for transmitting and one for receiving. There were rectifiers by Perryman, CeCo, Rectobulb, Odeon, Hytron, Thermionic Labs; transmitting tubes by Duovac, Triad, Vacuum Products Lab; special tubes by Arcturus, Canatsey, Telephoto and TV Corporation.

No fewer than fifteen new crystal manufacturers advertised in *QST*, with an unusual geographical coverage. The east was represented by such firms as Standard QRH Crystal Labs in Jackson Heights, N. Y. and Precision Crystal Lab in Springfield, Mass. Herbert Hollister was in Merriam and American Piezo Supply in Kansas City, both Kansas. Bliley was, and still is, in Erie, Pa. Standard Radio Labs, Dallas, took care of the southwest and La Grayce Co. in San Francisco put the west coast on the crystal map.

A half-dozen radio school advertisements, including that of the Radio and Television Institute of Chicago with Fred Schnell's picture in it, started in *QST*. Instructograph's first appearance was in the February 1930 issue.

John Rider, well known technical author, ran his initial ad in December 1930. John Rider, Publisher, is a *QST* advertiser today.

It is interesting to see how ideas for accessories to amateur radio recur. In *QST* for December 1932 de Wilde Company advertised a 24-hour World Clock with foreign cities printed on the face. Theodore Stern offered "Your call on a pin," chromium plated with safety catch. "Who's Who in Amateur Radio" was brought out by Radio Amateur Publishers in February of 1933. Within the last several years similar offers have been made a number of times.

Ignition interference is nothing new; it plagued hams of thirty years ago. Allen-Bradley said in August 1931, "Stop interference on radio-equipped cars with Bradley suppressors."

To the ham who was building, A. L. Munzig and F. W. Sickles were offering transmitter coils and in July 1931 Arthur J. Hunt showed an "Ultra Modern Tuner" called the Vari-Coil. Manufacturers of filter condensers were Siemen-Zwertusch, Condenser Corporation of America, Dubilier, Cornell — the last two not yet having merged.

Power and modulation transformers were on sale by Amertran, Webster Electric, Broadcast Service. Cage or doublet antennas could be bought from Thorola or Lynch Manufacturing.

General Engineering Corporation, Stromberg-Carlson, and Gates Radio advertised power supplies, Gates preferring the name "Rectifier."

The Delco Ham Speaker by United Motors Service and the Brush Development Crystal speaker were shown. Trimm Featherweight phones were advertised for the first time in May 1931.

Quite a selection of microphones was available during the three years. E. F. Johnson, Astatic, Ellis Electrical Lab, Gavitt Mfg., Kellogg, Universal, International Broadcast Equipment, Mayo Instrument, Radio TV Industries, Remler, Sound Engineers, Samson Electric, were in *QST*.

Don H. Mix first offered the Sentinel Magnetic Overload Circuit Breaker in December 1932. (He's W1TS, now an Assistant Technical Editor of *QST*).

Ham receivers were shown by de Forest, Radio Construction Co., Stenode Corp. of America, Hendricks and Harvey, McMurdo Silver. The Sparton short-wave converter was advertised by Sparks-Withington.

For those who wanted to experiment with television there were Jenkins with a Radiovision Kit, TV Manufacturing Company of America, Globe TV, Norden-Hauck.

Wide-awake advertisers kept an eye on *QST*'s technical articles. Examples are REL's parts for the TNT circuit in April 1931 and Delta's "Special units for the new crystal xmitter in November *QST*."

One name that had been in *QST* for many years made its exit as a manufacturer in 1932 — Acme. In February, Delta Manufacturing Company's first ad showed "Acme Apparatus" in parentheses; in December, Delta announced that it was the successor to Acme Apparatus Co.

Two other long-time advertisers combined: Weston-Jewell appeared in September with instruments for radio service men. And in 1931 one of the best-known company names of the era disappeared forever from the advertising pages of *QST* — de Forest. The last de Forest ad ran in December.

During this period a technical development took place that was of utmost significance in receiver design. Jim Lamb's *QST* articles in June, August and September of 1932 on single-signal reception influenced manufacturers and their advertising immediately, and that influence is felt today, thirty-two years later.

M and H Sporting Goods in Philadelphia was alert and advertised in November "Everything you need to make the Single-Signal Superhet described in Aug. and Sept. *QST*." Hendricks and Harvey advertised a single-signal receiver in December. In March of the next year, 1933, Leeds described its new Supreme Single-Signal Super. In September of 1932 National advertised "Special Parts for . . . 'single-signal' h.f. receiver as described in Aug. 1932 *QST*." Specifications of the new FB-7 in March of the following year stated that "both the circuit and the chassis layout have been designed for ready addition of mechanical filter (quartz crystal) when desired for full 'single-signal' operation."

Stores, now grown into distributors, that still advertise in *QST* include Harrison Radio, first ad in April 1930; Uncle Dave's Radio Shack, now Fort Orange Radio, August 1930; Burstein-Applebee, July 1932; Lew Bonn, September 1932.

But what about the advertisers of surplus who were worrying both *QST*'s readers and *QST*'s advertising department? That word "plethora" should have been saved for them, because in the thirty-nine months from January 1930 through March 1933 there were more than two dozen such houses using advertising space in *QST*. Merchandise on sale varied from "Bankrupt Radio Stocks," through tubes of unspecified manufacture and $75 generators for $4.95, to Army and Navy radio surplus bargains.

After serious discussion it was decided in the spring of 1933 that *QST*'s advertising policy must be radically changed. Advertising rate card No. 8 which came out in February and went into effect with the April 1933 issue carried the following: "Advertising is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League." The April editorial explained *QST*'s new firm stand; an advertisement quoting the paragraph from the rate card was printed in *QST*.

That advertising policy has been rigidly observed ever since. The same paragraph is on *QST*'s current rate card and the advertisement appears in *QST* every few months — in fact, it's in this issue.

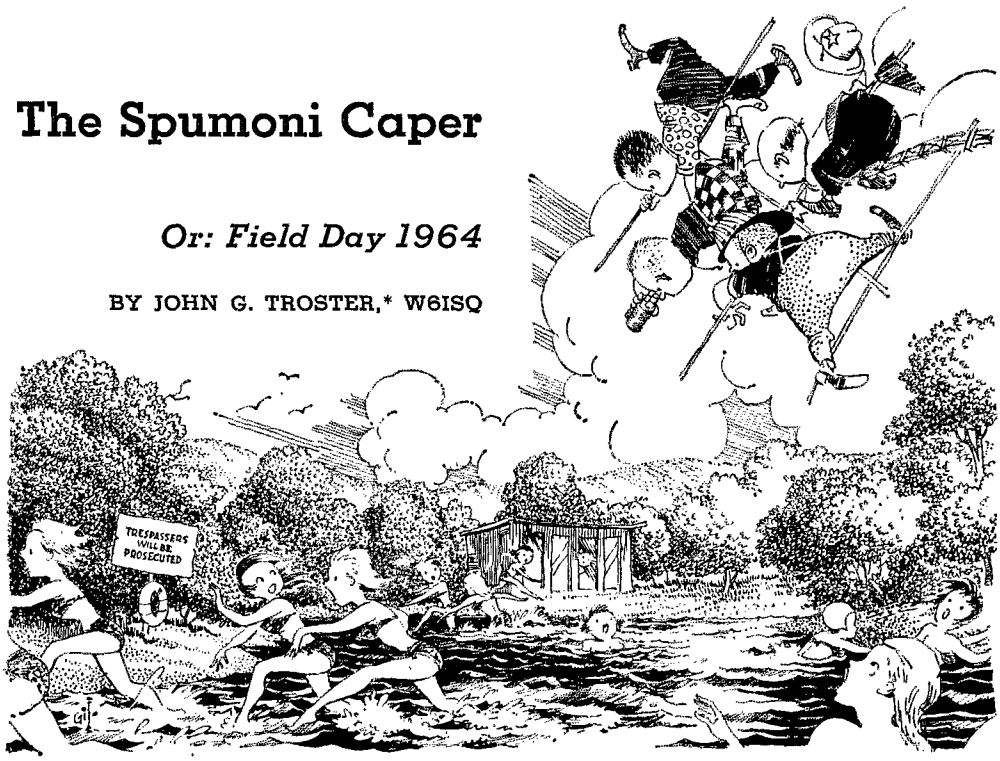
So, with junk surplus out of *QST*'s advertising columns and with single signal entrenched as the best method of reception — with no patent royalties for manufacturers to pay — it looked like good days ahead for readers of *QST* advertising, and for the advertisers themselves.

Rate card No. 8 gave the cost of a full-page advertisement as $210. *QST*'s circulation was approximately 35,000. QST

The Spumoni Caper

Or: Field Day 1964

BY JOHN G. TROSTER,* W6ISQ



MARGE . . . it's me . . . your friendly OM. Ahhhh . . . could you spare a minute to come down and bail me out?"

"Bail you out?? You told me you and Charlie were going to a hilltop to work a radio field day. So just what kind of a field day have you and Charlie had for yourselves?"

"Easy, Marge — we just happened to fall into the wrong pool. Oh well, it was this way —

"Charlie and me drove out to a real good high hilltop that Charlie knows about where there wasn't nobody for miles and miles around — we thought. Of course, we wanted to be high up and alone so's to concentrate better on Field Day radio calls and stuff.

"Well, Charlie props up the tent and packs in the radio gear, and I put that beam aerial up on the collapsible tower that don't need guy wires and goes up by itself when you throw the switch. You know, the one on the trailer I had in the driveway yesterday. Well, when I got the aerial mounted, I yelled to Charlie to click the switch on the tower — and — whoooops, up I go — 60 feet.

"Ya see, I was checkin' for the s.w.r. (That's kinda technical stuff for you, Marge — stands for 'several watts radiating' — ahhh — or somethin' like that.) Anyway, a aerial's got to have an s.w.r. or it don't work right. And the only way ya can find out if your aerial has enough s.w.r. is when it's up in the air. See?

"Well, I start lookin' for this s.w.r. thing when I hear shriceeeks. So, I look down just over the trees, and there, right below me . . . lots and lotsa people runnin' around this big swimmin' pool, and it looks like they's wearin' them funny little spumoni bathin' suits — or — ahhh — maybe — ahhh — well —

"I yell to Charlie about all them people with them little spumoni swimmin' suits — the kind ya see — or don't see . . . haw . . . in pictures in magazines. And I says they're all hollerin' up a good 50 db. over 9, and maybe they was in trouble. So, Charlie quick punches the switch and brings me down so's we can go rescue 'em. But then Charlie thinks first he ought to check how bad off the people with the spumonis is, so he jumps on the tower, kicks the switch, and we both go sailin' back up to 60 feet.

"Well, of course, I keep lookin' for them s.w.r.s on my aerial whilst Charlie is watchin' them Spumoni people and tryin' to figure out how we can help 'em.

"About that time we hear a sireen, and here comes a wagon flyin' up the hill toward our good little hilltop hideaway radio Field Day location. And out steps a sheriff, and starts hollerin' somethin' about 'Disturbin the Peace', and 'what are we doin' up there — ahh — peekin' into that Nud — ahhh — ' and 'come on down, *now*.' So, we yell down how to throw the switch. And when we get down, we tell him about the horrible trouble the Spumonis is havin'.

"So, then the Sheriff says in that case, he can't very well arrest us for Disturbin' the Peace until he sees for himself that the Peace is being Disturbed. And so he'd have to have a peek . . .

* 45 Laurel Ave., Atherton, California.

ahhh . . . look to investigate for himself.

"So he races over to his car and fetches a pair of binoculars big enough to spot a mole on a — ahhh — err — 'see a mole diggin' up a yard a mile away' — guess that's what he said.

"But then the sheriff is afraid to let Charlie and me stay on the ground for fear we'd escape and leave him stuck on the tower. So he says, 'all 'boarrrrd', kicks the switch, jumps on, and up go the three of us.

"Soon as we get up, Charlie and the sheriff start arguin' about whether all them people was wearin' spumonis or — ahhh — seems like this was a legal-type discussion or somethin', cause they start wagerin' and stuff like that.

"Well, about then, I looked at my watch and says that Field Day's gonna start in 15 minutes, so you fellas please stop jigglin' the tower so's I can find the s.w.r.s before we start. But by this time Charlie and the sheriff was really QRMin' each other. Course, I didn't know why they was arguin' like that, 'cause even a near-sighted phone man could see that the blonde Spumoni with the mole didn't . . . whhooooo . . . ahhh . . . 'Field Day in ten minutes!' I hollered."

"Just foolin', Marge — hoo hoo — dear Marge. What I really yelled was 'easy now, fellas', 'cause Charlie and the sheriff was fightin' it out now to see who's gonna do the investigatin' with them binoculars that was big enough to spot a mole — ahh —

"These two wrasslers were still lungin' and grapplin' for the glasses, when all of a sudden, swissshhhh . . . they squirt out of Charley's hand and the strap hangs up on the boom about ten feet out.

"Just then we hear this other sireen, and here comes a fire engine steamin' up to our hilltop. Well, the sheriff says it wouldn't do for him to be apprehended by the Fire Department 60 feet up on a tower peerin' down — ahhh — investigatin' a swimmin' hole full of Spumonis — and especially with a pair of binoculars strong enough to see . . . Maybe it was some kind of professional jealousy between the Sheriff's and the Fire Departments . . . Suppose?

"Anyway, the sheriff starts monkeyin' out the boom, hand over hand, to unsnaggle his binoculars. And the tower starts leanin' over like that old one in Pizza. Then Charlie sees what's gonna happen, and like the good fella he is, he gives a Tarzan holler and swings out the other side to balance 'er up.

"So there we are with Charlie and the sheriff puttin' on their circus act, and the tower teeter-totterin' forth and back, when the hook and ladder fire engine zeroes in with the long ladder at high port. And perched way up on top, ready to make the save, is the fire chief himself. And he starts grabbin' at Charlie and the sheriff every time they swing past in range.

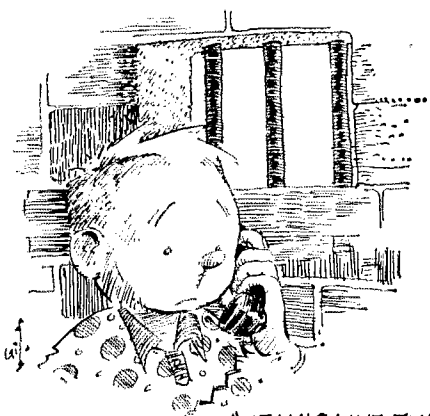
"Well the fire chief was missin' the fellas a mile, but he managed somehow to snaggle the binoculars. So, he starts investigatin' the Spumonis for himself. And then the Chief and the sheriff and Charlie all start yellin' at each other and makin' bets and wagers about somethin' — and all the time I was tryin' to find the %$#& s.w.r., ya know I was, Marge — dear —

"Finally Charlie made a pretty close pass at the ladder and the chief grapples at him. But somethin' went wrong, 'cause when the tower swung on past, there was the chief clutched to the tower, and yellin' at the sheriff about 'what are the odds?' or somethin' like that.

"Now Marge — dear — even you'd have to admit that four fellas waverin' around on top of a 60-foot tower, peerin' straight down on a swimmin' hole in a Spumoni farm, is a pretty unusual caper — like you said. But I knew it wasn't nothin' yet, 'cause I'd finally found all them s.w.r.s I'd been lookin' for, and they was real, real high and goin' higher. And that always means somethin' is about to go 'bloooie.'

"Besides, the tower was makin' bigger and bigger arcs over the Spumonis in the pool . . . and — well — finally, the old tower couldn't do her duty no more and here we come a-clawin' and a-flailin' and a-spashin' — Charlie and the sheriff and the fire chief and me — all in the water, and the Spumonis all a-screechin' and runnin' and hollerin'. And I was goin' down for the second time, and — Marge — ahhh — Marge dear —"

"Never mind that. Which one of you acrobatic clowns won the bet about the mole on the blonde — you — you . . ."



"Well, Marge, as a matter of fact — dear Marge — I — ahh — she pulled me out of the water — ahhh — ohh — saved my life — artificial restitution and all like that."

"And you're going to need more than artificial 'restitution' when I get through — !"

"But Marge, I promise I'll stay home this week end and be a one-operator, one-transmitter entry in Field Day — honest! If you'll only come down — Marge — Marge??"

"Not a chance, Nature Boy. You can just go call your blonde Spumoni lifeguard with the mole to bail you out!"

"But Marge — honey — you're all I got left. She just bailed out Charlie." QST

CONDUCTED BY JEAN PEACOR,* K1IJV

It's Second Nature

THERE are perhaps few radio amateurs who can't quickly recall all the details relating to their first QSO. This impression is lasting. As successive achievements are made in your radio career, these too fall into this category. It has become almost second nature, for example, to know just how many states you have contacted — with WAS the ultimate goal. Each new country also reflects thoughts of DXCC.

Using mathematical logic, if ten new states have been contacted in just two months of operating, fifty states can be contacted in ten months. This same logic can also be applied to contacting new countries for DXCC. But, does it? All seems to go along according to plan until only the 49th and 50th states are needed — or, perhaps it is the all elusive 99th and 100th country you seek. This period of suspense can be likened to the final hour of a contest when you suddenly realize you have 71 sections and need but two more.

The June 1963 YL column provided an extensive listing of many awards and certificates offered to all radio amateurs by the many different YL clubs. All of these awards are popular, but WAS/YL is one that falls in the second-nature category. Most radio operators know immediately when contact with a new YL brings them a step nearer to completion of the requirements for this award. This certificate is sponsored by YLRL and requires confirmation of YL contacts in each of the 50 states. Possibly you now need but one or two more contacts and WAS/YL can be yours?

If Nevada has been one of the elusive states, a contact with Joanne Talcott, K7SNS, will be a far more rewarding experience than just having contacted a Nevada YL. If you would meet one who truly embodies the real "ham" spirit, meet Jo. She and her OM, Neil, KN7RMS, and their three children live in Lovelock, Nevada. Their home is known to hams for miles around as "Ham Haven" where an open door and brewing coffee pot are always waiting.

Equally good on either phone or c.w., Jo's pleasant voice or fine fast fist commands attention on all bands. Forty and eighty meters are her current favorites. She can frequently be heard on 40-meter s.s b. operating her Heathkit HX-10 Marauder

Her talents are not restricted to amateur radio, as she is presently Noble Grand of a Rebekah Lodge, enjoys singing and playing the piano, and works wonders with a skillet and sewing machine. A wonderful gal who combines hamming and homemaking and one whom it will be a pleasure to meet via the air waves.

Or perhaps it has been a Rhode Island YL you

*YL Editor, *QST*. Please send all news notes to K1IJV'S home address: 139 Cooley St., Springfield, Mass.

(left) Two of a kind! These true ham spirit smiles belong to Dale Jolley, WA6RVS, of Long Beach, Calif. and Jo Talcott, K7SNS, of Lovelock, Nevada. (Right) Lt. Comdrs. Tom and Estelle O'Connell, K1YGY and K1CUY, of N. Kingstown, R.I.

Known as the "only 24-hour station in the state of Oregon," Fran Dillman, K7TWD, of Eugene, Oregon operates a Viking Valiant II or sometimes a Gonset G-76 transceiver when mobile. Another fine traffic operator, Fran is a very enthusiastic YL radio operator.

have found hard to find? The Newport County Radio Club reports with pride the story of one of their recent past presidents. Estelle Hopf, K1CUY, was unanimously elected the club president in 1960, the first YL to have that honor. At the time, Estelle was a lieutenant in the Waves. Upon later being promoted to Lt. Comdr., she was reassigned to Quonsett, R.I. Air Base where she met Tom, a Lt. Comdr. and test pilot in the U.S.N.

After their marriage in 1962, Estelle retired from the Waves and proceeded to introduce Tom to amateur radio. He became K1YGY having passed both Novice and General exams within the next year.

Still active members in the Newport club, Tom and Estelle enjoy a great deal of hamming on 10, 15, 20 and 40 meters, mostly phone recently, and usually operate on week ends.

88

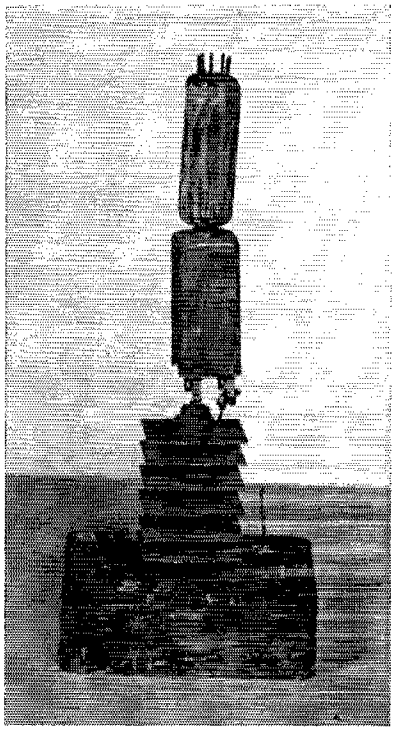
The technical aspects of amateur radio have always been masterfully covered within the other contributing editors' columns of *QST*. Thus, YL space has been devoted to other phases of YL participation. However, when a YL develops and designs something completely new it is time to vary from the norm.

Believed to be the only one in captivity, the picture of the filter shown elsewhere on these pages was designed by WA4KAD, Betty Key, of High Point, N.C. The full significance of Betty's design is not yet fully understood, but as a result of her idea, WA4FUV, her OM, built the filter.

This Deluxe 88 Filter is now in the possession of Virgil Hinson, W4ZEV. He feels that through careful observation of the picture, one can readily appreciate its usefulness.

YL Clubs and Nets

TOO — The Only Operator YL Club — is a new club formed this year. Its purpose is to bring together YLs who do not have OMs who are amateur radio operators. Membership is open to all YLs holding amateur radio licenses and who depend on their own means to keep operating. Any YL, young or not so young, DX or in U.S., is welcome. Dues are $1.00 plus 3 s.a.s.e. to join and $.50 plus 3 s.a.s.e. each year thereafter. DX YLs do not send dues, but IRC for postage only. Their year starts in April of each year. Further information may be obtained by sending an s.a.s.e. to Secy. Ruth Donnelly, K7ADI, 7826 N. Chautauqua Blvd., Portland, Oregon, 97217, U.S.A. Tillie Currington, KØRGU, is the club's president.



Deluxe 88 Filter.

A TOO certificate is awarded by the club for contacting 5 active members by U.S. stations, all others 3, after January 1, 1964. AOBM/M endorsements. Send GCR list of log entries and $.50 if in U.S., all others send 4 IRC to Ruth Donnelly. For each additional 5 or 3 members contacted, send s.a.s.e.

The Loaded Clothesline YL Net announces their new officers for 1964 as follows: Pres., Estelle Hanfelt, WØESD, NCS; Vice Pres., Pat Lyons, KØEVG; Secy., Helen Maillet, W7GGV; Treas., Annabelle Meck, KØWZN; Publicity, Phyllis Weir, K7WVT. This net meets Monday at 1700 GMT on 7235 kc.

The Camelia Chirps' Funfest held in Sacramento, Calif. in March was enjoyed by all attending. The many Baylares who were guests highly praised the entertainment and activities so well planned by the Chirps. One of the highlights at the luncheon was the presentation of the "bird" to the Chirps by W6QYL, ex-custodian of the "bird." Comments were that this would have to be seen to be believed!

Coming Events

All YLs participating in Field Day activities are invited to submit pictures and reports of their activities to this column.

JUNE! The month is here for the 5th International YLRL Convention to be held at the Nationwide Inn at Columbus, Ohio, on June 19, 20 and 21. Please register early. Early registrations will greatly assist the committee members in completing personalized favors and in their planning. Mail your registration to Elizabeth Isham, K8UKM, 474 Darbhurst Road, Columbus 4, Ohio. For complete convention information see the YL columns of January and May 1964. Bring a QSL card and MIGRATE TO THE BUCKEYE STATE IN 1964! QST

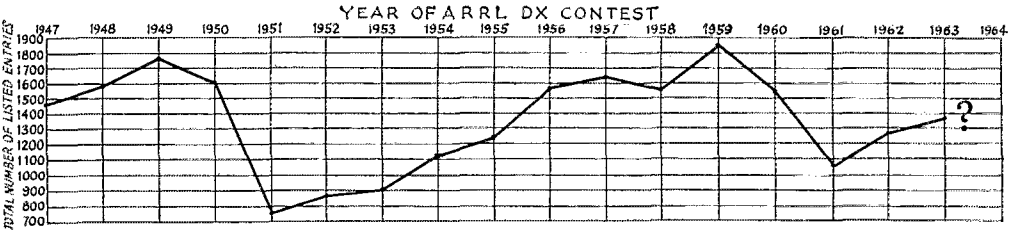
How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Why?

Among results of the 1956 ARRL DX Contest, in September *QST* of that year, you'll find an interesting set of statistics. It's a plot of annual total test entries over a ten-year period beginning with 1947. The pattern, unsurprising enough, bears a close resemblance to the sunspot-number curve for the same period. This appears to corroborate Uppen Adam's Long-Haul Hypothesis; *viz.*, the easier it is to work DX, the more guys are out to grab it.

We now have a large chunk of another cycle to work with. When we tack it on that other curve it comes out like this.



Good to see that line going up again! One would expect the cycles to look quite alike. They do. In fact the timing of the maximums and minimums, appearing in '49–'59 and '51–'61 respectively, is strikingly similar. In each case it took only two years for full decay.

It was generally supposed that the suddenness of the 1949–'51 dropoff could be attributed in considerable degree to the arrival of widespread TVI problems on the amateur scene. More likely, in view of the 1959–'61 dive without TVI as a new factor, that interference onset merely affected the magnitude, not the timing, of the earlier downtrend.

But we know that over-all DX conditions don't go from most wonderful to most awful in two short years. What's the gimmick in both sawteeth? One possibility: during years of improving DX propagation, increasing numbers of amateurs tend to focus their DX efforts on 28 and 21 Mc. (the more speculative issues in the DX stock market), building entire stations around those bands. When the first significant decline (technical market correction) in 28–21-Mc. DX results punches holes in their contest logs (stock portfolios), they get discouraged, drop out of competition en masse for a year or so, and gradually return to the fray via lower frequencies (blue chips).

Jeeves, poor fellow, is getting carried away. Been jittery ever since he sunk a wad in 21-Mc. preferred. Interpolative projection of the preceding graph convinces him that 1497.67 logs will be submitted for the 1964 ARRL DX Contest. The entries will include about 723 U.S./Canada c.w., 354 foreign c.w., 315 U.S./Canada phone, and 105 foreign phone logs. There's really insufficient data to get so gay with, but the fact that the three biggest ARRL DX Contests of the last 25 years occurred in 1939, '49 and '59 makes us wonder what's in store for 1969. And — horrors — how about 1971?

What:

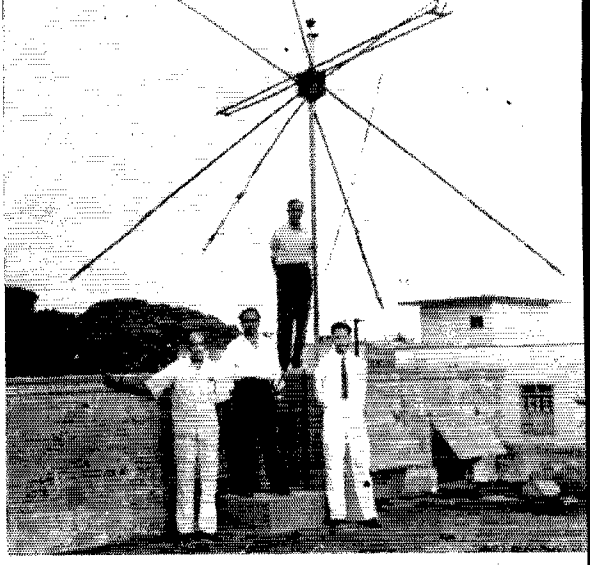
That graph, if its time base were shrunk to about a week per cycle, would give a pretty fair picture of DX conditions in this spring of '64. Things work up to a wide-open day or two and then — *blah*. If you're lucky enough to be on between the blahs you'll find things interesting enough, just as our.

15 Novice reporters, KN1FWE, **WNs** 2IRX 2LLK 4OIX 4QJK 4QJL 5GZX 5HZY 5ITA 6GFJ and 6HLZ, enjoyed the vernal 21-Mc. season thoroughly, thanks to CE1EK, CO2HS, CP5EZ (21,120 kc.) 16 hours GMT, CX1AAC, **DJs** 3CY 6JH 9LD 9QI, **DLs** 1BS 4KD 4PX 6VP 7CL 9VZ, **DMs** 2BCO (120) 18, 3SBM, EL6ND (192) 21, F8VN, **Gs** 3HEP 3IJX 3ILS 3SR 5LK, **HB9s** ACP CZ, HC2MO, HK3RQ (120) 18, **JAs** 4ACH 8AZO (132), **KH6s** AAY ENU UL, **KP4BJM**, **KZ5s** AX (120), EM JW, **LUs** 2JV (120), 6JAQ, **OA4s** NQN NQZ, **OHs** 2BR (120) 12, 5VD 16, **ON4s** NU WP, **PA0s** RTW (120) 13, XM 18, **PYs** 2BGA 4AZM 4BO 5ASN (155), **PZ1s** CK CM (192) 18, **SMs** 1CJW (120) 15, 3SU, **TG9SC**, VK3KS, **VP8HJ**, **VQ2s** GJ GP (120) 19, **WP4s** BNR BOE (135), BPO (120), YO7EA (120) 15, ZB1BX 16, **ZLs** 1ARY 2GH, **5A5TR**, **9Q5s** AB CR (195) and TH. Nice bag, lads.

15 c.w. dispatches in the General-like line hit the "How's" mailbag from **Ws** 2BTQ/KH6 3HNK 4HOS 7QB 8EQA 8YGR, **Ks** 4JSZ 0GSV 0JPL, **WAs** 2KSD 2SRQ 5AER 5CIY 5EAM 6TGH 6VAT 9ICQ 0APN, **WBs** 2GHI 2HBI 2IOM 2HSK 6DEJ 6FWW and 11ER who trade dots and dashes with AP2MI, **CN8s** GB FW, **CRs** 6LA 7AD (20) 16, 7HC 7IZ (70) 19, 7LU 8AD (68) 12, **CT1s** AW HX 17, CX3AN, **EA9EN** (10) 18, **ELs** 2AD (50) 13, 6ND 8X, **EP2DM**, **ET3GC** (38) 14, F2CB/FC, **FB8XX**, **FO8BI** (20) 21, **FR7ZD**, **FU8AA** (43), **HA1KSA**, **HI8s** CLU DAB, **HP1IE**, **JAs** 1CWM 1FAF 1HGY 1HKP 1ITX 1JCQ 1KGT 1KHK 1MRM 1MUZ 1MVQ 1OHV 3GHI 6AKW 6CUX 6DJI 6HW 8XL 8TQ 8ZO, **JT1CA** (35), K2DCX/TL8, **KGs** 4AM 6AAY, **KR6ML**, **KV4s** CI DB, **KZ5FZ**, LA5HE, LX3AX (30) 17, **MP4s** BBA (21) 15, QBF (40) 18, **OA4s** AO KF NQ, **OD5s** AX LX, **OX3UD**, **PJ2s** AE AG, **PZ1BK**, SM5DIC/9Q5, **SU1IM**, TG9HR, TL8SW, TN8AH, TT8AM, TU2AW, **UA0CE** (23) 1, UG6LF, **UH8s** AA KAA, UI8AI, UM8KAA, VO2JM, **VPs** 2AX 22, 2KJ (50) 19–21, 6BW 7NX 8GQ (50) 15–16, 8HF/mm 14, 8HJ, **VQ2s** BC BN GI 18, IE W WR, **VSs** 1LJ 1LP 1LV 6EY 6FC 9ARC 9OSC, **VU2s** GG (42) 14, HS, W5HJ/KJ6 (34) 21, **WP4BPR**, YA1BW, **ZBs** 1BX (50) 17, 1CR 2A, **ZDs** 3A (23) 20, 6RM, **ZEs** 1AS 8JN, **ZP9AY**, **ZSs** 3EW (75) 17, 7M, 4S7s EC KC, 4U1ITU, 4W1B (95) 14, 5A3CI, 5B4s AK TX, 5H3HZ, 5N2JKO, 5U7AH (65) 20, 5Z4AQ, 6O6BW (5) 20, 9G1s EI FE, 9L1TL, 9Q5s AB (65) 17–18, HD SL TJ and 9X5MH.

15 phone is another lively proposition, according to the word from **Ws** 3HNK 8EQA 8YGR, **Ks** 4JSZ 7VMO 0JPL, **WAs** 2ZVJ 5AER 5CTD 5EAM 6TGH 6VAT, **WBs** 2CCO 2GHI 2IOM and 6FWW dealing with

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



VU2BZ's boomless quad shelters (l. to r.) VU2s BZ GV BG and LC of the Bangalore Amateur Radio Club.

AP2MI, CN8s GB* GC, **CPs** 1DN* 8AB*, **CRs** 4AD 4AY 15, 5SP **6AL** 6DL 6EA 6FN 6GJ 6JA 6JT 7AH 7BF 7FH 7FN 7IA, **CX1BX***, **DL4OV***, **EA8s** AJ AM DL DM DR, **ELs** 1H 2S 5B 5D 8ND (416) 16, **ET3s** FF GC*, **FG7XL, GD6IA** (413) 14, **HC7DO***, **HPs** 1LB 2MR, **HRs** 1JP 1OP 4BW, **IS1**FIC, **JAs** 1DWW 1EHK 1JRK 2AK 3BUT 3EVQ 4BXU 6HK, KPis and KZ5s galore, **KJ6BZ, KX6**DB, **M1BK, MP4s** BEE DAA QBF*, **OAs** 5AH* 5C 8B, **OD5**AX*, lots of PYs, **PJ2**CU, **PZ1**BK, **SV0**WFF, **TGs** 5FJ 9KJ 9MP*, **TJ8**AC, **TN8s** AG BD 13, **TR8**AD, **'TT8s** AN AP, **TY2**AB, UA6ND, **UB5**KAD, VK6QL, **VPs** 2AQ 2AX 2GAA 16–20, **2KJ*** 3HAG (408) 22, 6AQ 7CC 7CX 9FD, **VQ2s** AB* AS DT WR*, **VSs** 6AE 9AIB 9ARC, W6ICM/**KM6, XE3**BL, **YNs** 4CF* 9AK/1, **YS1**IGM, **YV3**FJ, **ZB1**RM, **ZD6**RF, **ZEs** 1AS 3JJ 7JR* 8JB, **ZPs** 5JE* 6BB*, **ZSs** 3E* 6SG*, **ZLs** 1BE 1RI 2UD 3JO, **4U1**ITU*, **4X4s** RX TF*, **5As** 2CX 3TO 4CW 4TI* 5TE 5TW, **5B4s** AK HK JU PW, **5H3s** JI JJ JL JR*, **5N2s** BEL JKO* JWC LJM, **5X5**JK, **5Z4AA***, **6O6**BW*, **6W8s** AA AB 14, CK CZ DD, **6Y5s** EC EM, **9G1s** DM EC, **9K2**AY, **9L1**GR, **9Q5s** AB* BD EE EI GE HF JR RK* SI SL, **9U5s** BB DP and **9X5**VF, the asterisks representing single-sidebanders.

40 c.w.'s followers document another happy month on the 7-Mc. front, led by **Ws** 2BTQ/KH6 3HNK 5KNE 6YKS 7DJU 8EQA, **Ks** 1VWL 3SLP 3TEJ 4TWJ 5JVF 7QXG ØGVA ØJPL, **WAs** 2KSD 2SRQ 2WIJ 2ZVJ 5CIY 5EAM 6TGH 6VAT 9ICQ, **WBs** 2GHI 2IOM 6DEJ 6FWW and 6FIC. The customers include **AP5**CB, **BY1**PK 0, **CM5**FS (10) 3, **CN8**FW, **CO3**AG, **CP5**EZ (8) 2, **CRs** 6AZ 8AD (4) 14, **CTs** 1BT 2BG, **DU8**RP (26) 19–20, **EAs 7JZ** (12) 6, 8EE 9EN, **EI6**D, **EP2**RC, **F2s** CB/**FC** CC/**FC, FB8XX** (13) 21, **FM7**WB, **FS7**AA (11) 5, **FY7s** YF YK 11, **HA5KBB, HI8NPI, HP1**IE (9) 18, **HR2**FG 3, **IS1**MM, **IT1**AGA (3) 24, **JAs** 1BRK 1CG 1CWG 1CWZ 1DDR 1EM 1EPZ 1HWU 1IHE 1ITX 1LWI 1NLX 1OHV 1VX 2BAY 2BT 2EGO 3AOV 3BYQ 3CZH 3DDG 3FFD 4BUT 5ACD 5ADR 5AJQ 5ALA 6BDS 6BWH 7AKC 7AKQ ØBCH, **JT1**KAA (10) 11, **KA2**KS (22) 8, **KCs** 4USB 4USK (7) 5, 4USN (25) 7, 6BK (2) 13, **KGs** 4AM 6AAY, **KM6**CE (9) 11, **KR6s** BQ SB, **KV4s** AA (39) 23, DB, **KX6s** AJ (13) 8, **LX3**AX, **LZ1**DZ, **MP4s** BEE BEK QBF, **OA4**PF, **PJ2s** AE ME, **PZ1s** AH CM, SM5BKK/**9Q5** (2–10) 1, **SU1**IM, **SVs** 1AL 1BK 1YY ØWAA ØWM, **TG9**GZ (10) 5, **TL8**SW, **UAs 1**KAE/1 (15) 21 at Mirny, **ØBI ØKCO ØKCU** (22) 9, **ØKFG** (13) 8, **UD6s** BV GW, **UF6A**U, **UG6s** GL IR (15) 22, KAA, **UH8s** AE DC, **UI8s** CT KAD, **UJ8s** AQ AR KAA, **UL7s** LA NJ, **UN1**AL, **UWØs** AP IX (8) 7, **VKs** 1RD 4CJ/**VK9** 7SM, **VPs** 2AV 2AX 22, 2KJ 6AT 6BW 6PJ 6RG 8GQ 9L (23) 1, **VQ2s** BC WR W, **VRs 1B** (11) 6, 2BK (18) 19, 2DK, **VSs 1JW** 1LP 1LU 6FF (8) 12, 9AAA, **VU2s** PE (44) 19, PF 10, **YOs** 6XA 7DO (34) 1, 9IM, **YU1**BCD, **ZB1s** NX CR, **ZDs** 3A (8) 8, 6OL, **4W1B, 4U1**ITU, **4X4**QA, **5A1**TW, **5B4s** GF IP KG ZP, **5H3**HZ (18) 21, **5N2**JKO, **5Z4s** AQ ET IQ 1V, **6W8s** AC DD, **6Y5s** GH (23), XG, **7X2**NJ, **9G1**FE, **9L1**TL 2, **9M2RI, 9Q5s** AB TJ and **9X5**MH. **WN2**IRX joined the fun, too, catching **KP4s** AXM and RK upband.

40 phone, that SWBC-ridden bugaboo, succumbed to **Ws** 4HKJ 8EQA, **Ks** 1VWL 4TWJ, **WAs** 2VOW 6TGH ØEMS and **WB6**IFC to the tune of **CR6BX, DM2AMJ***, **EAs 6**AM* 7GF, **EP3**HS, **Fs** 2KM* 8SF*, **GW3**NWV, **HC2**JT, **HI8**RXM, **HK4**EB, **IT1**TAI, **KJ6BZ, KZ5**DG*, LX1KA*, **MP4**BBW, OA4KY, **ON5**AC*, **OX3**JV, **PJ2**AA, **PZ1**AX, **TI2**EW, **TG9**MP, **TU2**AU, **UD6**BR, **UW9**AF, **VK7**CK (85) 7–8, **VPs** 2GV 3HAG **7**NS **9**WB, **VQ2**WR, **VS9**AAA (90) 23–0, **XEs** 2GGC 3BL, **YV5**BPG, **ZLs** 1AGO (94) 18, 2WS 3LE, **ZSs** 1BK 1CG 2HI **3E** 5DW 6AOW 6TE, **4X4s** DH DK, **5As** 1TW 5TK, **5N2**JKO, **9G1s** DY (35) 18 and EO, the stars denoting non-s.s.b. entries.

80 c.w. is bedeviled by atmospherics now but those occasional quiet nights may be rich in DX rewards. **Ws** 1SWX/1 6YKS 7DJU, **Ks** 1EYY 3SLP 5JVF 9UOV ØJPL, **WAs** 2KSD 2SRQ 5AER and 6TGH mention loggings like **DU7SV, EIs** 6D 9J, many Fs and Gs, **FS7**AA, **FY7**YF, **HA1**KSA, **HB9**JG, **HKs** 3RQ 4DP (2) 7, **HP1**IE, **JAs** 1AEA 1BRK 1CG 1CJU 1DDR 1DMX 1GNX 1JEE 1KCA 1KGT 1LHH 1VX 2BDY 2COZ 2WB 3CDK 3DGE 3FIP 3JM 4YZ 5AJQ 5TX 6AK 7BMK 7BVS 7LK 7NX ØARJ ØVZ/Ø, **KC4**USK (9) 5, **KG6**AAY (6) 11, quite a few KP4s and KZ5s, **KX6**AJ (12) 11, **LX3**AX, **OH1**SH, **OZ1s** LO NF W, plenty of okay OKs, **PAØ**LV, **PY7**VBR, **SPs** 3ART 8ARY, **TI2**LA, **UAØs** EJ EQ KFG (8) 12, KJA, a hatful of VK-ZLs, **VPs** 6AF 9L, **ZB1**BX, **ZK1**AR, **ZS6**OS (5) 5 and **4X4**WF.

10 phone is down, of course, but not quite out, thanks to the diligence of **Ws** 5ERY ØPAN/1, **KØ**JPL and **WA5**AER who beat the boondocks for **CX9**PP, **EA4**DM, **FG7**XR, **JA1**BRK, **PJ2**AP, **VQ2s** BC 13, DT, **XE1**UV, YU5AHG, **XEs** 1AS 1AV 13, 1JZ 2JJ 2JL and 3JU, all apparently on straight a.m. . . . . W8YGR and **WA2-**KSD fool the critics by catching **28-Mc. c.w.** stuff like **HK7ZT** (50) 21, **HP1**IE, **11SF, KZ5s** FC (40) 21, TD, **VQ2**BC 13, **YV1**DP and **ZE1**AS. Say, remember back in the wild-harmonics days of the 1930s when almost everybody on 10 c.w. called CQ DX TEN instead of just CQ DX? (About half the signals one need were harmonics from guys on 20 meters. When you heard a harmonic from a country you needed, you ran back up to 20 and tried to work him on his fundamental. Wasn't easy!)

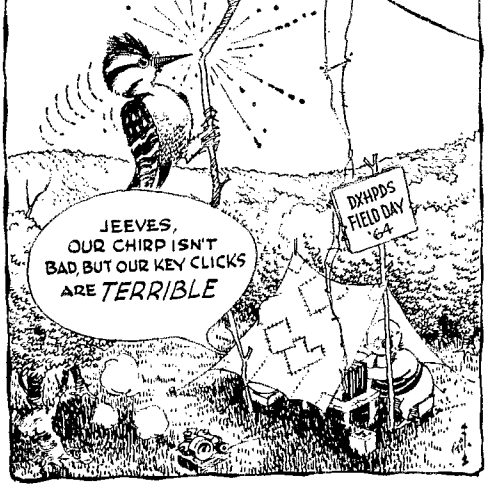
160 c.w. post-mortem comments are in order before we put this month's "How's" Bandwagon back in the barn. **W1**BB tallies up his luck during the 1963–'64 season at 137 different DX stations in 24 countries. The midwest wasn't left out, for **W9**PNE broke through to **VK5**KO (1801) in mid-March around 1130 GMT. This is Brice's 39th country on 160, and his 536-foot long wire is no hindrance. Those southern hemisphere breakthroughs could be occurring as you read this. Anybody having any?

* * *

No room for a 20-meter inspection this month, but **Ws** 2BTQ/KH6 3HNK 6YKS 7DJU 7VRO 8YGR, **Ks** 3SLP 4JSZ ØGSV ØGVA ØJPL, **WAs** 2KSD 2SRQ 2WIJ 2ZVJ 4CZM 5AER 5EAM 5CTD 6TGH 9FMQ 9ICQ, **WBs** 2HBI 6FWW 6IFC and 11ER on c.w., and **Ws** 3HNK 4HKJ 6YKS, K4JSZ, **WAs** 2VOW 2ZVJ 5AER 5CTD 5EAM, **WB6**IFC and subsequent reports on voice will help us do the job next month. Good huntin', gang!

Where:

OCEANIA — "I have already received logs from PK2ET (ex-DJ4IC), have ordered QSLs printed, and will QSL



100 per cent," declares DJ5QK. Unfortunately for FCC-licensed amateurs, Indonesia remains on the ITU/FCC Banned Countries List at this writing. When that country properly removes itself from this category W/Ks will be free to QSO those PKs, 8As and 8F2s . . . . . "I have logs and plenty of cards," reports VK2AXK-VK2ATQ, "but changing QTH has upset my QSL routine. I hope to catch up in the near future." Brother Kinsella's new address appears in the list to follow . . . . . KH6COY, who inherited the Wake QSL bureau from KW6CJ, wants former KW6-stationed amateurs to claim their QSLs now cluttering up his files; self-addressed stamped envelopes, please. Arnold writes W1ECH further: "It should be realized that hams traveling through these islands are stationed here only for short durations, sometimes for only a few days. They operate briefly, fail to leave forwarding addresses and do not notify their own local QSL managers of their presence here. I am sure this same condition exists on all these small Pacific islands." KH6COY/KW6 urges DXers who QSO such stations to QSL quickly, include s.a.s.e. and specify the name of the operator . . . . . VR1A, Chas. W. Adams, c/o P&T Dept., Betio, Tarawa, Gilbert Islands, Central Pacific, is the full QSL bureau address for VR1-land, according to ARRL Assistant Secretary W1ECH . . . . . Superactive ZL1TB guarantees 100-per-cent QSL, and ZL3II tells K5JVF on 40 c.w. that he still welcomes QSL inquiries concerning his past VR2EH action.

EUROPE — W2BTQ/KH6 reminds us to iterate that UV and UW prefixes now are used in some UA regions without special DXCC significance. Same as UT5 for UB5 . . . . . WA2YBR has no QSL arrangements with OK3CDP and suggests the Czech bureau . . . . . Never give up! S.w.l. L. Waite of NNRC just received ZB2A's QSL for a 1946 report. The card appears to have traveled the mails for 17 years . . . . . WGDXC reveals that W2SAW and XYL will leave in August for a three-month browse of the Continent. Better stock up now on some of that potent foreign-mint postage from Sax's inventory . . . . . The Gulf gang's *Bulletin* recommends three International Reply Coupons and an airmail-style s.a.e. if you would patronize DL9PF's QSL efforts in behalf of F9UC/FC . . . . . WA2KSD was pleased to bump into SV1AO, an exchange student at RPI, particularly because he needed Michael's QSL for their 1961 QSO.

ASIA — "I have taken over the responsibility of running the 9K2 QSL Bureau," notifies 9K2AN via W1WPO. Former QSL manager 9K2AZ is leaving Kuwait . . . . . Singapore suffixes AAA and ZZ are unauthorized, states VS1LS of MARTS (Malaya) . . . . . "G5GH now has MP4DAH logs," discloses W5VA-W5AI. "Bing apologizes for tardy QSLs resulting from redirection of mail to Das and England, then to Lebanon and Saudi Arabia." W2GHK notes that QSLs for MP4s MAP and TAX were launched in late March . . . . . W4HKJ recently had his 1959 KA0IJ QSO confirmed through WA6EYZ.

AFRICA — Marion Island hunters be advised by W2BXA that QSLs for ZS2MI QSOs before March 2, 1964, go via ZS1OU. QSOs after that date are confirmed through ZS5JY . . . . . "I'm still sending out 7X2VX QSLs," reminds W4UWC, specifying s.a.s.e. . . . . "International Reply Coupons are much appreciated," assures ZD3A in a note to LIDXA's W2MES. Reg's QSL output was delayed by slow delivery of blanks from his London printer. "When they do arrive I will reply 100 per cent to all valid cards received." . . . . . NCDXC's *DXer* says that VQ1GDW responds only to sign-on-the-dotted-line QSL blanks . . . . . WB2HBI is told by 9Q5s AAA and AB to QSL only via WA4STL (ex-W2HMJ) . . . . . NNRC's *Bulletin* remarks that mail to TU2AU may not get through if Smitty's name and/or call appears on the envelopes. Just United States Embassy, P.O. Box 1188, Abidjan, Ivory Coast Republic, will do. Good point to keep in mind when QSLing other overseas hams in similar circumstances.

SOUTH AMERICA — "Please note in *QST* that VP8GQ's log for contest activity on November 23–24, 1963, was lost in the post," pens G3PAG. John tells W1WPO that a replacement transcript will be filed — no more duplicated QSL requests, please . . . . . From YV5BBU of RCV: "Anyone needing a QSL from YV0AA, Aves island, can send for it to Radio Club of Venezuela, Aptdo. 2285, Caracas. QSLs for YV0AA activity on November 8–11, 1963, also can be sent via Hammarlund DXpedition, P.O. Box 7388, GPO, New York 1, N. Y." These instructions apply to YV0AA/mm, as well . . . . . W2CTN tells K5JVF that logs from OA8D/3 are overdue . . . . . W2GHK expects VP8HF's South Sandwich pasteboards to be on the way by this month . . . . . PY9AE finally came through with a QSL to W4HKJ for a 1959 QSO.

WHEREABOUTS — VE3AML no longer serves as QSL manager for YS1MS . . . . . NNRC notes that Jamaican 6YAs began using the 6Y5 prefix in April . . . . . "VP7NY QSLs now will be handled by Hammarlund DXpedition, P.O. Box 7388, GPO, New York 1, N. Y.," announces a W2GHK release. "Logs will reach New York periodically for operation on 6 through 160 meters, and

9Q5HF has a Viking I and 3-element quad smoking at Linga, a 7000-ft. QTH just two degrees off the equator on the shores of Lake Albert. (Photo via 9Q5TR/K3QDW)

QSLs will go forth continuously." . . . . . FDXC has it that W/Ks can obtain W4NXL/mm cards via K4MYZ. Others should apply through ZS1TZ . . . . . Plenty of "QSLers of the Month" are recommended for swift and sure confirmations by "How's" correspondents Ws 1SWX/1 6YKS 8TRN ØPAN/1, Ks 3FFJ 3SLP 4JSZ 6DQB 7QXG ØGVA ØJPL, WAs 2RGK 2VOW 2WIJ 5CTD 6ZMR 9ICQ, WB2s CCO HSK and ICH: CP8AB, DJ4AJ, DU7SV, F7DE, FG7s XR XS, FO8AA, FY7YK, HIs 4ARM 8LC, HK3VV, HP1IE, JA1LVF, KCs 4USK 4USX 6BK, KH6BTX, KL7ELJ, KP4s AQL AXM AZJ BBN BJM BJU, KV4CF, KX6BU, KZ5BC, LAs 1H 9OI, LUs 1AOF 8EE, M1M, OA1W, OZ1W, PY1AQT, SM6BUB, TG9SC, TI2EW, VPs 3HAG 9L, VS1LJ, WP4s BQA BPD BPH, XEs 1ZE 2AAG 2HW 3CM, YVs 1DP 5BIG, ZD3A, ZE4JS, ZL2ALO, 4U1ITU, 5A2TJ, 9G1DY and 9Q5AB, plus QSL agents Ws 2CTN 4ECI, WA4STL and KP4YT. Any quick confirmers you'd like to have commended here? . . . . . Florida DX Club *DX Report* editor W4HKJ writes, "Thanks for mentioning my needing VK9AD's QSL for a 1959 QSO. I promptly received five cards and letters and three over-the-air messages all confirming each other. The card arrived last Saturday. That's what I call results!" More QSL help wanted: W1AJV for QSOs with KC4s USA USB in '59, K6BAZ/FO8 '57, UI8AAZ '60, VP2s KH KR '59, VQ5GC '57; W1SWX/1 for CE0AT, HI8MM, VP2AX, 9G1EI; W3HNK for FY7YJ, 6W8BL; K7QXG for 9Q5BZ; K0GSV for EI9BC '60, VPs 2AR 2DJ 4TR '59–'62, ZS7L '61; and WA6ZMR for VR5BQ. Space for these inquiries is necessarily limited to objectives reasonably rare and reasonably overdue . . . . . WB2EDW offers QSL-managerial assistance to rarish overseas stations in bona-fide need . . . . . WA9ICQ feels that XE1NE's 10-by-8 wallpaper rates rating as biggest QSL of the month . . . . . "Wish you had a blacklist of slow QSLers," remarks W8TRN, armed with numerous candidates . . . . . "QSLs for all XE0ICS QSOs have been posted," sighs K6ICS, soaking his wrist. "I'm still working on the XE0CS stack. S.a.s.e.s surely help!" . . . . . So what else is new? Some of these postal possibilities may be:

CP1DN, Box 205, La Paz, Bolivia
CP8AB, C. Brezinski, Casilla 9, Riberalta, Beni, Bolivia
CR6GJ, P.O. Box 43, Gabela City, Angola
EL2AD (via K5AGJ)
EL8A, Box 497, Monrovia, Liberia

WANTED!

More amateurs are desired to assist the League in identifying and protesting the presence of any commercial or government or nonamateur stations of any category found trespassing in our amateur frequency bands. Can you be an intruder observer? Drop a postcard or radiogram to ARRL Communications Dept., 225 Main St., Newington, Conn. Ask for our CD-36 forms on which to report nonamateur intercept. (See the article on intruders, Mar. '64 *QST*, pages 26–27.) Help the League help you by enlisting in this operation.

ET3JF, J.D. Fry, P.O. Box 1141, Asmara, Ethiopia
ET3RT, R. Thompson, USMAAG, APO 319, New York, N. Y.
FK8AT (via W2CTN)
FS7AA (via WA8CHU)
HL9TO, W. MacDowell (W2AOO), Co. B, 11th Engr. Bn. (C.A), APO 358, San Francisco, Calif.
HL9TS, Lt. O. Weiss, Jr. (K2UVU), Hq. 4th Bn., 76th Arty., APO 51, San Francisco, Calif.
HL9US (via HL9KB)
ex-HS1D-TA3FAS (to ET3JF)
HZ3TYQ (W1TYQ, via HZ1AB)
K2DCX/TL8 (to K2DCX)
K4CSY/VP9 (to K4CSY)
K7VAX/KS6, W. Conway, Box 458, Pago Pago, Samoa
KG6IF, APO 315, San Francisco, Calif.
KH6COY/KW6, A.D. Samuels, c/o OIC, U. S. Army Radio Stn., APO 101, U. S. Forces, Wake Island
LU2DAW, P.O. Box 5102, Buenos Aires, Argentina
MP4BEQ, S. Gibbs, % IAL, Box 144, Bahrain, Arabian Gulf
MP4DAH (via G5GH)
PK2ET (via DJ5QK)
PY1MCV (via LABRE)
SM4CMG, R. Ohlsson (ex-SM5CMG), Box 1002, Fellingsbro, Sweden
TF2WIN (to K1MTG)
TR8AD, Box 1025, Libreville, Gabon
TT8AN, C. LaBarbe, Box 710, Ft. Lamy, Tchad
TU2AN, Box 2261, Abidjan, I.C.R.
VK2s ATQ AXK, Rev. Bro. D.L. Kinsella, Christian Brothers College, Crown Lane, Wollongong, NSW, Australia
VK9GC, A. Sandilands, Box 55, Rabaul, T.N.G.
VP7NY (see preceding text)
VQ9HJB (via G8KS)
ex-VS1LE (to 5B4DL)
VS1LP, R. Snyder, Mt. Elizabeth Flats, 53P Nutmeg Rd., Singapore 9
VS4RS, R. Skelton, ACT *Telecomms. Hq., Kuching*, Sarawak
VS9OSC, Amateur Radio Club, RAF, Salalah, BFPO 69, Aden
VS9PHH (via RSGB)
WB6CQR/KH6, Maj. W. Hall, 725 Duncan, Schofield Bks., Hawaii
XE1UFI, P.O. Box 70308, Mexico D.F., Mexico
XE1UIA (via LMRE)
XE6CS (to K6ICS)
XEØZZZ (to K8ZZZ)
YS3TM (via RCES)
YU2OZ, S. Kalapis, Dubrovnik-Lapad, Dalmatinski put 25b/I, Yugoslavia
YV5BBU (via RCV)
ex-ZC4AK (to GM3MBS)
ZC5s AJ AM LX (via WA2WUV
ZD3A (via RSGB or direct)
ZS2MI (see preceding text)
4X8JU (to 4X4JU)
ex-5A3CJ (to MP4BEQ)
5A4CW, Box 281, Benghazi, Libya
5A4TI, Oasis Oil Co., Box 395, Tripoli, Libya
8F2ER, Box 405, Djakarta, Indonesia
9Q5AB, via A. Nickel, WA4STL, 3326 Sargeant Dr., Charlotte, N. C., 28210
9Q5EI, Box 446, Kolweizi, R.C.
9Q5TR, Dr. H. Wilcke, Africa Inland Mission, Private Bag, ARUA, West Nile District, Uganda
9X5DW (via DL1ZK)

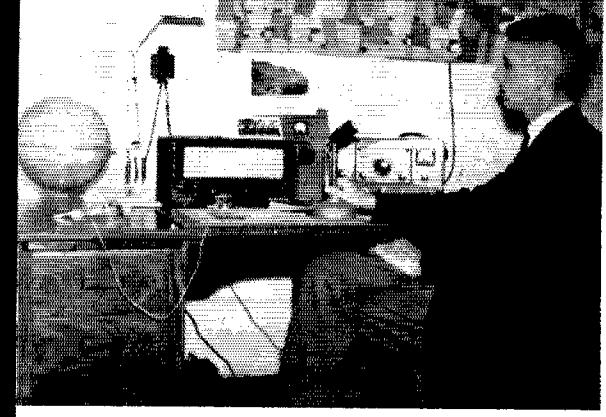
The preceding are necessarily neither accurate, complete nor "official", and are sent your way with the compliments of **Ws** 1RAN 1SWK/1 3HNK 6YKS 7QB 8YGR, **Ks** 3SLP 3SWZ 4JSZ 5JVF 7QXG 7VMO 9UOV 9GSV 9GVA ØJPL, **WAs** 2SRQ 2VOW 4CZM 6XMR 8AJX, **WB2s** CCO HBI HSK, GM3MBS, VE7BBB, DARC's *DX-MB* (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 *DXer* (W6HVN), Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV) and West Gulf DX Club *DX Bulletin* (W5IGJ). Any fresh "Where" material in *your* log or mailbox? QRV!

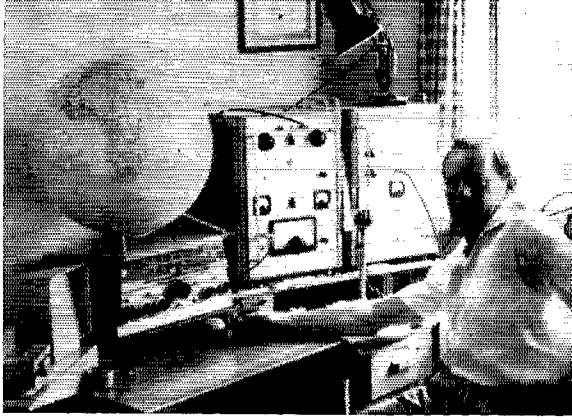
Whence:

EUROPE — PX1s MO and QX (F2s MO and QX) who did such a bang-up DXpeditionary job in Andorra last year, will present an encore of multiband multimode entertainment on the 12th through 21st of this month. They'll also sample 144-Mc. conditions as PX1RX from that 8000-foot hillside . _ . _ . _ SVØWAA (W4IA) tells W1RAN of much Rhodes QRM by SVøs WDD WF WG WQ and WV. Hams passing through Athens are urged to give Ev a buzz on telephone *012816* . _ . _ . _ Antwerp C.W. DX Club offers the Benelux Award to non-European DXers on the basis of confirmed QSOs with four PA/PI, four ON and two LX stations, and PZK (Poland) will present certifications to non-European stations who confirm contacts with three Cracow SP9s between April 1 and September 30, 1964, in commemoration of the 600th anniversary of the founding of Cracow's famed Jagellonian University. Full award details are available from ON5AX and PZK, P.O. Box 606, Cracow I, respectively . _ . _ . _ Ex-SM5CMG now finds himself rarer for WASM-II purposes, signing SM4CMG on c.w. and sideband from 10 through 80 meters . _ . _ . _ DL1FF, always a big sig on 160, 80 and 40 c.w., has his DX activities curtailed by a heart ailment . _ . _ . _ Mark your DX calendar for the Tenth WAE DX Contest, always a lively affair, sponsored by DARC (Germany) on (c.w.) August 8th-9th and (phone) the 15th-16th. Participation details here in due time . _ . _ . _ S.M.O.M., possibly the smallest "country" in the world, is the operational objective of IT1s TAI and ZGY. It's adjacent to a Rome haberdashery.

ASIA — "My stay on Cyprus will depend on U.N. peacemaking progress," writes 5B4DL (ex-DL2BJ-MD5DL-MP4MAC-MP4TAF-SU1SS-VQ4DL-VS1LE-VS9ADL-9M2AD) to W1WQC. "I have only a '19' set running two watts on 40 and 80 c.w. at present. My future locations will be Hong Kong, Christmas, Cocos and Borneo. See you on 15 and 20 when I get suitable equipment. W/Ks really roll in here on those two bands!" . _ . _ . _ "We recently formed the 8th U.S. Army Radio Club in Seoul and are licensed as HL9US with an HT-37, S-line, 2B, triband 3-el. yagi and 7-Mc. doublet," writes treasurer HL9KB. "HL9KN is president, HL9KC v.p., HL9KS secretary, and HL9TP activities manager. As HL9KB I run 100 watts into a triband cube quad, a 7-Mc. vertical beam fixed on the U.S.A., and an 80-meter Marconi. DX conditions seem to be getting better but 3.5-Mc. commercial and government QRM is terrible, and 7-Mc. competition from the JA gang is fierce." Al suggests a check with HM1AP of Korea DXers Society for details on WAK, a sheepskin based on confirmed QSOs with ten HM-HL9 stations. W2AOO now signs HL9TO on 14,040-kc. c.w. with the Army Engineers . _ . _ . _ W1RAN notes that airman friend W1TYQ is now franchised as HZ3TYQ with grim DXpeditionary intent. G3NMQ (ex-MP4QBG-5A3BC) also is in Dharan . _ . _ . _ VS9MB's Tom writes W1YYM of ARRL that the Gan gang's regular rig is on the rocks. "Our stand-by outfit gives us trouble, too, being an old Army set with lots of modifications by all and sundry." . _ . _ . _ 4X4IH radios for El Al airlines, visiting W2QJP, WB2s GHT HNQ and other New York area ham friends between transatlantic hops. Aaron has an HT-32 and 3-el. spinner on 20 back home . _ . _ . _ WA9ICQ finds Dickson Island's UW9AP a handy 14-Mc. item with which to finish off one's WAC . _ . _ . _ Singapore synopsis: K7QXG finds VS1LJ a regular 1600-1700 fixture on the low edge of 40 c.w. . _ . Weary of the usual hit-and-run DX contact, VS1s CM DD DK GQ JG JW KA LG LJ LU LV and MC have formed the Singapore Rag Chewers Club. There's a fancy red-on-white diploma available from VS1JG if you qualify by

W4BPD was ambushed by enthusiastic west coast DXers on his return to the States this spring. Gus, who scored almost 200 kiloQSOs in more than sixty countries over the past two years, had an extensive banquet itinerary interrupted by a mid-April appendectomy.
(Photo via W6RW, SCDXC)





ZEs 3JJ (left) and 4JS work plenty of Stateside friends from Salisbury. ZE3JJ caused Basutoland excitement as ZS8JJ in late '63. ZE4JS favors 14-Mc. c.w. with his 813 100-watter, KW-77 receiver and quad beam.
(Photos via Ws 2RSO and 3HNK)

chatting with one or more of the lads for at least half an hour. . . . VS1LS of the Singapore MARTS section writes W1BDI, "We are a small community of amateurs here, all keen to promote high standards of operation on the ham bands." . . . . . More Oriental oddments via the press of aforementioned clubs and groups: K4UTE, awaiting his own gear for YA4A action, passed the springtime manipulating YA1AW. Dick plans rarer DXpeditionary doings for late '64. . . . JTs 1AD 1AE 1AG 1KAA 1KAG and 4KAA are listed workable by JT1CA. . . . HL9TS (K2UVU) commenced his Korea DX career by clicking with W1s VG and JYH on 20 c.w. "The band starts to open here at 1200-1500 GMT, peaking later at 2300-0200. I'm using a simple vertical pending arrival of my quad rotator." . . . W6BYB filed the first non-JA application for 88-JA8 credentials. . . . 4X4JU, a 300-country type, says that ZC6 activity seems out of the question at present. . . . 5B4IP (G8IP) probes for difficult 7-Mc. phone DX with a ground-plane, 150 homespun watts and a souped-up 75A-1.

AFRICA — Kenitra Amateur Radio Club recently elected CN8s AW prexy, GB secy-treas, and GD a board director. Ws 4BJR and ØJHY hold office as veep and club custodian. KARC is affiliated with Morocco's ARAEM . . . . . Ex-HS1D-TA3FAS communicates from Asmara as ET3JF: "It's always lots of fun to operate from a rare DX spot, and I notice considerable improvement in the general operating habits of the W/K boys. My KWM-2 must tolerate plenty of QRM here, especially from the U bunch and other Europeans." . . . . . W1WPO learns that ST2AR's station is again under official lock and key. Hurry back on, OM . . . . . CR5SP and friend(s) expect intermittent action at Sao Thome, Principe, Annobon and Fernando Poo this summer, single sideband preferred. W2GHK will tip us off when possible . . . . . GARS (Ghana) offers its new 9G1 Award to DXers who hook five different 9G1s on two or more bands. Consult 9G1CC for specifics . . . . . GM3PYA expects to return to 5Z4DW in September after a U. S. visit, says s.w.l. R. Walsh of Newton, Mass. . . . . VQ2AD's transistorized 8-watt s.s.b. outfit is plenty readable on 14,276 kc. at W8EGR . . . . . According to W1YYM, CR6CH (ex-CT1UX-CT2AB) wields a wicked watercolor brush when DX is slow . . . . . Africa addenda via the clubs press: FB8ZZ passed along HB9TL's lend-lease sideband set to FB8XX unused. . . . 5N2JKO finds W/K 75-meter signals best around 0530-0615 GMT. . . . FH8CD is expected to put the Comoros in the s.s.b. column before this is read. . . . VQ1GDW still holds out on 14,110-kc. sideband around 1900 GMT. . . . VQ9HJB, 14,125-kc. s.s.b. at 1900 GMT, fills VQ9HB's Seychelles shoes while Harv activates rarer VQ8 regions. . . . Ex-ZD9AM will sideband from Marion's ZS2MI for a year or so.

OCEANIA — "Beginning in March my old friend ex-DJ4IC has been signing PK2ET on 14-Mc. c.w. near Solo, Java," discloses DJ5QK. "Jonny has a homebrew 100-watter, 51-J and Super Pro with a simple Windom skywire. PK2ET is most active between 0500 and 1300 GMT." Jonny unfortunately is out of bounds for W/Ks at this writing . . . . . ZL1TB is often told he's somebody's "first ZL." So regularly, in fact, that only six United States have failed to tile that phrase in his QSL collection. "Until conditions improve it appears I will have to be satistied with 44 states toward this 'hard way' WAS. Meanwhile I'll gladly arrange skeds with hams in Alaska, Hawaii, Idaho, Kentucky, New Mexico and North Dakota who still need that first ZL." . . . . . FU8AG, likely to pop up on 7010, 7020, 7030 or 7040 kc., continues to elude W1RAN. KG6SA is another 7-Mc. 0700-GMT enigma for New Englanders . . . . . W6CP hears that VK2SK is whipping up one of W6TC's popular *QST* HBR-11 receivers. Sam, chassis chess fan from 'way back, is also constructing s.s.b. apparatus . . . . . ZL3H (ex-VR2EH) tells K5JVF he probably won't soon again go roaming . . . . . Pacific patter courtesy club journalists: VS4RS is now Sarawak's communications chief. . . . K7VAX/KS6, a schoolteacher, hits 20 s.s.b. around 0200 GMT. . . . ZL4JF tries 40's low edge for three or four quick c.w. QSOs around 1100-1230 GMT. Another Campbells candidate is ZL4LY, usually on 20 c.w. . . . Juicy 80-c.w. items show up Down Under at 1300-1400 GMT, says VK4SS. . . . KG6IF, with several ops on 14-Mc. sideband, is back on from Marcus isle. . . . WA6HRS of KX6BU renown comments, "There were times in the ARRL Test when my QSO rate reached 74 per hour, and other occasions when W/Ks were booming through with practically no takers. Caught a good East Coast opening on 75, forty was good from 0530 to 0800 GMT, and a short session in the 15-meter Novice range created complete chaos there." . . . CR8AD's hours of electricity are limited. His favorite fire-up time on 40, 20 or 15 c.w. appears to be 1200 GMT. . . . WB6IWJ has a few more weeks of interesting KJ6BZ duty to discharge.

SOUTH AMERICA — Balmy summer breezes waft around up our way but winter holds remote Amundsen-Scott South Pole Station in an icy grip. W8GHE (ex-KC4USN) writes, "The fellows down there are undergoing eight months of complete isolation. Good old ham radio is their only contact with home." Ws 1VP 4DLK 4LRH and 6QPI are among the anchor team at our end . . . . . Maryknoll missionary CP8AB radiates from the Bolivian jungle 350 miles from civilization. WB2CCO says Casimir has a standout s.s.b. signal on 15 . . . . . K5JVF finds PY2SO determinedly gunning for the Dakotas on 7-Mc. c.w. ARRL's coveted WAS, of course . . . . . According to ISWL's *Monitor*, VP8HR and second op VP8GX have a Vanguard 50-watter and Heath RA-1 on 14 and 21 Mc. from Port Stanley.

HEREABOUTS — W1RAN reports W3ZA (TC3ZA, etc.) settling down in California after another productive overseas tour . . . . . "Grand Turk Amateur Radio Association has discontinued issuance of the Grand Turk Award as of May 1, 1964," records VP5BB . . . . . W1JYH tests a new Massachusetts QTH, and W1RAN has worked DXCC members in 131 countries . . . . . WA8CHU tells VE7BBB that FS7AA's K5CDP is about to sign a KL7 call . . . . . K6s ICQ and JJC helped K6ICS make all that springtime noise from Ensenada as XE6s CS and ICS. Despite mediocre conditions on 20 and 40, Len & Co. managed more than 500 QSOs on sideband and c.w. Incidentally, s.a.s.e. to K6ICS will get you details on obtaining hamming privileges in Mexico . . . . . VE3WSB plans thorough DX developments on 10 through 80 meters during October's Boy Scout Jamboree-on-the-Air . . . . . In recognition of his fostering of world-wide DX activities, W2GHK was cited as Newark News Radio Club's Member of the Month for February . . . . . Among incoming gripes of the month: K5JVF protests insufficient 40- and 80-meter output at the DX end. . . . Not enough c.w. DX around the 21-Mc. Novice segment, according to WN4QJK. . . . Ill-timed calling by W/Ks, particularly during transmissions by rare DX stations, provokes W7QB. . . . Twenty-meter DX phones who never listen over the Canadian segment rile VE8RG of PJ5MF . . . . . K9PRU seeks to throw in his lot with somebody's summertime DXpedition . . . . . WAØs BDU BMW and EMS vie for the first WAØ-type DXCC membership. WAØEMS resorts to a kilowatt to get over the hump but acknowledges it was more fun working his first 42 countries with 15 watts

(*Continued on page 168*)

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

U.S. to Europe on Two Meters!

MOONBOUNCE is a very special kind of amateur endeavor. We've had a pretty fair idea of the requirements for earth-moon-earth v.h.f. communication for many years now, and the figures are not encouraging to even the most ambitious and well-equipped v.h.f. man. Despite the known nature of the handicap, a few v.h.f. enthusiasts scattered over the world have devoted endless man-hours to the moonbounce problem, with a dedication that is in the best ham tradition.

Probably nobody in the moonbounce field has worked harder and made less noise about it than Bill Conkel, W6DNG, of Long Beach, California. Since 1952 he has, among other things, built and tested 59 different 2-meter antennas.

Moonbounce requires antennas that the average ham hardly dreams of building, let alone designing them himself and then putting them up in an average residential location. Taking nothing for granted, Bill has tried just about every configuration, and all polarizations, including reversible circular.

Never one to do things halfway, W6DNG has kept skeds with every known 2-meter moonbounce station in the world, and not without a measure of success. Time and again he has heard or been heard by K1HMU and OH1NL, two other outstanding v.h.f. moonbounce stations of recent years.

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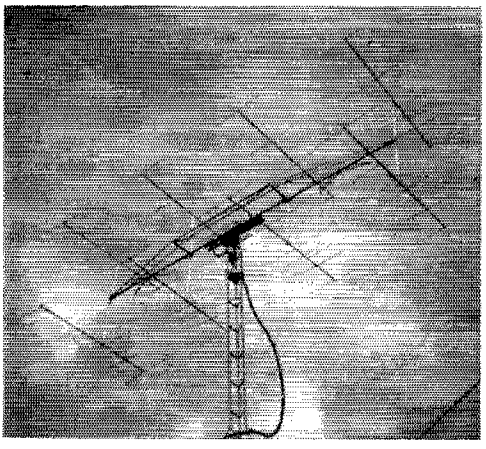

Probably most workers would have called some of these results "QSOs." Each heard the other on at least one occasion, and there are some very respectable recordings to prove it. But all along these fellows have insisted on the simon-pure approach, working for a complete exchange of information, in one session, on one band, without liaison simultaneously on other frequencies or by other communications media.

This objective was achieved by W6DNG and OH1NL on April 12. We have a new 2-meter record, and with it a batch of v.h.f. "firsts." This is the first real 2-meter lunar QSO over any distance, and it is the first transatlantic contact above the 50-Mc. band, the first West Coast-to-Finland v.h.f. QSO — and so on down the list.

The author of these lines has probably listened to as many hours of weak-signal v.h.f. DX recordings as any man alive. These include every known form of v.h.f. propagation, and nearly every 2-meter moonbounce tape ever made. Quite a few of the latter show readable signals at times, and one would have been tempted, certainly, to have called them QSOs. But always the vital factor of complete *exchange* of information was lacking, till now. After listening carefully to the April 12 recording made by W6DNG we have no further doubts. This is *communication*, for sure.

How It Was Done

It is well established that moonbounce work requires all the power one can develop legally in amateur circles. It takes the ultimate in weak-signal receiver techniques, including extreme selectivity and the best low-noise front-end design available. The antenna must give an honest 20 db. or so of gain, and it must be capa-

The antenna system shown in these pictures is the 59th in a series of 144-Mc. arrays built by W6DNG, Long Beach, Calif., for the express purpose of bouncing 2-meter signals off the moon. Eight 7-element Yagis, stacked four wide and two high, are fed in phase. The array is all-metal construction, and can be tilted to any angle above the horizon as well as rotated in azimuth.

V.H.F. SS RESULTS

The official results of the V.H.F. Sweepstakes, which normally appear in the June issue of *QST*, will be published in July this year.

ble of being elevated in angle above the horizon as well as rotated in azimuth. Control of antenna movement must be precise in both planes. Stability and calibration accuracy far beyond ordinary amateur needs must be included in both transmitting and receiving gear.

The big question, among 2-meter men at least, has been polarization. Do you go all-out for universality, and incorporate switchable-sense circular polarization, or do you take your chances with plane polarization, horizontal or vertical? Echoes have been received on 144 Mc. with both circular and plane-polarized antenna systems, and W6DNG has used both successfully in receiving his own signals via the lunar route. His first success some years ago was with a horizontal system, and the QSO with OH1NL was made with the horizontal array shown on page 95.

Antenna Number 59 in the moonbounce program at W6DNG has eight 7-element Yagis of graduated element spacing, four wide and two high. The individual bays were worked out thoroughly, and they show an honest 10 db. gain. The phasing system is balanced line, with "Q" matching at each folded-dipole driven element. The main transmission line is RG-17/U.

The transmitter power is one kilowatt, c.w. The receiver has a 416B preamplifier ahead of a Nuvistor converter and a 75A-4. A noise blanker is used in the converter output, and an audio filter in the receiver output.

At this writing we have no details on the setup at OH1NL, though we know that Lenna Suominen is no newcomer to the moonbounce fraternity. He has been working with W6DNG for many months, and signals have been heard each way on several occasions. OH1NL and K1HMU had a measure of success last summer. One observation we have from OH1NL is that his best results have been achieved when the moon is fairly high and the air clear. This is in line with K1HMU experience in the summer months, when the haze of an evening moonrise has seemed to be a dispersive medium.

So, we have our 2-meter moonbounce QSO, at last — the culmination of at least 15 years of amateur work and planning. Many calls come to mind as we report an event of this significance; fellows who have tried and failed, or succeeded perhaps in part. As we salute Bill Conkel, W6DNG, and Lenna Suominen, OH1NL, let us also honor W4AO, W3GKP, W1FZJ, W6QKI, W2NLY, K1HMU, W1ZIG and many others, whose tireless effort has contributed to amateur progress in this most esoteric form of v.h.f. communication. — *W1HDQ*

144 Mc. and Up

The 1215-Mc band is slowly gaining in popularity all over the country. WA2UDT tells us that the Central New Jersey VHF Society has several members active on that band as well as a microwave group. Bill alo sez that he has completed his 220-Mc. converter and r.f. section, but is still working on the power supply and 432-Mc. converter, tripler. In California the Westchester 1230 Mc. Net meets every Sunday at 7:00 P.M. Sounds encouraging when the v.h.f. gang starts net sessions on any band, 'cause that's where the activity is bound to settle down. WB6DMB observes quite a bit of 1215-Mc. activity in Orange County and San Diego. Bob has been experimenting with open-ended waveguide antenna on 1215, and is also making a study of components and designs for planned operation on S band and/or X band. He would appreciate hearing from other amateurs who are also engaged in operation or experimentation on these bands. K6HEP at Santa Clara sez he still wants skeds on 1215. And — WA5JAY in Louisiana has completed a receiver (less converter) for the same band.

At Milwaukee WA9FNS sez his work with microwave diffraction (2300 Mc.) is beginning to look very interesting, and that the gear is starting to show signs of life although there are many bugs still to be worked out. K7GWE at Gladstone, Oregon is still working on 10 kMc. polaplexers. Randy now has some v.h.f. transistors and is planning a low-power rig for the coming summer.

Jim, WB2EDW and Bob, WA2HIN at Grand Island, New York (near Niagara Falls) are working on conversion of some Motorola 470-Mc. gear to 432 Mc. The boys hope to soon be on the air with about 50 watts f.m. to 2C39s. They are also planning some work on 1215 when finances permit. At the moment however, they'd like some information on the 416B as they are unable to find sockets or any specs on 'em. They'd also like to hear from v.h.f. enthusiasts in the Buffalo-Niagara Falls area.

W2SEU not quite on 432 Mc. yet. Fred's having trouble with the grid drive to the final but is still working at it. WB2GKF sez he's been reworking two BC-645s for 420 Mc. One unit is finished and time involved was about 30 hours.

Another Jerseyite, WB2EZY, sez he too has a rig for 432 Mc., but if he's on the air with it or not we just don't know. Fred, W2SEU, has given up on his old 432 rig and is building a new one. With luck he should be on the air with it by the time you read this. He is presently on 6, 2, and 220 a.f.s.k. using a Model 19 teletype and a homebrew converter. K2SYA is also on RTTY on two meters and the boys operate on about 146.5 along with K2LCK. 220-Mc. activity is increasing in the Freeport, New York area, sez W2SEU, and if everyone on 6 and 2 meters who is talking about it actually gets on, the band will be crowded.

At York, Pennsylvania, W3MMV has two states on 1296, Pennsylvania and Maryland; five states on 432 with W1HDQ being his best DX at 240 miles. Fred keeps a nightly sked with W3RUE at 2200 EST and has been hearing bursts regularly although two-way contacts are infrequent. If anyone would like skeds with Fred on 432 just write him.

Rusty Holshouser at Salisbury, North Carolina, is looking for skeds on 420 and 220 Mc. The 432-Mc. rig consists of an SCR-522 driving a 2C39 tripler into a 2C39 amplifier, running about 180 watts input. Rusty recently got a 4X250 going on 220 with about 350 watts. Frequency not set as yet but it will be near the low end (freq. on the 420-Mc. band is 432.052 Mc.).

W4GJO sends the following information concerning the 420-Mc. band from Florida: "K4NTD's signal is greatly improved since he replaced his 13-element single Yagi with a double-10 J beam. We can work phone most nights, with just the varactor triplers on each end. Another new station was worked on March 17, WA4NKN in North Orlando. Still no signal from Vic, W4LIP, although he was said to be ready to go with a 64-element collinear. Dick, K4PBP, is currently building a 7077 converter and a varactor tripler and others in the St. Pete area are beyond the talking stage. Eventually I guess we'll have a real active band in Florida. Nightly across-the-state contacts continue and so far as I know, we have never missed working when both ends of the sked were kept. Sometimes c.w. is mandatory; often a.m. is like local quality. The night of March 17 showed very good conditions on 432 Mc. Both K4NTD and WA4GHK had very strong phone signals. John, K4IXC, was running about 200 watts input on 432 the last I knew. He has not been very active on this band, however, as he and WA4GHK have been working hard to work each other on 1296 Mc. He's been busy constructing dishes for that band." Grid goes on to report good conditions on 432 the night of March 20 when he was copying TV from New Orleans in the afternoon and from Montgomery, Alabama in the evening. One more new station heard was WA4FIJ in Panama City, who was on for some time testing on c.w. with a very good signal.

At Gurdon, Arkansas, W5JWL sez his kilowatt 432-Mc. transmitter is still underway but progress is slow. Joe is looking forward to working up an s.s.b. transmitter for 432 Mc. in the near future. Power will be in the 50-watt-output class and antenna system is 128 elements at 50 feet, fed with gas-filled coax. In Kansas City, Missouri, WA-9CWZ/Ø, is not having much luck in finding hams interested in 432 Mc. in that area. Bill sez he is "just getting my feet wet" on 432 and all he has is a Vocaline URC-425. As he is still going to school he has neither much time nor money to devote to 432 but would like hams in the area who are interested in the band to get in touch with him. Correspondence should be addressed to William Ganoe, WA9CWZ/Ø, 3629 Central, Kansas City, Missouri.

Reports concerning 220-Mc. activity are not nearly as numerous as reports on 420 Mc., but a few of the boys did send in reports. For instance, WA2UDT sez he has completed converter and transmitter for 220 Mc. and is presently constructing amplifiers for 220 and 144 Mc. W6ORS has completed his exciter for the 220 band and is now building the modulator and power supply. K7ICW reports that his attempts to modulate the 500-watt 220-Mc. rig with screen modulation have checked out OK for local use. K7RKH and K7ICW will be ready to go by April 1. WA9FIH observes that he has dug out the 220-Mc. rig and hopes to keep at it until completed.

Two months ago we announced the expedition to be made by K6ICS/XEØCS. A letter from Mike reads as follows: "Only a limited attack on the v.h.f. bands was given. (WHY!?) Two meters was the only band we had this trip, and we ran about 20 watts s.s.b. and c.w. Antenna was an eleven-element beam. Schedules had been made with many stations in the west but although we called and listened nothing was heard. The only signals heard on 144 Mc. were a few very weak ones which sounded like u.f.m. They were random in frequency and were only on the air for very short times. We were unable to get a fix on any of the signals with the beam." Location was the town of Ensenada, B.C., about 65 miles south of San Diego, California." Sorry you had no v.h.f. luck on that expedition, Mike. Perhaps the one at the end of April came out better.

Two meters seems to "come into its own" just a little more every winter. What with meteor showers, tropospheric openings, etc., more and more states are being worked on this band. WB2CCO writes that he is now running high power on 144-Mc. s.s.b. Bernie beams south and west nightly from 9:00 'til midnight looking for other s.s.b. stations. Transmitting frequencies are 144.2 and 145.2. Frank Kiefer, K2PWG, is working on a transistor VOX to use with his Johnson 6N2 for a.m. use.

WB2HZY is in a building mood and has built a two-meter ground plane and a beam. He is presently building a two-meter transceiver. In New Jersey, WN2KLD reports hearing a couple of 4s in Virginia on c.w. during early March. Moderate signals, sez Tom, and signals from Delaware and Pennsylvania were heard almost nightly. At New Brunswick, Greg, WA2OOD, has limited operating time because of school but he did observe an unusual amount of activity on April 5. By the time that summer rolls around WB2BCS and W2EXQ are expecting to be on 144-Mc. RTTY. K3VGX is looking for skeds on two meters. Brian is experimenting with different types of antennas for both mobile and home use and is presently building a two-meter converter and matching power supply. 144 Mc. is improving, sez K4QIF, but "where is everybody?" Howie comments that good conditions to the northwest have been observed on a number of occasions but "no one's there." March 26 was a big day for K4QIF when he worked K4KSC and W4TKH in Kentucky for state number 23 on 144 Mc. Skeds have been kept with W8QOH and W5RCI for some time. Results with W8QOH have been good but nothing yet from W5RCI. Howie is also very interested in 420 and 220 Mc. and would like to keep skeds on those bands with anyone interested. QTH: RFD 1, Box 212, Salisbury, N. C.

At Greensboro K4APL observes that two-meter activity is very good in that area and that an f.m. net is being started on 145.260. Ron noted particularly good conditions twice during March on 144 Mc., with stations in Greenville and Washington, North Carolina being heard. K4EUS is busy working on a new two-meter final using a pair of 4X250Bs. Sam sez he's been too busy adding to his house to be very active, but if he's building equipment too, we're happy. WA4BMC tells us there's lots of operating on s.s.b. in Florida on 144 Mc., and the gang is thoroughly enjoying the mode. WA4FIJ at Panama City noted a 144-Mc. tropo to central Florida on March 22 when he worked a number of stations between 0430 and 0500. Dick sez: "At 0458 hooked up with K4NTD in Oakland and then shifted to 432 Mc. My first report was 58, but that fell to 339 by 0600. First Panama City-Orlando area contact on 432 Mc., although one-way only. My receiver here was kaput!" Glad to hear you're putting out a signal on that band Dick; now just get that receiver working.

Word received from W5JWL notes that conditions were better than fair on 144 Mc. during most warming-trend days. Stations in Little Rock were putting good signals into Gurdon, Arkansas, as were stations in Texas.

Out in California, WA6NYJ (Redwood City) comes up with the news that "two meters has been fairly well open during March, and WA6JUV concurs in this opinion. Art, WA6JUV has been work-

ing W6YLO, WA6YTB and WB6GGE. WB6CKT tells us that he is running a Collins 75A-4 receiver with an Ameco CB-2 converter and PU-144 preamp. The transmitters are a Swan 120, a homebrew rig with about 3 watts out, which can be used to drive an RCA-CM3U f.m. final using a pair of 2E24s in AB_2 with about 20 watts out p.e.p. The antenna is a 16-element spiral type on a 20′ boom up about 30 feet. Out in the wide-open spaces of Montana W7CJN is hoping for more local activity in Butte on 144 Mc. in the foreseeable future. Orval holds skeds on 145.35 Mc. nightly with W7TYN, W7TQC, W7TUO, and K7OEK in Anaconda; also with W7EQP in Opportunity, Montana. Sez reception on both ends average Q5-S3 and are completely satisfactory.

An interesting and detailed report from K7ICW who sez: "Had QSOs with K6LZC on March 1 and 8 when he copied me partially on A3 phone; on the 22nd very poor on c.w.; and March 29 fair on A3. W6NLZ heard me for the first time on s.s.b. on March 29 using only 120 watts p.e.p. His sideband was quite good also. However, no two-way s.s.b. as yet. On March 16 I tuned up on 144 Mc. and had a go-round with K7NII (on sked) in Scottsdale, Arizona over a most difficult path. We didn't work each other on our first sked but I think he heard me and I certainly heard him. At his end, he was using 150 watts to a 32-element quad Yagi setup on 144.090, mine 144.018 using 500 watts to a 20-element Yagi on c.w. at 2100–2130 PST. I now have s.s.b. on two meter with 120 watts p.e.p. and a.m., working to get final completed. Hope to work K6LZC soon to give it a workout."

At Newark, Ohio K8RXD has been trying out vertical antennas for 144 Mc. and his biggest trouble is finding hams that have vertical polarization to make checks with. Best DX heard so far with the vertical was about 100 air miles. Dean would like to make skeds with others using vertical polarization. At Tiffin, Ohio K8YWF reports exceptional conditions on two meters on March 3. At that time Jerry was copying a number of stations in Michigan, Indiana and Ontario, and K8RPB in West Virginia.

From Michigan WN8LCZ reports working stations in Port Clinton, Toledo and Fremont, Ohio on March 13 and 23; heard stations in Republic and Cleveland, Ohio on March 22 (all on 144). K8PBA at Ypsilanti observed "not even a whisper of an opening" during the entire month of March. And K8VEX in Wayland, Michigan, has been putting finishing touches on his s.s.b. rig for 6 and 2.

Joliet, Illinois, is the home of K9PRB and W9OEQ who work WØDQY, K9EBA, KØGRH in the St. Louis area five nights a week on 144 Mc. The boys are looking for skeds with other states and would particularly like to sked stations in Tennessee and Kentucky. Frequency is 145.045. At Villa Park WA9AEN is now operating two-meter f.m., and in Chicago W9RSV is operating RTTY on 144 Mc. WA9HQP at Michigan City, Indiana noted extended ground wave on two meters on March 5 and 8.

50 Mc.

At Des Moines, Iowa WAØBRU observed stations in Omaha breaking through several times during the month of March on 50 Mc. Hal wants to know why there is not much activity above 51 Mc. We'd like to know, too, Hal. WØPFP reports working state number 37, 2-way s.s.b. during an auroral session on March 4. Lucky station was WØBJV in South Dakota. Meanwhile, another station in South Dakota, WØCUC, notes that he will be operating 50.0 to 50.4 Mc. as portable VE4 and/or VE5 from June 15 to August 15. He'll be on s.s.b. and c.w. daily. Ray Martin, WAØDZI, sez that during March he heard stations in Texas, Missouri, California, Montana and Iowa. 50-Mc. conditions good, sez Ray. At Kansas City, Missouri, WAØFLL is still trying for Iowa, particularly WØYYM who put good signals into K.C. on March 31. WAØCHD at Pleasant Hill (Missouri) reports KØIJJ and WAØEEU now running a kw. on 50-Mc. s.s.b. Randy also tells us that WØQXT is coordinating a radio club in that area and all comers are welcome.

Preparations began some time ago at the QTH of W9JFP, Milwaukee, Wisconsin, to get things lined up for the June V.H.F. Contest. Vic and three more of the Milwaukee boys are planning their vacations for the week of June 10 to June 17 so they can go portable 7 in Nevada. The boys will be taking along a Scamper trailer to operate on top of Observation Point. Of course all concerned are hoping for a band opening that week end on both 50 and 144 Mc. and "we're with them."

At Cicero, Illinois WA9FIH observes that on March 4 WA9FQT/9 worked WA4JIU and heard WA4GWW and WA4EDL during the only opening of the month. "Success" is the keyword for K8WVZ and K8YAY during the month of March. Mike (K8WVZ) reports that after two years of skeds the boys finally made it on 50 Mc. on the night of March 22. The boys are now working toward making their efforts into a reliable hookup.

In Detroit, Michigan, we hear that W8TFI, K8IYZ, K8HSO and K8IWZ are all using RTTY with the W2JAV terminal units. S.s.b. is growing all over the country on the v.h.f. bands, and Arizona is among those to be counted. At the present writing seven stations in the Phoenix area are operating regularly via that mode and one station, K7UAM in Tucson, is running 500 watts p.e.p. K7YSE at Scottsdale writes that "six opened up on April 6 after quite a rest. Worked Texas, Missouri, Oklahoma, and Nebraska on s.s.b. Looks like s.s.b. sure will pick up this year over last."

On March 1, K7ICW at Las Vegas, Nevada, was receiving signals on 50.110 on s.s.b. from K6YIL. On March 16, Al worked W5SFW on the same frequency with signals peaking S6/7 both ways. Al also tells us that hams in southern Nevada have agreed almost unanimously to use the design frequencies 52.525 Mc. and 146.94 Mc. for w.b.f.m. in the area.

K4KYL and K4PZT report from Knoxville, Tennessee that the band was open to Kansas, Texas and Oklahoma on March 5, with Kansas stations most frequently heard. Word received from WA4s LTS in South Carolina notes that activity has been low in that area since the tragic ice storm of January 1 when many of the boys had antennas knocked down. However, now that spring seems to be here, antennas are going back up and rigs are being checked. He's looking for meteor-scatter skeds to New England on 50 Mc. W4DEN is erecting a 60′ tower and has an 11-element beam; K4JQY is debugging his linear and hopes to be on 50 Mc. s.s.b. soon; WA4JQB heard a few Alabama stations on April 13, but no contacts. QST

Strays

The African Christian Mission has received a government amateur license and is asking for donations of equipment to outfit three 50-watt stations. Donors or sellers, write L'African Christian Mission, B.P. 1138, Stanleyville, Republique du Congo, Africa.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

WE are experiencing the usual aftermath of emergencies. While praise is being heaped on the amateurs by agencies served in the Alaskan emergency, and by the general public, the amateurs are criticizing themselves and each other both for what they did wrong and for what they didn't do that they should have done, and we are getting voluminous correspondence saying we oughta do it differently, there oughta be a law, some amateurs oughta be run off the air, and ARRL oughta do something about it.

Actually, we have heard it all before, many times. After each large-scale emergency, as far back as we can remember, there has been a hue and cry concerning changes that should be made in our policies and procedures, so that "next time" things would be different, *next* time there would be no QRM from casuals or contesters, everybody would understand what is to be done and how to do it. But the next big emergency would be in an entirely different locality, of an entirely different nature, and the same old situations, but in different clothing, would crop up.

Now, who would have thought we would have a big emergency in Alaska, of all places, affecting communications in the entire nation? To say that ARPSC was unprepared for an emergency here is the understatement of the year. Alaska has no SEC, only one EC in the entire state. NTS liaison has been indifferent throughout the years, although improving more recently. It looks as though our friend with the tall hat and handlebar mustaches picked the least-organized spot in the entire field organization, ARPSC-wise, to throw his latest orgy.

But he isn't chuckling and chortling at the result as much as you might expect, because the usual ingenuity and willingness of amateurs to make an extra effort in an emergency came to the rescue. KL7s that nobody ever heard of before showed up on the air and did a creditable job of handling emergency traffic. NTS nets on the West Coast swung into emergency operation according to plan and operated extra sessions, some of them continuously. NTS nets elsewhere and the TCC added extra personnel to handle the added traffic load. There was already a big load of Easter traffic on the nets; this, for the most part, was shelved as notification and inquiry earthquake traffic started to appear. Some people got their Easter greetings later than they would have if conditions had been normal.

Yes, we amateurs can again be proud of the job that was done. Naturally, we'll have as complete a story as we can in a subsequent issue of *QST*, as reports of operation in the emergency slow down and we can start analyzing them. Generally speaking, we have nothing to be ashamed of, much to be proud of.

* National Emergency Coordinator.

BUT . . .

We all know that an even better job could have been done if we had been better organized. Hardly anybody disputes this point, so let's examine some of the "we should haves" and "next times," just briefly, to see what some of the critics think should be done to improve our performance.

1) It seems there was a contest on when the earthquake occurred. Many think that some automatic provision should be made regarding discontinuance of contest activity when an emergency occurs.

2) One of the biggest squawks was about KL7 stations being interrupted in their sending of traffic by stations wanting to give *them* personal inquiry traffic. Traffic coming out of the disaster area should be handled first, should have a higher precedence than personal inquiry traffic.

3) More and better use should be made of the National Calling and Emergency Frequencies.

4) All amateurs should have a better familiarity with message handling procedure.

5) A nationwide net, or several of them, should be set up and operated continuously by volunteer NCSs, so that whenever an emergency occurs anywhere, it can be reported immediately.

6) FCC's rules regarding emergency operation should be strictly enforced by the commission, with the help of specially designated volunteer amateurs.

7) ARRL should instruct Official Observers to send OO cards to casual amateurs operating on the frequencies of emergency nets or stations.

Here are four of the men who make things go at the Redwood City, Calif., Civil Defense and Disaster Communications Service. Left to right are K6MPN, Chief Joseph Lod, K6JJU and K6AHN.

W4RHZ setting up an emergency station used during the Ohio Valley flood.

8) Certain frequency segments should be set aside for use in emergencies *only*, and a requirement be made for monitoring those frequencies every hour on the hour for any emergency calls. (Shades of Docket 10237!)

9) Amateurs who QRM emergency nets or stations with casual chitchat should be hanged, shot, drawn and quartered, and wouff-honged.

There is nothing new about any of these suggestions, especially that last one. But even if we should accomplish all the others before the next emergency, there will still be the same old troubles. Let's face it, only a percentage — and a small one at that — of amateurs are actively engaged in public service operation. Another percentage is receptive to education on the subject. *These* are the ones we have to concentrate on, so that in both emergency and normal times, public service communications can be effectively carried out in spite of the distractions created by any deterrent element. The Alaska emergency, tragic and distressing as it was, might serve as a catalyst, but it didn't really tell us anything we haven't known for a long time.

National Traffic System

We think the National Traffic System deserves a big hand of applause for the job it did following the Alaskan earthquake and all the repercussions therefrom. All in all, we are mighty proud. From a beginning of only about a year ago, the NTS gang has jumped into emergency communications like the veterans they are, and during the recent tragedy showed the world and the nation what can be accomplished by operators who are continuously active and organized as contrasted to those who are willing but unprepared.

It is to the credit of each NTS manager at region and area level, and each TCC director, as well as a great many section net managers, that hardly one of them used superlatives in their March reports. Almost without exception, they deprecated themselves and their nets, almost shamefacedly admitting that they had many shortcomings which were due to be corrected, and promising bigger and better things in the next emergency.

Well, this is just a reflection of the caliber of leadership we have in NTS. We're progressing, but perfection is a long way off, and we all know it. Let's examine a few of the rough spots, as brought out during the recent emergency operation.

In the matter of precedences, we relaying operators simply relay them as they come, never mind questioning them or making changes. The *originator* is the one who sets the precedence. If we think it's wrong, we can crawl all over him (but not the relaying station who gives it to us, it isn't *his* fault), and this might be a good idea, so he won't do it again. But the message goes through as received — unless, of course, you're receiving it from the originator and you get him to change it.

We're a little shaky on precedences. If a message comes through without one, *give* it one — routine (R on c.w.), regardless of what the text says. All we're doing is supplying a part of the preamble that is missing; we have no authority or knowledge on which to base assigning a precedence. If there is a precedence on it already, relay it as received. This is just another variation of a basic axiom of traffic handling which we *must* learn: *don't* read the message, *don't* try to interpret it, just *handle* it, exactly as received. It is permissible to correct the form, but *not* the content; this applies mostly to the preamble. Put in a precedence, correct the check, eliminate superfluous words or prosigns (e.g., via MARS, the year of the date, the words "to" and "sig," NFT, etc.), separate the parts of the address, but *leave the text alone* and do not alter the address or signature, even if it doesn't *seem* right to you. Check with the sending station to make sure you received it right, if necessary, but relay it *as received*. In this case, it is better not to think at all than to think wrong.

No more room, but lots more to discuss. Maybe we can get some of it into a bulletin later.

March reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
EAN	31	2475	1.350	79.8	100.0
CAN	31	2179	1.420	70.2	100.0
PAN	31	2047	1.130	66.0	100.0
1RN	60	873	.423	12.9	79.8
2RN	62	769	.678	12.4	100.0
3RN	62	727	.362	11.7	97.8
4RN	58	1069	.517	18.4	93.7
RN5	62	1753	.846	28.2	96.2
RN6	62	1628	.650	26.2	99.9
RN7	62	896	.329	14.4	79.5
8RN	62	1024	.444	16.5	93.6
9RN	31	904	.907	29.2	93.5[1]
TEN	62	1089	.712	17.5	73.4
ECN	29	178	.277	6.14	82.7[1]
TWN	31	464	.567	14.9	79.4[1]
Sections[2]	1462	11403			
TCC Eastern	97[3]	924			
TCC Central	87[3]	1216			
TCC Pacific	90[3]	1622			
Total	2472	33,340	1.420	14.2	Several
Record	2007	26,611	1.025	13.9	100.0

[1] Representation based on one session or less per day.

[2] Section nets reporting (50). AENB, AEND, AENH, AENJ, AENM, AENP (morn), AENP (eve), AENR AENT (Ala.); NEB (Nebr.) RISPN (R.I.); SCN (S.C.); BUN (Utah); N. Tex TN; NCSN (N.C.); Wash. Sect.; OFN, GBN (Ont.); WIN, WSBN (Wis.); CN (Conn.); ILN (Ill.); BN (Ohio); VTN (Vt.); GEM (Idaho); Ore. State; MDD (Md.-Del.-D.C.); TN, TPN, TSSBN, ETPN (Penn.); EPA (Pa.); QMN (Mich.); QFN (Fla.) W. Fla Phone; VSN (Va.); NJN, NJP, NJ6-2, NJNN, 16N (N.J.); MSN, MJN, MSPN (Minn.); NCCN, NCNE, NCNL, NCSSBN, TIIEN (N.C.); Iowa 160, Hamilton C. (Iowa); OQN (Ont.-Que.).

[3] TCC Functions reported not counted as net sessions.

We broke all records this month, because of the Alaskan emergency. All NTS nets were out in full force and once again proved they could operate under almost any conditions. More on the Alaskan emergency in a later issue.

We welcome the new EAN manager, K1WJD. Congrats to W2EZB, out-going manager, on his up-coming wedding. W9DYG extends his thanks for a fine job of NCS to the RN5 gang: Fred also sez CAN broke more records this month. K4AKP/6 (now WB6JUH) reports that PAN stood up well under the load of Alaskan traffic but wished they didn't have to hold up as much of the stuff as they did. W1BVR thanks the Vermont gang for their improved attendence; 1RN certificates were issued to *W1s* DWA EVN WFZ, *K1s* ESG NAN SMT UYZ YKT ZUS ZND and WA1ALZ. WA2GQZ reports the 2RN Clinic has completed its first cycle and hopes to run it again this fall. WA2KQG has received special mention. K3MVO is the acting manager of 3RN. K5IBZ reports RN5 continuing its fine showing of past months and has also turned out a very fine information sheet for NCS and CAN Liason. WB6BBO reports RN6 was active in the Alaskan 'quake and has issued RN6 certificates to W4CJD/7, *K6s* GZ and NCG. K7JHA and W8CHT sent fine reports on the 'quake. WØLGG reports TEN is improving and has issued certificates to *WØs* GRW SDN and WYJ.

Transcontinental Corps: W3EML received 100% reports

again this month and extends his thanks to all those who helped during the Alaskan emergency. W4ZJY has issued TCC certificates to WA4AVM and W5PPE. W7DZX reports traffic was up this month with a minimum of unsuccessful skeds.

March reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	142	78.3	2891	924
Central	95	93.5	2276	1216
Pacific	124	72.6	3244	1622
Summary	361	80.3	8411	3762

The TCC roster: Eastern Area (W3EML, Director) — *W1s* EMG NJM *W2s* GVH MTA *WA2s* BLV KQG VLK W3EML *K3s* FHR GJD MVO *W4s* DLA DVT K4POA WA4EUL *W8s* BZX CHT ELW K8NJW. Central Area (W4ZJY, Director) — W4ZJY WA4AVM *W5s* PPE QMJ UTW *W9s* AKV CXY DYG HAS JOZ VAY *K9s* DHN ZLA WA9AUM *WØs* BDR SCA WYJ KØFPC. Pacific Area (W7DZX, Director) — *W6s* EOT HC *K6s* DYX GID *WA6s* BRG ROF WB6JUH *W7s* DZX GMC WST/6 ZB *KØs* EDH EDK VE7AGF.

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Net Reports

Net	Sessions	Checking	Traffic
8 Ball Traffic	44	364	510
Interstate SSB	31	1513	906
EASN	21	89	27
20 Meter SSB	26	64	2902
North American SSB	26	791	1183
7290	44	1590	856
Northeast Area Barnyard	26	879	10

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Our apologies to W8UPH who should have been shown with a score of 1049 in the top 25 of the Post-War list on p. 86, April *QST*, and to W8DSW whose picture on the same page was shown with call as W8DSQ.

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Diary of the AREC

The amateurs of Newfoundland were called into action for the second time since December 19, 1963, when a wind and snow storm struck the East Coast of Newfoundland on Feb. 9. Winds of 90-m.p.h. with gusts to 120-m.p.h. eliminated all of the commercial outlets from the Avalon peninsula. The only means of communication was amateur radio. At 1003 EST, *VO1s* AO and BY started a six hour net. Emergency traffic was cleared along with weather reports and traffic for commercial services. A train was derailed at Port Aux Basques which led to other messages re the clearing of tracks, locations of trains and changes of schedules. Other stations participating in the net were: *VO1s* AE BJ BL CD CV DC DI DJ DL DO DT EC EL ET FR MN, K1WXP/VO1, K3SWC/VO1, K7GVM/VO1 and K8JQO/VO1. — *VE1WB, SCM Maritime.*

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On March 9, K8ENY received a call from the daughter of a hospitalized man in Ann Arbor, Mich. The Monroe Co. AREC was activated to look for donors of a rare type of blood needed. The American Red Cross was also contacted and within a short time blood was offered from Toledo (Ohio), Monroe, Deerfield and Ypsilanti, Mich. Other stations participating were: *W8s* NDM TZZ VKR, *K8s* EYH WXO and WA8CJF. — *W8NDM, EC Monroe Co., Mich.*

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On March 10, portions of Ohio, Kentucky and Indiana were hit by a flood that kept the AREC on its toes for several days. The Jefferson Co., Ohio, AREC was activated by K8VBH and along with the county Red Cross chapter aided those stricken by the 9-foot flood crest. *W8s* AXR AYR CSD DNQ ERR LGX MJJ ZEI ZRI, *K8s* AKN BYF CCK IMX KAL KVY OZR RJB RPB TVT UKH VBJ VPG VUP ZPQ ZWU, *WA8s* AGC DRL and KFG stayed on the air for some 56 hours passing traffic and keeping a flood watch.

In Ross Co., Ohio, the local c.d. group was activated by WA8AFI. A flood watch was set up and half hour reports were made to headquarters. By 10 P.M. the flood crest had passed the area and the city escaped a major disaster. Those stations taking part were: *W8s* CDI CUO DRZ GGG HOP LXJ NTL OTO THV ZQX, *K8s* CKY DFC OIQ DOK GOY JMN LMJ MQG NZX OUQ SUB WKJ ZWZ, *WA8s* AFI CJT DAS EFX FGW FGX FGY FKL KBY KMN KND LIV and WN8IPY.

In Kentucky, *W4s* ABK DJQ JP KVK RCC RHZ and WA4FYH were activated in various parts of the state to assist the Red Cross and civil defense in their requests for medical supplies, food, clothing, blankets and other types of assistance.

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On March 17, the local chapter of the Red Cross in Philadelphia, Pa., had just emerged from a demonstration of a disaster shelter provided for the members of AREC when they were greeted by an ear shattering noise, and saw a car rolling side over side toward them. Behind the car was a bus careening out of control, hitting four other cars on the way. Since the AREC and Red Cross were on hand, additional help was summoned immediately, the Red Cross began aiding the 49 injured people. Those participating were W3NSN and K3ESL.

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On March 26, K8LXA/mobile, traveling east on Interstate 90, came upon two trucks involved in an accident. K8LXA reported to K8NSM, who called K8TVE, who in turn called Ohio State Patrol. Three cruisers were dispatched to the scene to remove the trucks involved and direct traffic — *K8LXA*

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On March 26, six Americans were stranded on a small boat between the Philippines and Hong Kong. For four days and nights they were without power. W3EFZ/MM was able to contact DU1OR on the initial distress call. JA6AHY/MM was also contacted and helped clear the frequency so emergency communications could be conducted. With the aid of *DU1s* GF OR and SU, the *USS Duncan* was contacted and rescue craft were dispatched. The rescued Americans were no worse off for their four-day trip than being a little soggy. — *W3EFZ*

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In late March, W8SS/M was chatting with W8NHT when an accident occurred just ahead of W8SS's car. Within minutes after W8NHT called the police, squad cars were on the scene to clear traffic and aid the injured motorist.

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Members of the Tri-County Emergency Net, Crescent City, Calif., were active in the recent tidal wave flood resulting from the Alaskan earthquake. WA6EYY/6 acted as net control and WB6GVI kept the local radio station informed of happenings. — *WB6GVI*

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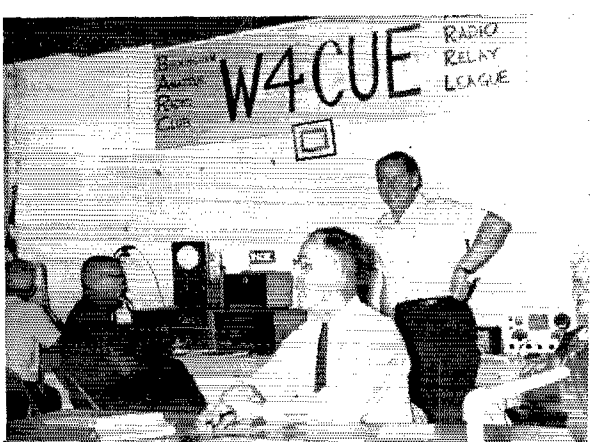
Thirty-nine SEC reports were received for February, representing 17,618 AREC members. This is four reports less than the same month in 1963 and represents fewer AREC members. *C'mon*, fellas! Sections reporting: E. Mass., Colo., W. Mass., Minn., N. Dak., Wash., N.C., Ore., B.C., Nevada, Ind., Ala., Alberta, Ohio, Maine, Okla., Va., Ark., NYC-LI, S. Dak., N.N.J., Tenn., Kans., Mich., Ont., W. Pa., Utah, R.I., E. Fla., Ariz., Mo., S. Tex., S.C.V., Iowa, Del., Hawaii, N.M., E. Bay, Los A.

RACES News

On March 1, the High Point, N.C, RACES provided communications for the Sabin Oral Polio vaccination drive. The headquarters station was in constant contact with the 22 inoculation centers which were supplied and covered by RACES mobile units. Those participating were *W4s* IVY CPJ UA, *K4s* AGV NUB RUP NLK TYW *WA4s* EIG PNV EKD FUV GMD NAU BTH FCP and LOG. QST



The Birmingham ARC handled 286 messages from its booth set up at the State Fair on Oct. 5. From l. to r.: K4PZH (back to camera), K4AAU, W4ASW and W4GET.

Correspondence From Members-

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

THE QUESTION OF GOVERNING

¶ A director should be congratulated upon polling his ARRL membership to obtain their views. However, the statement: "My policies will be formulated in accordance with the wishes of the majority" both perturbs me and leaves me apprehensive.

The intent is obvious; to insure that the ARRL remains a truly democratic organization. Yet, to poll members and vote as they indicate does not of itself make an organization democratic and presents the peril of being influenced by uninformed or selfish pressure groups.

What is a democracy? Does it always mean all decisions must be made as the majority wish?

The term democracy comes from the Greek words *demos*, the people, plus *kratein*, to rule; and is defined in Webster's *New World Dictionary* as: "1. government by the people, either directly or through elected representatives; rule by the ruled".

A director is elected by the ARRL membership through secret ballot because of his background and the belief he has sufficient good judgment to represent fellow amateurs. The fact of election is in itself a practical exercise in democracy. Upon completion of a term of office he will again be judged and, at that time, either accepted or repudiated by fellow members. This process assures that the ARRL must remain a democratic organization.

Today, as never before, amateur radio is subject to the pressures of governmental bodies. We must justify our existence. Add to this the "splinter groups" in our own ranks who, often uninformed or ignorant of all the facts, make a nightmare of our bands with their rapacious and vitriolic comments. Each "splinter group" has its own axe to grind and will welcome a chance to apply pressure on the ARRL.

Can you imagine our United States senators and representatives polling their constituents on world peace, disarmament, and foreign trade and then voting for the most popular?

Certainly a director should poll fellow amateurs, talk to them over the air, attend club meetings, listen to opinions and discuss issues, but, when time to vote, decide from all the facts available to him considering what he believes is best for amateur radio, and vote *as he thinks proper!*

He should not be a chameleon reflecting the color of the highest pressure group, nor should he hesitate to go against popular opinion when he knows the decision is the right one for amateur radio.

To quote *Hamlet*, Act 1, Scene 3: "This above all: to thine own self be true, And it must follow, as the night the day, Thou canst not then be false to any man." — *W4KIL*

PAST — AND FUTURE

¶ The series of historical articles that has appeared in recent issues of *QST* represents not only exacting research, but also excellent editing. Naturally the material is of nostalgic interest to those of us who have been associated with amateur radio for a period of years.

More important, perhaps, this type of information should help to convey to amateurs of more recent persuasion an appreciation of the significance of our hobby in the development of modern electronics techniques, and in the advancement of the state of the art in all of the fields of communications. It is a quite priceless heritage, and one that should serve to unify the fraternity in these days when our privileges are threatened on so many fronts.

Having helped Henry Craig sweep out Paul Godley's shop at the Adams-Morgan plant quite a few years ago, and having been broken into the game by A. A. Hebert, I feel reasonably capable of evaluating our current position, simply on the basis of historical perspective. Lack of unity resulted in serious losses in the past, and seems to pose a very real current threat.

Hams are by nature independent creatures, and I would certainly not suggest regimentation in thought and action. However, too many, with respect to such matters as your licensing proposals, are permitting self-interest to obscure group interest. Personally, I disagree heartily with much of what *QST* has suggested, but I disagree even more heartily with the type of emotional protest that is heard with alarming frequency.

When those who legislate our privileges (and they appear to be such, rather than "rights"), consider our case, and when they see dissension that goes to the very core of our existence as a functioning group, our case will be immeasurably weakened.

One might hope that such news as that from Alaska today would strengthen the amateur's case. Here, as in every disaster, our emergency facilities are bringing aid and saving lives. Unfortunately, things of this nature seem to bear little weight when legislative bodies and administrative commissions consider the amateur radio case — and particularly when political and economic considerations are introduced by interested parties.

The time has surely come to consider (with pride) where we have been, and to evaluate (with objectivity) where we are going. If we do so, I believe the ranks will tend to close. — *W2AFJ/K3ZMS.*

FEEDBACK FROM APRIL

¶ Your article, "Power A-Plenty for Pennies," in April *QST*, had me looking through my EE textbooks. There was a ring of familiarity but I just couldn't get watts and circular mils to add. Being an ardent experimenter, I gobbled up the article until the second reading. I thought I was missing something.

If you're going to publish something for April Fools, I suppose it should be convincing. We enjoyed the article even if it did injure the professional pride for a while. — *K4CYZ*

¶ Today, for the first time, I was actually ashamed of and ashamed for *QST* Magazine. Please see pages 28-9 of the April 1964, issue.

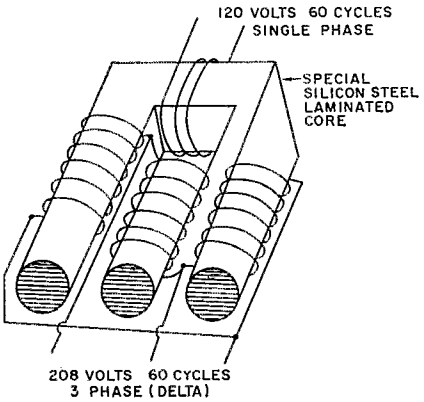
That piece, "Power A-Plenty" isn't clever. It isn't funny. It is the most juvenile, strenuous, and club-footed attempt at humor I've ever seen actually

in print. Not even a self-respecting moron would find it entertaining.

I resent some slob abusing my knowledge of electronics by taking me into some "never-never land" under the mistaken notion that this is humor. It was bad enough when it was done with some degree of cleverness, as in "The Templeton Case", which, in itself, was an inexcusable waste of white space in a technical magazine from which readers seek information and knowledge — not entertainment.

But the lid who wrote this was just plain insulting. John Troster is bad enough, altho he may have some value in portraying foul operating practices, but to shove this thing into the same issue breeds contempt. — *W9KJ*

¶ The core design in April *QST* was developed in the design drafting department of one of the big industrial companies. When it got into my hands I



developed the only known method of transforming single phone power to three phase power. This I am sure precedes the radio application which must have been worked out after this original design was released. Power is only limited by the critical construction of the core!! — *WB2KOQ*

¶ Running only 200 watts into a dipole was not getting me much DX here in Ø-land, so I decided to take advantage of the generous offer being made by one of your advertisers, Rare Cards, Inc. (April QST, page 166). Being of a suspicious nature, I first sent a telegram to the Better Business Bureau of Wakeup, Conn. requesting information as to the business reputation of Rare Cards, Inc. An answer to my wire was quickly received stating that the firm in question was indeed a reputable firm in that town, but for some strange reason, they only open for business one day a year, April 1st. The wire went on further to say that Rare Cards, Inc. is a wholly owned subsidiary of Larsen E. Rapp Enterprises, Inc., whose last known address is listed as Kippering-on-the-Charles, Mass. (April *QST*, 1960, page 51).

In conclusion gentlemen, I feel that you owe it to the readers of *QST* to discourage such "1 day" advertising as this . . . at least until next April 1st. — WØGVH/Ø

V.H.F. HIGH POWER

¶ While reading *QST*, April '64, I read the note by K3VQW about limiting the power input to 20 watts on the six-meter band.

I believe that this is foolish because the difference between 20 watts and 1000 watts is less than three S units. This is hardly noticeable locally but a few hundred miles away it makes all the difference in the world.

As far as the fellow hams running high-power s.s.b. and a.m. on six meters being condemned as DX hounds let me say this: from my limited experience it seems to me on six meters the "DXers" are constantly striving to improve their receiving and transmitting capability, so that possibly they might make the contact 250–300 miles away or so that they might get the station just "over the next hill." I was not around then but was this not the basis of the beginning of ham radio, to improve your station and make the frequencies do what everyone says they cannot do?

Finally, if you want QRM-free bands, try ten or fifteen meters. Yes, they are still ham bands. — *K1WTK*

PRIDE OR SHAME

¶ A gallant handful of Alaskan amateur operators has brought intense pride to the ham fraternity this past 48 hours. With a sense of shame, disgust and sadness I must remark that a large body of amateurs in the mainland United States does not deserve to share this feeling of accomplishment. The bedlam on 40 meters in the critical evening hours of Good Friday, and the "usual" week-end pile-up of rag-chewers and DX fans on 20 meters on Saturday, 28 March, bespeaks the callous disregard of too many for the responsibilities that go with their operating privileges.

One iota of intelligence, a faint sense of humanity, and the most elementary knowledge of propagation conditions should have made every ham realize that these two bands would be the only avenues by which vital information could be exchanged. Every amateur should have been willing and ready to serve, but should have made better use of his receiver and far less of his transmitter. Those mainland operators who were able to establish initial contact with the few operational KL7s were deluged with interference from others who had more good intentions than operating sense.

If our regulations are to be revised to include increased requirements of technical proficiency, I propose that new examination forms include a question to determine if the applicant has ever heard of the Golden Rule. — *K6AIC*

¶ Sometimes I wonder if the left hand of ARRL knows what the right is doing — amateur radio is not supposed to take the place of commercial communications services in handling "traffic" just because many are too cheap to pay for a telegram. QRM is made up of "traffic" and "contests" both of which could be curtailed without damage. Contests especially are superfluous. — *K3VQW*

A NEW DXCC?

¶ I would like to go on record that maybe the time has come to take a good, long look at DXCC with the view to starting over fresh. It would appear that we may be actually reaching the end of the road as to what we can count as a new country.

Since the end of WW II, when DXCC was reactivated and everyone started fresh we have "created" something over 330 countries with a resulting slowdown in new ones in the last few years. All you need do is look at the Honor Roll listing carried in *QST* each month to see the gradual jam accumulating at the top of the list as more and more hams "have worked them all."

(Continued on page 160)

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.

Alaskan Disaster. To those Alaskan amateurs actively operating to bridge the communications gap following the earthquake, all credit for a magnificent job. As W6FYZ wrote "When I finally pulled the switch another outstanding public service had been performed by the ham fraternity. The first assessment of the position of a community, in which all other communications had been shut off, had been made known . . ." Details will appear in *QST* as soon as reports invited from all participating amateurs to document the results have been analyzed.

Lessons from This Emergency Operation. Disasters always show some members of the amateur service at their best, others at their worst. Nature (unpredictable) again proves that "it can happen here." This calls for *advance* operational and technical preparedness *by every amateur.* Power and telephone circuits are quick casualties; emergency-powered equipment needed. What criticisms? One reporter says it took twenty minutes to pass traffic that should have been passed in five! KL's with outgoing traffic were clobbered by calls from dozens of W's wanting to send in a personal inquiry message — often for persons of unknown address. What became of the axiom to *wait until called* and to listen on frequencies before transmitting?

To Do-It-Better in Public Service Work. We recommend that (1) each reader know operations and message form by c.w. and phone netting routinely. Get identified in AREC or RACES; participate in actual traffic-handling in c.w. and phone nets. (2) Be willing to stand by, monitoring, ready to help. Never jump in and QRM, or solicit traffic into disaster areas! You may be a local hero to start off a message of inquiry but fastest health and welfare attention can be initiated by the public through Red Cross channels. This raises the message to agency (official) status. (3) Stations at the scene of action are in complete control or should be in complete control of circuit handlings. (4) Monitoring emergency frequencies from an adjacent channel, if and when called upon by these stations, is a method to help keep a clear channel. (5) An FCC 'request' to clear designated channels must be honored. (6) FCC's 97.107 (old rule 12.156) provides that FCC will specify bands or segments, *and declare a general state of emergency,* as required. This when invoked is bulletined and suspends casual amateur work and all other than the emergency communications and establishing of traffic arrangements for the areas designated. (7) Routine activities, contest or otherwise that may interfere must be suspended. Channels used or needed for emergency communications should be reserved for *only* emergency communications once you know of an emergency. Here again the principle of *listening before transmitting.* This, at the outset of any major emergency is imperative.

For Expeditious Voice Work. Here's a suggestion from KØEQH with experience in such matters. "Talk with a slow, steady delivery, repeating difficult expressions with phonetics. You can then have very good luck passing traffic without the need for continual fills. Some handling this traffic acted as though they expected an earthquake themselves. They rattled on causing poor copy and slowing the work to a handling of one message to where three should have been handled. We use the rule at work if not sure how fast to talk to write it out yourself as you give it. It may make a little more paper work on the desk but then the station reading it can also get it correct by writing it as you read it and then re-reading it for possible corrections. It is surprising how fast messages and traffic can be passed when one does not get excited and start running off at the mouth."

Field Day, 1964. Have *you* ever been part of the Field Day? You can go afield alone or with one other operator or with a club and be guaranteed a top experience. See the FD announcement for the fourth week end in June elsewhere in this issue. There's the common objective of testing emergency equipment, setting up antennas and stations in a hurry; operator ability to establish

At the April meeting of the Electron Benders Amateur Radio Club of Oklahoma, the current club president (K5ZGV) awarded plaques to the following past presidents in honor of their outstanding service and leadership to the club. Left to right: K5ZCJ '62, K5OOV '61 and K5EYT '63.

communications as when the chips are down should be tested. This is a test from a field location under rules that permit a wide choice as to the way to enter. One can organize as a team. Review message handling form and procedure. Don't forget to test your mobile rig, too, if you have one. For clubs the "aggregate mobile" classification of entry should not be forgotten. We trust we'll have many reports of mobile and portable operation with completely transportable equipments as well as the up-rooted and reassembled home station variety. Operating practice *before* FDs will help in successful productive Field Day operation. During June a club's operators might be advised by the FD Chairman to report into the Section's c.w. or phone nets and *start a message* in proper form! All amateurs, we believe, should cultivate the ability to operate systematically so that whenever called for, any amateur can give more than casual communications service to the fraternity and the public. This ability is something to be proud of. All amateurs are cordially invited to join in the Field Day operation June 27/28. Request your log forms for the FD from the ARRL Communications Department. — *F. E. H.*

RESULTS, FEBRUARY FREQUENCY MEASURING TEST

The February 14, 1964, FMT, open to all amateurs, brought entries from 324 participants who made a total of 1000 measurements. Of these, 127 ARRL Official Observers submitted 387, and 197 Non-OOs made 613 readings. All taking part have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement. September *QST* will announce details on the next ARRL FMT.

Observers	*Parts/ Million*	*Non-Observers*	*Parts/ Million*
W2AIQ	0	W8CUJ	0
W8YCP	.1	W9TZN	0
W5FMO	.2	W5QHK	0
WØVBK	.3	KØJIU	.1
W9GFF	.4	WØYMG	.1
KØBRS	.6	W1PLJ	.1
W4ZBQ	.6	W5AMK	.1
W8TBZ	.7	R. Summerville	.15
W3BFF	1.0	W2FMU	.3
K2AHS	1.2	K6CST	.3
K6MIZN	2.3	VE1IZ	.3
W3RDZ	2.4	W8LZY	.3
W1YRC	2.6	W6KT	.3
W6GQA	3.1	KØHLC	.3
K5RWB	3.4	K6RTD	.4

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for March Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	287	2979	2597	362	6225
K6BPI	98	2779	2583	196	5656
KØONK	151	2092	2020	49	4312
WØLGG	208	1207	1083	64	2562
W7BA	20	1098	1036	60	2214
W9IDA	17	927	917	8	1869
W1PEX	112	774	660	108	1654
W3VR	58	796	781	7	1642
W6GYH	210	682	673	5	1570
W4KIS	143	639	594	45	1421
WA4BMC	125	595	594	59	1373
W6RSY	40	636	438	165	1279
WA2RUE	182	543	445	98	1268
W9JOZ	15	581	581	0	1177
K9KZB	2	575	565	10	1152
W5PPE	17	560	534	16	1127
W3EML	43	592	471	12	1118
W9MM	10	527	512	15	1064
WA4IJH	14	488	468	20	990
W6EOT	5	536	439	10	990
WA6TWS	47	481	436	22	986
WØBDR	44	465	434	24	967
W7DZX	12	492	436	15	955
W7FNA	0	475	378	97	950
W7EJD	5	475	1	468	949
W4ZJY	7	503	433	1	944
KØTGU	15	458	438	20	931
K1RYT	30	448	405	21	904
W6WPF	4	444	409	35	892
K4AKP/6	36	418	374	44	872
WA9CCP	50	420	324	72	866
WA6WTK	2	422	376	42	842
K7CTP	57	409	290	71	827
WB6DRY	5	400	400	5	810
WA2GPT	28	393	348	37	806
W8UPH	22	387	332	53	794
K8JJC	158	318	166	151	793
K6IWV	6	381	368	13	768
WØOHJ	6	381	351	30	768
W7WST/6	20	361	357	3	741
K9DHN	16	378	344	3	741
K4VFY	216	262	248	14	740
K5KTW	108	321	284	21	734
K7IWD	24	390	312	1	727
W5UTW	4	360	359	1	724
K6MDD	0	361	300	61	722
WA2VYS	24	349	332	12	717
W9HAS	18	347	334	10	709
WA9AUM	21	338	338	3	700
W8DAE	113	322	187	77	699
WA2UZK	17	344	323	13	697
K1YKT	29	330	310	9	678
W5DTA	4	332	211	131	678
WA6BRG	17	365	275	15	672
K5IBZ	35	318	259	59	671
K1WKK	23	313	311	7	654
W1TXL	93	286	257	17	653
W6ASH	220	110	300	14	644
W7PGY	17	309	273	34	633
WA6CDD	153	239	224	15	631
WB6JGA	42	295	212	74	623
W5CEZ	32	302	250	10	594
WA2KGQ	42	265	233	37	577
WB2ALF	22	276	272	4	574
K8HLR	37	271	245	20	573
K8NJW	18	280	274	0	572
W2GVH	25	253	276	10	564
WA9BWY	22	267	198	63	550
K3PIE	19	264	257	7	547
W4DLA	34	254	252	5	545
K7EWZ	30	276	183	50	539
VE7BJV	33	252	248	4	537
WØZWL	5	370	17	135	527
WA2VLK	25	252	236	13	526
K7JHA	24	269	228	1	522
WA4AVM	30	255	235	1	521
W9DYG	31	269	197	21	518
K1WKJ	35	214	210	4	513
W7DIS	10	249	213	34	506
WA4HRG	27	239	229	6	501
Late Reports:					
W6GYH (Feb.)	116	616	602	10	1344
W6GYH (Jan.)	103	506	444	24	1077
K6MDD (Feb.)	0	412	329	62	803
WA2GPT (Feb.)	48	283	265	15	611
WA6WTK (Feb.)	6	269	253	14	542
K6MDD (Jan.)	7	260	200	60	527
WB6BBO (Feb.)	126	213	159	14	512

More-Than-One-Operator Stations

KH6USA	0	3991	0	0	3991
KR6MF	1792	263	211	52	2318
K6NCG	182	784	743	40	1749
K5VOZ	528	0	528	0	1056
KR6GF	497	68	70	58	693
W6CXO	250	210	40	0	500

BPL for 100 or more *originations-plus-deliveries*

K6PZM 249	W2RUF 135	WB2CSS 116	
W7APS 233	WA8DGE 135	WA6OUK 116	
K6GZ 225	K8LUY 133	WB2ECR 115	
K3QOO 213	WA2TQT 128	WB2HWB 115	
W4DFU 202	WB6HRH 122	K3OWN 111	
WA6TAW 188	K6YCK 121	K4SDS 111	
W6JXK 187	W1ZLX 120	WA5CAC 111	
KØTCB 179	WA6GJR 120	WA8ASV 104	
WB6IEK 177	W5EUL 119	K1WXN 102	
WB6RQJ 167	W4IAD 118	K1NAN 101	
K2SJN 158	K8GOU 118	Late Reports:	
WA4IMC 157	WA6CIE/0 118	K1NAN (Nov.) 157,	
W4BKC 145	WA8FIC 117	WB6BBO (Jan.) 144	
	K9UOV 117		

More-Than-One-Operator Stations

WA6VFM 328 W1AW 138 W6ZRJ 120

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: K3BHU, WA4AVM, W4MIN, W5DTR, WA6BRG, K6IWV, WA8DGE W9AOW.

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.

ELECTION NOTICE

To all ARRL members residing in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the.....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— *F. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
West Indies	June 10, 1964	William Werner	Aug. 10, 1964
S.J.V.	June 10, 1964	Ralph Saroyan	Apr. 10, 1964
Alaska	June 10, 1964	Kenneth E. Koestler	Apr. 10, 1964
Louisiana	June 10, 1964	Thomas J. Morgavi	May 31, 1964
W. Penna.	June 10, 1964	Anthony J. Mroczka	Aug. 7, 1964
Western 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
Mississippi	July 10, 1964	S. H. Hairston	Sept. 27, 1964
Utah	July 15, 1964	Thomas H. Miller	Resigned
Ontario	Aug. 20, 1964	Richard W. Roberts	June 15, 1964
Nevada	Aug. 20, 1964	Leonard M. Norman	Oct. 10, 1964
S.C.V.	Aug. 20, 1964	Jean A. Gmelin	Oct. 15, 1964
N.H.	Aug. 20, 1964	Albert F. Haworth	Oct. 26, 1964
Kansas	Aug. 20, 1964	C. Leland Cheney	Oct. 29, 1964

CLUB COUNCILS AND FEDERATIONS

Affiliated Council of ARCs, Inc., Ronald D. Mayer, W7NGW, Secy., 6115 S. E. 13th Ave., Portland, Ore. 97202

Chicago Area Radio Club Council, Inc., George Nesbed, W9LQF Secy., 2429 S. Harvey Ave., Berwyn, Ill.

Federation of E. Mass. AR Assns., Eugene Hastings, W1VRK, Secy.-Treas., 28 Forest Ave., Swampscott, Mass.

Hudson Amateur Radio Council, Inc., c/o Harry J. Dannals, W2TUK, RFD 1, Arbor Lane, Dix Hills, Huntington, L.I., New York 11743.

Manitoba Assn. of ARCs, Gordon F. Cummer, VE4CF, Secy., Box 475, Winnipeg 1, Man., Canada

Ohio Council of ARCs, James W. Benson, W8OUU, 2463 Kingspath Dr., Cincinnati, Ohio 45231.

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Details appeared on page 96, March *QST*. Let's hear from *you*.

During April the following additional amateurs were nominated in recognition of their extra skills and courtesies:

W1LJT	WB6CKV
W1RXB	K7VCK
K1WKW	K8BAP
W2AYW	WAØAYA
K2BFI	WAØFKU
W2DBQ	KØZKU
W2IIU	CN8FW
K4AOZ	KL7DTR
W4DNI	VE3EHL
K5ZEP	

ELECTION RESULTS

Quebec	C. W. Skarstedt, VE2DR	June 11, 1964
Maritime	D. E. Weeks, VE1WB	June 11, 1964
Eastern Massachusetts	Frank L. Baker, Jr., W1ALP	June 15, 1964

In the Georgia Section of the Southeastern Division, Mr. Howard L. Schonher, W4RZL, and Mr. James Gary Chambers, K4MDC, were nominated. Mr. Schonher received 301 votes and Mr. Chambers received 212 votes. Mr. Schonher's term of office began Mar. 26, 1964.

In the Tennessee Section of the Delta Division, Mr. William A. Scott, W4UVP, and Mr. David C. Goggio, W4OGG, were nominated. Mr. Scott received 410 votes and Mr. Goggio received 152 votes. Mr. Scott's term of office began Apr. 15, 1964.

In the Manitoba Section of the Canadian Division, Mr. William H. Horner, VE4HW, and Mr. Albert C. Jebb, VE4TJ, were nominated. Mr. Horner received 92 votes and Mr. Jebb received 12 votes. Mr. Horner's term of office began Apr. 15, 1964.

A.R.R.L. AFFILIATED CLUB HONOR ROLL

This month we present the first '64 listing of Honor Roll affiliated clubs. The listing is of those whose *entire membership* as reported in the Affiliated Club Annual Reports consists of members of the American Radio Relay League. As a special earned recognition for those affiliates having *every club member a League member* we shall shortly forward the Hundred Percenter's Certificate to the attention of the appropriate club officer.

The Board's requirements for ARRL affiliation are that only 51% or more of a club's membership be full or associate members of ARRL for continuing affiliation. This is hardly a difficult attainment in most cases, but to work for 100% is something else again. As questionnaire forms are returned from additional affiliates and show 100%, these clubs will be put in line for a further 1964 listing of Honor Roll to appear probably in December '64 QST. The current Honor Roll listing follows:

Aeronautical Center ARC, Inc., Oklahoma City, Okla.
Amateur Radio Tech Society of St. Louis, St. Louis, Mo.
Amateur VHF Institute of N.Y., Maspeth, N. Y.
Apple Pie Hill Amateur Radio Club, Inc., Absecon, N.J.
Ardmore Amateur Radio Club, Ardmore, Okla.
Athens Amateur Radio Club, Athens, Ga.
Berks Amateur Radio Club, Shillington, Pa.
Birmingham Amateur Radio Club, Inc., Birmingham, Ala.
Central Kansas Radio Club, Inc., Assaria, Kan.
Chicago Radio Traffic Assn., Inc., Chicago, Ill.
Chisholm Trail Amateur Radio Club, Inc., Duncan, Okla.
Coachella Valley Amateur Radio Club, Indio, Calif.
Coffee Dunkers of Detroit, Detroit, Mich.
Dutchess County VHF Society, Poughkeepsie, N.Y.
East Whittier Radio Club, Whittier, Calif.

The Election Club of Denver, Aurora, Colo.
Experimental Amateur Radio Society, Rockford, Ill.
Fountain City Radio Club, Knoxville, Tenn.
The Helix Amateur Radio Club, San Diego, Calif.
I R C Amateur Radio Club, Philadelphia, Pa.
Lake Success Radio Club, Hauppauge, L.I., N.Y.
Long Island DX Association, Ozone Park, N.Y.
Lower Columbia Amateur Radio Assn., Longview, Wash.
Magic Valley Radio Amateurs, McAllen, Tex.
Mahoney Valley Brass Pounders Club, Schuylkill County, Pa.
Mason County Radio Club, Inc., Ludington, Mich.
Norfolk County Radio Association, Norwood, Mass.
Northern New Jersey Radio Association, Englewood, N.J.
Order of Boiled Owls, Columbus, O., Chapter, Columbus, O.
Peterboro Amateur Radio Club, Peterborough, Ont., Can.
Piedmont Amateur Radio Club, Inc., Spencer, No. Car.
Potomac Valley Radio Club, Springfield, Va.
Radio Amateur Transmitting Society, Nashville, Tenn.
Radions, Lancaster, N.Y.
Rome Radio Club, Inc., Rome, N.Y.
St. Louis Amateur Radio Club, Inc., Valley Park, Mo.
Sheridan Radio Amateur League, Inc., Sheridan, Wyo.
Skagit Amateur Radio Club, Mount Vernon, Wash.
Society Radio Operators, Chicago, Ill.
State Line Radio Club of N.Y. and N.J., River Vale, N.J.
Submarine Base Medical Research Laboratory Amateur Radio Club, Groton, Conn.
Sun City Amateur Radio Club of Arizona, Sun City, Ariz.
Vanderburgh AR Emergency Service, Princeton, Ind.
Windblower V.H.F. Society, Inc., Wyckoff, N.J.

W1AW SCHEDULES

(June, 1964)

Operating Hours

Daily: 2230 to 0430 GMT.

While the reconstruction program is in progress, there is *no* provision made for visiting of the station. Visitors to the ARRL headquarters building, located on the same premises, are of course welcomed during regular office hours from 8:15 A.M. to 4:30 P.M. EDST Monday through Friday.

Operating Frequencies

C.w.: 3555 7080 14,100
Voice: 3945 7255 14,280

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:
C.w.: Mon. through Sat., 0000; Tues. through Sun. 0400.
Voice: Mon. through Sat. 0100; Tues. through Sun., 0330.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

June 13: CP Qualifying Run — W6OWP
June 13–14: V.H.F. QSO Party
June 19: CP Qualifying Run — W1AW
June 27–28: Field Day
July 10: CP Qualifying Run — W6OWP
July 11–13: CD Party (c.w.)
July 18: CP Qualifying Run — W1AW
July 18–20: CD Party (phone)
Aug. 6: CP Qualifying Run — W6OWP
Aug. 18: CP Qualifying Run — W1AW
Sept. 4: CP Qualifying Run — W6OWP
Sept. 10: Frequency Measuring Test
Sept. 12–13: V.H.F. QSO Party

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 June 19 at 0130 GMT. Identical tests will be sent simultaneously by transmitters on 3555, 7080 and 14,100 kc. The next qualifying run from W6OWP only will be transmitted June 18 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION:* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT June 19 becomes 2130 EDST June 18.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 2330 and 0130 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun. Mon. Wed. Fri. (GMT date) from 0130-0220; 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0130–0220; 10, 13 and 15 w.p.m. daily from 2330–2440 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0130–0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130–0220 GMT practice on those dates:

Date	Subject of Practice Text from April *QST*
June 3:	*It Seems to Us*. . . . , p. 9
June 11:	*The "Novice Gallon" — Mark II*, p. 11
June 15:	*Come Blow Your Horn*, p. 34
June 23:	*The Flying Spot — II*, p. 41

Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
June 26:	*Time Constant*, p. 20
June 29:	*Apparent Power*, p. 20

W1AW NOTE

Starting in June the ARRL Headquarters Station, W1AW, will be undergoing extensive reconstruction. Operation during this period (2230 to 0430 GMT daily) will be conducted from temporary positions in the basement of the building on a curtailed schedule on 80 40 and 20 meters only. Full W1AW services will be continued for the transmission of voice and c.w. bulletins, as well as both periods of tape-sent code practice, as noted elsewhere on this page. During most of this period, with the building in disarray as construction progresses, it will not be feasible to invite visitors.

We hope you will bear with us in these slight but necessary inconveniences with the expectation of renewed and extended complete schedules when the changes are completed, from a rebuilt and better W1AW.

DX CENTURY CLUB AWARDS

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions credited through March 31, 1964.

W1FH 309/335	W4GD 308/329	G3FKM 306/323	K3UPG 304/328	W4AIT 302/325
KV4AA 309/333	W9NDA 308/332	DL3LL 306/322	VE7ZM 304/328	W2OKM 302/320
W8JIN 309/334	W7PHO 307/325	W7GBW 306/330	W0ELA 304/327	W5AFX 302/327
W1GKK 309/334	W2DEC 307/323	W8LKH 306/326	W7ENW 304/328	W8RKP 301/323
W8BRA 309/332	W9HUZ 307/327	HB9J 306/330	W4TM 304/326	W2WZ 301/324
W2AGW 309/333	W8KML 307/328	CE3AG 306/330	W8DAW 304/327	W3ECR 301/318
W7GUV 309/332	W4QCW 307/324	W1JYH 306/329	W4ML 304/324	W8CKY 301/320
W9RRB 309/334	W9YPV 307/331	W0DU 306/328	W2ZGB 304/320	W2SUC 301/318
4X4DK 309/327	W8EWS 307/331	DJ1BZ 306/324	W5KC 304/327	K4LNM 301/315
W8POQ 309/326	W9LNM 307/330	G4CP 305/329	K2BZT 304/321	W2AYJ 301/320
W6CUQ 309/334	W2BXA 307/331	W6AM 305/330	W2HMJ 303/323	W1HZ 301/319
W4DOH 309/333	W3JNN 307/331	W2BOK 305/322	W5ASG 303/327	W4VPD 301/318
W8UAS 309/330	W8DMD 307/329	WØAIW 305/328	LU6DJX 303/327	W8PUD 301/318
CX2CO 309/330	W8JBI 307/326	W5ABY 305/322	OE1ER 303/325	W7AC 301/325
W3GHD 309/333	W5MMK 307/328	W2ZX 305/324	WØBFB 303/321	W4QPM 301/316
PY2CK 308/331	W6YY 307/327	W3LMA 305/327	K6ENX 303/320	W2GUM 301/323
W8KIA 308/332	G2PL 306/329	W3JTC 305/328	WØSYK 303/321	W2TVR 301/319
W8MPW 308/326	W1BIH 306/330	W2LV 305/324	WØODF 303/320	K6EVR 301/318
W8BF 308/329	W3KT 306/330	K2DCA 305/322	W1ZW 303/320	W3GAU 300/323
W2JT 308/327	WØQVZ 306/327	W1ME 304/327	W6CYV 303/321	W5UX 300/315
W2LPE 308/329	W6EBG 306/331	K2GFO 304/325	G8KS 302/320	W1HX 300/320
W2TQC 308/327	W1CLX 306/329	W5ADZ 304/326	W9AMU 302/319	DJ2BW 300/317
	W6GPB 306/327		W2FXN 302/316	

Radiotelephone

W9RBI 309/332	4X4DK 308/326	W8KML 306/327	W4DQH 305/327	W9JJF 301/318
CX2CO 309/330	W8BF 308/329	VO4ERR 306/328	W6YY 305/325	W4QCW 300/313
W3RIS 308/333	W7PHO 307/325	W2ZX 305/324	W2JT 303/317	W6AM 300/324
PY2CK 308/331	W1FH 307/328	W3INN 305/326	W2BXA 302/324	DL3LL 296/312
W8GZ 308/331	W8PQO 307/324	PY4TK 305/322	WØAIW 301/322	G3FKM 296/310

From March 1, through March 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.

New Members

WØIWR 226	K4SHB 124	K3LJZ 110	W7CST 104	K7CVL 102	AP5CP 101
W2VJN 187	4U1ITU 123	YU1BCD 110	GM3AXX 104	K9DKU 102	KR6LD 101
W5QVE 181	JA6ACZ 115	WB2APG 109	K2JJK 103	W2JSX 101	W6ORC 100
DL7JA 162	DM2AEC 113	VE3FAW 107	W8NDO 103	K2YTC 101	CN8GB 100
YU1KC 161	KØMIC 112	DM2ATL 106	KØWTT 103	W9TQA 101	HA5FQ 100
ZS2RM 152	VE3DDX 112	W5EGS 105	ZB1RM 103	W9VKC 101	OK2QX 100
HA5KDF 132	DJ4XA 112	CE5EF 105	K4CEB 102	WØPFG 101	OZ6HS 100
PY2BGL 129	G3NGG 111	WA2HJF 104	W4JD 102	VE6ARP 101	5R8AA 100

Radiotelephone

W5QVE 180	HK3AFB 120	9K2AP 110	KØBJK 106	W6YIN 103	K4RHL 100
W8CUT 120	W4RKN 110	VE3DDX 109	W5EGS 101	ZS6AKI 102	VE2AMP 100
	DJ4TZ 110	HR3HH 109	K2JJK 103	W1SIK 100	

Endorsements

W2QHH 320	W2ZVS 280	W8KSR 240	W1FJJ 200	HR9IM 161	VE3BLU 133
W4GXB 320	W4AVY 280	K8WOT 240	W9LNQ 200	K1LWT 160	W1BPY 132
LA7Y 312	W4UKA 280	W9WKU 234	DJ5GG 200	W1MX 160	W3ZVJ 131
W2CYS 311	EA1BC 275	W2PTI 230	K6BPR 199	K4RLO 160	WA2PWI 130
K2LWR 311	W1AEW 274	K4SCT 230	WA2IEK 195	WØCAW 160	WA2RUB 130
W6BVM 311	WA2ELS 270	W5VA 230	W4HKJ 194	DJ2SR 160	K4PVZ 130
W2HTI 310	K4HNA 270	UC2AR 223	W4GHP 191	HB9TU 160	K7EQM 130
W1GYE 302	W4HUE 270	W2GKZ 222	W5AI 190	W2LJX 151	WØICQ 130
WØAJU 302	DL1KB 265	HB9NL 222	W7IYW 190	W5IPH 151	K0TYQ 130
W4BJ 301	K4AJ 263	K3HQL 221	W8LOZ 190	ZL1QW 151	KP4APY 130
W1BAN 300	WA6SBO 263	K6OHJ 221	OH3NY 190	ZS5UP 151	WB2CKS 124
K4ICK 300	W7BGH 263	VE3TB 221	W1ETF 186	K1LPL 150	W4KN 123
W9RKP 300	WØNFA 263	WA2CBB 220	W3AHX 184	W2RSJ 150	W6TYM 122
GI3IVJ 300	W4JII 260	W4BHG 220	WØFDL 184	W3UHV 150	WA2SNY 121
WA6EYP 299	W7CSW 260	W8ALJ 220	W2MOF 183	W4AVY 150	DJ5IH 121
W4SSU 292	ST2AR 260	YP7NS 216	WA2JBV 180	W5LQC 150	K3NLC 120
W7AQB 292	K2GUN 259	IITF 212	K2YMO 180	WA6OHJ 150	W3URE 120
W9HB 292	W2MJ 252	K1ANV 210	W4QDM 180	W6TMI 150	WA4DZU 120
KØHAL 292	W4EEO 252	K8VDV 210	WA6FTM 180	K8AJK 150	K4BSV 120
KL7PI 292	W6PHF 252	DJ4TZ 210	W8OQV 180	YV5BOA 150	W7MIX 121
W7CMO 291	VE7CE 252	W7UVR 207	K4YFQ 172	W5MUG 143	W3GQF 114
W6KG 290	K9PPX 251	W6BZ 206	W2LJF 171	KL7AL 143	K1RUO 112
K6KII 290	W1VAN 250	W3HTF 205	K8DTZ 171	K1PZB 141	W6OHU 112
W4KFC 285	W3INH 249	K9WTS 204	W8OKB 171	W2YCW 141	F7CP 112
CR6BX 285	W2YXY 248	G3IEW 203	W1YYM 170	W1GOG 140	W1AOP 111
G3HDA 283	K4HYL 243	CR7IZ 202	KC6BK 169	W2NCG 140	WA2QHQ 110
DL3BK 282	W3YZI 242	SP5ADZ 202	K9GVE 167	WØTDR 140	W6HS 110
W8EV 281	W6ISQ 240	WA6GLD 201	KL7DTB/6 165	W1LBA 137	KØVSH 110
W1RAN 280	W8CUT 240	OK2QR 201	W3BSC 162	W4GJY 134	HA5BW 110
					KP4BJU 110

Radiotelephone

W9NDA 315	W4SSU 255	W8CUO 220	K6ENX 190	K1ANV 162	WA2VOH 146
W2OKM 310	WØPGL 250	DL3EA 214	W7BTH 190	KØKKN 161	KC6BK 146
LU4DMG 307	W7DLR 245	G3HDA 211	W1BHP 188	W2MOF 160	W5LDH 130
W2LV 290	K4HYL 242	W6TZD 210	W1ETF 185	K1AMO 151	W9GPI 130
GI3IVJ 284	WØNFA 242	TI2PZ 210	W6UBG 183	K1DPI 153	K8OHJ 128
W2RGV 280	YV5AXQ 241	W4EEO 208	ZS6BBP 182	WA6SBO 152	OA4PD 126
WA6EYP 265	KØRAL 235	W7CMO 208	CE3WN 181	VE3TR 152	W2PDB 120
K4AJ 261	PA0ZD 233	K9PPX 202	W2ODO 180	W2MM 150	K2UFM 120
W9BEK 261	CX3AA 232	W8NVP 199	DL1KB 178	W4HKJ 150	EI8P 119
W9HB 260	WA2ELS 230	DL3BK 193	EA4GZ 172	W5IPH 150	W4NDE 110
LA7Y 260	W3YZI 228	SM3AZI 193	W1BPM 164	VE1OC 150	W9DNE 110

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activitiesfor the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3MVO. PAMs; K3CAH, W3SAO, W3SGI. Because of a change in job matters, K3MQE has resigned as SEC. George Van Dyke, W3ELI, 4607 Convent Lane, Philadelphia, has been appointed SEC and all EC reports and new AREC applications should be mailed to that address. K3MVO succeeds W3UE as manager of 3RN and has accepted the appointment as RM at that level. The EPA C.W. Net meets at 2330Z on 3610 kc. and had 433 QNI with a QTC of 329. The PTTN meets at 2300Z on the same frequency. W3VR discarded the crutches but has not taken to rope-jumping yet. K3MNT won the N.J. QSO Contest. K3SFP is running 40 watts on all bands. K3ARR has changed jobs to the local power company. K3TEJ was active in the YL-OM and the DX Contests. W3BKF lost his nine-element 6-meter beam in the ice storm. K3HTZ is working in his dad's shoe store. K3KEL joined the Air Force and plans to keep in touch via the traffic nets. W3AXA still is QRT because of the loss of his 80-meter antenna in the storms of last winter. W3KEK is QRP as his plate transformer went up in smoke. New Gear Dept.: K3YQJ erected two antennas, a 20-meter dipole and Hy-Gain vertical. An RTTY machine for K3LTI works all bands. W3ADE is busting the ether with a new Valiant II. KN3YEO added an Eico 720 rig and t.r. switch. An Eico scope is added to K30MP. FCC will miss the regular visits from K3MEH who is now General Class. New class officers: Abington ARC—W3VAP, pres.; W3LWE, vice-pres.; K3LVK, secy.-treas. Lancaster Transmitting Society—K3MAW, pres.; K3QCB, vice-pres.; W3OY, secy.; K3RZE, treas. K3SLY has his Extra Class license. K3ZGO is now on with a new linear. Reports of stations participating in the Alaskan disaster were forwarded to Headquarters to appear in an article in a subsequent issue. Your SCM Stump Jumpers will be active during Field Day as W3ZRQ/3. Let's see how many of these FD messages get to us? Rain, naturally, is the forecast. Traffic: W3CUL 6225, W3VR 1642, W3EML 1118, K3MVO 430, K3BHU 261, K3MQE 159. K3OMP 125, W3RV 107, K3YQJ 104, K3OAH 85, W3ZRQ 83, K3LTI 74, K3HNP 67, K3RUA 66, K3JSX 65, W3NNL 56, K3TSO 40, K3KTH 39, K3IMR 38, W3BFF 35, W3ELI 27, W3QDW 20, W3LC 18, K3SFP 15, K3MNT 14, K3ARR 13, K3CHU 10, K3ZDK 9, K3JHF 8, K3RZM 7, K3KNP 6, W3LXN 6, K3TEJ 6, W3OY 5, K3AKN 3, W3BKF 3, W3AHZ 2, W3BNR 2, K3HTZ 1, W3ID 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RMs: W3QCW, K3JYZ, for MDD Net on 3649 kc. daily at 0000Z. The MEPN meets on 3820 kc. M.-W.-F. at 2300Z and on Sat. and Sun. at 1800Z. The MDD Net will hold its Annual Picnic in the Patapsaco State Park, near Baltimore, in the Hollowfield area, sites 58-49-60, on July 12. WA3AFA is on 2 meters. K3CEZ reports that KN3YUR and KN3FWR are on the low frequencies. KeBIX has joined the Air Force. W3CKI is really enjoying the 6-meter band. W3CQG is keeping a sked with his home town in Minnesota. K3DOC and W3DTN are using new Drake TR-3 transceivers. W3ECP kept the frequencies clear for traffic coming out of KL7-Land during the Alaska earthquake. W3GNQ took about 30 messages from Alaska then delivered them via telephone to various places in the U.S. W3UQS also was busy taking traffic from a KL7 using emergency power for delivery in the U.S. KN3FWW has passed the Tech. Class exam. W3GQF has a new 4-250A linear on the air. K3GZK is liaison for MDD to MEPN. K3LLR is working on a 6-meter project. K3LLV has fun in the DX Contest. K3MDL is A.E.C. and weather advisor for the Baltimore area AREC. K3OEH is on 6 meters with an HE-45B W3OHI is doing a little research on bonding aluminum and other metals together. K3ORW will have his DX-60 on with plate modulation. W3PQ lost his antennas in a heavy wind storm. K3PRN and K3VST are using the transistor VOX for control. W3QCW put out another fine bulletin for the MDD Net. It is sent to all stations checking into the MDD Net on 3649 kc. We need outlets in the Baltimore and Cumberland area on the MDD. K3QDD is busy getting W3GPW back on the the air at the Blair High School. K3QFG will be reporting from the Wyoming area this summer. K3QOO is returning to California. K3RUQ was at home over Easter and put up a Zepp antenna. K3SOZ lost his antenna in the snow storm. K3SMT has moved to a new QTH. W3UCR is in the Virginia area and is now WA4SUE. K3SVB is building a linear for his s.s.b. rig. W3TMZ has been traveling. K3TRK has a new 123-D receiver. K3VGX is looking for 2-meter skeds. W5VZO/3 is in our section on military duty. K3WOQ has been on active duty. W3YKQ is working on 6 meters. KN3ZBR, of Clinton, Md. reports that the theme of the Surratsville H.S. ARC is to serve the public. Traffic: (Mar.) K3QOO 316, K3QFG 149, K3UFV 138, W3QCW 87, K3QDD 74, K3LLV 67, W3AHQ 56, K3GZK 51, W3PQ 50 K3RUQ 49, W3ATQ 31, K3ORW 23, K3SGD 19, W3ECP 18, W3ZNW 16, K3CEZ 15, K3JYZ 15, K3THF 15, W3CQG 13, W5VZO/3 8, K3CXX 7, K3MDL 3, K3LLR 1. (Feb.) W3ATQ 19, K3CEZ 12.

DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSMN meets Tues. on 50.4 Mc. at 2100 local time. Appointments: K3OCE as Kent County EC; K3KEO and K3OBU as OESs; W3UDR as OO. The Delaware Field Day Trophy, donated by the SCM, PAM and RM, will be awarded to the club scoring the highest points per transmitter during Field Day. Rules will be sent to each club. Last year's winner was the Dover 6 and 2 ARC. The March DSMN transmitter hunt was won by W3CGV, followed by K3MPZ. K3OBU, who won the February hunt, played "rabbit." Both W3EEB and W3HKS have new antennas up and in operation. W3CFA reports the First State ARC Net meets Sun. on 28.6 Mc. at 1130 local time. K3ZVM is Field Day chairman for the Delaware ARC. W3FJF is starting his OO activities. Traffic: W3EEB 104, K3OWS 90, W3CFA 3.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZI. RM's: WA2BLV and WA2VAT. WB2FJF, K2RXB, W2MMD, WB2EFG and WA2EVK received certificates for their activities in the N.J. Phone Net. The Net's March totals were: 31 sessions, QNI 605, traffic 267. WA2BLV, NJN mgr., reports 31 sessions, QNI 517, traffic 365. W2ZVW, Beverly, has increased power to 1 kw., hoping to get through the summer. QRN. WA2WLN, Linwood has a new transmitter. W2EZM and K2CPR attended the North Jersey DX Round-up, WAKIP, Trenton, is a new traffic-handler on NJN. W2BAY, Haddonfield, hopes to have antennas back in the air soon. Look for the Novice Traffic Net on 3725 kc. WN2ILU sent in his first traffic report in the section. WA2IEK expects to move to Maryland. SJRA's *Harmonics* reports that W2CM, Haddon Heights, has passed away. The Gloucester County AREC held a mobile drill in early April. K2JKA, Gloucester County EC, and W2LVW made the plans. The club's Field Day chairman is K3AQL. The SJRA is making plans for a bigger and better "Hamfest" this year. K3JXC is chairman for the event. From Southern Counties ARA News: "K2LYB is welcomed back in the Atlantic City area. WB2HDG passed the General Class exam and W2TUR received the Amateur Extra. Members of the TVI committee are K2YYB, K2YZY and WA2OZQ." K2SBK is editor and publisher of *The Crust*, Apple Pie Hill ARC official publication. During the coming Field Day activities, and prior to the event, reports of club participation will be appreciated by your SCM. Traffic: WA2BLV 286, W2RG 147, W2ZVW 108, W2MMD 54, K2RXB 44, WA2WLN 42, W2ZI 39, K2CPR 17, WA2KIP 16, WA2-KAP 14, WN2ILU 11, K2BG 4, K2JJC 3.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ RMs: W2RUF, W2EZB and W2FER. 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. From reports received here Alaskan earthquake traffic was handled efficiently by many in our area. Newspapers were very generous in their praise and thanks for information received through amateur channels. K2KBI commented that it was apparent that many KL7s lacked emergency power. It is

expensive to own for personal use, but surely club groups should have a generator. This year's Field Day exercise will give your group a chance to simulate the emergency. Are you prepared?; 2-Meter f.m. nets using repeater stations have been reported in the Buffalo, Utica and Schenectady areas. One or two more in strategically placed points could give us a state-wide mobile net with unlimited possibilities. K2HUK will give information to any interested parties. It is important that frequencies be coordinated for maximum utilization. New officers of the Elmira Amateur Radio Assn are K2YQA, pres.; WA2PJJ, vice-pres.; WB2FXK, secy.; WA2TCZ, treas. WA2RPI is teaching a ham class at the Orphanage in Lockport; he made the front page of a local paper. WA2DAC should have first QSL from the World's Fair on 6 meters. He will work K2US from pocket mobile while he directs the Peru Central School marching band at opening day ceremonies. The RAWNY elected W2-GIH, pres.; W2CZQ, vice-pres.; W2CUU, secy.; W2-TAX, treas. Let's all make a special effort to participate in Field Day this year. It doesn't have to be a contest and many of us consider FD to be the most important single event in ham radio. Challenge a neighboring club or put on a public demonstration in the town park. Those making the BPL are W2RUF, WA2-KQG and W2GVH. Congratulations! Traffic: WA2KQG 577, W2GVH 564, W2RUF 346, W2FEB 111, K2OFV 72, WB2GAL 68, K2KTK 59, W2FCG 58, WA2DPR 56, WB2-JCE 40, K2BJX 35, W2RQF 35, WB2DMU 29, K2HOH 18, WA2GLA 17, K2AYQ 11, K2DNN 9, K2RYH 8, W2-EMW 5, WA2VZA 2.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN, K3-OOU and W3NUG. PAM: W3TOC. The WPA TRAffic Net meets Mon. through Fri .at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets 2330 GMT Mon. through Fri. on 3585 kc. K3VBL, the son of W3WDK, captured top honors at the Second Annual Gannon College Science Fair for high school students at Erie, Pa. K3GAO won the 1964 Erie County QSO Contest. Congratulations to K3DKH on receiving his BPL medallion. The Horseshoe RC reports via *Ham-umateur News*: K3PCE is in the U.S. Navy; K3YKO is on 6 with a G-76; K3QFK is on 160 meters; W3ZVA and K3SIQ worked 4W1B for rare DX. W3KUN is getting close to DXCC on 3.5 Mc. The Etna RC reports via *Oscillator*: A Silent Key is W3RI, of Tarentum, Pa.; W3OX is on 160; K3RAH has a Drake TR-3; W3LKZ is back home and on the air. W3IYI has a new Apache and antenna. The Steel City ARC (W3KWH) reports: K3KPI has an SB-300 receiver; W3SVJ and W3SDV attended the Sebring Sport Car Races in Florida; W3UUH's color photos were seen in the Roto section of the *Pittsburgh Press*. The March meeting of the Two Rivers ARC was held at the home of W3IMH. W3QCN is trying out Vanguard 2- and 6-meter units. The Cumberland Valley ARC (W3ACH) through *Valley QRM* reports: W3UMY is on 6 with a home-brew rig; W3NXZ is on 10 with a ground-plane; K3EDH has a multiband vertical up; a club project of building 10-meter converters is anticipated. The Radio Association of Erie *Newsletter* reports: A new ham is WN3AEK; K3QET is operating a Marauder; W3VHP has a new tri-band quad; the communications truck goes out every Sun. evening and checks into the Lake Erie Emergency Net. The Nittany ARC reports via *QST de K3HKK*: K3FIT now has his General; K3POG, W3ZZO, W3KJM and K3AKR are progressing slowly on 432 Mc.; K3POG now is on 6-meter s.s.b.; the new NARC building is progressing. New Officers of the Greater Pittsburgh V.H.F. Society are W3BWU, pres.; K3QBI, secy.; W3-EWV, treas.; K3JTH, net mgr. K3OTS, Beaver Co. EC and K3IFK, Allegheny Co. EC, have been making tremendous gains in the AREC movement. K3KMO (DJ0HZ, MIM) now is back in the States. Congratulations to the WPA Traffic Net, which had a very good month (Mar.) of traffic-handling and attendance. Traffic: K3PIE 547, K3DKH 387, K3PYS 240, K3NZB 186, K3OWN 173, W3KUN 156, W3SV 102, K3SDT 89, W3UHN 84, K3ZMH 75, W3LOS 73, K3TEZ 71, W3JHG 63, W3IYI 32, K3SOH 28, K3SIQ 20, K3SMB 18, W3-TOC 11, W3OEO 10, K3AKR 8, K3COT 5, K3OOU 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: W9USR. PAM: W9VWJ. Coo, County EC: W9-HPG. Section net: ILN, 3515, kc. Mon. through Sat. at 1900 CDT. The EC Net meets every Sun. at 1600 GMT on 3840 kc. Numerous reports have been received on the FB activity of the amateurs of this section in helping to facilitate the delivery of emergency traffic from earth-stricken Alaska. Recognition of this public service was published in many of this state's newspapers. The Western Illinois Radio Club of Quincy sponsored the Tri-State Hamvention May 16 with about 300 guests present. New officers of the St. Clair Amateur Radio Club are W9JMY, WA9DYY, K9TDX and K9ZHN. The CARCC's station, W9TEM, was on the air at the Hilton Hotel during the Annual Convention of the National Association of Broadcasters and did a magnificent job of public relations. This column's sympathy goes to the family and friends of W9QGG who recently passed away. A new Novice heard was WN9HUB. W9LNQ and K9UOV were top scorers in the latest CD Party. New appointees this month include WA9CKQ as OBS and K9-RAS as OO. WA9APT has a new W9TO keyer. WA9CCQ has taken to mobile with 8 watts a.m. homebrew. The Starved Rock Radio Club's Annual Hamfest will be held June 7 at the same place as last year's successful event. K9RYA passed the Extra Class examination and is exhibiting his certificate. The North Central Phone Nets handled 1079 messages during March and the ILN's count for the same period was 112. K9RHU is operating portable while attending the University of Michigan. K9IKR has gone 6-meter f.m. W9HAS has gone s.s.b. with a Heath SB-10. W9IDA has just finished his 35 years with Commonwealth Edison. The Calhoun County Amateur Radio held a ham and bean feed Apr. 19 at its club house near Batchtown. The Egyptian Radio Club, Inc., held its Old Timers Night and movies of old-time wireless were shown. W9IDA, K9KZB, WA9CCP, W9-HAS and K9UOV are BPL recipients for March traffic. WA9DLH (not WA9DCU) is an officer of the Proviso East High School ARC—his call wrong in the May *QST* report. Traffic: W9IDA 1869, K9KZB 1152, WA9CCP 866, W9-HAS 709, K9UOV 326, K9BTE 144, WA9AJF 143, W9JXV 115, W9USR 112, K9CYZ 89, K9GSD 76, K9OZM 66, WA9HSZ 57, W9SMD 53, W9IFY 32, K9IZE 23, WA9APT 22, W9HPG 13, W9GFF 12, W9PRN 10, W9HBI/9 6, K9RHU 6, W9SKR 5, K9RAS 2, K9QAE 1.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9GLL, K9IVG. RMs: W9DGA, K9DHN, W9-JOZ, 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: K9VXH as EC of Jay Co., W9FQN as EC of Elkhart Co., K9EJK as EC of Owen Co. and WA9BWY as ORS. BPL awards: W9JOZ, W9MMI, K9DHN, WA9AUM and WA9BWY. QIN honor roll: K9VHY, K9DHN, W9FJR, W9QLW, K9HYV, WA9AUM, W9ZYK, K9UXX and WA9BWY. 9RN certificates were received by K9ARW, WA9AUM, K9DHN, WA9ECX, K9SGZ and K9ZLA. IRCC delegates laid plans to encourage Indiana hams to write the Bureau of Motor Vehicles and state legislators opposing repeal of ham auto plates. The Wabash Co. AREC Net meets each Sun. at 1300Z on 50.4 and 52.525 Mc. *Amateur Radio exists because of the service it renders.* March net traffic: ISN 1319, IFN 361, QIN 250, Hoosier VHF 117, 9RN 904 with Indiana represented 100 per cent. Traffic: (Mar.) W9JOZ 1177, W9MM 1064, K9DHN 741, WA9AUM 700, WA9BWY 550, W9QLW 455, K9IVG 413, WA9ECX 266, K9SWL 107, WA9EED 103, W9ZYK 89, W9FJR 85, W9YYX 82, W9BUQ 80, W9CC 63, K9CRS 63, K9RWQ 62, WA9CJR 55, K9KTL 50, K9HYV 45, K9ZLR 42, WA9ELY 40, W9QYQ 40, W9RTH 40, K9MWC 36, K9ILK 32, W9FWH 29, W9EJI 26, W9PZW 26, WA9BGI 25, W9-DOK 20, K9BSL 17, K9WET 17, K9FPA 16, K9VHY 15, WA9DXY 13, W9TKK 12, W9GGW/9 11, WA9AEL 10, K9-DHJ 10, K9FHQ 10, K9SUH 10, W9URQ 10, WA9DVJ 9, W9BDP 8, K9UEO 8, K9GHN 7, WA9PDO 6, W9-SNQ 6, W9AQW 5, WA9GKF 5, WA9HQP 5, WA9FHF 4, K9PNP 4, W9HNJ 3, WN9HRG 1. (Feb.) WA9DXP 99.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9BCC. RMs: W9IQW and WA9AKE. PAMs: W9NGT, W9NRP and K9IMR. Nets: WIN on 3535 kc. daily at 0045Z, WTN on 3710 kc. Tue. through Sat. at 0130Z, BEN on 3950 kc. daily at 2230Z, WSBN on 3985 kc. daily at 2215Z, SWRN on 50.4 Mc. Mon. through Sat. at 0200Z. New appointees: W9IQW as RM for WIN; K9DGY as OES. Renewed appointments: W9BEW and K9UTN as ECs; K9IMR as OPS; W9GIL, W9YT and W9CBE as ORSs. The WNA Picnic will be held at East Park in Hartford, Wis., July 12. K9DKU received his WAC, WAS and DXCC awards. WA9FXJ has earned his WAC, WAS and CP15 awards. Wisconsin has 96.7 per cent representation on 9RN. WA9AKE earned his 9RN certificate. W9HGE has a Thunderbolt and WA9EUE has a Seneca on 6. CAN had 6 Wisconsin stations helping to set new records in March. WA9CDY is running a kw. on s.s.b. K9NRS is a new call at Naval Reserve Training Center, Sheboygan. W9CCO is leaving Plymouth for Iowa. New officers of the Ontagamie RC are WA9FFT, pres.; W9EUA, vice-pres.; WA9FMQ secy.; WA9ASD, treas.; WA9HFZ, act. mgr. WN9JFM made WAS in 7 months. The Arrows RC has 12 members. Traffic reports: WIN, 191 offered, 104 cleared in 12:58 by 296 check-ins; BEN, 156 offered, 109 cleared in 53:06 by 902 check-ins. BPL was made by W9DYG. Traffic;

(*Continued on page 114*)

THE DESIGN of a maximum power amplifier such as the National NCL-2000 demands detailed consideration of the frequently neglected problem of peak power capability. Any properly designed linear amplifier delivers maximum output at its rated design parameters of plate voltage and current — increase or decrease one without changing the other and efficiency decreases. When the input drive is increased beyond the level required to obtain peak input and maximum output the amplifier will saturate and there will be no corresponding increase of either peak power input or output. Peak power input will remain constant because of the saturation but the average power input will increase. The well-known phenomenon of peak limiting or "flat-topping" in a linear amplifier is usually the direct result of the amplifier peak plate current and peak output remaining constant when the average plate current is kicked higher than the point at which output is maximum — average input increases while peak output does not increase.

IT SHOULD be apparent that *peak* plate current, as in SSB operation, is the controlling parameter with a given plate voltage, and the amplifier must be capable of accepting proper peak input at high efficiency if maximum output is to be obtained without flat-topping. Therefore, the NCL-2000 is designed so that at the peak input of 2000 watts — 2500 volts @ 800 ma. — output efficiency is 60% minimum, and peak *output* is as high as 1400 watts. The conservatively rated NCL-2000 differs from usual amplifiers, including most 500 watt average jobs, in that it may safely be tested under i.c.a.s. conditions at its *peak* rated input with the *key down* — or at 2000 watts "DC", and the owner of a '2000 can satisfy himself as to its power capabilities and efficiency by observing the power output on a wattmeter with the amplifier operating into a dummy load under these conditions. He can be assured that when the NCL-2000 meters indicate an input of 1000 watts during s.s.b. operation, he is running a full 2000 watts PEP without flat-topping because of insufficient peak power capability.

IN THE first paragraph we said that maximum output occurs only at the rated design centers of plate voltage and current. So what happens to the poor CW operator, for instance, who must operate the NCL-2000 at 1000 watts input? If maximum efficiency occurs at 2000 watts — 2500 volts at a peak of 800 ma. — how can he achieve efficient operation at a piddling 2500 volts at 400 ma.? The answer is — he can't. Not by merely reducing the plate current of the '2000, anyway. Were he to do so, his efficiency would drop (as in *any* properly designed amplifier operating with insufficient plate current) to perhaps only 30%! To provide optimum efficiency for 1 KW CW operation, it is necessary to match the load impedance of the tubes to the load impedance of the amplifier. This may be done by altering the ratio of L and C in the pi-network, but it may also be done by altering the plate voltage and plate current — and the latter option is much easier. The NCL-2000 features a front panel switch marked *SSB-CW*. When thrown to the *CW* position, the plate and screen voltage on the 8122 output tubes is reduced from 2500 volts and 400 volts to 1800 volts and 290 volts, respectively. The amplifier is now loaded to 1000 watts (550 ma. @ 1800 volts) — load impedance is properly matched because of the lower plate voltage and current — and efficiency is back up to 60%! Output as indicated on a wattmeter is 600 watts. There is an extra bonus in this switching arrangement. The NCL-2000 is designed so that if it is properly loaded to 1000 watts in the *CW* position, it is only necessary to push the switch to *SSB* and the amplifier is correctly loaded and tuned for 2000 watt PEP SSB operation — without the necessity of tuning up at an illegal key-down 2000 watts.

THE NCL-2000 is a maximum amplifier in every sense of the word. We hope the above gives you some idea of the care that has been taken during its design to provide you with the controls required to best utilize its many features.

MIKE FERBER, W1GKX

Now there are two in

#1

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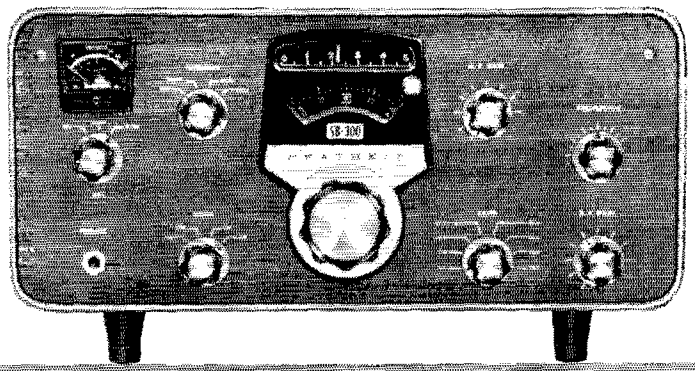


• Everything you could ask for in a deluxe receiver and more! • Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters • Crystal-controlled front-end for maximum stability on all bands • 1 kc dial calibrations—100 kc per dial revolution provides bandspread equal to 10 feet per megacycle—tuning knob to dial ratio approximately 4 to 1 • Provision for transceive operation with matching SB-400 Transmitter • Pre-built Linear Master Oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly • Professional styling and features at 60% savings

Good news travels fast! . . . especially on the amateur airwaves! Since its introduction, the Heathkit SB-300 has set the amateur world on its ear as one of the finest values in the industry! Deluxe styling and features now bring you a new dimension in quality, performance and dependability never before thought possible in kit form! . . . and by doing the easy assembly yourself you'll save 60% the cost of comparable units!

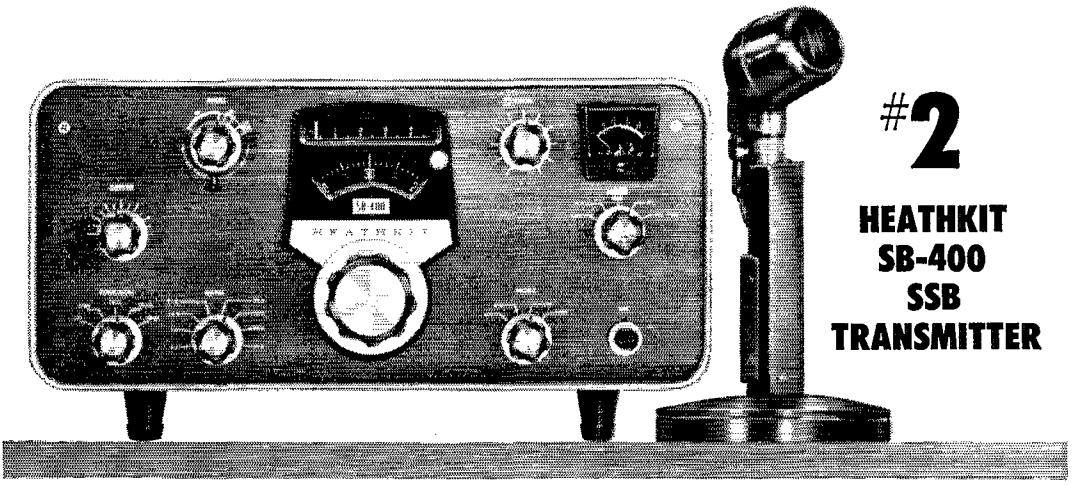
Experienced amateurs will quickly recognize the high standards to which this receiver was designed. Its many superb features include a crystal-controlled front-end for optimum stability on all bands, a pre-built Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations, a built-in crystal calibrator, hermetically-sealed 2.1 kc crystal band-pass filter, smooth non-backlash vernier dial mechanism . . . and many, many more! Order yours today!

Kit SB-300, less speaker
22 lbs., $27 dn., $22 mo.....$265.00
SBA-300-1 Optional AM crystal filter
(3.75 kc) 1 lb.....$19.95
SBA-300-2 Optional CW crystal filter
(400 cps) 1 lb.....$19.95
Export model available for 115/230 volts AC, 50-60 cps; write for details.

SB-300 SPECIFICATIONS—Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** Less than 100 cps per hour after 20 min. warmup under normal ambient conditions. Less than 100 cps for ±10% line voltage variation. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected; LSB, USB, CW, AM. **Selectivity:** SSB: 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). AM: 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). CW: 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response:** SSB: 350 to 2450 cps nominal at 6 db. AM: 200 to 3500 cps nominal at 6 db. CW: 800 to 1200 cps nominal at 6 db. **Audio output impedance:** Unbalanced nominal 8 ohm speaker and high impedance headphone. **Audio output power:** 1 watt with less than 8% distortion. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 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:** 14⅛" W x 6⅝" H x 13⅜" D. **Net weight:** 17 lbs.

FREE CATALOG
See the wide array of Heathkit Amateur Radio Equipment available at tremendous do-it-yourself savings! Everything you need in "mobile" or "fixed" station gear with full descriptions and specifications . . . Send for Free copy!

the HEATHKIT® SB series



#2

HEATHKIT SB-400 SSB TRANSMITTER

• Built-in power supply • Complete transceive capability with SB-300 Receiver • Linear master oscillator frequency control • Built-in antenna change-over relay • All crystals supplied for complete 80-10 meter coverage • Automatic level control for higher talk power, minimum distortion • 180 watts PEP SSB, 170 watts CW • Crystal filter type SSB generation • Operates SSB (upper or lower sideband) & CW • VOX & PTT control in SSB operation, VOX operated CW break-in using CW sidetone • CW "shift" transceive operation to eliminate transceiver chasing • Crystal controlled heterodyne oscillators • 1 kc dial calibration—100 kc per dial revolution • Dial bandspread equal to 10 feet per megacycle • 500 kc coverage per bandswitch position • Switched 120 V AC for external amplifier antenna relay • Sturdy, lightweight, heavy-gauge aluminum construction throughout • Neat, modern "low-boy" styling

Here it is . . . the new Heathkit SB-400 Transmitter . . . second in the exciting new Heathkit series of Deluxe SSB Amateur gear! Following the same high standards set by the Heathkit SB-300 Receiver, the new SB-400 Transmitter now offers a matching counterpart that permits complete transceive operation with a host of advanced engineering design features for unmatched performance, versatility and operating convenience!

Unique mechanical design . . . prebuilt Linear Master Oscillator (LMO) . . . built-in heavy-duty power supply . . . sturdy chassis construction . . . beautiful modern styling . . . and power-packed performance are just a few of the many features that make the SB-400 your best buy in an SSB Transmitter! Order yours today for "Deluxe" communications at tremendous do-it-yourself savings!

Kit SB-400. . .33 lbs. . . Write for credit details. $325.00 Export model available for 115/230 volts AC, 50-60 cps; write for details.

SB-400 SPECIFICATIONS—Emission: SSB (upper or lower sideband) and CW. **Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm—less than 2:1 SWR. **Frequency range:** (mc) 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0. **Frequency stability:** Less than 100 cps per hr. after 20 min. warmup under normal ambient conditions. Less than 100 cps for ± 10% line voltage variation. **Carrier suppression:** 55 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kc. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 cps. **ALC characteristics:** 10 db or greater @ 0.2 ma final grid current. **Noise level:** 40 db below rated carrier. **Visual dial accuracy:** Within 200 cps (all bands). **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **Backlash:** Less than 50 cps. **Oscillator feed-through/mixer products:** 55 db below rated output (except 3910 kc crossover which is 45 db). **Harmonic radiation:** 35 db below rated output. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 350 to 2450 cps ±3 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120 V AC line. **Dimensions:** 14⅛" W x 6⅝" H x 13⅜" D.

Watch for the new SB-100 All-Band SSB Transceiver and SB-2001 KW Linear Amplifier soon to be released!

HEATHKIT® by Daystrom

Heath Company, Dept. 9-6-1
Benton Harbor, Michigan 49023

☐ Enclosed is $265.00 plus postage. Please send SB-300 Receiver.

☐ Enclosed is $325.00 plus postage. Please send SB-400 Transmitter.

☐ Please send Free 1964 Heathkit catalog.

Address _____

Name _____

City _____ State _____ Zip _____

Prices and specifications subject to change without notice. AM-142

(*Continued from page 110*)

W9DYG 518, K9DKU 356, WA9AKE 255, K9WVM 129, W9NRP 108, W9SAA 70, WA9CDY 67, W9IQW 55, K9GSC 51, K9UUT 50, K9GDF 43, WA9FXJ 37, W9CBE 36, WA9BWD 25, WA9AOI 17, K9DBR 15, W9OTL 14, K9QKU 13, K9NRS 10, WA9IIJN 9, WA9EDZ 8, WA9AQT 7, W9CCO 7, K9DGY 7, W9FXA 6, W9FNT 4.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, WØHVA—SEC: WØCAQ. PAM: KØTYY. WN9KBA is a new call in the Minot area. The North Dakota 75-Meter Fone Net has an incomplete report of 16 sessions for March with 255 check-ins, a maximum of 21 and a minimum of 4. Thirty-three pieces of formal traffic were handled with 19 informals and 6 relays. The Goose River Net had 5 sessions with a total of 119 checking in; 3 formal and 2 informal messages were handled. The RACES Net reports 21 sessions with a total of 744 checking in with a maximum of 51 and minimum of 19; 132 formal and 68 informal pieces of traffic were handled. Traffic: KØITP 157, KØGGL 19, KØTYY 7, KØCAQ 6.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN. SEC: WØSCT. RM: KØGSY. Eleven towns and three states were represented at the SFARC quarterly auction. Congratulations to KØALT, state winner in the Betty Crocker Future Homemaker Contest. WØCUC lost his tower and all antennas in the March ice storm. He's operating with a vertical and borrowed tower. WØZWL reports the WX Net was discontinued for the season on Apr. 11. New call: WAØFPR, Clear Lake WØZWL made the BPL in March. The SFARC donated a receiver to the Crippled Children's Hospital and School, for the use of patients. WØDSK is mobile with a Swan. KØYWP is on the road for WØBJV. WØZRA has returned to recuperate from the winter in Arizona. Traffic: WØZWL 527, WØSCT 200, WAØAOY 198, KØVYY 101, WAØDEM 65, WAØCWX 56, WØDVB 46, KØZBJ 42, WØRWX 40, KØBMQ 35, KØZTV 30, WØCUC 27, KØAIE 21, KØYGZ 21, WØCQN 18, KØYJF 18, WAØCIJ 17, KØCXL 14, KØBSW 8, KØTXW 8, WØFJZ 4, WØOFP 4, KØEQH 3, WAØBMG 2, WAØBWF 2, WØDIY 2, WØRRN 2.

MINNESOTA—SCM, Mrs. Helen Mejdrich, WØOPX —Asst. SCM: Emerson Mejdrich, WØRIQ. SEC: KØKKQ. RM: KØZRD. PAMs: WØYHR, KØVPJ. MSSB: WØHBN. Newly-elected officers of the Mankato ARC are WØHUU, pres.; WAØDFT, vice-pres.; WØTCK, secy.-treas. Former Rochester ARC Pres. WAØCCG is now employed at St. Joseph Hospital, Denver, Colo. WAØBXJ, WØZSW and WØCLM are new BARC members. Scheduled picnics: Rochester ARC, July 19. Mankato ARC, July 26. Minneapolis ARC, Aug. 2. St. Cloud ARC Aug. 9. ORS KØJFJ is on the air with a new NCX-3. SEC KØKKQ reports encouraging increases in EC and AREC numbers. AREC members now total 188. All amateurs interested, please contact your SEC. Appointments issued: WØGRW as ORS. WØFFX as EC. Renewals: WØRIQ as ORS; KØZKK as OPS; KØBFS, KØEGE, KØICG as ECs; WØZOB as OBS; WØCTM as OBS. OBS WAØCQG reports the formation of a 6-mefer traffic net on 50.26 Mc. Sat. at 8 P.M. He asks that all interested amateurs participate. EC KØGKI reports further increases in the Fairbault Co. 160 meter "Long Wire Net." MSN member WAØIAW is building a modulator for his DX-20. EC WB6CDQ/Ø informs us that the Ramsey Co. AREC net will meet Mon. at 1900 and Sat. at 1300 on 28.6 Mc. Paul is working DX on 10 with a 12-watt mobile and vertical antenna. OBS/Asst. Dir. WØZOB recently enjoyed a pleasant vacation. Traveling by air, he visited N.Y., New Orleans and Los Angeles. ORS WØGRW has installed a home-brewed tri-band quad antenna. OBS WAØCQG has a new TR-3. EC WAØDGW and ORS/OPS WAØARA are building linear finals for s.s.b. work. OES WØCTM works KØIJN and WØTHS nightly on 432 Mc. and would like others to join them. Gary also has a rig operating on 1296 Mc. New Extra Class licensee KØBYV is active with a Challenger and an RME-3504. Silent Key: WØRWF. Traffic: (Mar.) WØGRW 328, KØRAD 141, WØOSJ 135, WØRIQ 128, WØOPX 125, WØHEN 87, WAØBYO 82, WAØDSH 69, WAØARA 68, WØATO 57, WAØDGW 48, WØALW 47, WØKYG 40, WØLIG 39, WØKJZ 38, WAØBZG 35, WAØEDN 34, KØJOA 34, KØLWK 34, KØVPJ 34, WØUMX 32, KØZIW 30, KØFLT 29, WØYHR 29, KØZRC 27, KØJFJ 26, KØZRD 26, WAØEPX 25, WAØBKA 20, KØFWC 20, KØJYJ 19, KØIJU 16, WAØDVH 15, WAØFIK 14, WØIRF 14, WØMXC 14, WAØIAW 13, KØZKK 13, WAØASV 11, WAØDIL 10, KØSRK 10, KØICG 9, KØUBA 8, WAØFCJ 5, KØIJU 2, KØMEQ 1. (Feb.) WAØBYO 87. (Jan.) WAØBYO 143.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5. PAM: WA5GPO. RM: K5TYW. Congratulations to the North Arkansas Amateur Radio Society on the first printing of its monthly newsletter, *The Hetrodyne*. The editor, Harley D. Thompson, K5WKW, Harrison, would like news items from hams in Northeast Arkansas. The Central Arkansas Radio Emergency Net met Apr. 2 for an FB steak dinner. K5CQP and W5EEJ are Asst. ECs for Pulaski County. W5WEE, WA5BQE, and WA5GVG are Asst. ECs for Boone County, announces EC K5AKS. Asst. EC WA5BBS continues to do an FB job in Poinsett County. Your SCM will be on 3885 and 3790 kc. during Field Day to receive your messages to give you that bonus 25 points. The Arkansas C.W. Net held extra sessions to insure quick delivery of Alaskan traffic. In 3 special sessions we passed 15 pieces of traffic with 22 stations represented for 129 minutes of net time. W5FUD was top OZK man of the month with 28 check-ins. OZK report: 32 sessions, QTC 122, QNI 287 times 886 minutes. The Arkansas Emergency Phone Net continues to have a high number of check-ins. The Arkansas Single Side-band Net meets on 3817 kc. at 1830 CST and could use your support. Do something to commemorate the 50th Anniversary of ARRL: like, donate something to the building fund! Don't forget the Razorback Hamfest. Traffic: WA5AVO 293, W9PHR/5 234, W5DTR 181, WA5BBS 71, W5JWL 66, W5DRW 39, W5YM 36, K5TCK 15, K3JYY/5 13, W5FML 4, K5AKS 2.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—W5CEZ, our RM, made the BPL again. LAN, Louisiana C.W. Net, continues to improve and grow. Several new stations have joined the roster through the efforts of Net Mgr. WA5FNB. W5MYZ, New Orleans anchor station (and I mean anchor) for LAN, is very active and acts as net control Thurs. nights. A Hamfest and Fish Fry will be held at Lake Charles May 16-17. 3850 kc. will be monitored for the mobiles. W5HHA says he had a lean month. Only working on his 221. RTTY converter, back-up receiver for station, installing dual diversity system, chasing bugs and resting. W5IQH installed full break-in c.w. at his station. He has been lining up operators for the AREC. WA5BLO has been busy handling a little traffic. W5JFB took his Heath 2er to San Francisco and had quite a time on 145.35 Mc. with the locals. He was able to work 20-30 miles with a simple coax antenna because of his height above the surrounding area. The Jefferson ARC has started a 10-meter Emergency Net in mobiles using converted CB units. K5FYI cleaned up his shack and located six unfinished projects he had lost. WA5GLF just finished a 300-watt linear and now is working on his newly-acquired BC-342. With the help of W4EM, W5FMO was able to lower his 15-meter beam, repair the slipping joint and get it back up on the 60-ft. tower. Please check the expiration date on your ARRL appointment and mail your certificate to your SCM for endorsement. Make application to the SCM for an ARRL appointment. Traffic: W5CEZ 594, WA5FNB 202, WA5BLO 137, W5IQH 98, W5MXQ 57, W5EA, 14, W5KC 13, W5FMO 10, K5FYI 5, K5KQG 3.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—WA5BMC and W5JDF on the Miss. C.W. Novice Net and the Section C.W. Net, with the Civil Defense Net, had a busy time with tornado warnings recently. There were on-the-spot reports from mobile stations with W5EPT, W5IZS, K5RFW, K5MFY, WA5DBO, W5WMR, K5SQS, WA5CAO, K5BWW, K5JRZ, W5GBA, W5SHX and many others standing by for hours. A new appointment is WA5BMC as EC for Itawamba County. W5WZ, W5JDF, K5RUO, WA5CAC and others were mighty busy with Alaska traffic. We welcome W5VDA/5 and W8CVJ/5 to the Mississippi section. Congratulations to K5RUO on winning first place in the Delta Division C.W. CD Contest. New Meridian Novice: WN5MFT. WA5CAC made the BPL in March. W5ESC and W5EWE are both going strong on 75 meters and W5JHS has done a fine job over the years on the Gulf Coast Sideband Net. Traffic: (Mar.) WA5CAC 264, W5JDF 225, W8VDA/5 82, W5WZ 69, K5RUO 25, WA5BMC 20, W5EMM 12, W8CVJ/5 2.

TENNESSEE—SCM, William Scott, W4UVP—New appointments: K4BTY as OO. Net reports for March:

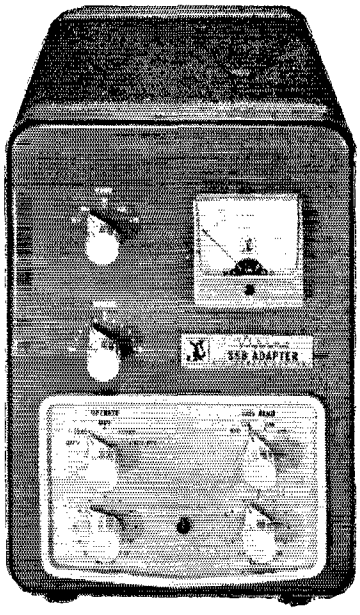
Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Average*
ETPN	3980	0640E	M-Fri.	22	73	468	22
TSSN	3980	1830C	M-Sat.	26	127	910	35
TPN	3980	0645C	Daily	31	186	889	29
TN	3635	1900C	M-Sat.	26	194	222	9

The Memphis Hamfest June 20-21 will feature Hoote-

(*Continued on page 122*)

Thinking about going to SSB?

... if you own a Viking "Valiant", "Valiant II" or "Five Hundred" ... here's a deal for you!



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If you own a Viking "Valiant", "Valiant II" or "Five Hundred" – then here's your chance to go to Single Sideband at a tremendous saving! All authorized Johnson Amateur Equipment Distributors have $100 certificates, which when validated by him, may be applied against the purchase price of a new Viking "SSB Adapter".

Save $100 by going to SSB now! Offer expires August 1, 1964!

SAVE $100.00 NOW!

Certificates are available only through your authorized Johnson Amateur Equipment Distributor. See him soon and save $100.00 by going to SSB now!

(Offer expires August 1, 1964)

SSB ADAPTER – Popular, filter-type SSB generator – bandswitching 80 through 10 meters – more than 50 db sideband suppression. Features built-in multiplier requiring VFO input only – design and front panel controls make operating practically foolproof! Superb audio fidelity and balanced audio response. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

Cat. No. 240-305-2... Wired, tested ..... **Net $369.50**
(WITH CERTIFICATE: $269.50)

E. F. JOHNSON COMPANY
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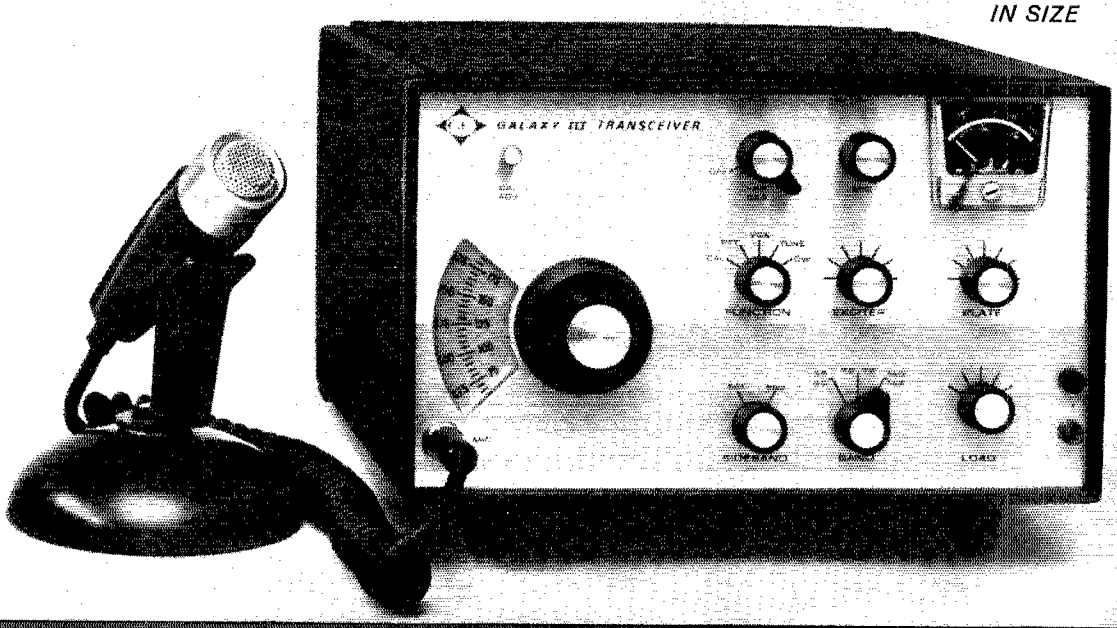

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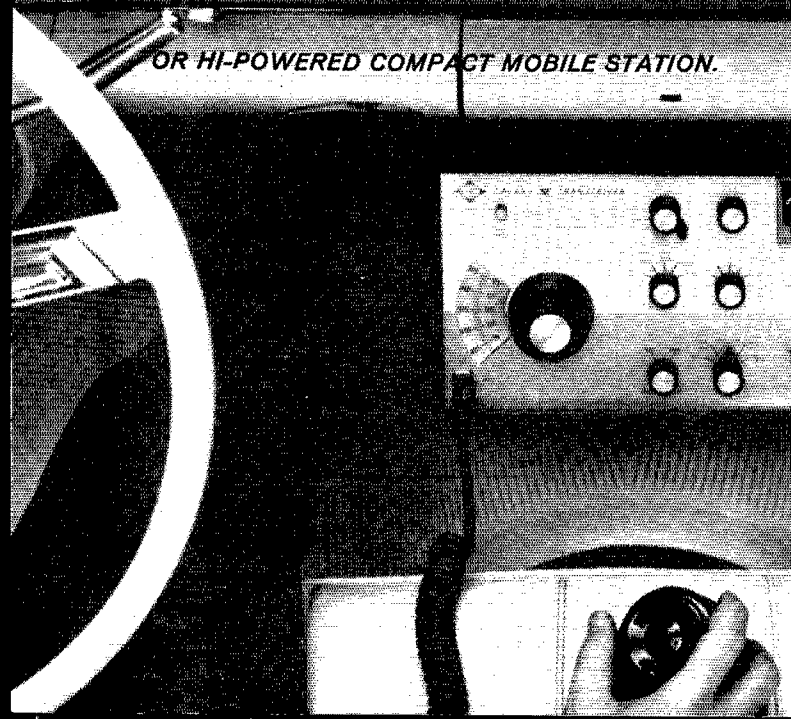
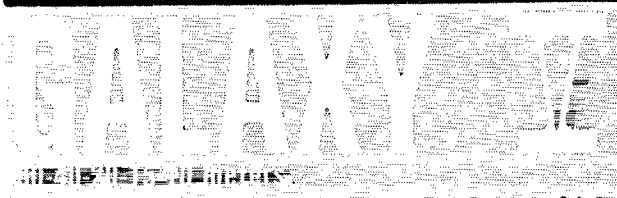
TWO NEW COMPACT 300-WATT SSB/CW TRANSCEIVERS

OR HI-POWERED COMPACT MOBILE STATION.



BOTH TRANCEIVERS ONLY 6" x 10¼" x 11¼"



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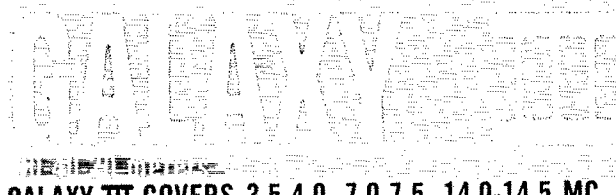
GALAXY V COVERS 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 and 28.0-29.0 *MC
*Factory supplied 28.0-28.5 and 28.5-29.0 MC.
Optional crystals available



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GALAXY III COVERS 3.5-4.0, 7.0-7.5, 14.0-14.5 MC.

SEE BOTH MODELS AT ALL LEADING HAM DISTRIBUTORS

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WRITE FOR COMPLETE DETAILED BROCHURE

GALAXY OF FEATURES (For both the V and III)

- ★ Suppression better than: unwanted SB 55 db, carrier 45 db
- ★ Highest receiver sensitivity: ½ uv @ 10 db S/N
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- ★ Easy reduced-power tune-up
- ★ Exceptionally good AVC
- ★ Accessory compatability (see below)
- ★ Shifted carrier CW prevents Transceiver "leap-frogging"
- ★ Extra clean CW keying
- ★ New advanced hybrid circuitry—transistorized VOX/AUDIO/AVC
- ★ Highest stability—drift less than 100 cycles in any 15-minute period after warm-up
- ★ Panel selection of VOX/PTT
- ★ Panel calibrator adjustments
- ★ VFO Dial illuminated in three-color, and a well lighted "S" meter. Engineered for convenient mobiling.

GALAXY III & V ACCESSORIES

- ★ AC POWER SUPPLY $79.95
- ★ SPEAKER CONSOLE $19.95 houses AC supply
- ★ 100 KC CALIBRATOR $19.95
- ★ VEST POCKET VOX $24.95
- ★ REMOTE VFO $59.95 mobile/fixed station use
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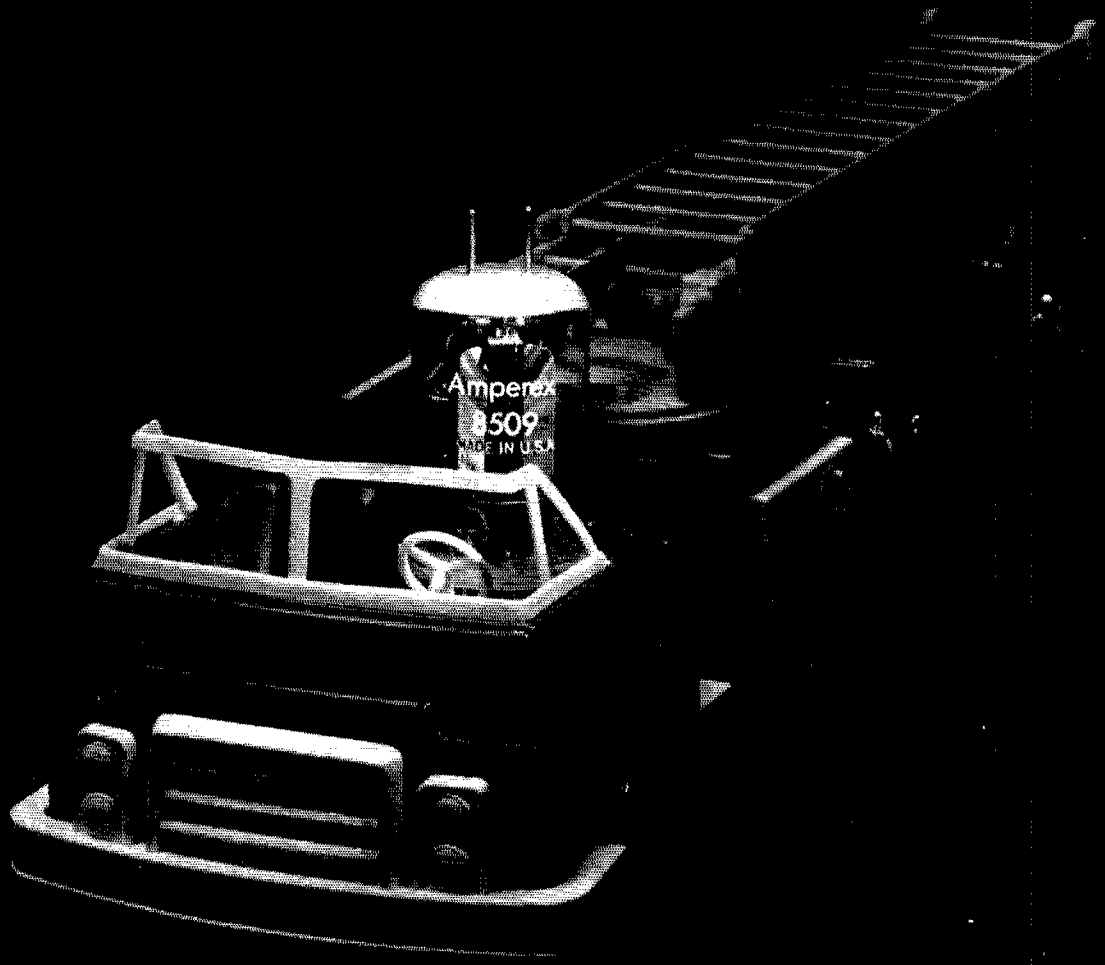
- ★ TRANSISTORIZED DC SUPPLY $119.95
- ★ UNIVERSAL MOBILE BRACKET $7.95

...and for Mobile Communications Equipment with greater power in a smaller package, there's the new Amperex 8509, instant-heating version of the renowned 5894



Take the Amperex 5894, a twin tetrode widely recognized by communications equipment designers and end-product users alike for its overall superiority. Take the Amperex instant-heating Harp Cathode, the same Harp Cathode that is now proving its exceptional qualities in the rapidly growing Amperex family of instant heating communication tubes. Put the two together and the advantages to designers of transistorized communications equipment—whether its back-pack or land safety—are unbeatable.

Like the famous 5894, the new 8509 is designed for use as an RF power amplifier, oscillator, modulator and frequency multiplier. It features high-gain, unfailing uniformity and extreme reliability.

Unlike the 5894, however, and thanks to its Harp Cathode, the 8509 has an operational warm-up time of only 0.5 second thus insuring an ideal marriage with transistorized circuitry, and the reduction of battery power supply-size without sacrificing either power output or equipment efficiency.

Under Typical Class C Telegraphy ICAS operation as a Push-Pull RF Power Amplifier, the 8509 will deliver a Power Output of 96 watts at 250 mc. At reduced ratings the tube may be operated up to 500 mc.

For complete data on the new 8509 and other Amperex instant-heating communication tubes for mobile applications, write: Amperex Electronic Corporation, Tube Division, Hicksville, Long Island, New York 11802.

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Riverside
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Los Angeles
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Orange
San Francisco Radio Supply
San Francisco
Scott Radio Supply, Inc.
Long Beach
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Sacramento
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Electronic Wholesale, Inc.
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Amateur Electronic Supply Center
Orlando
Amateur Radio Center, Inc.
Miami
Electronic Wholesalers, Inc.
Miami
Grice Electronics, Inc.
Pensacola
Jacksonville Marine Radio
Jacksonville
Kinkade Radio Supply
Jacksonville
Kinkade Radio Supply
Tampa
Rich Electronic, Inc.
Miami

GEORGIA
Ack Radio Supply Company
Atlanta
Specialty Distributor Co., Inc.
Atlanta

HAWAII
Honolulu Electronics
Honolulu

IDAHO
Schwendiman Distributors Co.
Idaho Falls
United Elect. Wholesale
Twin Falls

ILLINOIS
AAA Sales
Lincoln
Allied Radio Corporation
Chicago
Amateur Electronic Supply
Chicago
Bruce Electronics
Springfield
Egyptian Electronics
McLeansboro
Electronic Distributors, Inc.
Chicago
Green Mill Radio Supply
Chicago
H. & H. Electronic Supply
Rockford
Harbor Sales and Service
Alton
Industry Services, Inc.
Chicago
Newark Electronics Corporation
Chicago

INDIANA
Castrup's Radio Supplies
Evansville
Fort Wayne Electronics Supply, Inc.
Fort Wayne
Graham Electronics Supply, Inc.
Indianapolis
Lakeland Radio Supply
Angola
Radio Distributing Company, Inc.
South Bend
Van Sickle Radio Supply
Indianapolis

IOWA
Amateur Radio Supply
Des Moines
Evans Amateur Radio Supplies
Des Moines
World Radio Lab.
Council Bluffs

KANSAS
Amateur Radio Equipment Co.
Wichita
Moler's Camera Clinic
Wichita

LOUISIANA
Central Radio Supply Co., Inc.
Alexandria
Crescent Electronic
New Orleans
Davis Electronic Supply
Baton Rouge
Ports Electronics Parts Co.
Shreveport
Radio Parts, Inc.
New Orleans

MARYLAND
Amateur Radio Center
Baltimore
Electronic Distributors, Inc.
West Wheaton

MASSACHUSETTS
DeMambro Radio Supply Co., Inc.
Boston
Herbert W. Gordon Co.
Harvard
Graham Radio, Inc.
Reading
Lafayette Radio
Natick

MICHIGAN
M. N. Duffy and Company
Detroit
Electronic Distributors, Inc.
Muskegon
Purchase Radio Supply
Ann Arbor

MINNESOTA
Lew Bonn Company
Minneapolis
Electronic Center, Inc.
Minneapolis
Ham Electronics
Alexandria

MISSISSIPPI
Swan Electronics
Jackson

MISSOURI
Burnstein-Applebee Company
Kansas City
Henry Radio, Inc.
Butler
Walter Ashe Radio Company
St. Louis

MONTANA
Electric City Radio Supply
Great Falls

NEBRASKA
Valley Electronic Supply
North Platte

NEW HAMPSHIRE
Evans Radio, Inc.
Concord

NEW MEXICO
Radio Equipment Co.
Albuquerque

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Amsterdam
Barkee-Higbee Inc.
Fredonia
Fort Orange Radio
Distributing Co., Inc.
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Buffalo
Harrison Radio Corporation
New York
Radio Equipment Corporation
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Hillebrand Electronics
Toledo
Morrison's Radio Supply
Ashtabula
Pioneer Electronic Supply Co.
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SOUTH CAROLINA
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Columbia
Kings Electronic Service
Bishopville
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Williston

SOUTH DAKOTA
Burghardt Radio Supply Inc.
Watertown

TEXAS
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Dallas
Busacker Electronic
Equipment Co., Inc.
Houston
Capitol Electronics
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Crabtree's Wholesale Electronics
Dallas
Edwards Electronics
Lubbock
Electronic Equipment
Houston
Electronic Equipment
& Engineering Co.
Corpus Christi
Fischer Electronics
San Antonio
Hargis-Austin, Inc.
Austin
Howard Radio Company
Abilene
Ed Juge Electronics, Inc.
Fort Worth
Lavender Distributors
Texarkana
McNicol, Inc.
El Paso
Radio and Television Parts Co.
San Antonio

UTAH
Manwill Supply Company
Salt Lake City

VIRGINIA
H. C. Baker
Roanoke
Bristol Radio Supply
Bristol
Key Electronics
Arlington
Preist Electronics, Inc.
Norfolk

WASHINGTON
Gordon Armstrong
Seattle
Cascade Electronics
Lynnwood
C. & G. Electronics
Seattle
C. & G. Electronics Co.
Tacoma
H. C. J. Electronics
Spokane
Northwest Electronics, Inc.
Spokane
Northwest Instrument Company
Seattle
Pringle Electronic Supply, Inc.
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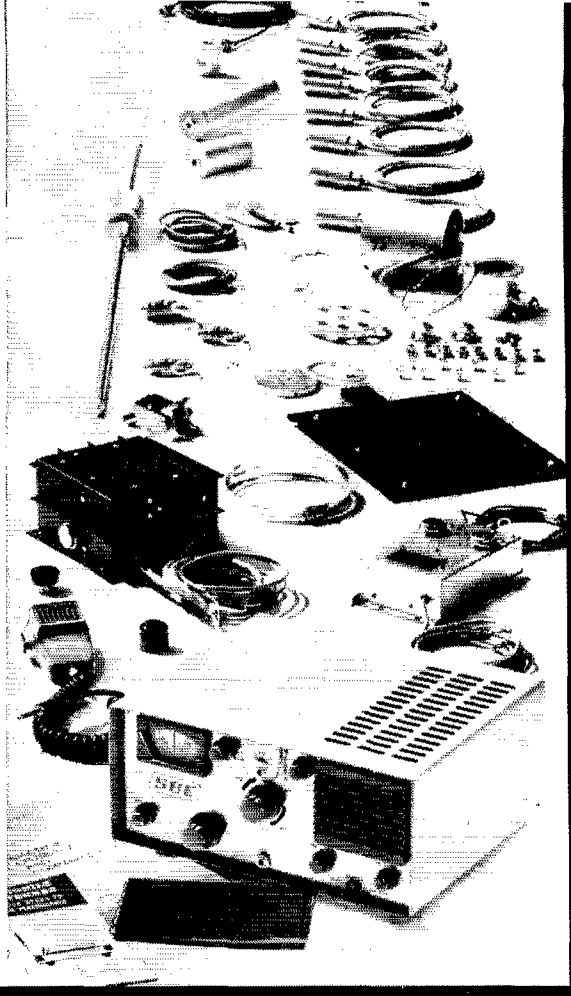

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Webster, Electro-shield system including: coil shield, distributor shield, harness shield, spark plug shield and generator or alternator noise supression kit. (Full instructions)
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Band-Spanner H-215 mount
Band-Spanner spark plug and generator suppression kit.
21 feet, RG-58/U coax complete with plug
Booklet: "Mobile antennas, "Simple steps to peak performance"
Booklet: "Auto radio noise reduction techniques"
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Station Activities

(*Continued from page 114*)

nanny Sat. night at the Women's Building, Fairgrounds. New officers of the Kingsport ARC are W4WQZ, pres.; W4TYT, vice-pres.; WA4EWW, secy.-treas. The RATS of Nashville invites state clubs to send items of interest for its monthly bulletin. Address RATRAFFIC, 612 Hogan Road. Congratulations to K4ILW and his Bristol AREC gang on a fine job of relaying bowling scores from the Tennessee Women's Tournament. Our thanks to WA4BXH, WA4CRH, WA4CGK, W4CAT, W4CVG, K4DJV, W4HPN, W4BXG, K4LTA, WA4EQA, W4SZE, K4SXD, K4MIF, K4WUH and others who participated. Your new SCM solicits your support and welcomes your comments on any phase of section activities and hopes to meet all of you during the next two years. The section deeply appreciates the great amount of activity, time and travel our former SCM, W4OGG spent on behalf of the section during his term. Traffic: W4ZJY 944, WA4HRG 501, WA4IUM 308, W4PQP 308, WA4GQM 254, K4ULT 229, W4MXF 104, W4YAU 84, K4JXG 80, W4OGG 74, W4CVG 56, K4FJR 55, W4PFP 37, W4VNU 37, K4WWQ 37, W4RMJ 34, W4UVP 22, WA4EWW 21, K4WUH 18, WA4AJK 16, WA4AWG 15, WA4AIS 14, K4TAX 14, WA4BXH 13, WN4NIV 12, W4HPN 10, WA4NUJ 10, W4VTS 9, W4DMS 8, WA4IBZ 8, K4RNZ 7, WA4GLS 5, WA4LAX 5, K4BSI 4, W4SGI 4, K4OUK 3, K4EPS 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4QIO—PAMs: W4BEJ, W4SZB, W4USE. RM: WA4LCH. V.H.F. PAM: K4KJQ. Your SCM attended the Great Lakes Division Convention in Detroit recently. K4JGB has been appointed an EC. Many Kentucky stations monitored the bands for Alaska traffic during the emergency. WA4KZI has been appointed Chairman of the 1st Annual Hamfest to be held at Henderson, Ky., Sept. 27, 1964. WA4LCH is back in his shack and active. Sorry to report that K4KEN has become a Silent Key. Everyone who participated in the flood emergency in Ky. in March did a very good job. Some OBSs are not transmitting their bulletins. Why not? Sorry to report our SEC, John Gerard, has resigned. Sorry to hear that K4LOA's XYL has been hospitalized. The 5th Annual Breaks Interstate Hamfest will be held at Breaks Interstate Park June 14. K4TRT is on with a Valiant 2. Butler High School in Louisville is forming a club. K4DZM was high QNI in 9RN in March. Thanks to all who provide liaison for Ky. with this net. Recent emergencies point up the fact that the best way to be of help during these times is to QNI the nets regularly. Badly needed is an NCS for MKPN on Sat. Several stations in Ky. have received Public Service Awards for activity in the Eastern Ky., flood of last year. KYN for February had QNI 170 and QTC 205; KYN for March held 51 sessions, QNI 423, QTC 284, MKPN had 29 sessions, 396 QNI, 53 QTC. Ky. Emerg. 6-Meter Phone Net had 9 sessions, 11 QTC, 107 QNI. Traffic: (Mar.) W4BAZ 274, WA4AGH 128, WA4ELK 122, K4DZM 96, K4QIO 67, W4QCD 56, K4HOE 45, WA4LCH 38, W4CDA 37, WA4BSC 34, K4KWQ 32, W4SZB 20, W4PLN 17, W4ZXV 17, W4BEW 14, W4KJP 13, K4KJQ 11, WA4ENH 5, K4ZIQ 5, WA4KZI 4, WA4GMA 2, K4LOA 2. (Feb.) K4ZIQ 18.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX. RMs: W8EGI, K8QLL, W8FWQ, K8KMQ. PAMs: W8CQU, K8LQA. V.H.F. PAM: W8PT. Appointments: W8ALG, K8JZP, W8PDF, K8PNX as ECs; W8BEZ, WA8DJC, W8EGI, WA8ENO as ORSs; W8ALG, WA8ASV, W8HK as OPSs: W8UUS as OBS; WN8LCZ as OES. Silent Keys: W8ABT, WA8GDJ, K8YAY. New officers: Kent RC—W8IWF, pres.; K8CGD, vice-pres.; K8JJC, secy.; W8VV, treas. Oak Park ARC—K8GXT, pres.; K8SJD, vice-pres.; K8NKB, secy.; K8JZS, treas. Ford ARL—K8UBV, pres.; W8PCR, vice-pres.; WA8GLY rec. secy.; K8KJZ, corr. secy.; W8PDQ, treas. Huron Valley ARA—K8MPE, pres.; K8IEH, vice-pres.; WA8CXF, secy.; WA8IAQ, treas.. K8JDM, trustee. Muskegon ARC—K8SAF, pres.; W8TBP vice-pres.; WA8DLT, secy.; K8BGW treas.. K8ZYR, W8KTJ, W8UCG, board members. BPLers: K8JJC, K8HLR, K8NJW, K8GOU, W8ELW, K8LUY, WA8ASV. The Great Lakes Division Convention is history. It was a big success, and everything was represented from spark to RTTY, with W8ZZ/8 on the air. Ex-W8FJL is now K6CSC, looking for Detroit on 14,045 kc. Sat. at 1800 GMT K3NSS is the club station at NSS, Washington; D.C. K8LOS says 10 has been opening. K8IJN, North Mich. U. at Marquette, Mich., is trying to get an inter-college net going on 40; contact K8TNZ/8 at 1301 N. 2nd, Marquette, Mich. W8AR and W8SXY are back from Texas; W8ATB, W8QBO and W8BQO are back from Florida. W8LGA is the U. of D. Radio Club.

(*Continued on page 126*)

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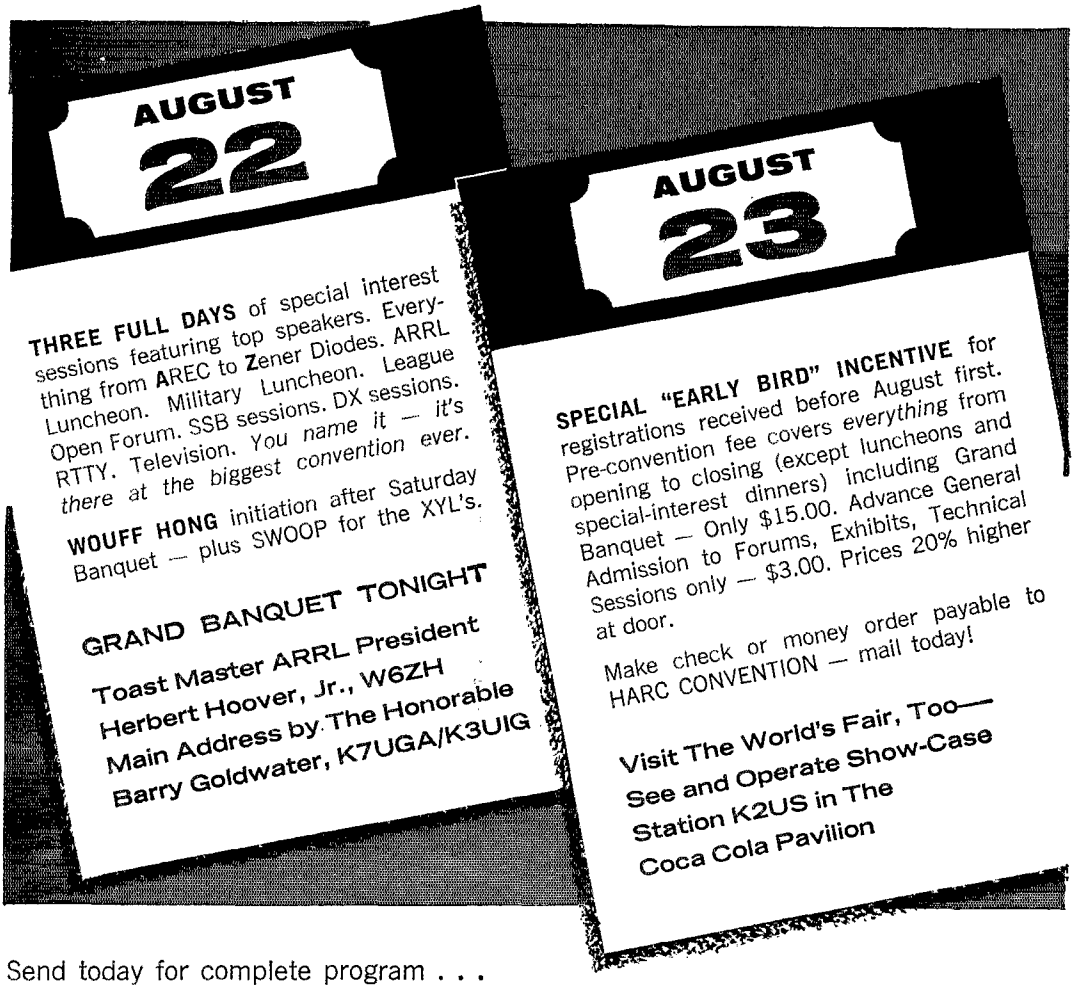

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(*Continued from page 122*)

W8UUS is the first Michigan station to make WAC on RTTY. W8SWF lost his tower in a wind storm. The Monroe County AREC Hq. now is in operation. W8-BQD is in the hospital with a broken leg and collar bone as the result of an auto accident. So is K8ZJV. W8-HK wants to sell the photo shop. The Eye Bank Net transferred 18 eyes during March. K8YEK (OO) gets down to 10 c.p.s.! A lot of 6-meter stations are now handling traffic but not reporting it. Ask me for Form 1 cards. The Cent. Mich. ARC had 44 hams out for the Mothers March of Dimes, and 23 out for the Teens for Polio Bread Sale—this effort brought in $5000. W8-CKK now has 42 AREC men in Ingham county. Traffic: (Mar.) K8JJC 793. K8HLR 573, K8NJW 572, K8GOU 350, WA8DNZ 326, K8KMQ 313, W8ELW 291, W8GTL 216, K8LNE 177, WA8ASV 139, K8LUY 135, K8QKY 101, W8BEZ 91, W8EU 87, K8JED 77, WA8DZP 75, W8PBO 70, W8AUD 63, VE3CYG/W8 58, K8WQV 57, K3DCB/8 54, K8BYX 53, W8FWQ 50, K8YRO 50, W8-FX 46, K2SIL/8 45, W8RTN 41, W8DSW 40, W8ZHB 37, W8EJR 36, K8QLL 34, K8LQA 29, K8VCB 27, K8-CIP 26, W8IBB 26, WA8DJC 25, K8TIG 24, W8UUS 22, W8EOI 21, K8PYW 21, K8VDA 21, W8TBP 20, W8-WVL 19, W8PGW 17, W8SWF 17, WA8HGE 16, W8IUC 16, W8EGI 14, W8AHV 8, W8HK 8, W8DSE 5, W8FDO 5, W8RHF 5, K8VFR 5, K8GJD 4, W8DVB 3, W8ILP 3, W8HKT 1. (Feb.) WA8ARI 48, WA8CXF 39, WA8-ARJ 36, WA8ARK 32, W8TBP 23, K8TFE 3.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8-UBK. W8CSX will operate portable from Switzerland County in Indiana June 21 on CHC/QRP 7 and 14 Mc. from 1300Z to 2100Z. The Greater Cincinnati ARA's *The Mike and Key* states that Sept. 27 is the date for its stag hamfest, W8MGN and W8QMP joined the Silent Keys. On my first trip to this hamfest, as I drove into the area W8UPB was sitting at the registration table alongside the road. I got out of the car, registered and bought my tickets. Carty told me to take over at the table and he would drive my car to a good spot for me. My first customer to stop in front of the table was a beautiful magazine cover young lady, who got out of her car and came over to register. At that moment Carty came running across the field calling to me "Weck, this is a stag." I felt very cheap and sorry to have to turn her down. Hi. The Tusco RC heard W8PTX speak on microwaves. The Seneca RC held its annual auction. Columbus Ara's *Carascope* tells us the club has a new home and meetings will be held in the Columbus Center of Science and Industry Building. Inter-City RC's *IRC News Bulletin* says the club saw three color movies, W8UPB spoke to the members and W8TAJ and K9QAX were in the hospital. Toledo's *Ham Shack Gossip* informs us that WA8FEN and WA8-GAT received their General Class licenses, WA8BJM, moved there from Wooster, W8OGR has a new baby girl, K8GII and K8NQJ returned from Florida, K8OMG underwent surgery, K8NQK won a Swan S.S.B. mobile unit, the Toledo Mobile RA held its ninth annual auction with K8NQK K8QCR and K8ZSZ/8 winning prizes, Toledo RC's 1964 officers are K8YOO, pres.; W8BGU, vice-pres.; W8VKR, corr. secy.; W8QUR, rec. secy.; W8YGR, treas.; Toledo Edison RC held a steak dinner, Fulton County ARC's 1964 officers are W8VAQ, pres.; W8BGU, vice-pres.; WA8BRE, act. mgr.; W8-UPB, secy.-treas. Parma RC's *P.R.C. Bulletin* tells us the club members toured the Bell Telephone Bldg., W8-SUS gave a talk on substituting silicon rectifiers for common rectifier tubes, W8DK joined the Silent Keys, W8F is in the hospital following an operation, the club has two code and theory classes with 42 for the General Class license and 30 for the Novice Class with W8CZM, W8ACV and K8IIU as instructors and K8DHX had been released from active duty in the Armed Forces. W8UPB gave a talk at a special meeting of the Canton ARC. Appointments made in March were W8ECB as ORS, WA8EEW as OPS, W8ARW as EC and WA8CCV as OBS. W8GIU received his DUF-3 award. W8HNP, your SEC, would like to have the ECs of Ohio get in touch with him if he can be of help in stimulating AREC activity by attending one of your club meetings. You can either write to him, A. A. Garn, W8HNP, 5034 Oak Ridge Dr., Toledo 13, Ohio, or contact him on the Dog-house Net Mon. on 3860 kc. at 2300Z or on the Ohio Emergency Net on 3860 kc. Thurs. at 2300Z. W8GJO graduated from Ohio State Univ. W8SWS's tower blew down. W8VO, who started v.h.f. operation in the early '30s, joined the Silent Keys. W8UPH made the BPL in March. Traffic: (Mar.) W8UPH 794, W8DAE 699, K8-DIU 437, W8BZX 294, K8LGA 220, K8UBK 205, WA8AJZ 198, W8MGA 188, WA8CXY 182, K8BNL 134, WA8BXN 133, K8ONQ 72, W8GRG 65, K8RXD 63, K8LBU 62, W8QCU 62, K8VWN 55, W8DQD 53, K8PBE 53, W8ILC 49, W8LZE 48, W8IEP 45, K8LGB 44, WA8AJD 43, K8-YDR 35, WA8BZR 30, WA8CFJ 26, K8BAP 22, W8DHG 22, K8GWK 21, W8DIH 17, W8GQD 10, W8ERD 9, W8-AEB 4, W8RO 4, WA8EEW 3, W8GIU 2, K8YWF 2, WA8BOV 1. (Feb.) W8DDG 28, K8PBE 18, (Jan.) W8-DDG 17.

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 2400 GMT; NYSPTEN on 3875 kc. nightly at 2300 GMT; EsS on 3590 kc. nigtly at 2300 GMT; Emergency Coordinators on 146,550 kc. Fri. at 0015 GMT. Appointment: WB2FVD as OPS. Endorsement: W2HO as EC. The entire section is proud to have three BPL winners for March traffic: WA2UZK, WA2VYS and K2SJN. We're pleased to report that all nets did a splendid job during the Alaska disaster. We need Emergency Coordinators in Rockland and Ulster Counties. Any volunteers? The section must be prepared for any local disaster. Send a representative to the New York State County Net (NYSCN) on 3510 kc. each Sun. at 1000 EST. W3ASK, propagation expert, was guest of the Schenectady Club in March. The first annual DXCC meeting for the second call area was held in Eastchester on March 21 with a large attendance. At the Albany Club, WA2YRF spoke on the decibel meter. A patent was issued to K2KUZ for his International Time Indicator as advertised in *QST*. Veterans Hospital station K2-CWX is active in Albany but can use more operators. Contact WA2HFT. K2JKX was guest speaker at the Westchester Club. We welcome the Arlington H.S. Club in Poughkeepsie as an affiliated society. WA2HAQ is its president. WB2GSK and WB2IYU are new Generals. WA2IRK, WA2YAW and WA2WIR visited Headquarters and W1AW. Traffic: WA2VYS 717, WA2UZK 697, W2-THE 333, K2SJN 247, W2URP 189, K2TXP 182, W2EFU 137, WA2OOO 111, WB2FZC 67, WB2FXB 51, WA2PUM 51, WB2HYB 48, WB2FVD 39, WA2VYT 37, W2PKY 26, WA2HGB 23, WA2JWL 22, K2HNW 13, WA2YHA 11, W2ANV 10, WA2LJM 7, W2WGE 7.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN, RM: W2-WFL. V.H.F. PAM: W2EW. PAM-75: WA2QJU. 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; NYCLIPN, 3932 kc. Mon. through Sat. at 2100Z. BPL certificates went to WA2-RUE, WA2GPT, WA2VLK, WB2HWB, WB2CSS, WA2-TQT and WB2ECR. A net certificate went to WA2OOL as an EXEMPLAR of the V.H.F. Net. W2EW says "All nets in the area are deserving of $9 praise for their tireless efforts in the handling of Alaskan traffic." I'll buy that! The Rockbound ARC reelected WB2EGV, pres. The jr. operator of WA2GPT is making wedding plans. WA2VLK has CP-35 and made the A-1 Operator Club. WB2CSS has WN2MTW for a brother. WB2ECR is expecting a new rig and a new harmonic, in that order. WA2IUQ has WAS on 40- and 20-meter c.w; also, WK-DZ4 and Empire State awards. WA2UYQ has cured the despondent rig. W2DBQ has a Big Wheel antenna on 2 meters. It's stacked, really! All Queens AREC nets now meet Mon. at 0100Z. Hey, Kings are on Mon., too. WA-2OOL is liaisoning from V.H.F. to NYCLIPN. WA2YLL is using a new HT-44. New appointments: WB2HWB and WB2CSS as OESs; WA2QJU as PAM for 75 meters. New YLRLer K2DNY as a bombed-up Gonset II in the mobile. It explodes now and then. K2SJP is struggling with a 19-story co-op type antenna. WA2TPM is brewing a new tuned cavity for 6. WA2VKK will be K1-ESV from Tolland, Mass., again this summer. WA2-UNH is headed for the U. of Buffalo. WB2AWX is using a DX-20 and an HQ-110 when not in Hunter College. WB2AOU has been upgraded to General. WA2IYD is on 432 Mc. with the Vidicon camera he built. WB2BKS operates with an HQ-110A and an HG-303 plugged into a 14AVS antenna. Boy, WB2ASR has a Venus on 6-meter s.s.b. See Field Day is almost here and you're not ready yet. I tole ya! Your SCM will be operating with W2-YKQ in Upper Brookville, L. I. Be sure messages to the SCM are in ARRL form for maximum point count. Listen, he's "18 watt" WA2TAQ in Far Rockaway, but "kilowatt" WB2FNW in Rockaway Park! Harken, WA2-YHN did finish the kw. power supply-modulator WA2JIT and WA2SDH are sporting brand-new HT-32s. WA2RUE clobbered a set of fingers with a door, but is now back handling traffic. New officers of the Port Washington Brotherhood of Radio Amateurs are WA2-ICV, pres.; WA2OMB, operations mgr.; WA2TXQ, trustee; WB2ATZ, tech. dir.; WB2CBZ, act. mgr. WA2-TYF is grabbing R.I.-type DX with a three-element

(*Continued on page 128*)

Ask the man who has one...

THE INCOMPARABLE

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MODEL 18HT

HY-TOWER

Designed for 80 through 10 Meter Operation

Ask Tom Branch, W8MRL/5, San Angelo, Tex, how he likes his Hy-Tower . . . he'll tell you:

"In all my 30 plus years of being a licensed amateur, I have never received more satisfaction from a purchased product than I have from my Hy-Gain Model 18HT Hy-Tower. I am consistently receiving better reports, both D-X and Stateside, on all bands than I ever did with any other type of antenna (beams excepted). The SWR's on all bands are even better than the engineering reports stated and the ease with which the antenna was assembled and raised proved to be a very pleasant surprise. Hy-Gain's engineering staff certainly deserves commendation for the excellent mechanical and electrical design of the Hy-Tower—it fills a long wanted need of Radio Amateurs everywhere."

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Tom's praise of the performance of his Hy-Tower will not be short-lived. He'll find his self-supporting, omni-directional all band Hy-Tower will deliver outstanding performance for years to come. There's just nothing to wear out on a Hy-Tower. Installed on a mere 4 sq. ft. of real estate, this 50 ft. vertical radiator features automatic band selection through the use of unique stub decoupling systems which are impervious to weather and wear and effectively isolate various sections of the antenna so that an electrical ¼ wave length (or odd multiple of a ¼ wave length) exists on all bands.

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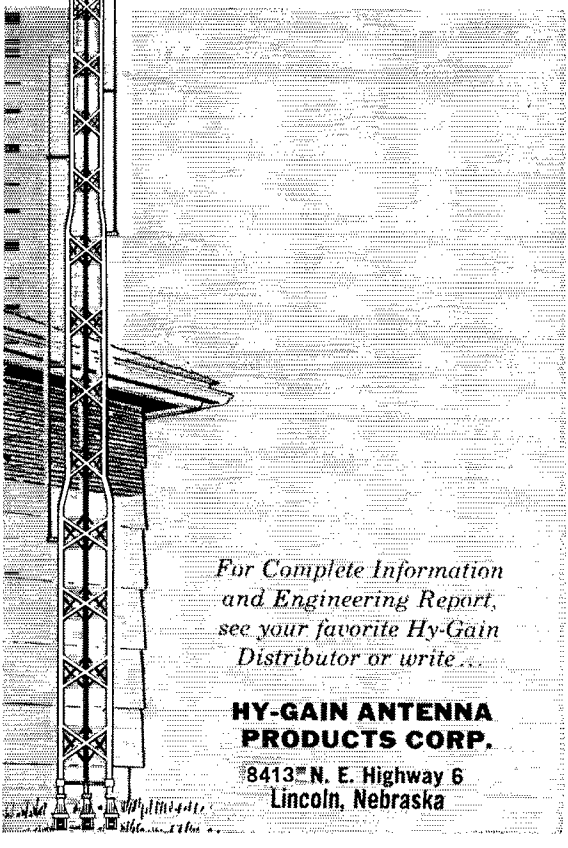
Phasing two Hy-Towers will result in gains of 2.2db end fire, 3.86db broadside, and 4.0db cardiod. Truly the ultimate in an antenna system for 80 and 40 meters.



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"sneak" beam on the apartment roof. (Ya sneak it up just before and sneak it down just after.) W2SIL with the FAA at JFK, works with the FCC where tall antennas may be a hazard to air navigation near the airport. The Rockaway ARC will hold its spring auction June 12 at 8 P.M. at the American Legion Hall in Rockaway Beach. Officers of the Bayside HSARC are WA2CYZ, pres.; WN2KWJ, vice-pres.; WN2KSJ, secy. WA2TQT married a fetching YL and they're settling a new homestead. K2PWG finished his "Vox-in-a-box." Hey, K2US is goin' like blazes. Been to see it yet? And, how about that big HARC '64 National Convention Aug. 21-23. You all ready for that, too? Traffic: (Mar.) WA2RUE 1268, WA2GPT 806, WA2VLK 526, W2MTA 432, WB2HWB 313, WB2CSS 174, WA2TQT 138, WA2QJU 134, WB2ECR 127, WA2YNH 108, W2GKZ 104, WA2LJS 94, WA2WGN 77, WA2IUQ 67, WA2PJL 63, WB2EUH 53, WA2UYQ 30, WA2KER 20, WA2PMW 20, W2DBQ 18, WA2OOL 16, WA2WAO 16, WA2YLL 15, K2DNY 11, W2EC 11, W2GP 11, WA2RMP 11, WB2EGV 10, K2SJP 8, WA2EFN 5, W2PF 3, W2SIL 3, WA2TPM 3, WA2VKK 2, K2KYS 1. (Feb.) WA2GPT 611, WA2RUE 286, WB2ECR 128, WB2AON 7, WA2TAQ 5.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2LQP. NNJ ARPSC nets:

NJN	3695 kc.	2300Z Daily	W2QNL-RM
NJ Phone	3900 kc.	2200Z Ex.Sun. (1300Z Sun)	K2SLG-PAM
NJ 6&2	51.150 kc.	0300Z TThSn.	K2VNL-PAM
NJ 6&2	146.700 kc.	0200Z WSn.	K2VNL-PAM
NJNN	3725 kc.	2320Z TTh. (Novice)	WA2SRK-RM

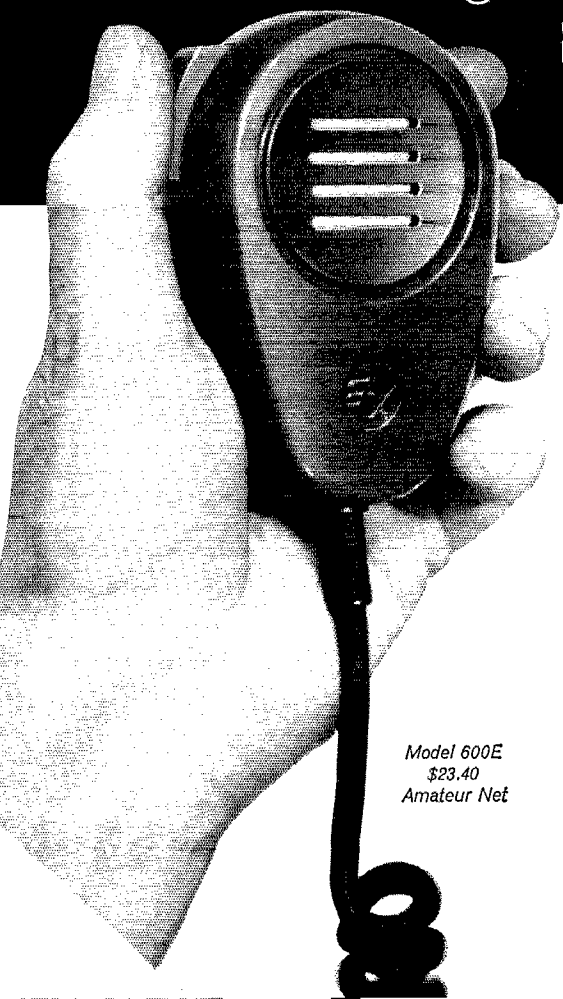
The 16N net on 160 meters will recess for the summer. Details on local AREC activities may be obtained from the SEC, K2ZFI. New appointments: WB2COZ and K2ZAL as ECs; WA2OOD and WN2KLD as OESs. Congratulations to WB2GFY and WB2LAS on the receipt of their General Class licenses! WA2RIN reports a visit to, a QSO with and a QSL from W1AW. WB2DDW, WA2OOD, and WB2GFY are working on 420-Mc. TV and are looking for equipment and information. WA2SRQ has a new Drake 2-A. New officers of the So. Amboy ARA are WA2FWD, pres.; W2SUS, vice-pres.; WA2TKD, secy.; WB2CGI, treas.; WA2FYL act. mgr. WA2UOO put up a vertical 10-meter dipole to work mobiles. WA2CCF has a model 15 RTTY operating. WB2CVN reports 29 QNI in the East Coast RTTY Net, including YV5AVW! W2CHI is now K1UCE. W2CFB is assembling a 1-kw. amplifier. WB2EZY has finished building a laser. Steve also has a new rig for 6 and 2 meters. The local gang in Scotch Plains meets on 28.860 kc. This includes W2KOG, W2MTP, W2CZM, K2EIY, W2LLO, W2YMP and W2NKD. The Central N.J. V.H.F. Society had W1HDQ as a guest speaking on antennas. WB2EZA is the Thurs. NCS for the New Jersey Novice Net. Higher class licensees as well as Novices are invited to QN1. Data listed above. The Monmouth Amateur RC meets the 2nd Wed. of each month at the Georgia School House, Freehold, N.J. New officers are K2TWY, pres.; W2SQN, vice-pres.; WA2TXB, secy.; WA2DHR, treas. OES WN2KLD reports reception of W4s on 144-Mc. c.w. WB2CRS is writing a book on electronics. March winds knocked down WB2GKF's beam for a spell. WA2UDT completed a 220-Mc. converter and is now starting another for 432 Mc. WA2NHZ is sending code practice (Middletown). WA2VYN/WB2BCS report success with reduced carrier on 144 and 220 Mc. WN2KDD finds QSLing better on 40 than on 2 meters. WA2OOD is building 2-meter s.s.b. converters. Congratulations to Asst. SCM W2LQP on a new son. K2DDC has taken his Viking I out of mothballs at the new QTH. K2MFX, W2DME, W2ZK, W2DEC, WA2GMN and W2CVW were seen at the SSB Dinner. Here is a list of No. N.J. OOs: W2JAE, W2JDH, K2UCY, W2TPJ, W2NIY, WA2CCF, K2VNL, W2NZC, W2DME, K2BEV, W2BVE, W2VMX, W2SJB. Several outings are planned this summer, courtesy WA2GQZ, at which we can "eyeball" and "brainstorm" ideas and problems. Traffic: (Mar.) WB2ALF 574, K2VNL 414, K2UCY 238, WA2TEK 178, WB2DEP 126, WA2VID 123, WA2MYB 117, WA2SRK 109. W2CVW 99. WA2UOO 84, K2JTU 47. K2ZFI 43, WA2KVQ 42, W2PEV 34, WA2QPX 32. W2LQP 27, WA2WAJ 27, WB2FCT 25. K2EQP 23, W2TFM 22. WB2AEJ 20, WA2CCF 19, W2DRV 15, W2ABL 12. WA2TWS 11. WB2EZA 10, WA2AKM 8. WB2BCS 8, WB2COZ 8, W2SIY 8, K2AGJ 4, WA2OQP 4, K2MFX 3. W2EWZ 2, WA2PWI 2. K2PTI 1, K2UKQ 1. (Feb.) W2LQP 43, WA2OQP 4, WA2PWI 3.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—Asst. SCM: Ronald M. Schweppe, KØEXN. SEC: KØVBM. RMs: WØLGG, WØUSL. PAMs: KØBBL, WØLSF. Net reports: Hamilton County Net—QNI 282, QTC 6, sessions 31; 75-Meter Phone Net—QNI 1039, QTC 174, sessions

(*Continued on page 130*)

There Is Nothing Tougher Than Mobile Service...Except Our New Model 600E!



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MOBILE SERVICE is the most demanding form of voice communications you use. Power and size limitations are extreme, putting an unusual premium on efficiency. The environment is tough, putting an accent on reliability. In the final analysis you will benefit fully from your mobile equipment only by paying strict attention to every detail of installation and operation.

Mobile service performance starts with the microphone—the first active element in the system—and there's no better way to start than with the new E-V Model 600E dynamic microphone. It is a little more costly than many microphones you can buy that "just work", and rightly so. For the E-V 600E is a lifetime investment in top-notch performance.

Look closely. The dynamic element of the 600E is the direct descendant of a long line of military microphones built to perform faithfully under battle conditions. This element was chosen for high intelligibility and its ability to withstand any environmental conditions. The proved ruggedness of the E-V Acoustalloy® diaphragm easily withstands ear-shattering sound pressures with no change in characteristics. But there is more to the 600E than ruggedness. Its sound quality has no equal. Here's why.

The frequency response of the 600E is ideally suited to SSB and critical AM transmission. You get highest intelligibility with any ALC circuit or frequency-shaping network in common use. That's been proved with on-the-air tests with every commercial SSB mobile transmitter and transceiver on the market today. Further, the high output level of the 600E will fully modulate even the "Scotch" input circuits sometimes found in mobile rigs. The 600E is available in 150-ohm or Hi-Z models.

Now pick up the 600E. It is shaped for comfort, with an easy-acting switch that gives you positive control, even when you are wearing heavy gloves. The case is molded of Cycolac®, a space-age plastic that absorbs a fantastic amount of abuse. The 600E never feels hot or cold to the touch, regardless of the climate. The shielded coiled cord has passed flexing tests that far exceed normal life, while the switch has test-cycled on and off over a half-million times without a sign of failure. Even so, both cord and switch are designed for easy field service, if necessary.

The E-V 600E is built to outlast every other piece of mobile equipment you may use, while outperforming every other microphone on the market. It will probably be transferred from rig to rig as the one most useful communications tool you own. Actually, the 600E, like all E-V microphones, is guaranteed forever against defects in workmanship or materials. It must perform as stated, or your money back.

The one best way to find out what the E-V 600E can contribute to your mobile installation is to try it. We guarantee you have nothing to lose. Ask your Electro-Voice distributor to help you put the new E-V 600E dynamic mircophone to work in your rig, today!

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SETTING NEW STANDARDS IN SOUND

26; Iowa 160-Meter Net—QNI 1171, QTC 19, sessions 31. WØTDO reports OO activity was a little lower because of other commitments. WØSEF transmits Official Bulletins four times a day, Mon. through Fri. WAØBRU has been experimenting with some surplus crystals and is working on a 2-meter transceiver. WØPFP worked WØBJV on 6 meters for his 37th state two-way s.s.b. OOs KØTDO, KØAZJ, WØUSL and WØNLF were active during March sending a total of 33 reports to fellow amateurs. Traffic: (Mar.) WØLGG 2562, WØBDR 967, WØUSL 113, WØNTB 109, WAØFSW 50, KØTDO 34, KØOKD 31, KØEVC 22, KØBRE 16, KØBBL 13, WØJPJ 12, KØGXP 11, KØBKR 10, WØMMG 10, WØQVZ 10, WØPTL 9, WØEEG 8, WØYDV 8, WØBLH 7, KØAFT 6, WØNFL 5, WØFDM 4, KØKAO 4, WØFMZ 3, WØGPL 3, WØNCS 3. (Feb.) WØNGS 29.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF, PAM: KØEFL, RM: WØSAF, V.H.F. PAMs: KØVHP, WØHAJ. The following are appointed as ECs in the respective areas: Zone 1, KØCPD; Z-2, WØCGJ; Z-3, KØLHF; Z-4, WØREU; Z-5, WØZGK; Z-6, KØYQE; Z-7, KØIZW; Z-8, WØEQD; Z-9, KØGLW; Z-10, Vacant; Z-11, KØVQC; Z-12, KØTCS; Z-13, KØLPE; Z-14, KØYBR; Z-15, WØTWJ; Z-16, WØBMW; Z-17, WØFHU; Z-18, KØJDD; Z-19, KØODA; Z-20, WØZXN; Z-21, WØZUX; Z-22, WØCJI. Traffic net activity.

Net	Freq.	Time	Days	Sessions	QTC	QNI	Ave.
KPN	3920	1245Z	M-W-F	18	100	360	20.0
KPN	3920	1400Z	Sun				
QKS	3610	0030Z	Daily	30	73	168	5.6

NCSs for the above: WØORB, WØIFR, KØEFL: WØBYV, KØBXF, KØIRL, KØYTA, WAØDFZ, WØSAF.

HBN	7280	1800Z	Daily	22	104	683

NCSs. WAØDKY, WØDWD, KØHGI, KØWXD, WØQJU, WØTWJ.

Two years of office as your SCM are rapidly coming to a close. Much headway has been made in building a more effective section. Many new friends have been made and I have enjoyed working with you. In accord with many requests your SCM will seek a second term of office. Don't forget to send in your club scores for Field Day. Your club may be the big Kansas winner of the SCM trophy. All entries postmarked before midnight, July 17, are eligible. Rules may be procured from WØALA or KØBXF. Traffic: WØOHJ 768, KØBXF 322, WØALA 96, WØBMW 59, KØGII 49, WØIFR 49, KØYTA 47, WAØCCW 23, WØZGK 22, KØZJE 17, KØYGR 15, KØEMB 14, KØEFL 12, KØJDD 11, WØBYV 9, KØDVN 8, WAØDZI 5.

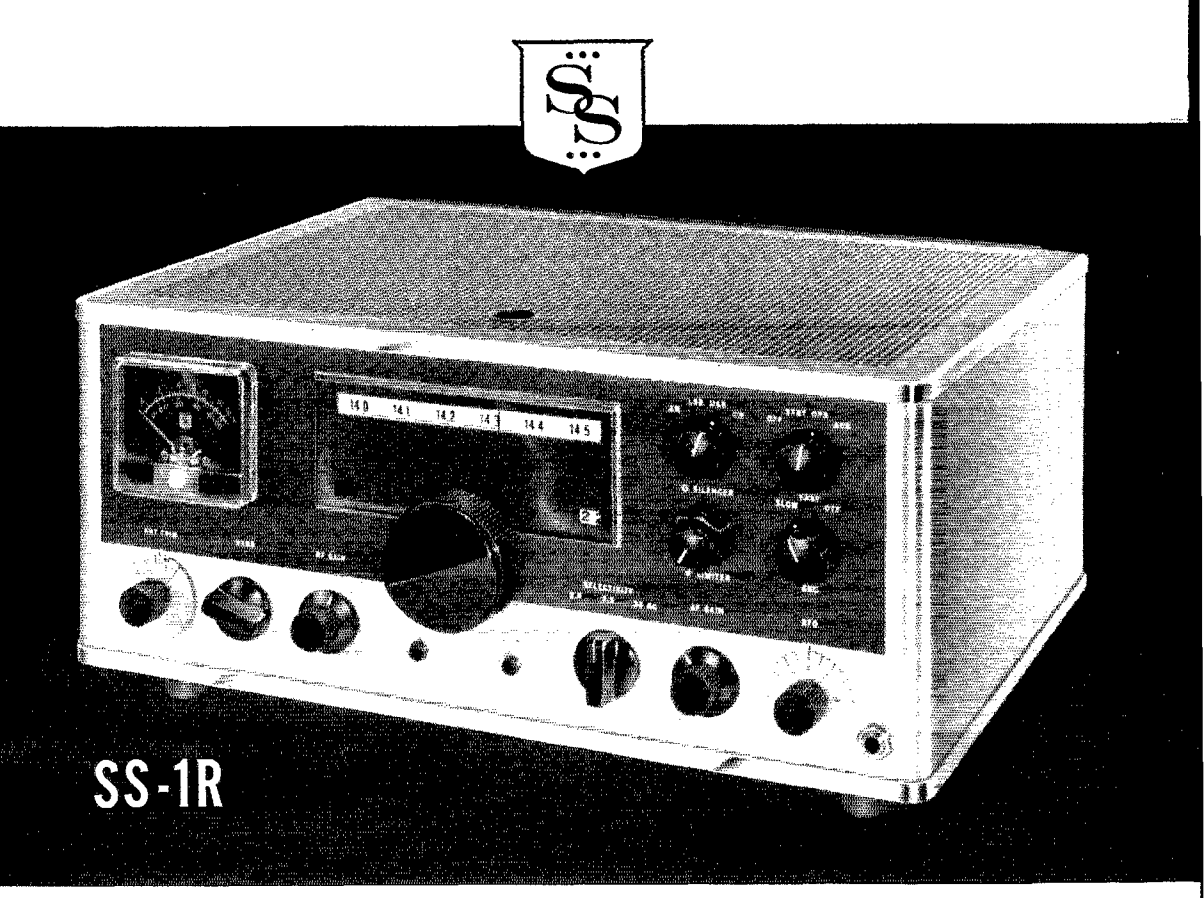
MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL, RMs: KØONK, WØOUD, PAMs: WØBUL, WØBVL, WØOMM, KØONK. Appointments renewed: WØEOJ as OPS, WØGCL as ORS, KØONK as OO, EC and PAM. New NCSs on MNN are WØFHV and KØLQH; on MEN, WØAIM; on MØSSB, WØMMJ. KØAEM is a new member on MON. WØRR is at the K.C. Home Show operated by clubs in the Kansas City area. WAØFKI is publisher of *OARS Newsletter* (Greene County ARS) and WØAH is editor and stencil cutter. WØAIM is editor of *Tri-State QRM* (Tri-State ARS, Joplin.) WØTPK used tape recordings of area, regional and section c.w. nets for a talk to the MSM Radio Club (WØEEE.) WØBUL went to K.C. to observe the special emergency drill set up by EC KØTCB. Mobiles at shopping centers sent traffic to the base station. The base station relayed to NTS. WØDE got his Extra Class ticket. KØIHA is on low power for a while. KØRXD has a 2-meter rig. KØONK has a DJ show on WVMC, 570 kc., at Mo. Valley College. Hams in the Pleasant Hill area are forming a club. Contact WØQXT to join. The Mo. Storm Warning Net on 3885 kc. has been announced by SEC WØBUL. OO activity at WØQWS is up because the rig broke down. WAØBUC is on 6 and 2 meters with a 65-ft. tower. KØUJJ and WAØEEU are running kw. s.s.b. on 6 meters. v.h.f. traffic activity is increasing. Net reports (Mar.):

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3885	2345Z	M-W-F	12	202	771	WØBUL
MON	3580	0100Z	Tu-Sun.	26	183	241	WØOUD
MNN	3580	1900Z	M-Sat.	26	78	33	WØOUD
SMN	3580	2200Z	Sun.	5	23	25	WØOUD
PON	3810	2100Z	M-F	22	245	151	KØBWE

Traffic: KØONK 4312, KØTGU 931, WØWYJ 420, KØTCB 249, WØOUD 204, KØBWE 112, WØHTO 94, KØCWP 80, WØHVJ 71, WØBUL 62, KØLQH 58, KØEQY 52, WØKIK 40, WØDVC 38, WAØCWV 32, WAØDGT 28, KØWOP 19, WØOGC 18, KØQCQ 18, WØBVL 13, WØRTO 12, WØAIM 10, KØAEM 9, WAØDJG 8, KØVIQ 8, WAØEUE 4, KØPCK 4, KØRXD 4, WØGQR 2, KØIHY 1.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØTSU. Net reports for Mar.: Nebraska Storm Net, QNI 1044, QTC 47. The Net is meeting at 0130Z during

(*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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the summer. AREC Net, WØIRZ NCS, QNI 83, QTC 7. Junior Ops Net (new), WAØCDQ-WAØBBS NCS, reports QNI 29. Western Nebraska Phone Net, WØNIK NCS, QNI 640, QTC 39, 100 per cent check-ins, WØZHV, WØLOD, W4LEE Ø WØRIH. Nebraska Morning Phone Net, WAØCFB NCS, WØEGQ ANCS, QNI 642, QTC 68. Nebraska Emergency Phone Net, QNI 980, QTC 140. Nebraska Section Net (c.w.), QNI 64, QTC 18. Late report: Nebr. Storm Net (Feb.), QNI 777, QTC 8. WØYFR reports that the 160-Meter Net has discontinued operation for the summer but if response warrants will resume next fall. Net attendance is improving and all nets welcome more check-ins. Traffic: WAØCIE 239, WØLOD 95, WAØBES 76, KØYDS 76, WØFIG 47, KØDGW 38, W4LEE Ø 36, WAØBIE 32, WAØBID 28, WAØAES 27, WAØCFB 27, KØZEO 22, WØNYU 18, KØHNT 16, WØHYD 16, KØJFN 16, WØBKW 15, WAØCEZ 15, KØUWK 14, WØYFR 12, WØMTI 10, WØVEA 10, WAØCDQ 9, WØLJO 8, WØNOW 8, WØBOQ 7, WØNIK 5, KØPTK 5, WAØBOK 4, KØFRU 3, WØGGP 3, WØHOP 3, WØRJA 3, WØZWG 3, WAØCPS 2, WAØEBX 2, WØEGQ 2, WØFBY 2, KØHNW 2, WØPQP 2, WØWKP 2, WØWZR 2.

NEW ENGLAND DIVISION

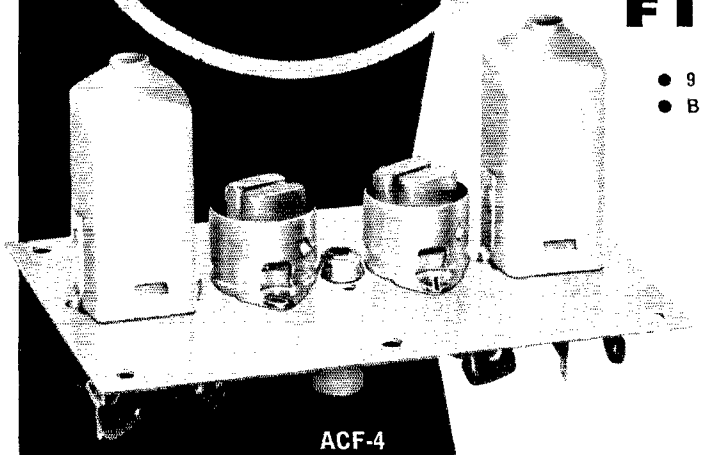
CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. H.F. PAM: W1YBH. RM: K1GGG. V.H.F. PAM: Open for new appointment. Traffic Nets: CN daily at 1845 on 3640 kc. CPN, Mon. through Sat. 1800, regular time Sun. at 1000 on 3880 kc. CECN (Connecticut Emergency Coordinators Net) 0900 on 3880 kc. Crystals will be taken back at cost price for 145.980 Mc. for anyone who wishes to return to W1FHP. The Connecticut Traffic Nets held their 11th annual meeting at Wallingford Apr. 11 with 60 members and guests present. Introduction of call letters, net operating ideas and points of interest to all traffic handlers were brought up. Meeting with your director and National Emergency Coordinator, various net control stations spoke on what might help operating conditions. A taped session of CN was put on by W1EFW. New net bulletins were handed out by managers. Others are available on request for those who could not attend. Write your manager. The new EC for West Hartford is K1SJG. K1WXN and K1YIX are new ORSs. Endorsements went to W1BNB: OPS endorsements to K1OJZ and K1MBA; endorsement for Class IV Official Observer to W1EQV. Section net certificates from CPN went to K1EIC, K1OJZ, W1THN and W1LUH. New stations on the net are WA1AAQ and K1YFE. Traffic totals from CN: 453 messages, 31 sessions and average of 14.6 stations. CPN, 213 messages, 31 sessions and average of 20. High QNI goes to K1WXN, K1ZND, K1GGG, K1AQE, NTR, OJZ, DGK, EIC, W1FHP, LUH, K1SRF and LFW. BP1 certificates went to K1WXN, K1WKK and K1WKJ. Reserve your mountain top for Field Day. Send photos and news items to Headquarters soon after or with your score sheets. Good luck to all clubs and portable with secret weapons for transmitters. Certificate winners in last December's Conn. Wireless Assn. N.E. QSO Party were K1LBH 1st, W1WHQ 2nd. Traffic: (Mar.) K1WKK 654, K1WKJ 513, W1AW 292, W1EFW 247, WA1ALZ 220, W1RZG 197, K1WXN 139, K1YIX 125, K1UYZ 106, K1ZND 101, K1GGG 83, W1MPW 81, W1YBH 81, W1BDI 79, W1CTI 62, K1JAD 59, K1AQE 44, W1CHR 44, K1PQS 41, W1FHP 38, W1OBR 36, W1LUH 26, K1NTR 22, K1OJZ 22, WA1AAQ 21, W1QV 21, K1PLR 18, W1BNB 9, W1PRT 7. (Feb.) W1OBR 13.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC, K1DYG. PAM: K1ADY. RM: K1MZB. Traffic nets: Phone—Seagull Net, 3940 kc., 1700-1800 daily except Sun. Maine State C.D. Net meets Sun. at 1100 EST on 3993 kc. and Wed. on 3530 kc. at 1900 EST with W1BYK as NCS. The AREC Net meets Sun. at 0900 EST with K1DYG as NCS. C.W.—The Pine Tree Net meets at 1900 daily Mon. through Fri. on 3596 kc. The First Regional Net meets at 1815-1930 daily on 3605 kc. The PTN again is looking for more stations to check in and make it more lively for the NCS. There are about six or eight stations at the most that check in every night faithfully. Attention all certificate holders, please check your certificates for endorsement as the SCM has now been in office for one year and the endorsements are due. W4VEY/1 has been transferred to W4-Land, about thirty-five miles from his home in Miami. KØKPU/1 and KØYYX/1 (XYL) are now located in Brunswick close to his work. K1UXZ now is on 20 meters. K1SZC has a new Hallicrafter's SR-160 with an HK-1b keyer. K4BSS/1 is trying to see how many silicon diodes he can burn up at once; he is working on 54 at this writing. K1NAN made the BPL again. He also is experimenting with 2-meter equipment. Certificate winners in last December's Conn. Wireless Assn. N.E. QSO Party: W1EIO, 1st. W1UOT, 2nd. Traffic: (Mar.) K4BSS/1 150, K1NAN 141, K1VXU 90, K1SCZ 49, K1TEV 8, K1UXZ 5. (Nov.) K1NAN 256.

(Continued on page 134)

NEW FROM INTERNATIONAL

AOC
SINGLE SIDEBAND FILTERS



ACF-4

- 9 mc center frequency
- Bandpass 6 db 3 kc (approximate)

ACF-2 Two-crystal filter circuit using low impedance link input and 2K resistive output load. Unwanted sideband rejection greater than 30 db. **$9.95**

ACF-4 Four-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 40 db. **$18.95**

ACF-6 Six-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 55 db. **$27.95**

MATCHING OSCILLATOR CRYSTALS for the ACF filter series. Recommended for use in OS-4 oscillator.
CY-6-9LO **$4.40**
CY-6-9HI **$4.40**

OS-4 Crystal Oscillator **$6.95**

SE-6F Mounting Case
Special AOC case for mounting filter plates. **$5.50**

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EASTERN MASSACHUSETTS—SCM, Frank L. Baker Jr., W1ALP—Novices, take a look on 3733 kc. on Mon., Wed. and Fri. at 6.30 P.M. W1AOG, W1EAE and W1AOW had 70 QNIs and 28 traffic. K1ZTO is on several bands. W1ICP spoke at the Massasoit Club. W1ALP was present. W1s LHJ and GLF have gone s.s.b. W1CQC has a home-built receiver. New officers of the M.I.T. RS, W1MX are K4RNH, pres.; K3OAE, secy.; W2TDE/K1ZED, station mgr.; W2QHQ, treas.; K4BVD, act coordinator. EM1OMN reports 13 sessions, 111 QNIs, 107 traffic. The 6-Meter Net reports 22 sessions, 500 QNIs, 119 traffic. A net certificate has been sent to K1VRQ. K1KUY is away at school. K1VPJ is an Asst. EC and is building an emergency-powered 6-meter transceiver. The Needham H.S. ARC had an exhibit at the school's science fair. K1s VPJ, VFY, ZSA, EZX, ZKK and WA1ABU took part. The Framingham Club held 2 meetings. The Yankee RC showed two films at its meeting. K1YJD is back in civilian life. K1RFE is in Iceland. K1UHN gave a talk on transmission lines, assisted by K1s GLD and LJT, at the QRA. WA2SOZ/1 is in Lexington. The Pocahontas RC meets on 28.9 Mc. Sun. A.M. at 10, as per W1KXQ. K1AIQ is at McDill AFB, Fla. Between listening some and talking with other hams, many deplore the operating of stations on on the 75-meter phone band. One fault is not listening before coming on and calling CQ. Appointments endorsed: W1DBY Chelmsford, W1EIQ Bedford, W1IPZ Shirley, W1HRY Wellesley, W1RM Newton as ECs; W1NF as OO; W1s MX, DOM, DIY as OPSs; W1s MX, DIY, FJJ, K1ONW as ORS. K1s KMV, KUY, VPJ as OESs. The EM2MN had 22 sessions, 212 QNIs, 160 traffic. On 10: K1s, EYW, IPB, LOE, W1OUP, W1ALP. The Townsend ARC now is affiliated with ARRL. W1AOG, our SEC, received reports from K1s PNB, ICJ, MOO, HZU and W1STX. New appointments: W1NZP Brockton, K1KAN Wakefield as ECs; W1s QFK, ULJ, ZLX as OBSs; K1ZWI as OES; K1ZHS as ORS; W1HXK as OO. Silent Keys: W1AYO, W1EGR, ex-W1SM, K1RXS. W9UAQ/1 handled traffic for Alaska from Otis AFB. W1BKQ, Norwell has a new beam for 6. W1s PEX, ZLX and K1YKT made the BPL. K1YKT received a 1RN certificate. K1-EKP is in the AFB in San Antonio, Tex. W1FJJ is going in the Army for 6 months. W4TFL/1 has a new linear with 3-4CX250s in grounded grid. K1UIW is active in nets. W1NF really works the DX on 80-meter c.w. W1MX is working on new kw. rigs. W1KN has a new SX-111 receiver. WØPAN had a new baby YL. K1SLZ gave a talk at the Middlesex Club. W1BGW is after DX The Dorchester ARC now is on Tue. at 8 P.M. on 28,840 kc. The Central New England Net had 26 sessions, 707 QNIs, 4 traffic. WA1AVS is on 75-40-20. W1HXX is on 50.55 Mc. while flying around New England week ends. K1BUF is getting the RTTY bug. The T-9 Club met at W1ISX's QTH. K1MCL moved to Maryland. K1WYS is net mgr. of the Whitman ARC, which has a new club house on Pine St. The net meets on 50,200 kc. Sun. at 10.30 A.M. and has about 40 stations. W1MRQ is having a "ball" working DX with his KWM-2 plus a pair of 4-400s and has over 100 countries. K1DYA transferred to Colorado Springs. W1ECK is working on a new kw. final. K1AYA is building a high-power rig for 2. Our Eastern Mass. Novice Net is coming along fine and K1-PNB is putting out a nice monthly bulletin. This month's QNIs: KN1ETT, WN1s AIS, AXB, AVT, BHS, K1s VOK, YKT, SMT, PNB, UIW, ESG, SZG, YSJ, YFE, YCS. Certificate winners in last December's Conn. Wireless Asso. N.W. QSO party were: K1MFM 1st, K1WJD 2nd. W1SMO is in the Veterans' Administration Hospital, Brockton. Traffic: (Mar.) W1PEX 1654, K1YKT 678, K1ESG 359, K1GKA 196, W1EMG 164, W1ZLX 145, K1PNB 137, W1OFK 135, W1LES 120, W1ZSS 119, K1-ZQU 114, K1ZHS 108, K1OWK 82, W1DOM 80, K1BGK 71, K1VGM 60, W1AOG 55, K1VOK 45, WA1ANA 38, W1BJE 35, W1FJJ 34, K1LCQ 31, W4TFL/1 23, K1CMS 13, K1UIW 12, W1NF 10, W1MX 5, WØPAN/12. (Feb.) K1VGM 11.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. PAM: K1RYT. Once again it is our sad duty to report the passing of one of our most respected and beloved old-timers, Prentiss M. Bailey, W1AZW. Our sincerest sympathy to his family. If you can get hold of a copy of the April issue of *Random Scatter* (Berkshire County Amateur Radio Assn.), you will find one of the finest memorial tributes to a departed friend that you ever read (written by W1DPY). RM K1IJV reports a total of 21 different stations reporting into WMN during the month with a total of 152 messages handled. Plans are being formulated to have 10-,6- or 2-meter phone nets tie in with WMN and MPN for better distribution of traffic. W1JAH, and his XYL, Margie, presented a most interesting illustrated lecture at the April meeting of the BCARA. W1IPQ is running a few milliwatts of transistor power on 6-meter phone. K1MCS is on 6-

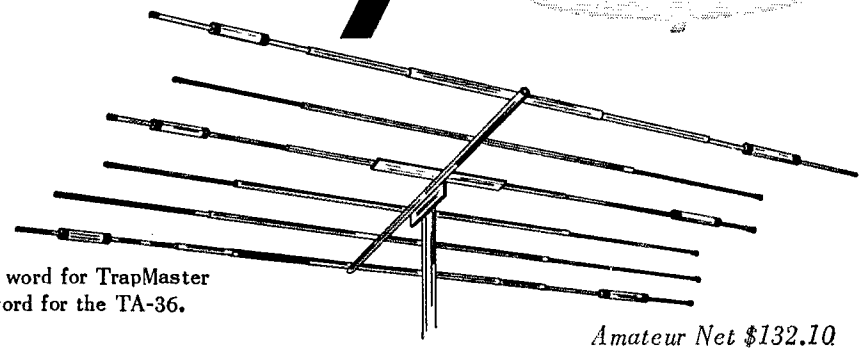
(Continued on page 136)

Mosley

TRAP MASTER

MODEL TA-36

for 10-15-20 meters



Incomparable is the word for TrapMaster and terrific is the word for the TA-36.

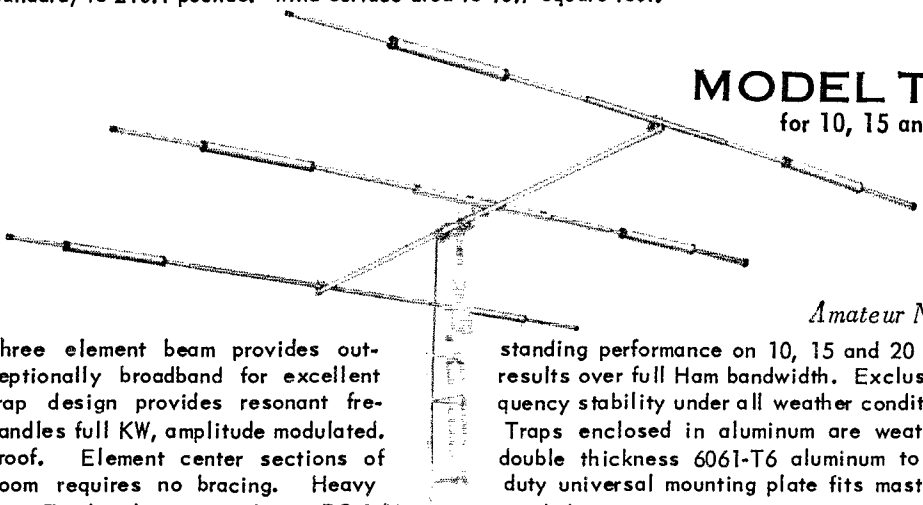
Amateur Net $132.10

The new clean-line TA-36 . . . the three band beam that will give your signal that DX punch!

This wide spaced, six element configuration employs 4 operating elements on 10 meters, 3 operating elements on 15 meters and 3 operating elements on 20 meters.
Automatic bandswitching is accomplished by means of exclusive design high impedance, parallel resonant "Trap Circuits". Built for operation at maximum legal amateur power.
Traps are weather and dirt proof offering frequency stability under all weather conditions. Just one coaxial feed line is needed. 52 ohm, RG-8/U is recommended.
Antenna comes complete with illustrated instruction booklet and color coded elements for ease of assembly.
SPECIFICATIONS and PERFORMANCE DATA: Forward gain on 10 meters is 9 db., on 15 meters is 8.5 db. and on 20 meters is 8 db. Front-to-back is 20 db. or better on all three bands. SWR is 1.5/1 or better at resonance. Transmission line - 52 ohm coaxial. Maximum element length is 29 feet. Boom length is 24 feet. Turning radius is 19' 3". Assembled weight is 69 pounds. Wind load (EIA Standard) is 210.1 pounds. Wind surface area is 10.7 square feet.

MODEL TA-33

for 10, 15 and 20 meters.



Amateur Net $104.75

Three element beam provides outstanding performance on 10, 15 and 20 meters. Exceptionally broadband for excellent results over full Ham bandwidth. Exclusive MOSLEY trap design provides resonant frequency stability under all weather conditions. Easily handles full KW, amplitude modulated. Traps enclosed in aluminum are weather and dirt proof. Element center sections of double thickness 6061-T6 aluminum to reduce sag. Boom requires no bracing. Heavy duty universal mounting plate fits masts up to 1½" OD. Feed with one coax line. RG-8/U is recommended.

SPECIFICATIONS and DATA: Fwd. gain up to 8 db. Front-to-back is 25 db. SWR is 1.1/1 or less, at resonant frequencies. Maximum element length is 28 feet. Boom length is 14 feet. Turning radius is 15.5 feet. Assembled weight is 40 pounds. Wind surface area is 5.7 square feet. Wind load is 114 pounds. Shipping weight is 53 pounds.

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meter mobile. K1VPN has completed his 6-meter rig. W1EOB still is working the second shift so not much ham radio. Capt. London Albright, W6SLF, was the guest speaker at the March meeting of the HCRA. He described the internal workings of the revised MARS system. K1AEC won the HCRA W.A.S. Contest. The Hampden County 10-Meter Traffic Net meets nightly (except Sun.) at 8 P.M on 28.700. We'll tie it in with the National Traffic System so go ahead and originate traffic for anywhere that traffic from the U.S.A. may be sent. We'll deliver! KITGS has done a splendid job in keeping MPN on the air. Traffic: K1RYT 904, W1DWA 135, W1-BVR 131, K1IJV 105, K1SSH 103, W1ZBN 53, W1LBB 40, W1AMI 24, W1DVW 13.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. PAM: W1TXL. RM: W1BTV. Endorsement: K1JOD as EC. RISPN report: 31 sessions, 549 QNI, 134 traffic. During the recent Alaskan quake, W1-IMY contacted W3CVE, who was in contact with Alaska on 40 meters, W3CVE relayed messages to W1IMY who in turn relayed them by landline to W1BDI at Headquarters. W1BTV worked W2EZV/MM off the coast of Ireland and enabled W2EZV to contact his wife. W1YNE was kept very busy with Alaskan traffic on the NTS and Navy MARS networks. K1PTV, of the Newport County RC, has resigned as president because of business reasons and W1WLG was elected to the office. The club plans a big Field Day operation and those appointed to the committee were K1VPK, K1VQO and W1JFF. Frank Capone was elected a member of the club and has started to study for his ticket. WN1BLC received his Novice Class ticket and WA1BMF received his Tech. Class ticket. W1BTV would like all c.w. operators interested in forming a c.w. net to contact him at 66 Victory St. Cranston, R.I. Traffic reports should reach the SCM as soon as possible after the end of the month. Certificate winner in last December's Conn. Wireless Assn. N.E. QSO Party: K1BRJ. Traffic: W1TXL 653, K1TPK 159, W1YNE 60, W1BTV 49, K1VYC 42.

VERMONT—SCM, E. Reginald Murray, K1MPN—All nets are operating on summertime schedule. The Green Mt. Net on 3855 kc. daily at 2130Z; the Vt. Fone Net, 3855 kc. Sun. at 1300Z; the VTN 3520 kc. Tues. and Thurs. at 2300z; the Vt. Trading Post Net, 3855 kc. Sun. at 1900Z. The BARC plans to sponsor International Field Day again on July 25-26 at the Cliffside Country Club in Burlington. VTN is off the ground with a good number of stations faithfully checking in but could use more, so don't be shy. Many hams helped during the floods at White River Jct.—K1NIW, —W1ELJ, K1ZCB, W1FN, K1UCE, K1DVM, K1ITA, K1RGB, K1WZJ and W1AD to name a few. The Vt. Emergency Net operated for quite a few hours during the crisis and many stations around the state took turns at NCS. The Green Mt. Net had 634 check-ins for March; the Vt. Fone Net had 166; VTN had 71 with 32 pieces of traffic passed. Certificate winners in last December's Conn. Wireless Assn. N.E. QSO Party were: K1WZY 1st, K1YRB/1 2nd. Traffic: K1BQB 188, W1WFZ 43, K1LLJ 35, W1CBW 18, K1MPN 14.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—RM: W7EMT. The Red Cross in Boise is moving into a new building with room and provisions for amateur radio communications. W7GGV is moving his ham shack upstairs in the new home. W7DZH, W7DQU, W7DHD, K7KBV, K7UAE and K7KBY handled communications for the local high school drill team parade. K7-NHA now is on RTTY. Interest is picking up for a late spring or early summer hamfest. Direct comments to the *Ham Hill News*. K7WKR now is on phone with a new Conditional Class license. Our appreciation to all who handled traffic connected with the Alaskan emergency. Some are listed in the traffic reports and no doubt there are many others of whom we have received no word. GEM Net: 48 QTC in 31 sessions. FARM Net: 71 QTC in 22 sessions. Traffic: W7EMT 131, W7CDR 53, W8UNA 50, K8HLR 43, K7KBY 40, K7CXG 37, W7KXJ 37, W7-GGV 28, W7JMH 28, W7FGM 27, W7SJI 14, K7OAB 7, K7QQP 7, K7DFZ 5.

MONTANA—SCM/SEC, Walter R. Marten, W7KUH—Asst. SCM/L.F. PAM: Dr. Marvin Hash, W7YHS. V.H.F. PAM: W7TYN. RM: W7FIS. The Mont S.S.B. Net meets Mon. through Fri. on 3910 kc. at 1800M. Fire completely destroyed the home of W7IOJ. He has no rig, no home, so let's all give George a helping hand. Many Montana amateurs handled traffic during the Alaskan earthquake. The Montana S.S.B. Net had 24 sessions, 699 check-ins and 174 pieces of traffic. W7QZJ joined the 2-meter gang. K7UPH joined Navy MARS. K7OGF built a solid state power supply. W7CPY reports that 3910-kc. s.s.b. rolls into Arizona FB. He is now back home in Billings. K7TZZ moved back to Butte. W7FSP is building a 6-meter converter. W7OIO's rig blew up. W7-

(Continued on page 138)

There is just no better way of getting started in VHF than with the newest of the new in the Clegg line — the 22'er two meter transceiver. This ready-to-go station combines many of the fine features that have made the Clegg name famous in VHF ham circles for years plus refinements to make 2 meter AM phone operation more interesting and challenging. It is realistically priced — your distributor will have complete information.

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Features

RECEIVER

1. Dual conversion with crystal controlled first injection oscillator
2. Crystal lattice filter providing selectivity of about 10 KC at 6 db and less than 16 KC at 50 db
3. Freedom from spurious responses, IF leak through and images
4. Panel Meter doubles as calibrated S Meter on receiver and "relative output" meter for transmitter tune up
5. Full 143.8 MC to 148.2 MC coverage with calibrated tuning dial
6. Fine tuning control with approximately 25 KC range
7. Excellent AGC performance
8. NUVISTOR RF stage and low noise first mixer provide .2 μv sensitivity (10 db S + N to N)
9. 3 watts audio output available with self contained high efficiency speaker for operation in high ambient noise associated with mobile operation
10. Effective Automatic NOISE LIMITER

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1. Broadband exciter stages to simplify rapid QSY
2. High efficiency straight through final amplifier with crystal controlled 18 WATT input
3. High level plate and screen modulation with speech clipping for typical Clegg "HIGH TALK POWER" performance
4. PUSH TO TALK with provisions to switch external LINEAR and VFO
5. TRANSMITTER frequency SPOTTING SWITCH
6. Self contained universal solid state power supply for 115 volts AC and 12 volts DC
7. Tube line-up

6CW4	Rcvr RF	12AX7	AF Amplifier
6KE8	Mixer/Xmtr Osc	6BQ5	Rcvr Audio Output/ Xmtr Modulator (2)
6KE8	VLO/Buffer		
6BA7	2nd Mixer	6EA8	Xmtr XLO/1st Multiplier
6AZ8	IF Amplifier		
6BA6	IF Amplifier	12BY7	Buffer Amplifier
6AL5	Diode Detector/ Noise Limiter	12BY7	Xmtr Driver
		2E26	Xmtr Final Amplifier

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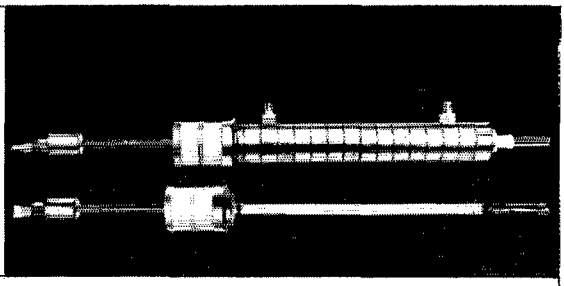
CJN added a second grounded-grid stage to his 2-meter converter and completed the v.h.f. standing-wave bridge. K7EWZ is sending messages to other Governors from the Montana Governor welcoming them to participate in Montana's Centennial. Anaconda stations on 2 meters are W7TYN, W7TTO, W7TQC, W7EQP, K7OEK and K7YNZ. The Anaconda Radio Club will operate the base station for the W1MU Hamfest Aug. 7, 8 and 9. The latest 6-meter stations in Great Falls are W7AYH, W7AHR, W7JVN, K7IOA, K7PWW, K8KGI/7, W7TLA, WA4LLJ/7; and 2-meter stations are W7AYH, W7KDP and K8KGI/7. K7IOA and W7AHR are building 2-meter converters. K7IJI and W7HDP are building 432-Mc. equipment. K7PKV is building a new 4-1000 linear. A Montana Emergency Mobile Corps is now being formed. Anyone interested, contact your SCM, W7KUH. Endorsements: W7IOA as EC; W7TYN as V.H.F. PAM, EC and OES; K7EWZ as ORS; W7FIS as ORS and OO. Section Net certificates were issued to the following stations for their excellent participation, observance of net rules and of ARRL operating practices: K7QVD, W7JMX, K7PKW, K7LUH, W7OCD/7, K7MYC, W7JHM, W7NPY, K7PWY, K7PKV, K7QKN, K7SVR, W7FL, K7UPH and K7YNZ (for the Montana S.S.B. Net). K7EWZ again made BPL. Traffic: K7EWZ 539, K7NHV 147, K7PWY 78, K7UPH 29, K7MRZ 27, W7NPV 14, W7OIO 14, W7COH 13, W7LBK 10, K7THR 9, K7JBH 5, K7YNX 5, W7CPY 4, K7QCO 4, K7YNW 3, W7EWR 2, K7EIW 1, W7FIS 1, K7JAT 1, K7MOW 1, K7MYH 1, K7PGN 1, W7QGJ 1, W7SMY 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. Oregon State Net (OSN) 3585 kc. now at 0300Z, Tue. through Sat., sessions 21, attendance 134, traffic 84. BRAT awards to W7AJN, W7BVH, W7ZFH and K7IWD. At the regular monthly meeting of the Portland Area AREC, plans were made to offer their help in providing communications whenever it was needed. The highlight of the meeting was a panel discussion on traffic-handling. The panel was under the direction of W7NGW, with W7ZFH and W7AJN assisting. W7DEM's traffic was ARC H&W for Alaska and Crescent City, Calif. W7CPV monitored the Oregon C.D. Net and relayed traffic to W7DEM on 2 meters for Crescent City and then it was relayed to WA6EYY and WA6CYQ in Crescent City, Calif. No other reports on full activities have been received yet. Ex-K6GLE is now WA7ABL. Amateur TV experiments have been successful, with K7DVK receiving picture and sound transmitted by live camera from W7HGY. Traffic: K7IWD 727, W7DIS 506, W7ZB 210, W7DEM 119, W7ZFH 114, W7MAO 36, K7SHC 28, W7AJN 25, K7KTG 8.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. The Alaskan earthquake brought the old traffic boys back in action in the section with eight of them making the BPL and handling over eight thousand pieces of traffic. K7CHH is in W8-Land on business and vacation. W7TIQ is back on 80-meter c.w. after a long absence and has a new antenna up. W7AIB reports that signals are picking up and conditions becoming much better for net operation in the evening. W7AMC says the new QSL press is ready. K7-JRE will attend Whitman College in Walla Walla next year. Jim lost his 40- and 20-meter antenna during a wind storm. K7SRI finally has his crystal calibrator going. W0GWD/7 is a new arrival in the section in the Spokane area. K7RSM reports he had a ball during the second round of the ARRL DX Contest using a Ranger and a Drake 2-B with a two-element tri-bander. K7-VNV and his group are planning a big 6-meter project on a.m. The Columbia Basin Assn. of Amateur Radio Clubs was formed in Prosser in March and consists of the following clubs: Twin Cities, Richland, Prosser, Sunnyside, Yakima, Ellensburg. The officers are K7-MGA, pres.; W7WCW, vice-pres.; K7GGQ, secy.-treas. W7CHI is having trouble with gear at Vets Hospital, Walla Walla. W7NDC and K7SKP are on the committee for the 1964 C.W. QSO Party. W7IDB left for duty with the U.S. Army for three years. K7UEB, club station at Walla Walla College, is being remodeled and getting a new shack. Reports on the coming Skagit Hamfest indicate attendance well over three hundred is forecast. Director Roberts, W7CPY, and Vice-Director Thurston, W7PGY, will be in attendance. K7JHA, the RN7 manager of the NTS, reports he had good assistance from W1JHR, W7VAS and K7TPN during the heavy traffic flow from Alaska, and the use of the standard ARRL text was most gratifying. W7DNU and K7KCT are mobiling now with FB sigs. W7SLB is on s.s.b. and skeds his brother, W7PUA/2. The VARC of Puyallup is furnishing communications for the Daffodill Parade and also graduated eleven from its code and theory class. W7EOL has a new linear with a new 150. W7SUQ has a new auto and transceiver and contacts his family in Vancouver while attending school in Seattle. W7SAP has new mobile. Top man in the QNI column for WSN during March was K7CTP with a perfect

(Continued on page 140)

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

attendance. W7COP won the ART-13 from the W7DK club. W7BSW had a bout with chicken pox recently. Traffic: (Mar.) W7BA 2214, W7DZX 955, W7FNA 950, W7EJD 949, K7CTP 827, W7PGY 633, K7JHA 522, W7OER 319, W7APS 314, K7SRI 79, K7JRE 64, W7AMC 63, K7UHO 50, W7AIB 24, K1RFX/7 22, W7BTB 18, W7TIQ 11, W7EVW 4, K7CHH 2, W7JEY 2.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—Clubs in Hawaii should have their secretaries send in monthly reports on activities for inclusion in this column. Get them to the SCM by the first of the month .Congratulations to two new OBSs, KH6AU and KH6DXB. KH6AFS had an enjoyable eyeball contact with KH6AO and KH6DBY when they recently visited the Big Island, Hawaii. The YL Club recently met at Louisa Borthwick's home. KH6ESL presided. KH6IJ will be nearing his 30th anniversary with his weekly newspaper column. KH6s EUU, EVY, EVG, DUL, DYA and DXB, plus K7GOK/KH6 and WB6CQR/KH6, had a rendezvous with seven mobile units and one Army helicopter to respond to a simulated (tidal wave) "tsunami" emergency on 2 meters. KH6EU has joined the Silent Keys. KH6DH and KH6HR have joined the local phone company in the engineering dept. K8DHU was working WA6MSO/KL7/m at 0446Z when the first word of the Alaskan Earthquake was flashed. All the gang at KH6USA are raving and saying, "Thank the good Lord for amateur RTTY." KH6ELR, chief op. at KH6USA, organized and spearheaded the more than 25 operators during the peak of the KL7 traffic. K7GOK/-KH6, lent his 1-kw. rig to the station to give more coverage. Traffic: KH6USA 3991, KH6BZF 5, KH6ATS 4.

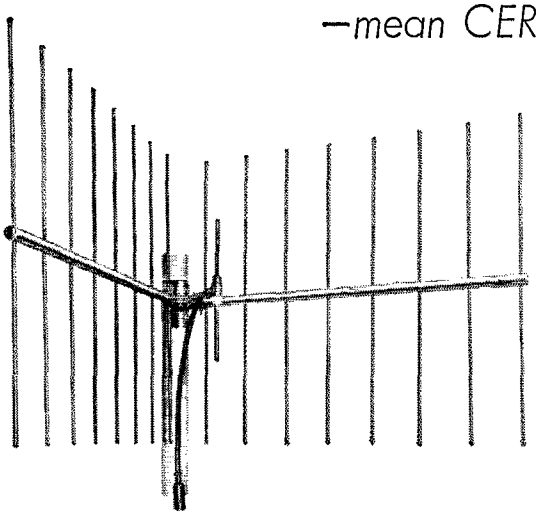
NEVADA—SCM, Leonard M. Norman, W7PBV—Flash: *ARRL Members of Southern Nevada Vote 8 to 1 to stay in our present Pacific Division.* W7GZT was host to W6ZHH and his S.S.B. Mobile Cavalcade at the Hacienda Hotel for a week end of fun and relaxation. Our congratulations to W4CJD/7 and K7SFN for the Nevada Traffic Net on 3660 kc. K7RWN is instructing a group in c.w. and theory. KA7ZTU and K7ZOJ are active on 40 meters. W7BJY and W7TGK are both home from the hospital and doing fine. K7ICW and K7RKH are on 220 Mc. K7UGE handled a lot of outbound Alaska traffic. SNARC and CCATS members are securing name-pins for their respective clubs. W7OHQ has been appointed coordinator for Southern Nevada Salvation Army disaster-relief communications by K7YVT. W4CJD/7 is RM and K7SFN is Asst. RM for the Nevada Section C.W. Traffic Net on 3660 kc. K7BVZ and his XYL report very good fishing. K7SFN reports good DX—VK, KP, KX, ZL and KC. Traffic: K7SFN 113, W4CJD/7 84, W7OYQ 57, W7RBV 42, K7TTV 23, W7PBV 5, K7YHR 4, K7YXX 2.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Edward T. Turner, W6NVO. SEC: WA6HVN. V.H.F. PAM, WA6RXB. The Santa Clara Valley Section was saddened by the sudden passing of K6VQK, OPS from Pacific Grove. Val was a very active phone operator on the Mission Trail Net and took a very active part in section planning. We shall all feel his loss and extend our sympathy to his family. The new V.H.F. PAM is WA6RXB, of Santa Clara. Ralph is now handling the Two-Meter Section Net, and is working with WA6RHH, of the San Francisco section, on the formation of a Bay Area Net covering all three sections on 2 meters. A major activity in March was the relaying of disaster traffic in the Alaska Earthquake. Those stations reported very active in the section were W6ASH, K6GIZ, W6RSY, W6YEV, K6LFH, W6UW, K6DYX, W6PLS and W6ZRJ. ECs who reported activity were WA6HVN, K6LFZ, W6PLS, W6DEF, K6TEH, W6IBW, WA6FCH. According to reports, newspaper accounts and coverage of this traffic work in the section was the best ever. W6ASH reports that the Oscar overseas net is active with stations from all continents. W6JXK is looking for a BPL medallion. K6GIZ reports that a major difficulty in the Alaska disaster was the fact that too much traffic was sent in, so that little could come out. K6DYX commends KL7DTR for his RTTY work during the disaster. Smitty was active during the emergency on RTTY and c.w. W6YBV was active handling bulletins on the Alaska quake on the traffic nets. W6PLS, in Half Moon Bay, reports that his group was alerted for the "seismic wave" which hit the coast after the quake. W6DEF now operates a little s.s.b. but still claims c.w. is the best mode. K6EQE is active as OPS on MTN. W6QMO is now back on the c.w. nets. WA6UAM plans to attend Carnegie Tech. next year. W6OIT was active on 75 during the Alaska quake. W6AUC acted as OO on 20-meter s.s.b. to help keep emergency channels clear and handled some emergency traffic as well. W6VZE has been renewed as EC for Burlingame. W6YHM now has a 50-ft. tower and twenty-

(Continued on page 142)

C-P COMMUNICATION ANTENNA SYSTEMS

—mean CERTIFIED PERFORMANCE!



Base Station Corner Reflector Advanced Design Antenna

(10X-Unidirectional Gain)

Cat. No. 161-509, Frequency Range 450-470 MC

Cat. No. 161-509 Corner Reflector Antenna is designed for use in the 450-470 Mc band. All reflector screen components are manufactured of high strength aluminum alloys, all mounting components are fabricated of hot-galvanized steel and all radiating components are fabricated of aluminum. The above combine maximum strength, optimum electrical performance and minimum weight for the first time in an antenna of this type.

This lightweight aluminum antenna is ideal for use in multiple corner arrays.

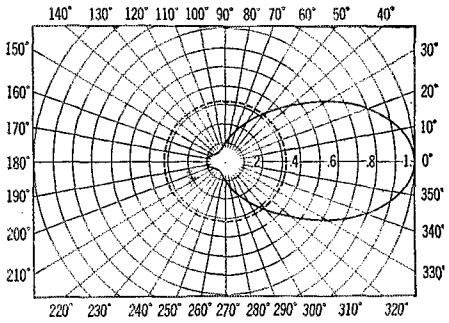
Electrical Specifications:

Nominal input impedance	50 ohms
Forward gain	10 db
Front-to-back ratio	20 db
Maximum power input	250 watts
Internal feedline	RG-8A/U
Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
VSWR	1.5:1
Bandwidth	±3%
Lightning protection	Direct ground

Mechanical Specifications:

Reflector (size per side)	2' x 2'
Reflector material	High strength aluminum alloy
Radiating element material	High strength aluminum alloy
Radiating element diameter	⅜"
Rated wind velocity	100 MPH
Lateral thrust at rated wind	16 lbs.
Torsional moment on mounting pipe	16 ft. lbs.
Weight	8 lbs.

Stainless steel hardware supplied to mount antenna on 2" IPS pipe.



Horizontal field strength pattern of Corner Reflector 10X-Gain Antenna Cat. No. 161-509. A dipole pattern is shown for reference.

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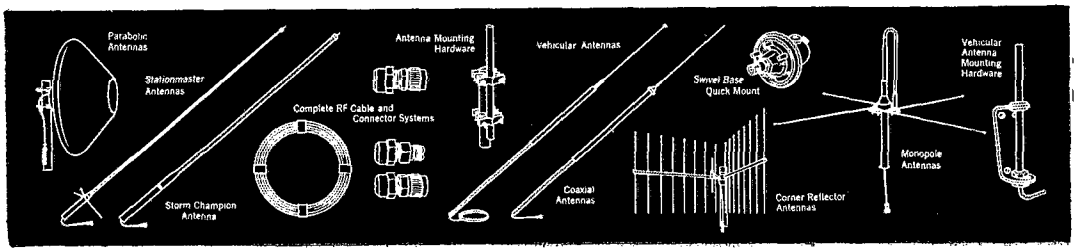


element 2-meter beam in operation. Don plans to be active aeronautical and maritime mobile in the Alaska area next summer. K6LFZ reports that emergency planning is making great strides in Hollister. W6RFF is teaching electronics two nights per week. K6MTX built a new keyer. W6PLG is working on plans for handling FPO traffic between NTS and Navy MARS when given the OK. K6YKG was active in the recent CD Party. K6TEH reports that the new Salinas Valley Red Cross Station, WB6HUK, handled incoming traffic during the Alaska quake. Traffic: (Mar.) W6RSY 1279, W6ASH 644, W6JXK 497, K6GZ 348, K6DYX 316, W6ZRJ 244, W6YBV 219, W6PLS 127, W6DEF 121, W6AIT 79, K6EQE 40, W6QMO 36, WA6UAM 31, W6AUC 27, W6OH 27, W6VZE 19, W6YHM 15, K6LFZ 12, W6RFF 6, K6MTX 4. (Feb.) W6ASH 30.

EAST BAY—SCM, Richard Wilson, K6LRN—Ye SCM is the proud owner of a TR-3, the four-wheeled type. The LARK wants to remind everyone that m.c.w. and phone can be used by the same Field Day station for twice the contacts. WA6ECF's DX record is now 122/101. Martha, WA6NEL, and Larry, WA6EJA, are now living in the San Fernando Valley. Congratulations to WB6JGA, our SEC, on achieving the BPL on March traffic. He made it before the Good Friday Alaskan earthquake. WA6AHF is on RTTY. All he needs now is a bicycle to deliver the messages. The Livermore Radio Klub's Pot-Luck Dinner on Feb. 29 was a success. K6LRN, W6KTF and WA6ANE attended the ORC auction on Apr. 3. The following stations were active during the Alaska emergency, relaying traffic: WB6JGA, K6ZYZ, W6OJW, WA6ECF, WA6MIE and K6IMV. The Alaskan emergency points out the need for every operator to know how to handle a message in standard ARRL form. Welcome to K6TFT, who has just moved from San Diego to Vallejo. Frm the Hayward RC *Chevron Rag* and the CCRC are articles advocating the use of the 10- and 2-meter bands for our local contacts. There's no use in cluttering up our low frequencies when 50 watts on 10 meters will get you just as far and no QRM to boot. What ever happened to the 29ers and the skyriders? I am going through the appointments to bring the list up to date. I find a lot of people don't bother to send in monthly reports. If you skip three months you can consider your appointment cancelled. Among those being cancelled for lack of activity are ECs K6HTJ and W6WAH; OES WA6JCD; OBS K6IGN; ORSs W6TT, W6EY, K6AHV, W6NBX; OOs W6IDY and W6BEZ; OPS W6EY. To quote the *Operating an Amateur Station* booklet, the monthly report is the criterion of activity. Regular reports are necessary as prerequisite to annual endorsement and renewal of all league appointment certificates. WB6JGA passes along a list of stations QRMing the net operations on 14,100 during the Alaska quake situation. Most of this is just thoughtless operation. Let's listen a little more carefully before transmitting. K6GK meets UTL on 3565 kc. and does a lot of operating on 40 meters. Activity seems to be a little slow. Keep the cards and letters coming. Have them to me by the 1st of the month. Traffic: WB6JGA 623, K6ZYZ 136, K6GK 45, W6OJW 28, WA6MIE 27, W6UB 26, W6KTF 23, K6IMV 20, WA6ECF 14, K6LRN 5, WA6FBS 4, W6ZF4.

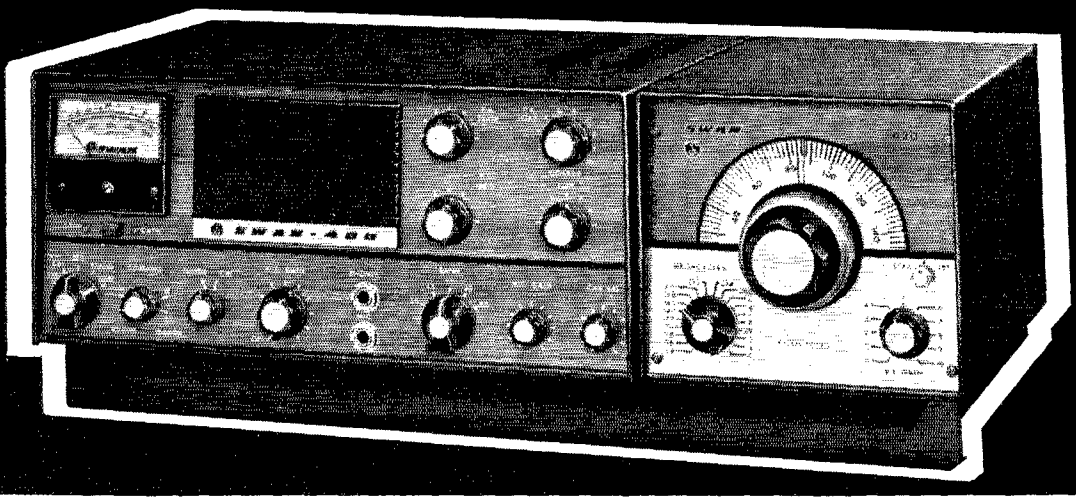
SAN FRANCISCO—SCM, C. Arthur Messineo, W6UDL/K6CWP—SEC: W6KZF. Our thanks to those who participated so wonderfully in the recent KL7-Land disaster. WA6QXV is installing a new antenna farm at his new QTH in Ukiah. WA6FLW, the new EC for Santa Rosa, reports increased activity in that section on v.h.f. and plans an AREC station at the County Fair. More PICON! The San Francisco Radio Club held its annual auction and all reported many good buys. Everyone already is looking forward to Field Day in this section, and many clubs have already located their sites and are busily checking out the FD gear. Plans are progressing favorably for the Greater Bay Area Hamfest in October. JA1CRT was a recent visitor at WA6IVM's QTH. Ray also informs us that JA1BZE wants to join the SFRC. WA6KLL asks all of you 2- and 6-meter boys and gals to check in on both phone and m.c.w. on FD for twice the points. W6KZG's timely reminder: Check over your portable and mobile gear as well as your emergency power unit; always keep them in good condition as well as the spare antenna in case a storm blows down your regular sky-hook. WA6MDL is now going to school in Los Angeles. W6YKS, from up north, has a new SX-110 and says its FB. The grapevine has it that W6GGC and his XYL, Rose, are planning a vacation to the World's Fair in New York and then on to Europe. Good traveling to you both. W6CTH should be back from his visit to Japan. We will all be waiting for the stories of his "eyeballs" with JA hams. George, OES in Santa Rosa, writes that 144-Mc. activity is on the increase in that area. While scanning the bands during the Alaskan quake, I noticed some very good procedure, and also

(*Continued on page 144*)

HERE IT IS! THE SPECTACULAR

NEW SWAN-400 SSB TRANSCEIVER

5 BANDS - 400 WATTS



SWAN-400 SINGLE SIDEBAND TRANSCEIVER 400 watts P.E.P. input, 10 through 80 meters. Fixed station, portable, or mobile. SSB, AM, and CW.

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SWAN-420 FULL COVERAGE FREQUENCY CONTROL UNIT Highly stable transistorized VFO designed for fixed station operation. 20 ranges 200 kc each. Illustrated above as companion to SWAN-400.

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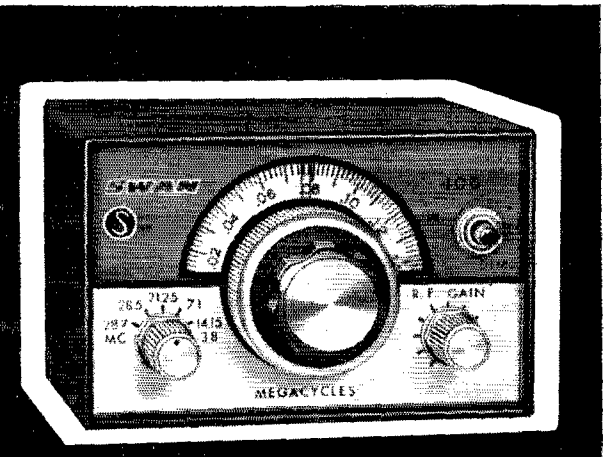

SWAN-406 MINIATURIZED CONTROL UNIT Provides phone band coverage. Designed for mobile installation. May also be used for fixed station. Highly stable transistorized VFO in a compact package.

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ACCESSORIES:

- AC POWER SUPPLY, MODEL 117B.....$ 75
- MOBILE POWER SUPPLY, MODEL 512 .....$145
- PLUG-IN VOX UNIT, MODEL VX-1.....$ 25

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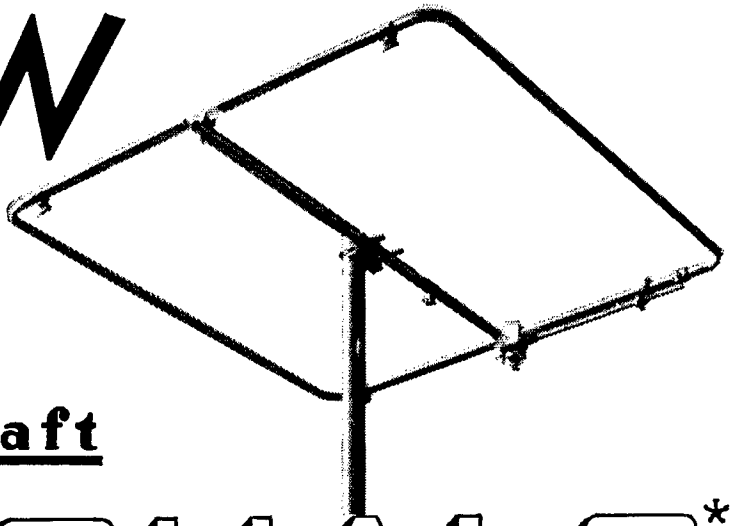
some that left much to be desired. It would be good if some of us would review our procedure, a good deal of unnecessary QRM would be avoided, and a more efficient operation would result. Traffic reports continue to come in very slowly so credit cannot be given to many that I'm sure have handled a great many messages. Try to get 'em in by the first of the month if you can. W6FDU is now training with Uncle Sam's reserves so will be an inactive OO for the balance of the year. Traffic: K6NCG 1749, W6CO 500, W6FDU 242, WA6RRH 240, W6YKS 175, K6RCR 132, K6TWJ 82, W6PZE WA6YNL 77, WA61VM 39, K6SAA 12, WA6FLX 9, K6ALI 2.

SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC: Mary Ann Eastman, WA6HYU. The Golden Empire ARC, Chico, says that WA6SES has a new homebrew 15-watt phasing s.s.b. rig on 75; WB6DNW was active on 3992 kc. handling traffic during the "lost plane" alert in the Quincy area; W6CWH decorated the roof of Skyway Lodge with a beam borrowed from W6DSX; WA6FWM urges winding your own filament transformers if you can't locate them with proper specs; W6SYX has graduated from Tucker-Tin-Two to double sideband with inverted audio; WA6FYB, formerly of Chico, is now on 1920 kc. from Santa Clara; W6JHY is recovering from an operation; Dave Nock (father of prexy) presented GEARS with a handmade gavel; W6CGJ has the latest Lafayette HE-80 receiver; W6YKU and WB6DNW, with their OMs, attended the annual YL get-together in Sacto. Sacramento Area: WA6YKR of the Yolo ARC is now OES and OPS. K1CAU/6 ORS skeds traffic at 1800 on 3915 kc., SJN Net and NCN at 1830 on 3905 kc. W6WGO reports 80% of his traffic is with NCN. *Mike and Key*, newsletter of downtown Sacto. ARC, reports that the recent exhibits and talks on old-time radio gear was most successful. K6QIF, W6PIV, W6PEI and WA6RMG stood by on local Red Cross frequencies when an airliner crashed at Lake Tahoe recently. The SARC hopes to occupy Willow School near Somerset for Field Day; K6GDS and K6IKV will chairman the bash this year! The Eldorado County ARC has moved its meeting place back up into the snow country at eightmile fire station in Placerville! At a recent meeting of the Eldorado Club, W6CIS, State Radio Officer for c.d., spoke on RACES, following which WA6HYU (your SEC) spoke on ARRL and AREC for Public Service and K6UML and W6RNA gave the scoop on traffic-handling. *RAMS News* reports those taking part on 3965 kc. in the recent RAMS SET were W6QHP, W6CXD, WA6YZO, K6UVE, WØUMG, WA6IVI, WA6QGT, WA6UQZ and WA6HGH. Sacto. Aerojet ARC showed films on "The Big Bounce" and "Seconds For Survival" at a recent meeting. K6KSE is building a code oscillator for the SARAC. K6EYE represented the Aerojet Club at the recent ARRL Pac. Div. Directors meeting in Oakland; your SCM W6BTY and ASCM/SEC WA6HYU also attended for the section. McClellan MARS presented Bob Thompson, of Ma Bell, at a recent meeting. WA6ZDE and W6ZCH, of the Northhills ARC, each sport new TR3s and advise that 145.300 Mc. is the new net frequency for NHARC on Wed. nights. *Special Notes:* Hospitality was wonderful at the Eldorado County ARC, the Aerojet ARC, MARS, and the Oroville Amateur Radio Society when your SEC recently visited on "tour of duty." Please keep those fine newsletters coming. *Support your 1964 AARL Pacific Division Convention* to be held in Sacramento Sept. 25-26-27. Traffic. (Mar.) W6WGO 229, W6AF2. (Feb.) W6WGO 35, K1CAU/6 3. (Jan.) K1CAU/6 38.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—K6GZN is president of the Delta Radio Club, which meets on the 3rd Fri. at Jr. Museum. W6YGZ is editor of the Delta ARC bulletin. K6ODA has joined the Silent Keys as the result of an automobile accident. The Fresno Amateur Radio Club is busy installing equipment in its new 22-ft. trailer, which will be used for Field Days and other events. Those helping in the project are K6ACO, W6ARC, WA6DRH, WA6ZGQ, WA6RDY, WA6IMA and W6JPS. We apologize for anyone we may have missed. W6NXL has a homebrew transceiver on 50 Mc. W6ZFN was active during the earthquake in Anchorage, passing RTTY messages. K6IXA was a recent visitor in Fresno attending RTTY school. K6PBL has a 1308 receiver. K6OER is going on 2 meters. WA6BAI is on 2-meter f.m. K6OLN manages to pass a few messages after finals. The Livermoor Radio Club will be operating WA6ODP on both 6 and 2 meters, and can use m.c.w. and phone for twice the contacts. W6GEG was a recent visitor in Fresno. W6NKZ has left for Europe; we'll have a report on him later. WB6ETQ returned from a pleasant trip to the Orient, and visited with his son in Guam. WA6EBX is interested in 2-meter f.m. W6MYU is being transferred back to the Bay Area. Traffic: K6OLN 2.

(*Continued on page 146*)

NEW



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SQUALO*

6-10-11-15-20 or 40 METERS

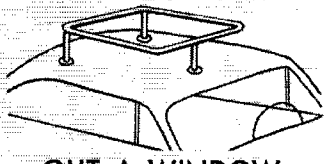
Cush Craft's continuing research produces another first —THE SQUARE HALO. Squalo is a full half wave, horizontally polarized, omnidirectional antenna. Outstanding all around performance is achieved through a 360° pattern with no deep nulls. Full size and compact dimensions provide a low Q for broad band coverage. Direct 52 ohm Reddi Match feed gives an SWR of 1.5-1 or less from 50 to 51 Mc.

The 6 and 11 meter Squalos are packaged complete with rubber suction cups for car top mounting and a horizontal support for mast or tower mounting. The 10-15-20 and 40 meter Squalos are designed for mast or tower mounting where space does not allow for larger antennas. Squalo is ideal for net control, monitoring, or general ham coverage.

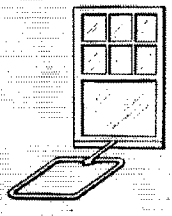
Whether you are a beginner, apartment dweller, or serious DX man the space saver Squalo is for you. You can buy one for each band and build a Squalo Tree!

Model No.	Description	Net Price
ASQ-6	6 meter 30" square	**$12.50**
ASQ-10	10 meter 50" square	**19.50**
CSQ-11	11 meter 50" square	**19.50**
ASQ-15	15 meter 65" square	**23.50**
ASQ-20	20 meter 100" square	**29.50**
ASQ-40	40 meter 192" square	**66.50**

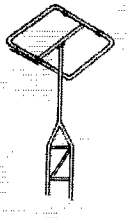
ON YOUR CAR



OUT A WINDOW



ON A MASK



*Pronounced Squaylo

Cush Craft

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ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RM: WA4FJM. PAM: K4ODX. V.H.F. PAM: K4MHS. All c.w. net members please note: Both NCNE and NCNL will move to their new frequency, 3573 kc., June 1. Times will be: NCNE 2330Z, NCNL 0300Z. We now have a very good s.s.b. net in the section which meets on 3938 kc. at 0030Z daily with WA4MLV as temporar net mgr. W4YMI is working on a 10-meter AREC net in Craven and Jones Counties. K4GNX says his son has finished his training at Parris Island and is assigned to radio school, San Diego, Calif. W4ACY, W4PLL, W4BUZ, K4RID and many other stations in N.C. were monitoring 20 meters and picking up Red Cross traffic coming into this section immediately after the Alaskan quake. W4VSJ is attending Adult Education class in radio and basic electronics. WA4LWE, the new EC for Surry, Ashe and Alleghany Counties, welcomes AREC applications from that area. K4GPL reports a new local f.m. 2-meter net is being activated. Many thanks to the OOs who sent in their FB reports; this is the best month yet. Newly-elected officers of the CRML are WA4FDE, pres.; WA4GEX, vice-pres.; WA4DBZ, treas.; WA4EYA, secy. Net traffic: NCNNE 389, NCNL 154, THEN 95, SSBN 54. Traffic: WA4-PDS 370, W4LWZ 238, WA4ICU 123, K4YYJ 84, WA4-ANH 82, W4BAW 74, WA4FJM 70, K4CDZ 68, W4BNU 60, W4YMI 42, K4EO 36, K4GNX 32, WA4EIS 31, WA4-DKZ 30, K4QDO 28, W4FDV 20, WA4KFH 14, W4ACY 8, WA4GEU 6, WA4JCS 3, W4VSJ 2.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ. RM: K4LND. S.S.B. PAM: K4JOQ. Nets: C.W., 0000Z and 0300Z, 3795 kc.; A.M., 0000Z, 3930 kc.; S.S.B., 0000Z, 3915 kc. Our RM, Bill, reports that WA4PFQ is doing an excellent all-around job for the C.W. Net. Terry is taking NCS, 4RN representative and any other duty he can and has just been appointed ORS with a Section Net certificate for his fine work. WA4JHD, is running a hot second on the SCN and also has been appointed ORS and awarded the Section Net certificate. We understand that W4JA has had over 300 letters of interest concerning his "Black Box" article in Feb. *QST*. W4PED, our former RM, is spending some time debugging his home-grown rig trying to make it sound like the commercial rig he used to operate. Prediction: W4NTO will be the last man in 4-Land to go v.f.o. or s.s.b. Fritz still is making improvements to his a.m.! C.W. Net traffic: 125. Traffic: WA4PFQ 186, K4LND 128, WA4JHD 70, WA4LPV 70, WA4LPX 41, WA4ILO 18, K4OCU 16, W4NTO 12, WN4ORD/4 5.

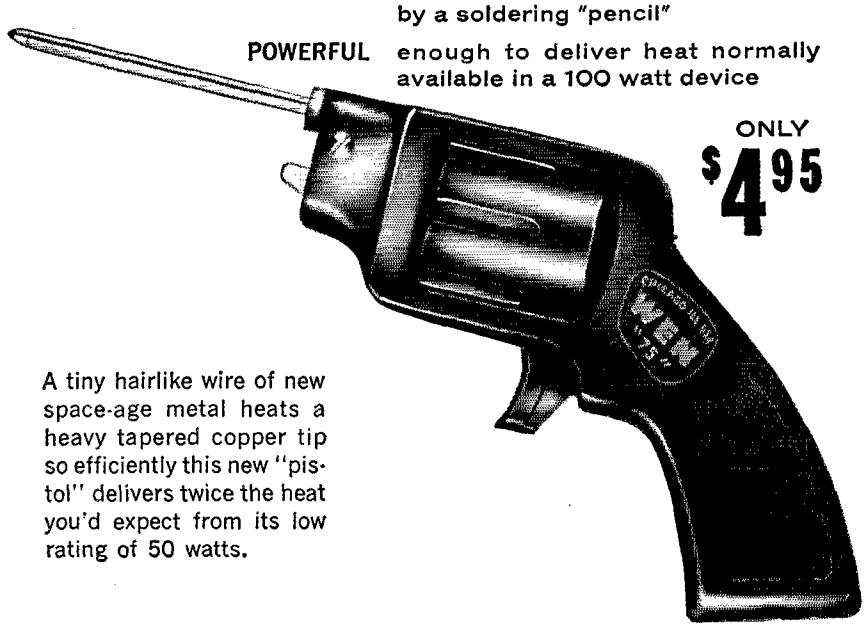
VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ. RMs: K4MXF, WA4EUL, W4SHJ, W4QDY. PAMs: W4JMA, W4DKP Asst. Net Mgr.: WA4GWD (VSBN). W4JUJ says that he enjoyed both YL-OM Parties (phone and c.w.). WA4GWD reports good VSBN activity and he worked KH6, DL4 and ZL3 on 75-meter s.s.b. He is trying for WAS on phone. W4PRO is back on the air with new SB-300 receiver. K4IKF, K4ZHA and K4TSU had a ball putting rare Craig Co. on the air from the New Castle International Gliderport—160 QSOs, 24 states! March winds have taken down part of K4NAV's antenna. K4SDS says there will be more Old Dominion Award Expeditions with the warm wx. W4ZAU turned over the VSN Mgr. job to WA4EUL. WA4KTZ is on the air with a SR-160 and an inverted VEE. K4ISM finished his 80-meter vertical. W4MXU reports 65 net sessions during March! DX hunter and PAM got another one for 306 countries worked and 304 confirmed! WA4GHA stepped up his power with a Warrior which helps with his NCS job on VSBN (Sat.). W4WBC reports a busy month with traffic and DX contests. W4-BGP and XYL WA4BVE changed their QTH to Vienna. W4NVX hopes to be more active with DST coming up. Ye ole SCM now has s.s.b. capability and is getting on the air more regular-like with c.w. and phone. The Virginia Section Nets are on a healthy basis and it is hoped that the warm wx doesn't cut things back too much. Nets: VSN (slow-speed) C.W. 3680 kc. 2330Z Mon. through Fri., WA4EUL Mgr.; VN (high speed) C.W. 3680 kc. 0000Z daily, K4MXF mgr.; VFN (a.m.) 3835 kc. 0000Z daily, W4FCS mgr.; VSBN (s.s.b.) 3935 kc. 2300Z and 0300Z daily, W4JMA mgr., WA4GWD asst. mgr. All nets except VFN are National Traffic System (NTS). The newly-organized Lee Co. ARC meets the 4th Fri. night of each month. Traffic: (Mar.) W4DLA 545, K4PQL 437, WA4EUL 387, W4DVT 321, K4-KNP 280, W4MXU 257, W4SHJ 169, W4JMA 160, WA4-FCS 158, W4RHA 144, K4SDS 129, WA4KTZ 118, WA4-GWD 108, K4FSS 102, W4NLC 94, K4PXY 90, W4ZMT 88, WA4KVR 80, K4ITV 77, WA4JRY 68, W4LK 62, W4ZAU 46, W4OKN 45, W4DKP 41, K4ISM 41, K4MXF 31, WA4SHD 28, W4TE 28, W4QDY 26, W4WO 26, W4-BZE 21, W4NVX 20, W4BGP/WA4BVE 19, W6GGR/4

(*Continued on page 148*)

FROM SPACE-AGE RESEARCH
the WEN SOLDERING PISTOL with ATR*

DELICATE enough to do work normally done by a soldering "pencil"

POWERFUL enough to deliver heat normally available in a 100 watt device



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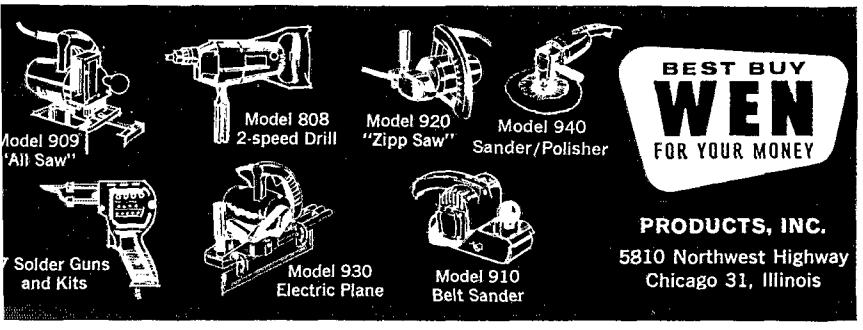
A tiny hairlike wire of new space-age metal heats a heavy tapered copper tip so efficiently this new "pistol" delivers twice the heat you'd expect from its low rating of 50 watts.

*NEW ATR REGULATES TEMPERATURE FOR HIGHEST EFFICIENCY

A surge of 50 watts brings tip to working temperature in seconds . . . then only 30 watts are needed under normal soldering conditions. When the tip is placed against an unusually large cold mass, ATR automatically triggers more heat until the mass is properly heated . . . then regulates it back to its amazing 30 watt efficiency. No double triggers or tricky switches with ATR—exclusively in the new WEN Model 75 Soldering Pistol.



FOR IMMEDIATE DELIVERY SEE YOUR REGULAR ELECTRONIC DISTRIBUTOR OR USE THIS COUPON:

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Soldering irons too heavy? Soldering gun tips too fragile? Soldering pencils—too little power? WEN Model "75" SOLDERING PISTOL Solves All Three Problems!

Wen's new Model 75 Soldering Pistol uses an entirely new idea in element design to bring you the light weight, long reach, and clear view of a soldering pencil, PLUS the soldering capacity of a 100-watt device! More than a 'gun,' more than a 'pencil,' the 75 will handle any soldering job—from printed circuits to chassis grounds—with ease. And it never overheats! What's more, the rigid tip and barrel will not bend or break! Here is a service tool that is equally at home on the service bench, in the tool kit, or on an assembly line. You can put it down anywhere, and the tip will not touch the surface—no more burnt tables or floors! This is the best all-around soldering tool ever devised.

Compare these features: • **Automatic temperature regulation** • **Will not overheat or burn tip** • **Solid copper tip carries no current—lasts and lasts** • **Lightweight—only 12 oz.** • **Instant heat—fast cooling** • **Delivers heat equivalent to 100 watt soldering guns** • **Heavy copper tip quickly heats large masses** • ***Tip mounted in*** **rigid barrel—won't bend or break** • **¼" tip; 7" long —long reach—clear view** • **Built-in spotlight**

15, WN4QIT 15, K4IIP 14, WA4HQW 13, K4NOV 13, W4MK 10, WA4GHA 8, W4JUJ 7, W4WBC 4, K4AET 3, W4KX 3, W4OWV 2, W4PRO 2, K4BAV 1, K4YZT 1. (Feb.) WA4FCS 150, WA4HQW 42, K4IKF 11.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RM: K8HID. PAM: K8EPI. West Virginia c.w., a.m., s.s.b. and PON nets are on 3570, 3890, 3903 and 3905 kc. The Tri-State ARC of Huntington named its monthly newsletter *TARA-GRAM*, with W8DUV as editor. This club will hold its annual picnic at Camden Park, Huntington, June 7. W8LMF and WA8FIC received A-1 Operator certificates. K8EEJ, new OO is working on RTTY gear. K8KST, Huntington and Cabell County EC, received a nice write-up in the local paper. Congratulations to W8DJP on receiving his amateur Extra Class license. WA8FIC made the BPL, three months in a row. W8AVW, Greenbrier Co. EC, reports the Emergency Net is active on 28.8 Mc. WA8DGE comes through with a record-breaking traffic report and another BPL. K8EPI reports WVN (phone) handled 67 messages in 22 sessions. WA8CRW reports WVN (s.s.b.) in 14 sessions handled 11 messages. K8KST reports excellent results from a 75-hour alert during the Ohio River floods. W8IRN, Kanawha EC, now has 33 full members, 12 supporting, 12 mobile units and emergency power supplies. 144-Mc. activity continues to increase; watch for state stations at 9 P.M. *nightly*. The State Radio Council will present an award to the club winning Field Day this year. Remember the West Virginia State Radio Convention, Jackson's Mill, July 4 and 5. Traffic: WA8DGE 341, WA8FIC 258, W8CKX 26, K8CHW 15, K8ELH 14, W8HZA 12, K8MYU 8, W8DUV 6, K8KST 4, W8JM 3, W8AVW 2.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—On the evening of Mar. 19, at about 2010-2020 MST near the end of the Columbine Net, the skip was out for the State of Colorado. WØETE/5, Lawton, Okla., was acting net control to aid with relays. WØETE/5 heard a very weak one calling him so he kept working and finally through his perseverance he was able to make out the call of KØLCZ, Hazel, from Ute, Colo., frantically calling him. He never was able to completely copy her Q5, but he was able to perceive that she was in some sort of dire straits; therefore he stuck with her until he got the drift that she could not call out on her telephone but that incoming calls were okay. She finally let it be known that she would like Jim to relay a message to someone in Delta, Colo., or Fruita, Colo. She wanted someone to call a doctor in Nucla, which is just a few miles from her, and the doctor could in turn call her. Jim had WØGDC, in Fruita, make a long distance call to the doctor in Nucla who in turn called Hazel. Hazel was later taken to the hospital by ambulance. It just goes to show that there are a few hams left who will work to pull out a weak signal to see if they can be of any assistance to a fellow ham. Hazel probably would still be sitting there if it were not for people like Jim and Slim. HNN traffic: 569. Traffic: KØZSQ 281, WØHXB 167, KØDCW 158, WØSIN 68, WAØAMA 54, WØENA 40, WØRVG 23, KØQGO 14, WØMYE 2.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, Jr., W7OCX. SEC: W7WKF. W7WKF has accepted the appointment as SEC and at the same time taken the job as State RACES Radio Officer. W7YDW is chairman of the Utah Council of Amateur Radio Clubs, with W7CWK as treasurer. The presidents of the Bountiful, Hill AFB MARS and Ogden Clubs serve as vice-chairmen. W7POU has kept a total of over 70 skeds with hams from all over the country and England. OBS W7ZC is on 7220 kc. s.s.b. daily at 1915Z and 2015Z. K7PRJ put up a 20-meter beam to handle Alaska traffic more efficiently. K7SAS broke into traffic-handling in a big way with a count of 263. BUN traffic: 132. OBS W7LQE changed his Mon. schedule to 3935 kc. at 1745 MST. Traffic: W7LQE 320, K7SAS 263, W7VTJ 70, W7OCX 63, K7PRJ 56, W7QWH 17.

NEW MEXICO—SCM, Newell Frank Greene, K5IQL—SEC: K5QIN. Our director, WØBWJ, and your SCM visited several clubs, Alamogordo, Albuquerque, Los Alamos, Santa Fe and Las Vegas all mustered good turnouts for one or both. Other groups who desire help or information should contact the SCM (see page 6). We need a greater organization of local emergency nets and better liaison with NTS. C.w. men, please contact W5CRF. W5UNK and W5UJF are on 2-meter s.s.b. with high power. W5CYZ is moving down from 145 Mc., and should make more contacts. W5CMK is as good as new after his operation. We have plenty of wallpaper for OES, OPS and other appointees who wish to help put our section on the map. The Alaska and Wichita Falls emergencies swelled traffic totals, but much of it is unreported. How about it, fellows? A Form 1 is easy to

(Continued on page 150)

fill out if you can't originate a message to this station each month. Traffic: W5CRF 224, W5UBW 70, K5IQL 62, K5HTT 12, W5WZK 2.

WYOMING—Acting SCM, Wayne M. Moore, W7CQL—Nets: The Pony Express meets Sun. at 0800 on 3920 kc.; YO, Mon., Wed. and Fri. at 1830 on 3610; AREC, Mon. through Sat. at 1230 on 3920 kc. RM and ORS: K7QYG. OBS: K7TAQ. Note the new daily net which will handle routine traffic as well as practice AREC methods. K7TAQ and W7HH are doing a fine job for the Eyebank Net in Wyoming. W7NMB is back on c.w. again after a long absence from the air waves. The Casper VHF Club is looking for new members and welcomes all interested hams to its meetings. Anyone interested in station appointments, please contact your SCM as there are several appointments available that should be filled to round out the organization structure in the state. Traffic: K7IAY 73, W7DXV 44, W7HEB 43, K7SLM 34, W7YWE 32, KØSAG/7 30 K7ITH 22, W7HH 21, K7VTM 17, K7NQX 12, K7OVD 9, K7TCF 9, K7LOH 8, K7SAR 8, W7AEC 6, W7BHH 6, W7COP 4, W7FLO 4, K7WNF 4, K7HHW 2, W7TZK 2, W7HTL 1, W7ONZ 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: WA4EXA. PAMs: K4BTO, K4NSU and K4WHW. We regret that W4USM had to resign as RM but are sure that WA4EXA will do an FB job. K4BSK is the new AENP liaison capt. WA4GLX is OBS, is on AENT and AENP (eve). K4YUD is now Class I OO. K4ANB has a new boy born Feb. 29. W4-KCQ's grandson was born St. Patrick's Day. The Gulf Coast V.H.F. AREC Net is growing steadily. K4OHZ and WA4IGV will operate from Shelby Co. June 3 and 4. W4RLS and W4PRP had big scores in the ARRL DX contest. March net reports:

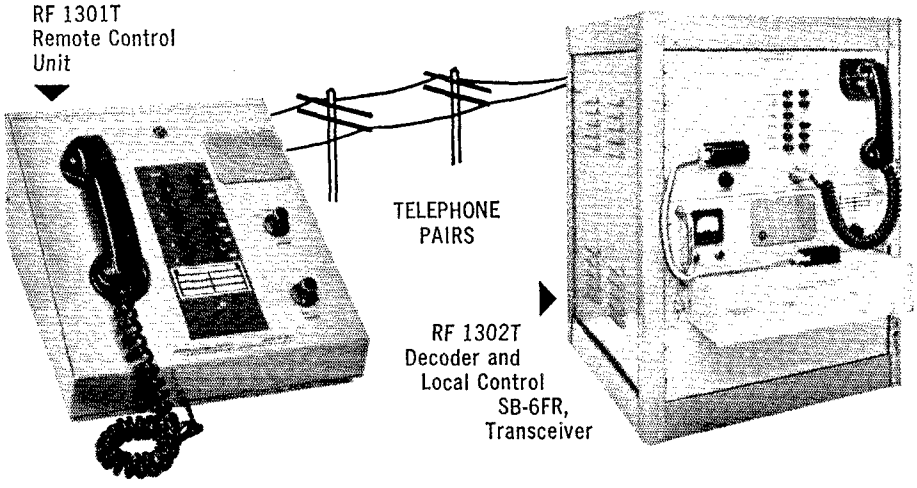
Net	*Freq.*	*Time/Days*	*Sessions*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575	0100 Daily	29	3.4	7.6
AEND	3725	2200 Daily	21	1.3	5.9
AENM	3965	0030 Daily	31	5.4	58.8
AENP	3955	1230 Daily	25	2	15
AENP	3955	0000 Daily	37	2.25	25.6
AENR	50.55	0115 Wed. Fri.	9	.78	23
AENT	3970	2230 Daily	29	2.14	11.28

New equipment: WA4AYX a 2B and an HT-37, WA4-MGI a Seneca, WA4IUV a tower, WA4FGJ an SBE, K4PHL a TA-33, WA4PVK an HT-32 and a 2B, W4-USM a TA-36, WA4PUX a 30L1, K4YMB the S/Line, W4RLS 15- and 6-meter beams, K4AJF a 6-meter rig K4KZM and W4UAR are on 146.250 Mc. nightly at 1900 CST. Traffic: (Mar.) WA4AVM 521, WA4EXA 267, K4-WOP 128, W4YRM 105, W4YNG 103, K4BSK 91, K4-WHW 75, K4KJD 61, W4NML 59, K4AOZ 49, WA4HGN 49, K4NUW 46, K4NSU 28, WA4GLX 19, K4AVM 18, K4GXS 14, WA4AYX 11, K4DSO 8, W4DS 7, K4FZQ 7, K4JDA 6, W4KCQ 6, K4ANB 5, WA4EEC 5, WA4-MGI 4, K4RIL 4, K4UMD 4, W4CIU 3, W4DGH 3, WA4HFE 3, W4YFN 3, K4WWP 2, WA4CWI 1. (Feb.) K4DSO 12, WA4MRQ 3, W4YFN 3.

EASTERN FLORIDA—SCM, Guernsey Curran, W4GJI—SEC: W4IYT. Asst. SEC: K4KRG. PAMs: W4SDR, W4OGX, WA4AZZ. RMs: K4KDN, W4RWM. Well the RTTY net got off to a start on Apr. 5 and is due to be called each Sun. at 1600Z on 3700 kc. Those attending the first meeting were W4GWF, WA4FYV, W4QCE, K4JJZ, W4IET, W4DFU, WA4BMC and WA4-FIJ with the RM, W4RWM, as NCS. The call up by counties is on tape with a 30-second standby. Come on, you typers, and join up! This network has an unlimited future in the disaster service, AREC, c.d. and Red Cross, and both the mode and equipment are improving daily. At this point it is too early to competently correlate the vital aid that Florida amateurs afforded the stricken areas in Alaska. However, it is known that literally thousands of messages were handled and relays were set up with taping stations around the clock for days. W4KIS, K4KDN, WA4BMC, W4YJM, W4NBF were only a few and a vote of our thanks goes to K1-VXU, in Maine, who kept circuits to Florida and Alaska in fluid operation. We in East Florida extend our very best wishes to the Alaskans for a speedy recovery. K4-FQP reports that he is having success on 160 meters. Running only the oscillator on his Globe Chief to an end-fed long wire—Marconi type no doubt—he had QSOs with W3GQF (Baltimore), W8VLO (Toledo), W9PNC (Wabash, Ill.), W3PMV (Pittsburgh), W8-GDQ (Ohio), W8KFY (Michigan), and a rare 6YACZ in Jamaica; he also copies W1AW with *QST* bulletins loud and clear. By the time this is in print we shall have enjoyed the hospitality of the Orlando Club. The Broward Amateur Radio Club, at Ft. Lauderdale, will exchange club papers with other clubs. The Broward *Ham News* is edited by K4LJS. Traffic: (Mar.) W4KIS 1421,

(*Continued on page 152*)

REMOTE CONTROL OF SSB COMMUNICATIONS EQUIPMENT



The system provides 6 pre-set channels between 1.6 Mc and 16 Mc. Power output is 125 watts p.e.p. with selectable upper lower sideband.

A highly reliable system for controlling an SSB Transceiver from a distant operating location. All important transceiver functions can be controlled including Channel Selection, Mode Selection, Power On/Off and Audio Output.

This equipment is intended for use in systems where the operating position must be remote from the transceiver or antenna location. A typical example is when the control location is in a business office in the center of a city with no space for an antenna and the surrounding noise level is high. Another example is an airport control where interfering signals from radars and other electronic equipment make HF reception difficult.

The control link between the Remote Control Unit and the Transceiver can be either standard telephone circuits or multi-conductor cable, depending upon system components specified.

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WA4BMC 1373, WA4IJH 990, K4KDN 403, K4BY 384, W4DFU 375, W4URX 369, W4TUB 348, W4IAD 332, WA4COR 301, WA4LBM 280, W4BKC 258, K4NCN 204, WA4RSQ 183, W4SDR 136, W4AKB 131, K4FQP 103, WA4BAW 100, W4IEI 88, K4LCF 85, W4MIN 85, WA4-JYB 84, W4OGX 82, WA4KDL 80, K4MTP 79, K4COO 70, WA4LHK 70, K4DAX 56, WA4IWO 55, W4IYT 54, K4SJH 51, WA4GDS 50, W4GWF 49, W4GUJ 48, W4-VWL 48, K4CIZ 37, W4TJM 36, K4QAY 35, WA4ESS 34, K4EBE 33, WA4FYV 33, W4SME 30, W4FP 28, K4ENW 23, W4GJI 22, WA4KZF 22, K4ILB 18, WA4-RBM 18, WA1AFP/4 13, W4ZJZ 13, WA4EVQ 11, W4-NOK 9, WA4RXG 4, WA4OBD 2. (Feb.) WA4JRB 147, W4LVV 6, WA4EVQ 4. Correction Feb. WA4RXG 30.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. RM: W4BVE. Panama City: WA4FIJ called the first meeting of the West Fla. RTTY Net. If you have a printer stored away, please let me or FIJ know. K4VFY devoted long hours to traffic-handling in the Alaska disaster. Mike was rated top NCS on RN5 in March. WA4IMC won second place in the Science Fair for a spark-gap transmitter. Fort Walton: W4ZWD, OBS, copies all Bulletins off the air direct from W1AW. W4MTD and K4SMB met recently at an EARS meeting and discovered they had flown on the same crew in the Navy in 1952. WARN Manager W4BVE reports the net was very active during the Alaska quake. Plans to expand coverage of WARN to Central and South America are on the agenda of the IARU Region II Conference in Mexico City. Pensacola: K4SMB has been appointed EC for Escambia County. With 295 hams, he has the biggest job of any EC in the section! Two-meter activity is picking up around town, with K4VND, WA4ILM, K4YVJ, K4RUG and W4UUF active. WA4ECY, Corry Field Station is now on RTTY with a Model 19 and a Navy TU. W4AXP continues to represent the section in LO Parties. Nominations are now open for the *Fla. Skip* Outstanding Amateur Award. Have you sent in yours? Traffic: (Mar.) K4VFY 740, WA4IMC 399, W4BVE 280, WA4-ECY 138, WA4FIJ 120, K4SMB 103, W4ZWD 23. (Feb.) K4VFY 261.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: K4MDC. RM: W4DDY. PAMs: W4FYH, K4-PKK, WA4EHT. The Amateur Society of Teenage Radio Operators is moving to new club rooms and reports PY7BMC, Tony, an exchange student, as a new applicant. K4MDC and W4WKP are working with the Red Cross on communications. WA4LMY and WA4-PSA assisted in keeping WA4GPA on the air handling traffic during the recent Alaskan disaster. K4BAI will summer at Fort Benning with the JAG detachment. WA4MPD has a new power supply and TV antenna trimmed for 6. K4FLR, with a new Communicator and no 6-meter antenna, works out fine with an 80 dipole. The Lanierland Amateur Radio Club's officers are K4-UVD, pres.; WA4NED, program chairman; K4FLR, secy.-treas. The first guests of the year were W4ORI and K4VJM, of the Confederate Signal Corps. K4VGQ is active again after a lapse because of school work. GSN meets daily on 3595 kc. at 0000 and 0300 GMT; Ga. S.S.B. Net, 3975 kc. daily at 0100 GMT; GCEN, 3995 kc. Tue. and Thurs. at 2300 GMT and Sun. at 1300 GMT; the Coosa Valley Emergency Net, 3950 kc. Sun. at 1830 GMT; the Georgia Cracker Mobile Net, 3995 kc. Sun. at 1830 GMT; the 4RDN Net, 7115 kc. daily at 1500 GMT; the Kennehoochie ARC Net, 28,680 kc. daily at 0230 GMT. Traffic: W4NSO 162, K4FRM 44, K4FLR 41, W4RZL 39, WA4BVD 10, K4FUE 4, WA4MPD 3, K4BAI 1, WA4PSA 1.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John McKowen, W6FNE—Asst. SCM: Richard H. Ingham, WA6DJB. SEC: K6-YCX. Asst. SEC: W1KUX. RMs: W6BHG, W6QAE. PAMs: K6PZM, W6ORS, WA6TWS. Traffic was very heavy in March with 13 BPLs. The surprising part of it is that most of the Alaskan Disaster traffic is going to show up in the April totals. SoCal Six has taken the bull by the horns and has started to originate traffic in lieu of receiving from RN6. This top-notch net needs c.w. operators to liaison to RN6 or SCN very badly. Let's get out the v.h.f. gear and give them a hand. The Alaskan Disaster brought AREC and NTS together in this section as ARPSC as a well-oiled machine. There were a few squeaks here and there but ARPSC is now a thing of the present in Los Angeles. The gap between AMCROSS and AREC in Los Angeles is closed now and the future looks very bright for a close relationship. Support your local section nets: So-Cal Six, 0300Z daily 50.4 Mc. and SCN (Southern California Net) 0300Z daily 3600 kc. Those interested in leadership appointments in the AREC should contact K6YCX, our SEC. Traffic: (Mar.) W6GYH 1570, WA6-TWS 986, W6WPF 892, WA6WTK 842, K6IWV 768, K6-

(*Continued on page 154*)

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ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7OIF. RM: K7TNW. Appointments: K7TNW as RM. All stations interested in traffic-handling should check into the following nets: The Copper State meets at 1900 MST Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 0800 MST on 3880 kc.; the Tucson AREC Net Wed. at 1900 MST on 3880 kc.; 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. K7NKC, K7YSE, W7KVU, K7JUE and W7RUX are active on 6-meter s.s.b. Congratulations to K7WTO and K7ZGD on receiving their General Class licenses. All c.w. men are asked to look for the Arizona C.W. Net, which will be reactivated shortly. W7AH continues to put Arizona on the DX bands. All OO, OES, ORS, OPS and OBS appointees are reminded to keep your SCM posted each month on your activities prior to the 5th of the month. This is one of the requirements for continuing to hold a valid certificate. Club secretaries are reminded to keep the SCM informed about club news and elections. If you want the SCM to visit your club, drop him a line. Traffic: K7TBB 163, K7TNW 83. W7FKK 63, K7NHL 37, K7RUR 23. K7KRW 6.

SAN DIEGO—SCM, Don Stansifer, W6LRU—Of special interest to all traffic men in the section is that of all 73 ARRL sections, San Diego handled more traffic, 177,223, during the past year than any other section. This was over 50,000 more than the second highest section. Amateurs in Orange County have formed an Orange County Council of Amateur Radio Clubs, representing six clubs and two public service groups. A new OO, and the only one in Orange County, is K6LJA. ORS W6DGM, of Newport Beach, enjoyed the IEEE show in New York, and recently earned his 30-w.p.m. certificate. The American Radio Club of El Cajon plans Field Day in the Laguna Mountains. The new chief operator at W6TAB is WA6ZNX. A Silent Key is K6OWQ. Active in Imperial County on 7162 and 7186 kc. is WN6IRA, who is willing to make skeds for those needing this rare county. A new OBS in San Diego is K6YRF. Back on 80, 40 and 20 meters is WA6PDE. WA6BRG, ORS San Diego, is now member-at-large on the Pacific Area Staff. W6CCE and WN6IZT were recently married. Your SCM had good meetings recently with the Orange County Club in Santa Ana and the Newport Club. From June 20 until Sept. 1 please address all mail to me at Route 3, Box 47, Bishop, Calif. 93514, where I'll be signing WA6VUI. Don't let Field Day this month be your last amateur activity until the fall. Keep active over the summer and keep news and reports coming to me for this column. Traffic: K6BPI 5656, W6EOT 990, K4AKP/6 872, WA6BRG 672, WA6CDD 631, WA6ROF 287, K6IME 149, WA6TBY 77, WA6BDW 36, W6WRJ 15, W6DGM 12.

(*Continued on page 156*)

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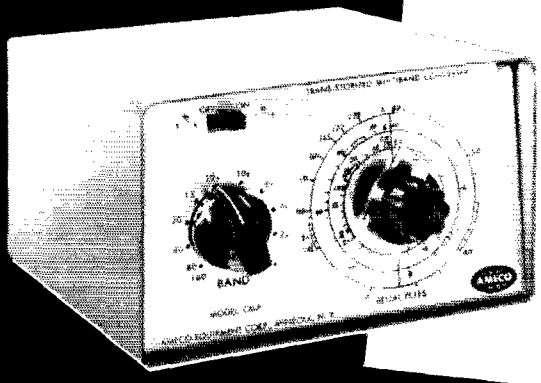

Model CMA covers all frequencies from 1.7 to 54 Mc. and 108 to 174 Mc. The output can be fed to a standard broadcast set or any communications receiver. The CMA has better than 1 microvolt sensitivity. It can be operated from an internal battery or from the 12 volt car battery. Model CMA has an RF stage, tuned by a panel dial for best image and spurious rejection. Up to 10 crystals can be selected by the band-switch. Size — 3¾" x 6" x 6¾". For more detailed information, write for special "Converter Information Sheet".

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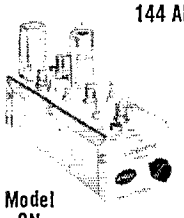

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Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) **$49.95.** Model CN-50K, CN-144K or CN-220K *in kit form, (specify IF.)* **$34.95**

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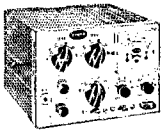

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CB 6W — wired & tested $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc, ... $23.95
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PS-1W — Wired $11.50

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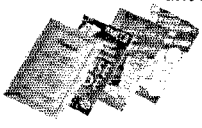

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SANTA BARBARA—SCM, William C. Shelton, K6AAK—SEC: WA6OKN. RM: W7WST/6. WB6DRY and W7WST/6 made the BPL. Both handled many messages from and to Alaska during the emergency. Others reporting Alaskan assistance were K6BUD, W6CQO, KØTPU/6, W6KZO and the SCM. W6KZO was on harbor patrol with the USCG during the high tides on the California coast. WB6GZE has a new jr. operator, a boy. WB6BII now is mobile with an SR-150. WA6OKN attended the S.S.B. Convention in W2. The Point Mugu 2-Meter Net was alerted during the tidal wave emergency and functioned very well. I had another operation on my left eye and am progressing very well. All section members get your nominations in for SCM as my term expires in August. I do not plan to run again because of my eye problem and would appreciate someone taking over. Traffic: WB6DRY 810, W7WST/6 741, K6BUD 67, W6CQO 30 K6AAK 27.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. PAM: W5BOO. RM: W5LR. Your SCM attended the Lawton Okla. Hamfest Mar. 8 and was surprised at the number of Texas hams present. If you ever have the opportunity to go to one of the Oklahoma get-togethers don't miss it. While in Lawton I met with WA5CMC, Wichita Falls area EC, and other officers of the Red River ARC and discussed their progress in civil defense and emergency operation training. The value of this training was proven in the recent cyclone disaster that hit the Wichita Falls area. All of the mobiles were called into service to furnish communication from the stricken area before the local telephone service could be restored. Moral: It is better to be prepared and never need it than it is to need preparedness and not have it. The Midland Hamfest was, as usual, a huge success with 450 in attendance. Mr. Howard, FCC Inspector in Charge, was present and was very busy giving examinations. I met with the Brownwood ARC members and went over their plans for the coming West Gulf Convention June 12-14. Herb Hoover, Pres., and John Huntoon, Secy. of the League, will be there and it will be an opportunity to meet and talk with them. W5FIR has been in the hospital with a broken leg and other complications. Drop him a card. Traffic: W5UTW 724, W5DTA 678, WA5DQP 226, W5LR 35, W5ETA 2.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil Andrews, W5MFX. SEC: K5DLP. It looks like we had all kinds of excitement when the Alaskan quake hit. W5EHC, who is Chief of FAA Emergency Communications Teams, at once placed W5PAA as the Official FAA Station in official capacity and handled traffic to and from Alaska. The following day W5PAA was placed back into amateur status and W5EUL, the Oklahoma County EC, took over and handled over 3000 welfare messages. W4SKI/5 advised me that he had won first place in the N. Mex. QSO Party for Oklahoma. The Lawton-Ft. Sill Hamfest had a turnout of about 400. Mayor Gilley gave a welcome address and expressed his desire that we have the West Gulf Convention in Lawton next year. We were honored by having W5QKF, our West Gulf Division Director, W5UYQ, the Vice-Director and W5BNC, Northern Texas SCM, present. The Oklahoma officials surprised the Lawton-Ft. Sill Club by presenting them with the new fixtures for their "inside plumbing" at the new club house. Traffic: W5PPE 1127, K5VOZ 1056, K5KTW 734 .K5JBZ 671, W5QMJ 463, K5TEY 363, WA5CPX/5 328, K5DLP 277, W5EUL 162, W5MFX 103, K5CAY 96, K5OCX 92, K5LZF 90, W5DRZ 85, W5JXM 69, W5UYQ 34, W5EHC 27, K5CBA 16, K5YAQ 16, W5WDD 14, W5GMJ 12, K5JOA 11, K5MTC 8, W5PML 8, W5MQO 6, WA5FLV 5, W5FU 5, W5PNG 5.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB.—Asst. SCM: A.E.W. Street, VE1EK. New appointments include VE1AIH and VE1AHH as ECs. VE1BL has a new NCX-3. VE1BC and VE1OW (XYL) have been vacationing in the West Indies. VELs GC, OM and ZR are active on 147.06 Mc. from the Halifax area. VE1WL is active after recovering from a serious illness. VE1NP and VE1NO have returned to 75 meters after a long absence. Ex-VE1RR is now VE3EZY. Coming events include Field Day, June 27-28 (don't forget there is a 10-point deduction for errors in your Field Day message this year), Nova Scotia Campfest, July 4 (location not known at this time) and, of course, the Convention at Charlottetown, Labor Day week end, Sept. 5-7. Does your transmitter use a 160 meter v.f.o.?; If so, better check the third harmonic when working on 75 meters Congratulations to VE1AGN on his Advanced Class license and to VE1ANA on getting his call. VE1s NV and AKC have transistorized converters for mobile operation. VE1WI and VE1PS are on 2 meters from Cape

(*Continued on page 158*)

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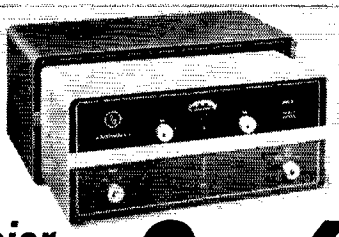

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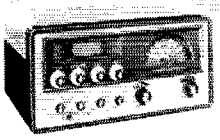

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Breton. Ex-VO1FF is now VE3EFW. Traffic: (Mar.) VE1RT 58, VE1DB 17, VE1AEB 11, VE1OM 10. (Feb.) VE1RT 79.

ONTARIO—SCM, Richard W. Roberts, VE3NG—Many of our operators were busy with disaster traffic during the Alaska earthquake. VE3HWD is now in the Sudbury area. VE3APG is back after seven years. VE3-DBJ has gone high power. The Ontario DX Assn. runs a fine bulletin. For information write P.O. Box 212E, Toronto 4. VE3DMZ of Ft. Williams, is a Silent Key. VE3BVC is in XE1-Land for a short visit. After ten years and four committees we're still waiting for call letter plates. The Skywide ARC held a very successful Ladies' Night. VE3EXF was voted the club "ham of the year." Cooksville ARC has the call VE3CCR. VE3DXM reports that the Belleville & Kingston Two-Meter Net is very healthy. VE3NF was on TV recently on station CKWS, Channel II in Kingston. The topic was Ham Radio of course. VE3CIX was in W4-Land operating on 2. Hamilton ARC officers are VE3EUM, pres.; VE3CIB, vice-pres.; Bob Wilson, secy.-treas. Mail for the club should be sent to P.O. Box 253, Hamilton. The club's Annual Banquet will be held May 27. Vandals ruined VE3DVS's mobile while it was parked in his driveway. They broke into his car and smashed his Apache to pieces. VE3CNB has worked 75 countries and has 70 confirmed. VE3BJK is now s.s.b., as is VE3FJD in the Windsor area. Windsor and London are very active with their 2-meter nets. To those holding appointments issued by the SCM or SEC, check to see if they are valid. *All* certificates *must* be endorsed every twelve months. The London gang, under VE3CFR, is busy with plans for the ARRL Ontario Division Convention to be held in London in October. VE3CYR received his A-1 Operator certificate. Traffic: VE3CYR 158, VE3CFR 147, VE3NG 133, VE3AWE 90, VE3BUR 76, VE3DRF 73, VE3EHI, 54, VE3ETM 48, VE3BTE 44, VE3DPO 33, VE3DVE 33, VE3BLZ 31, VE3EZY 26, VE3TT 22. VE3BII 21, VE3-DUU 21, VE3AKQ 19, VE3LK 15, VE3WW 14, VE3AUU 11, VE3DH 9, VE3FEH 8, VE3VD 4.

QUEBEC—SCM, C. W. Skarstedt. VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. Our new QSL Mgr. is VE2NV, a prominent DX man. The AREC organization is active. We have a new SEC, VE2AUU. Present ECs are: VE2s AAH, ALF, AYA, BBH, BCK, BEO, BFZ, BOC, EC, HV, IS and SC. If you are interested please tune to 3755 kc. Sun. at 11 A.M. Channel 2. 26,975 kc. also is very active with some 35 stations reporting. VE2BK, VE2BB and VE2VV attended the S.S.B. Dinner at N.Y.C. VE2BB reports into the Maritime WX Net daily at 6 A.M. VE2DR installed a new TR-44 rotor. VE2BG is recuperating after a fall off a ladder. VE2WT steals his father, VE2WU, at Joliette. VE2AI engineered a new type 2-meter antenna which is proving very effective. VE2TT is one of the outstanding 2-meter men and capable of checking frequency to a cycle. VE2AGI was elected pres. of the St. Maurice Valley Amateur Radio Assn. VE2AIM is the leading light and control station of the enlarged 2-meter net in this region; active daily at 1931 EST on 144.138 Mc. More and more c.w. stations are investigating the pleasures of proper traffic work on the OQN, daily on 3535 kc. at 7 P.M. Merci à Hank, W8CHT, pour ses compliments sur notre colonne en francais. VE2AWK de noveau actif après une absence de plus d'un an. VE2BKI aimerait une schédule avec Montreal sur 2 mètres. Cette bande semble perde de la popularité. Ne manquez pas les bulletins de VE2BEZ en c.w. sur 80 m. Le noveau botin de RAQI devrait être prêt d'ici deux semaines. Traffic: VE2ALH 170, VE2DR 135, VE2OJ 94, VE2BMS 75, VE2JJ 47, VE2EC 30, VE2AUU 28, VE2-BRT 22, VE2CP 19, VE2HV 14, VE2AZF 10, VE2JZ 4, VE2SC 3, VE2ART 2, VE2AEM 2, VE2ALF 2, VE2BBH 2 VE2BHN 2. VE2AYC 1.

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: VE6-HM, VE6NX, VE6PL. OBSs: VE6HM, VE6AKV. ORSs: VE6BR. OESs: VE6DB, VE6HO, VE6AKV. Our PAM reports that by the time you receive this issue APN will be on summer sked at 2100 MST. Our SEC reports that Edmonton finally got started with the AREC. We have two who never fail to send their monthly reports, VE6-HM and VE6FK. VE6RP and VE6HM were on TV for their part in the Alaska earthquake on a program called "Eye Witness News," also EMO took some pictures of the Edmonton gang for the bulletin *Survival*. The Alberta boys are talking of forming a provincial body. I hope they do. Maybe in that way we can get in better reports than we have in the past. Fellows, send your certificates for endorsement. News from VE8-Land is lacking these days. Who has heard anything of the Norwegian Expedition at the north pole? Traffic: VE6HM 229, VE6TG 21, VE6FK 11, VE6PZ 10, VE6UH 7, VE6SS 5, VE6AHV 4, VE6SU 4, VE6PV 2, VE6WN 2, VE6ABS 1, VE6OR 1.

(Continued on page 160)

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HI 6 mtr	149
HB 2 mtr	139
IV 6 mtr	199
350	229
SUPER 6 conv	22
G66B	72
G66B 3 way sup	29
G77A & 2 way	139
CLEGG 99er	89
INTERCEPTOR	329
DX100B	147
TX1 Apache	159
DX60	59
DX40	44
GR91	37
MR1 receiver	69
MT1 xmtr	47
X6 6mtr conv	24
HG10 vfo	34
VF1 vfo	18
ACL ant tuner	19
HD11 q mult	14
QF1 q mult	9
HEATH SIG tr	17
VTA vtvm	24
HEATH 6er	39
KNIGHT R100	59
B&W 5100 xmtr	119
P&H 6-150	159
PALCO 65 xmtr	57
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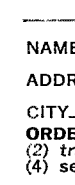

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BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—VE7QQ, at Terrace, will be QRT until the end of summer house-building. VE7AMW spent the Easter holidays wiring 110 into the summer cottage for summer humming. The Vancouver Club had a 2-meter transceiver and the winner was an SWL, who claims he will now work for his ticket. VE7AUF is slowly gaining her health. VE7DH is looking for "Rock Hounds." Any takers? VE7BBB now has the Atom Smasher and Limestones awards. The Royal City ARA officers are VE7-AAA, pres.; VE7BHE, vice-pres.; VE7NE, secy. VE7s BBA, AHM, BNO, BOS, DE, BOB and BGJ are all on 144.9-145.3 Mc. a.m. at 2100 PST nightly looking for other a.m. stations. Orchard City ARC officers are VE7-ANQ, pres.; VE7BOG, vice-pres.; VE7BMB, secy. It is reported that VE7AC is now running a DX-100B. VE7 LP has his tower up again and is active on 14-Mc. c.w. VE7BLA is the new EC for Fraser Valley. Please support your ECs. The Nanaimo Club reports another new member, VE7BDR. VE7GR still is working on his amateur TV transmitter. EC VE7AMW reports on the disaster in the Albernies. Two meters is of no value in emergencies unless some base station iwll turn its beams toward Vancouver Island. It is reported that a 2-meter mobile was in the Albernies and could hear Vancouver but none would give a listen for him. The BCARA still has QSL cards for those who will mail postage to VE7-ALE. Traffic: VE7BJV 537, VE7AGF 428, VE7AKE 94, VE7BHH 55, VE7QQ 45, VE7BHW 7, VE7AMW 2.

MANITOBA—SCM, M. S. Watson, VE4JY—During the earthquake crisis in Alaska our SEC, VE4OL, was very active in arranging the passing of traffic. VE4SR was in direct contact with VE8HA in Anchorage and traffic was handled by VE4UM, VE4MP, VE4EG, VE4-JW, VE3EDK and others assisting. The Brandon ARC held a successful banquet Apr. 3. The MARC is in charge of the Manitoba Hamfest and all committees are hard at work for the big day on Sept. 5 and 6. By the time this report appears a new SCM will be named for Manitoba and your present SCM will bow out after serving for the past 4 years. May my successor have the full cooperation of the Manitoba amateurs. Traffic: VE4JY 27, VE4UM 24, VE4QJ 15, VE4EG 10, VE4QD 10, VE4KN 8, VE4PA 4, VE4SW 4, VE4AN 2, VE4HF 2, VE4JA 2, VE4DN 1, VE4NW 1.

SASKATCHEWAN—SCM, Mel Mills, VE5QC—Last call for the 1964 Saskatchewan Hamfest to be held July 3, 4, 5 in Queen City, Regina, "where ham is king." This hamfest is to help celebrate "50 years of organized amateur radio." Don't forget the Thompson Lake Roundup July 12. Join the South East gang in a real relaxed get-together. VE5TQ and family have left for Winnipeg. The Saskatoon bunch will miss you, Tom and Kathy. VE5-LM's new Johnson 500 is burning a real swath in the bands. You are trading oftener than Neufeld and Mills, Leo. VE5HQ has a completely new mobile including the car! Don't forget the ARRL meeting at the hamfest. VE5CU our SEC, will take AREC applications and explain the organization to one and all. See you in Regina. Traffic: VE5HP 83, VE5LM 69, VE5NX 35, VE5HQ 12, VE5EO 8, VE5JK 8, VE5JU 3, VE5PJ 2, VE5SP 2, VE5-VD 2, VE5CB 1.

Correspondence from Members

(Continued from page 103)

So, maybe the time has come to call a halt, and like at the end of WW II, start over fresh. This is the 50th year of ARRL so possibly starting off the 51st year would be a good time to renew the interest of many hams in the thrills of chasing those rare ones. No doubt a hue and cry will go up from many DXers at such a suggestion but possibly ARRL could come up with a plan that is equitable to all.

Or am I alone in these thoughts? — *W1FH*

AGE LIMIT

¶ If instructor Miller's "age limit licensing" (*QST*, p. 78, March, 1964) had been in effect in 1937, I suspect that I might not now be a professor in electrical engineering. My entry into ham radio at the tender age of fifteen, encouraged by an amateur who gave no thought to "age limit licenses" turned out to be also my entry into a stimulating and exciting profession. Recently I have returned

(Continued on page 162)

to the hobby, and find one of its most pleasurable aspects to be my contacts with the younger hams. I have found them to be courteous, efficient and responsible operators. These young men represent the new blood which is so vital to our hobby; as such, they are not only desirable but necessary. — *W9HAO*

I read WA4ITK's article "You're Only a Novice Once" in February, 1964, *QST* with a nice feeling of satisfaction, that amid all the complaints and bickering that goes on there are still some who recognize the brotherhood and companionship that is available to all through amateur radio. But I must say, it was short-lived when I read in the next issue of *QST* a letter suggesting the denial of license privileges to those under 18.

Recently I was honored by acceptance to membership in the Old Old Timers Club and, in spite of the forty years since my first radio contact, I remember very well that it all started when I was a Boy Scout (under 18) and that my first radio contacts were on equipment (?) developed from the *Boy Scout Handbook:* my sole source of information.

In looking back over the roster of the OOTC I find that most of its membership date their interest in radio to a time before they had reached the mature age of 18 years and a goodly part of them followed this interest into adult life and have, throughout the years, contributed much to the radio industry.

Personally, I think the young people should be encouraged to start amateur radio early and work at becoming proficient operators and qualified technicians. To me it is a major responsibility of every licensee to help others as was done by WA4ITK's 12-year-old Novice contact with his "U have a nice fist, OM, keep up gud wk." — *K4SBV*

I was dismayed to learn that a college professor could hold such an opinion about "children" in amateur radio. May I remind him of one of the primary purposes of the amateur service in the eyes of the FCC: "Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts." The basic fundamentals of theory required to pass the license examination do little to make an adult an "electronics expert," but a youngster who gets a license has a great encouragement for studying to become an electronics technician or expert.

Since our frequency bands were not created for the sole purpose of allowing adults to converse without interference from "childish chatter," I believe that youngsters have a very justifiable place in amateur radio. — *K7OLZ*

Complete Mobile Package

(Continued from page 15)

operated by either the p.t.t. switch at the microphone (via J_4) when S_3 is in the TRANSMIT position, or by S_{3B} when S_3 is in the TUNE position.

The +12-volt connection to the transmitter heaters is made via Pin 4 on J_5, and Pin 4 on P_3. The circuit back to ground is completed through Pin 3 on J_5, Pin 3 on P_3, Pin 6 on P_3, Pin 6 on J_5 and S_{2A} when S_2 is in the ON position.

The +12-volt connection to the converter plates is made via Pin 3 on J_7, Pin 3 on P_5, Pin

(Continued on page 164)

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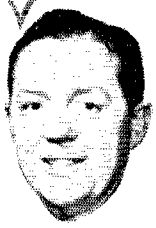

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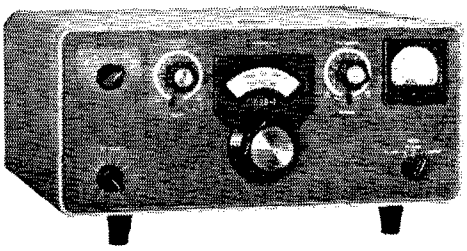

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1 on P_4, Pin 1 on J_1, K_{1B} when S_3 is in the RECEIVE position (or S_{3A} when S_3 is in the TUNE position), Pin 3 on J_6 and Pin 3 on P_4. The circuit is completed back to ground via Pin 4 on J_7 and Pin 4 on P_5.

The +12-volt connection to the converter heaters is made via S_8 (in the ON position), Pin 2 on J_7, and Pin 2 on P_5. The circuit is completed back to ground via Pin 4 on J_7 and Pin 4 on P_5.

I_2 lights when the transmitter heaters are turned on by S_2, and I_3 lights when the converter heaters are turned on by S_8.

To summarize the control system for battery operation, S_2 turns on the transmitter heaters (I_2 lights). S_8 turns on the converter heaters (I_3 lights). With S_3 in the TRANSMIT position, plate power is applied to all stages of the transmitter, and plate power is removed from the converter, when the change-over relay K_1 is energized by closing the p.t.t. switch. When S_3 is in the TUNE position, plate power is applied to the converter and the relay operates, but only the v.f.o. receives plate power. This combination makes it possible to set the v.f.o. to frequency while listening on the converter.

With S_4 in the PHONE position, screen voltage is applied to the modulator when power is applied to the transmitter. With S_4 in the c.w. position, the modulator screen is open and the secondary of the modulation transformer is shorted. On transmit, the v.f.o. runs continuously, and the other stages are keyed at J_3. In c.w. operation, S_3 may be used as the stand-by switch. In the TUNE position, S_3 operates the relay, applying power to the v.f.o., and to the converter for monitoring. The transmitter is then keyed by grounding the cathodes of the driver and final stages at J_3. When S_3 is thrown to the TRANSMIT position, the relay circuit is opened. The cathodes of the last two stages are grounded, but the transmitter does not operate because the relay has removed plate voltage.

Fig. 3B shows connections to P_3 for operating the transmitter (only) from an a.c. supply. The strap from Pin 3 to Pin 4 on P_3 connects the transmitter heaters in parallel, and one side of the 6.3-volt a.c. heater supply is fed in at this point. The heater circuit is completed back to ground via Pin 1 on J_5, Pin 1 on P_3, Pin 6 on P_3, Pin 6 on J_5 and S_{2A}. A 12-volt d.c. supply must be provided for the relay, and this is fed in at Pins 5 and 9 on P_3 to Pins 5 and 9 on J_5. Other connections are obvious. QST

(Part II, covering construction and adjustment, will appear in an early issue.)

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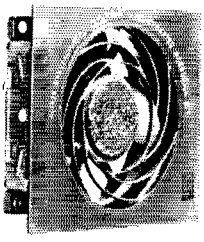
Resistance: 50 ohms, non-inductive. **SWR:** Less than 1.5 at 54 Mc. **Dissipation:** 250 watts (up to 5 minutes); 150 watts continuous. **Connector:** Standard coax (SO-239 type). **Size:** Approximately 13½" long by 1" diameter. **Mounting:** Any convenient location. **Caution:** Due to heating when loaded at high power, the unit should be mounted in freely circulating air.



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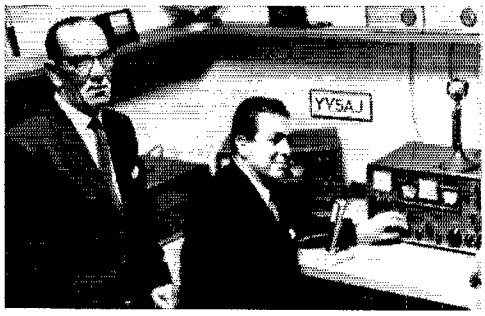
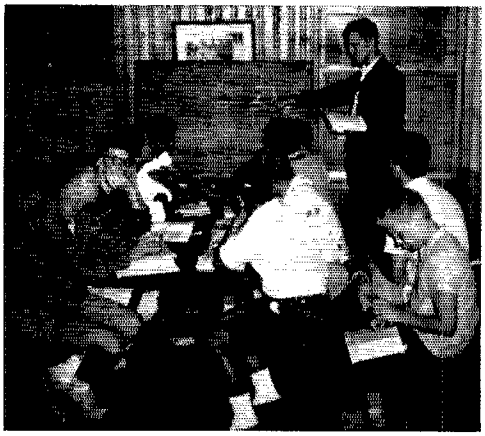


Luis Rotundo, YV5AEC, President of the Radio Club of Venezuela, with Stuart Meyers, W2GHK (seated), President of Hammarlund and Godfather of the Hammarlund DXpedition of the Month, at the operating position of club station YV5AJ in Caracas.



In the last five years, Camp Albert Butler (sponsored by the Gilvin Roth YMCA of Elkin, N. C., and located 20 miles from Elkin in the Blue Ridge Mountains) has graduated more than 200 licensed hams from classes like this. Instructor David Gilliam here explains a plate tank circuit to would-be hams. Student-campers range from housewife to granddad, from grammar school student to college professor. It's not all electronics—there are the usual other camp activities. Inquiries should go to the Roth YMCA, Elkin, N. C.

Happenings of the Month

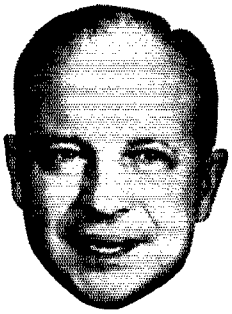
(Continued from page 67)

Jr., Hudson Division Vice-Director Harry Dannals, and Assistant Director Tom McCann were also present.

On motion of Mr. Kahn, affiliation was unanimously GRANTED to the following socities:

Arlington High School Amateur Radio Club
Poughkeepsie, New York

(Continued on page 168)



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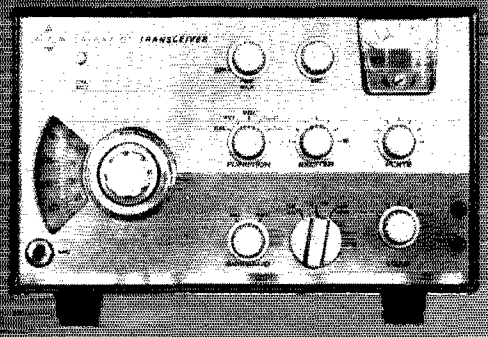

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Franklin Amateur Radio Organization Russellville, Alabama
Kingsville Radio Club Kingsville, Texas
McClellan Amateur Radio Society McClellan AFB, California
Missouri Valley Amateur Radio Club, Inc. St. Joseph, Missouri
Townsend Amateur Radio Society Townsend, Massachusetts
Ursuline Amateur Radio Club (H. S.) Youngstown, Ohio
Walhalla High School Amateur Radio Club Walhalla, No. Dakota
Walt Whitman High School Amateur Radio Club Bethesda, Maryland

In ratification of earlier action by mail, on motion of Mr. Eaton, unanimous approval was GRANTED for the holding of a Rocky Mountain Division Convention in Estes Park, Colorado, July 11–12, 1964; a Maritime Province Convention at Charlottetown, P.E.I., September 5–6, 1964; a Pacific Division Convention at Sacramento, California, September 25–27, 1964; and an Ontario Province Convention in London, October 16–17, 1964.

On motion of Mr. Groves, after considerable discussion on the unfortunate conflict in dates with the aforementioned Ontario convention, approval was GRANTED for the holding of a Michigan State Convention in Grand Rapids October 17, 1964.

On motion of Mr. Denniston, unanimously VOTED that the League supports IARU proposals 105, 106 and 107, relating to admission into membership of the Jamaica Amateur Radio Association, the Radio Amateur Association of Greece, and the Radio Society of Ceylon.

The Committee next discussed plans for the forthcoming amateur meeting in Mexico City. On motion of Mr. Groves, unanimously VOTED that Noel B. Eaton and Robert W. Denniston are designated the official ARRL delegates of Canada and the United States, respectively, to the Pan-American Congress of Radio Amateurs in Mexico City April 15–18, 1964, with authority to affiliate the League with the proposed Region II Division of IARU and to enter into discussions in support of the operation of such a Region II division.

The Committee was in recess for luncheon from 12:20 to 12:45 P.M.

During the course of the afternoon, the Committee discussed at length, but without formal action, refurbishing of the Maxim Memorial Station, W1AW; license fees; the World's Fair amateur station, K2US; progress of the building fund program; RM-499; the Seaman (K3IOP) case; and non-amateur operation in the amateur bands.

There being no further business, the Committee adjourned at 6:35 P.M.

JOHN HUNTOON
Secretary

How's DX?

(Continued from page 94)

. . . . . Though W6AM parted with 70 of his 95 acres he still retains eight rhombics on a 1200-foot hill overlooking the Pacific . . . . . Despite punk propagation conditions WN2IRX has managed 21 countries and 43 states on 7 and 21 Mc. with a completely homespun outfit. Good to see

(Continued on page 170)

BULLS EYE BUYS AT ARROW

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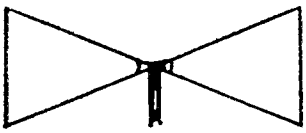
"WONDER BAR" 10 METER ANTENNA



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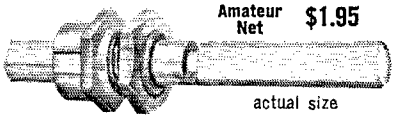
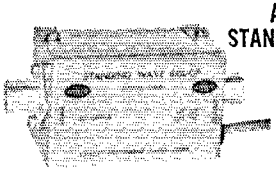


actual size

AMECO MODEL BIU BRIDGE INDICATOR UNIT

Model BIU, when used with the Ameco SWB or other make of bridge, will accurately read SWR, percentage power and percentage voltage (3 scales). Contains a sensitive 100 microampere 2 1/8" D'Arsonval meter. Unique switching circuit provides for reading either one of 2 bridges. Charcoal grey cabinet with satin copper panel, 2 3/4" x 5" x 3". Wired and tested. **$15.95**



AMECO MODEL SWB STANDING WAVE BRIDGE

High quality bridge accurately reads SWR's from 1.8 to 225 mc. (including ham, CB and commercial bands). Can handle up to 1 KW. Uses inductive coupling and can be left in the line continuously without insertion loss. Contains two SO-239 VHF connectors. Satin copper case, 1 3/8" x 2 1/4" x 4 1/2". Wired and tested. **$9.95**

PRECISION BALL DRIVE DIAL

Another superb product of Jackson Bros. of England. 4" dia. dial with 6:1 ball drive ratio. Fits standard 1/4" shaft. For that velvet touch...
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FAMOUS JENSEN 8" P.M. SPEAKER

Model C-855 professional series, dual cone, ceramic-magnet, 12 watt handling capacity. Ideal for remote ham and hi fi use. Shipping weight, 4 lbs.

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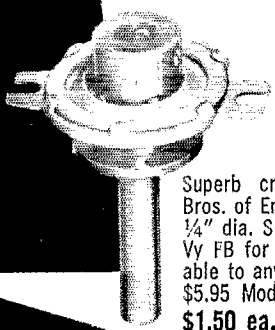

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Same as used in W2EWL SSB Rig—March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x 3/4" w. x 3/4" d. New and fully shielded.

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some of the newcomers rolling their own . . . . . Local lore via club newshawks: Ws 9JJF and ØMILY are said to be readying for that rare road once more. . . . DXdom lost an ace QRP specialist when W1AZW passed on in March. A member of NEDXA well versed in most phases of amateur radio, Prent captured 180 countries while running less than 40 watts. . . . British Columbia DX Club, VE7VC and associates, plan a gala program for the Pacific Northwest DX Convention on the first two days of August. . . . A heavy workload hampers W6ITH's DX doings as FS7RT and VP9RT. . . . Puerto Rico Amateur Radio Club resumes publication of *Ground Wave* after a seven-year layoff. PRARC brass includes KP4s BBN pres., TL v.p., BAJ secy., AQK treas. and DV publication editor. QST

Rocky Mountian Division Convention

(Continued from page 10)

the convention: WØJR on 75 and KØKZJ/Ø on 6 and 10 meters. Accommodations are available in a wide variety of hotels and motels in the area, ranging from $5 per couple up. Requests for reservations may be made directly with hotels or through the Estes Park Chamber of Commerce. Meals will be included at the Stanley Hotel (American Plan) in a $17.00 per person package (minimum two persons per room). Convention meals are as follows: Saturday luncheon $2.80, Saturday banquet $4.50, Sunday breakfast $1.50, and Sunday dinner $3.00; price includes tax and gratuity. Registration is $3.00 until July 1: $4.00 at the door. Checks should be made payable to the Colorado Convention Committee, and should be sent to Chester R. Lewis, KØKZJ, 1861 S. Shoshone St., Denver, Colorado 80223.

Your Emergency Obligation

(Continued from page 54)

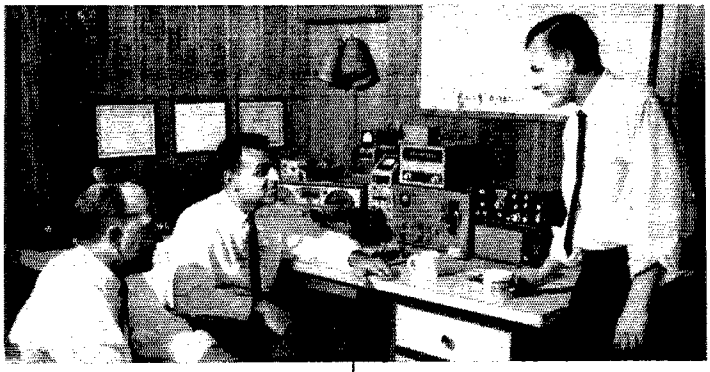
tracting the replacement of the equipment is not the company that installed it originally, the prices will be especially low, because selling the used equipment to amateurs is a good way to get it off the market. Sometimes such equipment is sold for the cost of the paperwork.

No local emergency plans should conflict with any national or state emergency plans, and all local plans should conform with the AREC and RACES programs.

A station is only as good as the man who operates it. It is the responsibility and obligation of every active amateur to know the emergency operation procedures and frequencies that are set forth in *Emergency Communications, Operating an Amateur Radio Station*, and other booklets published by the ARRL, as well as in the *Handbook* and *QST*. It is also the duty of every club to provide a local emergency program that is inte-

(Continued on page 172)

FIELD ENGINEERING WITH A FUTURE



You're looking at George Lucas, W1ZYS, "Pops" Karentz, W1YLB and Ray Churchill, W1VBI, enjoying an infrequent eyeball QSO at "Pops" Millis, Mass., QTH. It is unusual for these three people to get together in the same ham shack — more often all three are on far-ranging domestic or foreign assignments supervising Advanced Capability Radar installations for our armed forces.

George Lucas, W1ZYS, is currently Raytheon's resident field engineer at Boeing, Wichita, Kansas. He has advised and instructed on new ACR alignment techniques at many major Air Force bases in the U.S.

Ray Churchill, W1VBI, specializes in high speed bombing radar aboard B-52's. He may be at Loring AFB, Maine one day, Edwards AFB, California the next.

Pops is the Field Project Supervisor of Air Force Programs for Raytheon's Electronic Services Operation. Pops served in a wide range of field engineering assignments prior to his promotion to Project Supervisor and is currently responsible for field programs requiring the services of a large group of field engineers. George Lucas and Ray Churchill are members of Pops' highly capable and fast moving field team.

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grated with the RACES and AREC programs, and to train and test its members in the operation of that program.

While it may not be possible for an individual operator or club to provide all of the equipment described here, emergency preparedness should be an important consideration in the station of any active amateur, and should have priority on any club's funds and time. It cannot be too strongly emphasized that *an amateur is obligated by the privilege of his license to provide the most useful and helpful communications during an emergency.* QST

QST ARTICLE CONTEST

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

The author of the article selected by *QST*'s staff as the best each month for the remainder of 1964 will receive a $25 U. S. Savings Bond. This month's winning entry, by KØUNK, appears on page 54.

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

IARU News

(Continued from page 65)

Government of American Samoa, Pago Pago
Saudi Arabia: HZ1AB, Det. #5, Hq. USMTM, APO 616, New York, N. Y.
Scotland: via Great Britain
Senegal: Ch. Tenot, 6W8BF, P.O. Box 971, Dakar, or via REF (France)
Sierra Leone: **N. Henwood, 9L1NH, Technical Institute, Freetown**
Singapore: QSL Manager, P.O. Box 777
Somali Republic: Box 397, Mogadiscio
South Africa: S.A.R.L., P.O. Box 3037, Cape Town
Southern Rhodesia: R.S.S.R., Box 2377, Salisbury
Spain: U.R.E., P.O. Box 220, Madrid
St. Vincent: QSL Bureau, P.O. Box 142, St. Vincent, West Indies
Surinam: QSL Manager (PZ1AR), Surinam Amateur Radio League, P.O. Box 240, Paramaribo
Sweden: Sveriges Sandare Amatorer, Enskede 7
Switzerland: U.S.K.A., Buron/LU
Syria: P.O. Box 35, Damascus
Tanganyika: P.O. Box 2387, Dar es Salaam
Trinidad and Tobago: P.O. Box 756, Port of Spain, Trinidad
Uganda: R.S.E.A. QSL Bureau, P.O. Box 3433, Kampala
Uruguay: R.C.U., P.O. Box 37, Montevideo
U.S.S.R.: Central Radio Club, Box 88, Moscow
Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
Venezuela: R.C.V., P.O. Box 2285, Caracas
Virgin Islands: Richard C. Spenceley, KV4AA, 16 Commandant Gade, Charlotte Amalie, St. Thomas
Wake Island: **A. Samuels, P.O. Box 445**
Wales: via Great Britain
Yugoslavia: S.R.J., P.O. Box 48, Belgrade
Zanzibar: via Tanganyika

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Mallory Radio Noise Filter: Removes AC line disturbances. 30 Amps. @ 115 VAC. Easily installed. A **$15.00** value. Only **$3.95.**

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Kenyon Filter Choke: 10 Hy. 500 Ma. 8" x 6" x 6" . . . 31 lbs. Kenyon T-530. Jobber carton. **$14.95.10 Hy./75 Ma. Choke:** 250 Ohms DC. Cat. #14–12. **90¢.**

Cardwell 300 Mmf. Variable Capacitor: 7000 V. spacing. Cardwell type TC-300-US (Mycalex) **$8.75.**

Jennings UCS Vac. Variables: 10 to 300 Mmf. @ 10 KV. **$59.00.**

G.E. 1N537 Top Hat Diode: Tested for 600 to 800 PIV at rated current of 750 Ma. GE rates these diodes for lower PIV, but work FB @ PIV plus. **36¢.**

Corning Glass Trimmer Capacitor: ½ to 5 Mmf. **$2.50** value. Only **20¢.**

Miniature Line Transformer: Pri: 20 K Ohms @ 3 Ma. Sec: 600 Ohms/2 db/45 Mw. **$1.00.**

Westinghouse "Oz-Pak": High-Voltage Silicon Rectifier. Operates as FWCT or as FWB up to 4 KV. D.C. @ 1.6 Amps. Send for further literature or order @ **$69.95.**

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Bliley 500 KC Crystal with Holder: $3.95.

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RCA Plate Xfmr: Pri: 120 Volts @ 60 CPS with taps. Sec: 830 VCT @ 360 Ma. Tapped at 760 VCT @ 360 Ma. Herm.-sld. 5" x 5" x 4". 12 lbs. **$4.50.**

Chicago Dual Filament Xfmr: Pri: 115 V. @ 60 CPS. Sec: (1) — 6.3 VCT @ 8 Amps; Sec: (2) — 6.3 VCT @ 4 Amps Herm. Sld. 4" x 3" x 3". 5 lbs. **$2.50.**

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Collins KWM-2, with Heavy Duty Home Built AC Power Supply. $750.00.

Collins 75S-3A Receiver. $595.00.

Dumont type 322 Dual-Beam Scope. $350.00.

Panoramic Model RCX-1 Radio Adaptor: plus or minus 100 KC of input frequency 450 to 470 KC. Operates from 115 or 230 VAC @ 60 CPS. **$100.00.**

Hallicrafters SP-44 Panoramic Adapter: plus or minus 100 KC. **$100.00.**

Mallory 20,000 Mfd. Filter Capacitor @ 25 V.D.C. (30 VDC Surge). **$2.95.**

Ohmite 5 Ohm 100 Watt Rheostat: $1.30.

Aerovox "Buttertub" Mica Capacitor: .00015 Mfd. @ 5,000 V. **$3.95.**

18 to 36 V.D.C. Voltmeter: Herm. sld. 2¼" diameter. Mfd by Roller-Smith/Simpson, etc. **$3.50.**

Don Bosco "Mosquito": Self-contained, battery-operated signal generator. Size of a large fountain pen. For audio, IF, and RF signal injection. 1 KC thru 30 MCS. Sale price: **$7.95.** Brand new with instructions. Clips into your pocket.

4 Conductor Cable: Ideal for Rotators. ¼" diameter. Color-coded. 4¢ per ft.

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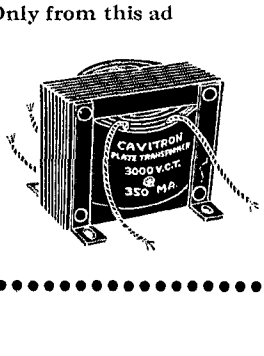
Plate Transformer: Pri: 115 VAC @ 60 CPS. Sec: 3,000 VCT @ 350 Ma. (removed from equipment) .. **$19.50**



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IT is with deep regret that we record the passing of these amateurs:

W1BOP, Thomas C. Prior, Riverside, R. I.
W1BUG, Bertrand G. Scott, Boston, Mass.
W1KAT, James P. Dwyer, Guilford, Conn.
W1LJ, Leo F. Jarret, Lowell, Mass.
K1RVO, Nicholas R. Tavello, Epsom, N. H.
W1TZU, Michael Jaskolka, New Bedford, Mass.
W2CM, Charles C. Stephen, Haddon Heights, N. J.
W2DUH, Joseph L. Decker, Albany, N. Y.
WA2EAQ, Sol M. Sloman, Laurelton, N. Y.
WA2OIV, Herman Peretz, Floral Park, N. Y.
K2QQH, Joseph A. Holahan, East Marion, N. Y.
W2SN, Henry W. Yahnel, Helmetta, N. J.
W2VQ, H. R. Shortman, Jr., Jamaica, N. Y.
W3HKV, Russell H. Byers, Oakmont, Pa.
W3LQQ, Fred H. Biever, Smethport, Pa.
W3YLQ, Ottis V. Adams, Jr., Baltimore, Md.
W4BFW/HO, John S. Williams, Jr., North, Va.
W4DSO, Joseph L. Lowdermilk, Morganton, N. C.
W4EY, Harry J. Hoffman, Temple Terrace, Fla.
W4LZL, Martin P. Carroll, Miami Springs, Fla.
K4WKF, LeRoy Hill, Jr., Norfolk, Va.
K5CRE, Moltke J. Nelson, DeRidder, La.
K5DLH, J. L. Copeland, Jr., Lawton, Okla.
W5GSK, Fred F. Taylor, Buchanan Dam, Tex.
W5PPG, Roy Z. Taylor, Oklahoma City, Okla.
K5PWF, Claude L. Schwartz, Brookshire, Tex.
W6ACE, William H. Westerman, Berkeley, Calif.
WB6GLA, Henry C. Rosene, Whittier, Calif.
WA6KBX, Maurice Kass, Lakewood, Calif.
K6OWQ, Mary P. Schultz, Temple City, Calif.
K6PNF, John B. Gibbs, Petaluma, Calif.
WA6TOL, Josephine B. McBride, Portuguese Bend, Calif.
K6UZR, Wayne C. Stewt, Sr., Fort Bragg, Calif.
W6WG, Wallace C. Thompson, Ventura, Calif.
W7SWM, H. St. Clair Tait, Portland, Ore.
K7VUP, Lavern H. Holman, Grand Ronde, Ore.
K7VXA, Earl L. Frease, Bountiful, Utah
W8ABT, Gordon M. Haddy, Alpena, Mich.
W8ADR, Raymond E. Wheeler, Detroit, Mich.
ex-W8CNP, Foster G. Sheets, Delaware, Ohio
WA8GDJ, Robert McCurdy, Trenton, Mich.
K8TOY, William E. Betzler, Canton, Ohio
K8YAY, Larry J. Childs, Union City, Mich.
W9FTX, John R. Bellew, Chicago, Ill.
K9GNO, Alvin Hartley, Bunker Hill, Ill.
W9OCP, Marvin A. Peterson, Michigan City, Ind.
W9UB, Herbert E. Harrison, South Bend, Ind.
WØRWF, Cletus E. Bellinger, Minneapolis, Minn.
WØSRX, Myron E. Lowrey, Yankton, S. D.
KH6EU, Charles L. Shannon, Kaneohe, Oahu, Hawaii
KH6EZ, Ira Mercer, Honolulu, Hawaii

Strays

"A Complete Two-Band Station for the V.H.F. Beginner" — a reprint of four articles that appeared in July, August, September, and October, 1961 *QST's* — is still available for 50¢ (no stamps, please) from the ARRL, 225 Main Street, Newington Connecticut 06111.

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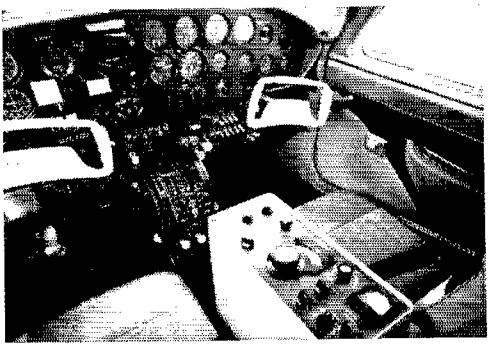

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Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

Ship Me: _____

I enclose $_____ and will pay balance

☐ C.O.D. ☐ 1 Year ☐ 2 Years ☐ 3 Years
(10% deposit)

If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.


EVEN IF YOU'RE NOT ORDERING TODAY, SEND ABOVE INFORMATION FOR ATTRACTIVE CREDIT CARD

NAME _____

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CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

W1, K1, WA1 — G. L. DeGrenier, W1GKK, 109 Gallup St., North Adams, Mass. 01247.
W2, K2, WA2, WB2 — North Jersey DX Ass'n, P.O. Box 303, Bradley Beach, N. J. 07720.
W3, K3, WA3 — Jesse Bieberman, W3KT, P.O. Box 204, Chalfont, Pa. 18914.
W4, K4, WA4 — Thomas M. Moss, W4HYW, Box 20644, Municipal Airport Branch, Atlanta, Ga. 30320.
W5, K5, WA5 — H. L. Parrish Jr., W5PSB, P.O. Box 9915, El Paso, Texas 79989.
W6, K6, WA6, WB6 — San Diego DX Club, Box 6029 San Diego, Calif. 92106.
W7, K7, WA7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon 97301.
W8, K8, WA8 — Walter E. Musgrave, W8NGW, 1245 E. 187th St., Cleveland, Ohio 44110.
W9, K9, WA9 — Ray P. Birren, W9MSG, Box 510, Elmhurst, Illinois 60128.
WØ, KØ, WAØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn. 55921.
VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
VE2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.
VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ont.
VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, B. C.
VE8 — George T. Kondo, VE8RX, % Dept. of Transport, P.O. Box 339, Fort Smith, N. W. T.
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.
VO2 — Douglas B. Ritcey, Dept. of Transport, Goose Bay, Labrador.
KP4 — Joseph Gonzalez, KP4YT, Box 1061, San Juan, P. R.
KH6 — John H. Oka, KH6DQ, P.O. Box 101, Aica, Oahu, Hawaii.
KL7 — Alaska QSL Bureau, Box 6226, Airport Annex, Anchorage, Alaska.
KZ5 — Ralph E. Harvey, KZ5RV, Box 407, Balboa, C. Z.

(Cards for SWLs may be handled via Leroy Waite, 39 Hanum St., Ballston Spa, N. Y.)

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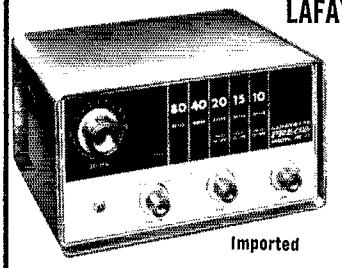

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A great 2-in-1 combination. Tuned interstage circuits and 2 stages of RF amplification assures higher signal-to-noise ratio, improved I.F., image rejection. Easy to install.

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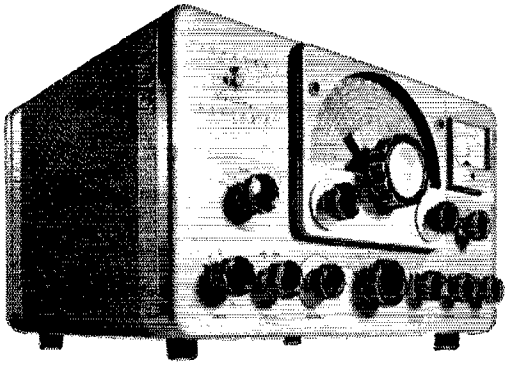
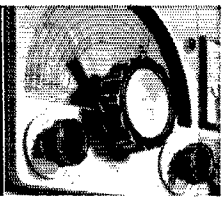
"RANGER II"



"The biggest little 75 watts on the air!"

"One of today's most popular AM rigs!"

EASY TUNING
Basic tuning controls located on VFO dial escutcheon — QSY within phone or CW portion of a band usually possible by merely changing VFO frequency setting.



An excellent "first" transmitter for the Novice or the new General, the "Ranger II" is one of today's most popular AM rigs! For AM or CW operation, for 160 through 6 meters — the "Ranger II" offers the "biggest-little" 75 watts you'll find on the air! Rated at 75 watts CW and 65 watts high-level AM, the "Ranger II" delivers communications quality audio with the necessary punch to break through today's QRM! As an exciter, the "Ranger II" will drive any of the popular kilowatt level tubes and will provide a high quality speech driver system for high powered modulators without modification!

FEATURES INCLUDE: Built-in temperature compensated, extremely stable VFO — separate, calibrated bandspread dial scales for all 7 bands — highly efficient pi-network tank circuit — flexible, timed sequence keying system — self-contained power supplies — effective TVI suppression!

What else? The "Ranger II" offers attractive styling in a compact cabinet and is available at a reasonable price.

Cat. No. 240-162-1 . . . "Ranger II" Kit . . . . . **Net $249.50**

Cat. No. 240-162-2 . . . "Ranger II" Wired . . . . . **Net $359.50**

E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.
(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.
(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**
(5) Closing date for Ham Ads is the 20th of the second month preceding publication date.
(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**
(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

BIG D Hamboree August 15, 1964. Goodies, Contests, Auction. Family fun, picnic area, swimming pool nearby. Write Dave Wheeless, Dallas Amateur Radio Club, Box 30532, Dallas, Texas. Pre-register, $2.00.

HAMFESTER Radio Club Picnic and Hamfest: August 9, 1964. Write for details Hamfester Radio Club, K9LOK, John Chass, 5434 South Bishop St., Chicago, Ill. 60609.

HAMVENTION: Chillicothe, Ohio; July 26th at Ross County Fairgrounds sponsored by Scioto Valley Amateur Radio Club. Bring the family. Admission $1.00. Robert Striplett, Sec'y.-Treas. W8BAP. Te. 104, Chillicothe, Ohio.

6th ANNUAL Penn-York Hamfest. Lincoln St. School, Waverly, N.Y. June 20, 10 A.M. Reservations to "tickets" P.O. Box 81, Elmira, N.Y. Advance, $4.50. At door, $6.00. Last day for advance, June 13th. Awards, speakers, contests. NCX-3.

SRRC Hamfest, June 7th. See May Hamfest Calendar in QST for details, or write: SRRC/W9MKS, George E. Keith, RFD #.1, Box 171, Oglesby, Ill.

SAN FERNANDO Valley Radio Club 8th Annual Hamfest-Picnic: June 21, 1964. Sunset Farms, Sylmar. Tickets/info: W6SD Hamfest, Box 3151, Van Nuys, Calif.

HAMFESTER Radio Club Hamfest August 9, 1964. Write for full details. Hamfester Radio Club, K9LOK, 5434, So. Bishop St., Chicago, Illinois 60609.

AMATEUR Paradise Vacation: Livingstone Lodge and log cabins, Mascoma Lake, Enfield, New Hampshire. Couples, families, 100 acres, swimming, fishing, boats, sports, Dartmouth golf course, tennis. Hot showers. Fire places. 35th year. Light housekeeping. Couples, $50 per week, children half. Literature. Al O. Livingstone, W2OPN.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WE buy all types of tubes for cash, especially Eimas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TOROIDS: Uncased 88 Mhy. like new. Dollar each. Five/$4.00. P. P. DaPaul, 309 South Ashton, Millbrae, Calif.

SOUTHERN California: Transmitter and receivers repaired, aligned. Bandwidth, frequency, harmonics measured. Used ham gear bought, sold, traded. Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel KEllogg 8-0500.

CASH for your gear! We buy, trade and sell. We stock Hammarlund, Hallicrafters, National, Johnson, RME, Hy-Gain, Mosley and many other lines of ham gear. Ask for equipment list. H. & H. Electronic Supply Inc., 506-510 Kishwaukee St., Rockford, Ill.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel NOrmandy 8-8262.

QSLS?? WPES?? Personalize made-to-order one-day service! Largest variety samples 25¢. DeLuxe samples 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Michigan. (Religious QSL samples 25¢) Christian Ham Callbook $1.00.

C. FRITZ QSLS. Bringing hams greater returns over a quarter-century! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz. (formerly Joliet, Ill.).

QSLS. Twenty exclusive designs in 3 colors. Rush $3.85 for 100 or $6.90 for 200 and get surprise of your life. 5 days' service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elm, Hamilton, Ohio.

QSLS: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLS "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples, 25¢.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples, 10¢.

Specialists. Distinctive Samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago 39, Ill. 60639.

QSLS Special. 100 50 Star U.S. Flags on glossy cards, $3.70. Ppd. Other samples 10¢ or 25¢ refunded. Dick, W8VXK, Rt. 4, Gladwin, Mich.

QSLS-SWLS. 100 2-color glossy, $3.00: QSO file cards, $1.00 per 100. Samples, 10¢. Rusprint, Box 7575, Kansas City 16, Mo. 64116.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 787-1, Atascadero, Calif. 93422.

QSLS. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

SUPERIOR QSLS. Samples 10¢. Ham specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

ZIP Code rubber stamp, call, name, address, with ink pad, $1.00. K4ISA, E. Perry, Box 8080, Allendale, Fla.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSLS, SWLS. WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

ATTRACTIVE QSLS. Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

QLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing; eye-catching, comic, sedate, fatabulous, DX-attracting, prototypal, snazy, unparagoned cards (Wow!). Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLs, samples 10¢. Ham specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS. Samples 25¢. Rubber stamps: name, call and address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLS 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegle Ridge, N.J.

QSLS, Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals K2VOB Press, 62 Midland Blvd., Maplewood, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

QSLS. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

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.

1½" Call QSLS $2.40/100, $2.90 (2 sides). Samples. Gariepy, 2624 Kroemer, Ft. Wayne, Ind.

RUBBER Stamps, 3-line, $1.00. Andrew Travis, 2002 West 8th, Austin, Texas 78703.

FREE QSL Samples. 1167 East 23rd, W6OHE Press, San Bernardino, Calif.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

PHOTOSTAMPS of your station with gummed back for your QSLS. 100 $1.50. Samples 10. Morgan, W8NLW, 443 Euclid, Akron, Ohio.

QSLS-SWLS. Gorgeous rainbows; others. Immediate service! Very reasonable. Samples 10¢ refunded. Joe Harms, Mystery Hill, No. Salem, N.H.

QSLS, $1.90. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSL. Stamp and call bring samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLS, SWLS. 3- colors, 100 $2.00. Samples dime. Bob Garra, Lehighton, Penna.

RUBBER Stamps for QSL cards. QSL kit includes 3 stamps, ink and pad for $6.50. Three line stamp, only $1.80 Free sample impressions. Write E & R Rubber Stamp, 50 Gerald Rd., Rantoul, Ill.

QSLS. Samples. Dime. Printer, Corwith, Iowa.

QSLS: Distinctive, economical. Free samples. QSO file cards 200-$1.50. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS. Samples 10¢. K. Kidd's, Rd. 1, Box 254, Telford, Penna.

QUALITY QSLS. Custom and stock. Samples 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

EYEBALL QSLS: 500, $2.99; 1000, $3.99. Fast service. Free delivery. Samples mailed free. Western Card Co., 3108 X St., Sacramento, Calif.

QSLS: 3 color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free Samples. Thomas St., Riegel Ridge, Milford, N.J.

3-D QSL Cards stand out everywhere! Cost a little more and show it. Details, samples, 25¢ (refundable). 3-D QSL Co., RR #1, Monson 2, Mass. 01057.

QSLS, 100 for $3.00. 28 new drawings. Samples 10¢. Brigham, Colson St., No. Billerica, Mass.

CANADIANS: Wanted, 30L-1 linear, VE8NN, 103 Clark Dr., Brandon, Manitoba P., Cana.

CANADIANS: Collins station, complete; KWM-2, 312B5, 30L1, 516F2 AC, MP-1 DC, power supplies, 351D-2 mobile rask, Astatic 10-D, Electro-Voice 714, Webster Band-Spanner and mount, all less than one year old and unmarked, $2700. VE3-CWG.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX Rockville, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mry and 1-44 Mhy uncased like new condx, toroids: information sheet, mounting hardware and six mylar capacitors. $5.00 ppd. Toroids: specify 88 or 44, less capactrs. $1.00 each. 5/$4.00, ppd. KCM Products, Box 88, Milwaukee 13, Wis.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WAlker-5-7000.

CRYSTALS: Free Bargain List. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne. 236 Park Avenue, Bethpage, L.I., N.Y.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. Specify equipment wanted. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

TUBE Specials: 811A, $2.50; 812A, $2.75; 866A, $1.45; 6146-6883, 3 for $5.00, etc. All new. Free list. Lou-Tronics, Inc., 74 Willoughby St., Brooklyn, N.Y. 11201.

HAPPY Hams Club. Are you happy with Ham Radio as it is? Do you think more operating restrictions and license requirements are unnecessary? Be Happy with us! Send 25¢ (coin) for handsome inscrolled 8" x 10" Club Membership Certificate suitable for framing. It's a Wow! Brigman, W4IEN, Box 257, Norcross, Georgia 30071.

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.

RTTY Gear for sale. Write for list. 88 or 44 Mhy Toroids five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

304TL tubes wanted. Also other xmttg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

ATTENTION! Mobileers Heavy-duty Leece-Neville 6 volt 100 amp. system, $50; 12 volt amp. system, $50; 12 volt 6 amp. system, $60; 12 volt 100 amp. system, $100. Built-in silicon rectifier alternators 12 volt 6 amps, $100; 12 volt 100 amps, $125.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 1907 Coney Island Ave., Brooklyn 30, N.Y. Tel. DEwey 6-7388.

RTTY, MU Western model M-1 FSK and AFSK converters regular, $11.50; special $89.95 new. Pat's Used Electronics, 1138 16th St., Denver, Colorado 80202.

WANTED: For personal collection: QSTs March and May 1916. WICUT, 18 Mohawk Dr., Unionville, Conn.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GArfield Area code 201-471-2020.

WANTED: All types of aircraft or ground ratios. 17L 618F or S 388, 390, GRC, PRC, 51J, RVX. Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames, W2KUW, 308 Hickory, Arlington, N.J.

MUST Sell: 75A-4-500A, Globe King, Johnnie Brines, K4GGM, 16 Barbrick St., Concord, North Carolina.

SELL, swap or buy ancient radio sets and parts, magazines, Laverty, 118 N. Wycombe, Landsdowne, Penna.

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.

JOHNSON Desk kilowatt, new sideband modification kit, Ranger P.T.T. sequence keying, factory-wired, kilowatt Matchbox SWR bridge, new tubes, extra spares, 4-400A's, 810's, 872A's, not surplus. Complete cables, ready to operate, condition like new; $900 cash. Ted Brix, 5573 No. Van Ness Blvd., Fresno 5, Calif.

FOR Sale: Duplicate QST and CQ magazine. Send list for quotation. Wanted: Old callbooks, Pacific Radio News, Modern Electrics, early wireless gear, catalogs, etc. for private collection. W6YPM.

CASH for callbooks. Old callbooks prior to 1925 or after 1931 wanted. W8EF, 795 Lake Shore, Grosse Pointe, Mich. 48236.

SELL: KWS-1, $650.00. In excellent condition. Dave De Armond, W6MSD, 3024 Seminary, Oakland, Calif.

4CX1000A, final and supply custom-built by Eimac. 3000 watts P.E.P. Supply 0-5000 V 1 amp, all immaculate, see 1957 QST, page 4 and 11 November issue. For sale in shack. Demonstrated. Hunter Bandit 2000A, like new w/spares, $375.00. W1CPI, Wakefield, R.I. ST 3-5835, 3-3867.

BOOST Reception: 3.5-30 megacycle SK-20 Preselector kit, $18.98. Boost modulation. AAA1-1 clipper-filter kit, $10.99. Reduce noise, NJ-7 Noiseiector, IF, wired, $4.89. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento, Calif. 95822.

WANTED: Navy surplus Link model 886 remote control unit. Ralph Villers, Box One, Steubenville, Ohio.

ESTATE OF K9MBF: Collins 30S-1. One owner. $900. Contact Mrs. M. A. Knoller, 4908 N. Cumberland, Milwaukee 17, Wis.

75A4, Ser. #4010 2-filters, $485; Central Electronics 100V, $450; HT-37, $285; HT-41, $225; SX101A, $240. All gear like new condx. Call Henry, WB2CNA, N.J. 201-44-43189.

EICO 720 xmtr, 730 mod. and Knight R-100 for sale. All professionally wired: can be shipped or mailed. $180 or make an offer. K8QA, 255 N. Graton, Romney, W. Va. 26757.

WANTED: Nazi daggers and short wave equipment for cash or trade. Ham gear, Bayliss, 140-25 Ash Ave., Flushing, N.Y.

HW-12, HW-32, $115 each. Phelps, K1UBE, 103 Chambers St., Manchester, Conn.

USN Staff Corps Officers, ACTDU and retired, starting "Worked all Staff Corps" Award, need your QTH. Call, Awards held for substantiation list, WA5GVE, Kennedy, KN5CS, Athens, Ga.

MOBILE and fixed all-band DCKW linear amplifier; w/Adcom transistor P/S; 4CX300s; 110OVAC blower and inverter; zener regulations throughout; finest components. Also 500 mfd. variable vacuum 10 KV. Best offer or swap. Dr. Arcuri, W2KSV, 8 Linden Ave., Pelham, N.Y.

FOR Sale: Los Angeles area only! Hammarlund HQ-140X receiver, $125. Wanted: Polycomm 2 meter rig. AC supply for Gonset G-76. Telephone OS-5-6701 or SP 2-4040.

SELL: HX-20 with HP20 AC supply. Professionally wired and aligned, $210. Will ship. W3UB, Bryn Athyn, Penna.

FOR Sale: Heathkit Pawnee, $200; Hallicrafters SX-100 and spkr, $145.00; Johnson 6N2 converter, $35; Eico 730K modulator, $45; Heathkit, Twoer, $35; 2-meter vertical, $10; Dow-Key coax relay 6U or 110VAC, $7 ea. W6UZK, David Maxwell, 1939 Rock St. No. 11, Mountain View, Calif. Tel: 415-961-5863.

FOR Sale: SX-115 receiver, $350.00 cash. Call 609-494-2518. W2FWY, Erich Schmidt, 13th & Blvd., Ship Bottom, N.J.

HW-12 SSB transceiver, HR-10A xtal calibrator, HP-23 AC supply, factory aligned, all three, $150. Hy-Gain 20 meter Mono-Bander plus AR-22 rotor, $45.00; Johnson 250-23-1 Matchbox, $32. Johnson 250-20 low-pass filter, $7.50; Calrad dynamic mike, DM-11, w/stand, $750; Mastercrafters 7112 clock-timer, $6.50; RTTY-15 printer with table, $90. Want to buy: Strip chart recorder similar to Minneapolis-Honeywell/Brown. Give price, model and condx. Albert Weiss, W6UGA, 2370 Knob Hill, Riverside, Calif.

JOHNSON Viking Pacemaker, $199.50; Ranger $149.50; Johnson Viking kilowatt, desk model, $850.50. Phil Rand, P.O. Box 28, Redding Ridge, Conn.

BRAND New! 4 months old NC-190, in original carton, $135.00. Also AT-1, 80-10 CW xmtr, $20. WB2DRE.

WANTED: Cosmophone. Dave Bell, 1088 Rubio, Altadena, Calif.

COLLINS Bargain. Perfect 32S-1 with 516F-2 supply $450.00. K4AEF.

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; URABA, $195; 51J-3, $675; Boehme Aut. keyer, $125.00; Wheatstone pertorator, $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.)

STATION Complete: Everything works absolutely perfectly: DX-100B, RME 4350A (new tubes in both); Microphone, Antenna relay, cables and connectors. Best offer by July 1. Medical student needs cash! Will deliver or meet purchaser half-way for reasonable distances. Six meter twelve volt Gonset mobile convertor, used one month. Best offer. Also, 2-element Tribander, Michael Treister, 20942 South Woodland, Cleveland, Ohio. Tel: WY 1-6389.

FOR Sale: Plate transformers, 3600-0-3600 VAC @ 1000 Ma., with dual 110V and 220V primarics. $35; 4-1000A filament transformers 7.5 VCT, @ 21 amps, $17. Peter W. Dahl, KØBIT, 5331 Oaklawn Ave., Minneapolis, Minnesota 55424.

VALIANT FW $200; HQ-110C w/matching spkr, $140; Hy-Gain TH3 Tribander, $40; Ameco CLB 6 mtr mobile converter, $12; Viking II, $125; Waterman Pocket Scope, $75. WA2GFO, 89 Pinho Ave., Carteret, N.J. 969-0867.

RME 6900 under five hours' use, best offer over $200. Sideband package from QST, June 1958. Best offer over $110. Need frequency meter. K2POE, 1152 Park Ave., Vineland, N.J.

RECEIVER: 25-tube homebrew communications receiver for sale by college student who just doesn't have the time: $199. Also, 4-track stereo Norelco tape recorder, 3 months old, $95.00. Ted Lester, WA2VVB, 141 Main St., Keyport, N.J. 201-264-1595.

FOR Sale: SX-101A, 2 years; CW rig, VFO, 90-watts; 10 meter phone rig, 20 watts; 80 meter SSB rig, 70 watts; 80 meter linear, needs rectifiers: Dow-Key relay, KW; best offer over $325.00. Gene Weber, K3LOH, 238 Lincoln St., Homer City, Penna.

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. Kit Kraft, B-763, Harlan, Ky.

SELL: HT-37 purchased last summer, unused since Sept., $350.00; Drake 2A and 2AQ with xtal cal., $150.00; Johnson 250W Matchbox, $20; D-104 mike, $12. All in like-new condx, need money for college. Wess, 4712 Reamer Ave., Columbia, S.C.

OFF To College: Apache, extra 6146's, low-pass filter, $200; NC-270 receiver, $200; both in perfect condx; also SWR bridge, DX-20, Heath VTVM, antenna relay, trap vertical. WA2QYZ, 0-57 Pine Ave., Fairlawn, N.J.

MUST Sell for college: Apache, SX-101A, and factory wired SB-10. All or singly. About two year old. Best offer. K9ZSY, 101 Park, River Forest, Ill.

SELL: HT-32, $315 cash. K9GKR, John W. Dilges, Box #3, Fairfield, Ill. 62837.

MAKE An offer: SX-99; Heath Q-multiplier; HE-35, 6-meter transceiver with 115/112 volt supply; Viking I with VFO; BC-458 SSB/VFO, 6 volt car radio for 160-meters. Wolf, 273 Kinderamack, River Edge, N.J. 07661.

FOR Sale: HT33B 1 KW AM, CW, 2 KW PEP, SSB. Linear like new, $695; 32S1, $400; 75S1, $375; 51J3, just realigned, $650; 6N2, Thunderbolt, $375. Lots of UHF goodies. Write for list. K1PY1, Tobe Deutschmann, Jr., 2020 Washington St., Canton, Mass.

CLEAN Apache, $155.00, F.o.b. Buffalo, N.Y. Collins filter F455N40, $12.00; new 4X150A, sealed carton, $6.50; W2AZL 2-meter converter with power supply, $25.00; 200 Kc xtal, $2.00; 0-100 microamp 2½" Simpson, $4.50. W2SSC, 8550 Howard Dr., Buffalo 21, N.Y.

PIGGY Banks and oval coin purses. Attractive, impressive, 50¢ each. (Postpaid U.S. and Canada). Send now! Wayne Grove, K9SLQ, Box 173, Bluffton, Ind.

SELL: NC-98 rcvr w/spkr, in excint condx, $48.00. Alan Rose, 50 W. 90th St., NYC 24, N.Y. Tel: TR 3-0434.

HEATH Apache and Warrior amp., $360.00; HRO-50T1 w/ spkr, $125.00; another Apache, $170. Canadian deals, too. F.o.b. W9QQN. Norm Alexander, 3N384 Wilson St., Elmhurst, Ill.

SELL: Heath Warrior $175.00: Mohawk w/spkr, $275. Used vy little. In excint condx. KØQCY, Gary Maben, Garner, Iowa.

VIKING II, 180-watts c.w., 135 fone, $100. Model 122 VFO with xmtr, $25; HQ-150 rcvr, 5.5 to 30 Mc. bandspread, built-in Q-mult., xtal calibrator, $150.00. All guaranteed in excint wkg. condx. W3HET, Box 251, RFD 4, Annapolis, Md.

WILL Ship: You make offer—HQ-100C rcvr. G66E rcvr w/12 VDC-110VAC supply, AF-67 xmtr, Mark Heliwhip 10 M or CB, Heliwhip mount. Heath GDO, 110VAC coax relay. K6GIW, 5097 Glasgow Dr., San Diego, Calif.

HQ-150, clean, good condition throughout, recently aligned, with instruction book: $160. W1ECH, 1 Marlon Place, Cromwell, Conn.

COMMUNICATOR II, 2M, in beautiful condx; $90. Pfaff, K2GNC, Marys Lane, Centerport, L.I., N.Y. 11721.

32S3, Serial No. 10494, for sale, In new condx: $550.00. S. Talago, Rte. #3, Bridgeport, West Virginia.

RHOMBIC—Bruce's original paper in IRE Proceedings for August 1931. Sterba curtain described by Sterba himself in July 1931. Southworth's paper with antenna patterns September 1930. Also have February 1921, October 1929, October 1931. All six copies for ten dollars. L. A. Morrow, 99 Bentwood Road, West Hartford, Conn. 06107. Phones: 521-0416, 666-1541. Area code 203.

SELL: 75A4 receiver, serial No. 4020, in perf. condx, inside and out. Going mobile: $495. Dr. Mortimer D. Solomon, 41 Westbrook Lane, Roosevelt, L.I., N.Y. Tel: 516 BA 3-3575.

WANTED: Heath Seneca, 220 Mc., 6-meter SSB transmitters. Sell: Heath 'scope 10-30. RF signal generator, audio generator, ACVTVM, 3-'scope probes. VTVM. All in brand new condx. Will swap Heath equipment for above transmitters. Stan Nazimek, WB2GKF, 506 Mt. Prospect Ave., Clifton, N.J.

SX-101 M. III, $150 or trade for any SS13 Collins equipment. What have you? W. K. Gardner, 5333 Waterman, St. Louis, Mo.

200-V perfect, $595. W3DJW, 6904 City Ave., Philly, Penna.

HELP? Need info VO2GS QSL 1948/49. Belived VE3 now. W1RAN.

ATTENTION! Have you seen "Equipment Exchange"? Interesting Buy, Sell, Swap offers galore! 12 big issues. $1; sample copy free. Write: Brand, Sycamore, Ill.

SELL Or swap: IBM executive typewriter, with or without IBM Contract, like brand new, (cost $700). G. Dubbs, 741 Campus St., Uniondale, New York 11553.

SELL Or trade: New Wollensak #1980 stereo tape-recorder. Cost $379; Fisher #800 AM-FM stereo tuner/amplifier, K7EPD, 4250 E. Palo Verde Dr., Phoenix 18, Arizona. 947-1518.

SELL: Johnson Valiant for highest reasonable check received. Electronically fine. Appearance OK. Satisfaction guaranteed or your money returned after two weeks trial. You pick up or pay shipping. Unaccepted checks returned immediately. Burk, W2-DWP, 41 Lewis, Cranford, N.J.

WANTED: Gonset Tuners (152-162 M.C.) #3012, (108-128 M.C.), (40-50 M.C.), others. Richard M. Jacobs, WAØAIY, 1015 Glenside Place, University City, Missouri 63130.

TRADE: Heath "Sixer" and halo for "Twoer" and halo. K3NQA, George Drake, 4120 Taylor Ave., Baltimore 36, Md.

SELL: NC-300, matching speaker, in excint condx: $155. Al Dantes, 1090 Ravoli, Pacific Palisades, Calif.

VFO Heath HG-10, $15. Brad Kummer, RR #2, W. Helena, Arkansas.

INCREASE Range and intelligibility with the Wallace Audio Gainer. Externally connected in minutes. Free information. Path Products, 55 Halley St., Yonkers, N.Y.

SELL: 75A4 receiver, serial 1144, with 3.1 and 6.0 filters, spinner dial and speaker. Excellent condition. $425.00 or best offer. A. A. Farrar, 2501 East Ave., Rochester, N.Y. 14610.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

WANTED: Coil set E for HRO-5; second bound volume of G-E Ham News. Sell or trade: coil sets H and J for HRO-60, $10 each; HQ-170C, IF noise silencer, $225; Johnson TR switch, $19; Ranger, $160; HRO-7, $125. WØCHM, 1527 Fifth St., Boulder, Colorado.

COLLINS 75A 4 #3081 w/mod. Cent. Elec. 200V, #E1199, in gud condx. Can ship. Any reasonable offer considered. W4OAA, Joe D. Price, Georgetown, Ky.

RECEIVER: Surplus, RU-17/BC-429 w/coils, dynamotor, battery eliminator, manuals, etc. Trade for 'scope, Twoer, xmtr, or wathavu? Write: Jonathan Fauer, WN2JYH, 4746-40 St., Sunnyside, N.Y. 11104

WANT Talk with Hamilton College Alumnus Greater NYC. W2ICW, 212-FL-77146.

COMPLETE Station for sale: $375 takes all. Viking Valiant, SX-100, oscilloscope, VP-15-20M beam, 10-40 M vertical, Johnson Matchbox, assorted lengths of coax and fittings. Bill Slade W3KFV, 935 N. 19th St., Allentown, Penna.

COLLINS KWM-2 30L-1, 312B4, 516F2 10D and G-stand. High serial number. Like-new, original Cartons. $1300. WA2AVW.

BACK Copies of QST: May through Dec. 1946, 1947 thru 1963 complete CO: 1948 complete. Odd copies between 1949 and 1955, 1956 thru 1963 complete. Will sell any combination you wish. K2SDR, 5 Washington Place, Plattsburgh, N.Y.

FLORIDA Home VS 51J4 and/or 28ARS or 28; will consider excint condx 51J4 and/or 28 gear as part payment on fine Bradenton retirement home, 2 bedrooms, livingroom, kitchen, dinette, etc. Breezeway garage and Florida room hamshack space. On high, dry ground, excint neighborhood. Cost over $11,000. Selling to expedite settling of estate: $7,600. Contact W4UMC, Frank Brooks, 1209 Augustine Ave., Fredericksburg, Va. Phone evenings: (703) 373-8264. Can be inspected c/o Don McGuire, registered broker, Bradenton, Fla.

SELL: Absolutely perfect 75A-4, #2707, spinner knob and matching spkr. $495.00. WØRAK, 623 N. 5th, St. Peter, Minn.

EICO-6 and 12-volt bttry, elim. & chargr, 6 to 20 amps, $20; Johnson CB Tone-Alert 12V-DC and 110V AC, $30; Gonset FM radio, mobile tuner, $30; Hy-Gain new Boy Mobile ant. base mounts, $1.50; Gonset G-76 transistorized 12 volt DC pwr. supp. #3350, $45; Lafayette HE74, 6 to 80 M, VFO, $55; Multi Elmac PMR-8 rcvr, TV Camera with built-in 7 in. mon., w/xmtr. Will demo, $150; C-E 100V 6-band xmtr, 10-11-15-20-40-80 M, SSB AM-PM DSB FSK, 5 to 100 W var., R.F. Control, bilt-in 'scope, VOX, etc., used less than 20 hrs, $495; C-E same specs as above, but rated at 200 W Mod, 200V, $595. Sal Francione, W2IDC, 146-07 Jamaica Ave., Jamaica, L.I. N.Y. (212) JA-3-5973.

WANTED: Linear GSB201. Ellie Johnston, W2GJ, 12 Harbor Rd., Oyster Bay, N.Y.

SACRIFICE: Clegg Thor VI 6M xcvr w/AC pwr. In mint condx. $250. K5MTR, 3007 Acadia, Marshall, Texas 75670.

SB-33 transceiver, $325.00. Perfect. Will ship in original carton w/manual. K2VOQ.

SELL: Famous GPR-90 Communications Receiver. Over $600 new. In excint condx, $275. Jac Holzman, 37 West 12th St., N.Y.C. Tel: CH-3-2874.

WANTED: KWM-1 and Collins AC power supply. Must be clean, and in xcint wkg condx. B. Sharpe, W9JKC, 634 Vernon St., Sedalia, Mo.

HELP: New ham needs any discarded equipment or uscable junk. Help give me a start. No C.o.ds. WAØIHV, 2413 Golf St., Sedalia, Mo.

DX-100, $100; Mohawk receiver, $200, both in excint condx. Prefer you call and see these in operation. W7FWA, 3815 North 48 Drive, Phoenix, Arizona, AP 8-5339.

CALIFORNIA, Far East Hams! Hallicrafters SX-71 receiver, excint condx, $117. Major E. Reardon, S. H. Division, MAAG, APO 143, San Francisco, Calif.

KWM-2 with noise blanker and Waters Q-multiplier, Collins DC power supply and mobile mount. In perf. condx: $1075.00 or you make offers for individual items. Robin Anderson, K8CSW, County Line Rd., Chagrin Falls, Ohio.

CATHOLIC Hams: Colorful decal of radio amateurs' patron saint. 25¢ coin. Wizpatronics, Candia, N.H.

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.

ELMAC AF67, PMR7, M1070 power, 5 plug-in Fiberglas whips and mount, mike, coils, relay. K8DQC, 3713 Brooklyn Ave., Cleveland 9, Ohio 44109.

SELL: DX-40, $50; SX-99, $80; Knight VFO, $15; Vibroplex Original, $15, Package deal: $150. WA2MTI, 21 Napoleon St., Newark, N.J. (MI 2-1805).

SELL Drake TR-3 transceiver and AC-3 supply. Only a few hours of service. Must sell. Wonderful buy. Cartons and booklet: $525.00. Phone HE-3-0803. Webb, K2GKH, 125 Ocean Ave., Jersey City, N.J.

COLLINS 75S1, $325.00: Swan SW-175, $175.00 or you make offer. W5YUO, 4928 Cockrell, Ft. Worth, Texas. WA 7-8108.

KWS-1 wanted. Prefer late model. W6WZD, 98 Fairview Ave., Atherton, Calif.

SELL: 40 ft. self-supporting steel tower. 4 post complete with ladder, exc. condx. Vy similar to Vesto. $100. Sry, will not ship. Glen Edson, 16 Monticello Dr., Paxton, Mass.

ONLY $1.00 for Collins 75A3 and 32V-2 in 2-rolls of 1960 SmD-BUcents. F. L. Webb, W4AAH, Collinsville, Va.

ELECTRONIC Tubes—Top Brands Sold at substantial savings! (Minimum Order $15.00). Authorized GE Distributor. Send for FREE Buyers Guide for all your Tube Requirements. Top Cash paid for your excess inventory (new Only-Commercial Quantities). Metropolitan Supply Corp., 443 Park Avenue South, New York, NY. 10016, 212-MU 6-2834.

SELL: KWM-2, mint, with Waters Q-multiplier and AC supply. $950; 30L-1, $370; Swan SW-240 Tribander with AC supply and Adcom D.C. mobile supply and Nutronics antennas for all 3 bands, complete for $400; Model 15 teletype with keyboard and TU converter, no waiver, $110; BC-1031-B Panadapter, $75; Heath MR21, RDF, $75; BC-221-T frequency meter with matching book, $35; Heath Twoer, $30. Sheldon Derlichter, 403 Sunset Drive, Wilmette, Ill.

OPERATE SSB/AM/CW: Hallicrafters SX-100 w/R-48 spkr, Central Electronics 20A w/extra anti-trap unit and CE-458 VFO, Lakeshore P-400-GG 575 watt amplifier, cables, manuals: $525. Local sale preferred. Eric Landau, WA2KER, 165 Trinity Place, West Hempstead, N.Y. 11552.

800 Watts PEP with P & H LA-400-C linear. Grade "A" shape, $125.00; wanted: Deluxe Vibroplex Vibro-Keyer. KØQYD, Box 772, Bismarck, N.D.

SELL: Collins stations: 75S-3, $475; 32S-3, $550; 516F-2, $85; 30S-1, $1,000; 312B-5, $245; KW Matchbox, $110; KWM-2A and blanker and case, $940; PM2, $100; MP-1, $135; 30L-1, $400; 312B-4, $150; 275W; Matchbox and coupler, $55; 51S1 revr, $950. Little used. All in mint condx. Consider discount on entire lot only. No splits. Cash/carry. Al Riess, W2BN, 320 East 52nd St., N.Y. 10022, P 15-5544.

NOVICES: First reply takes xclnt Heath DX-20 with manual and 10 gud xtals in Novice bands for $45 plus shipping. WB2-CNG, Phone 516 PO-7 4422. Richard Lee, 95 Reid Ave., Port Washington, L.I., N.Y. 11050.

HAMMARLUND SP-600FX receiver, first class condx. Will ship. $450. W5HOA, Bill Weeks, 850 E. Madrid Rd., Las Cruces, N.M.

SALE: Marauder HX-10, $295; Drake 2B with calibrator, used 6 months: $195; Heath 'scope O-8, $25.00; Scott 314 FM tuner and stereo amp., $175; Wollensak Stereo recorder, $100; D-104 mike, $20. Vibroplex Original, $10. All in A-1 condx. A. D. Johnson, 321 Broadway, Goodland, Kansas.

COMPLETE Station, never used, boxed, factory-wired: Johnson Navigator, $100: Eico transmitter, 730 Modulator, $125: KT320 receiver, Preselector, $100; Paco oscilloscope, signal generator, $75; VFO, Vibroplex, $60; HE-40 receiver, $35; 148/175 Mc. receiver, CB transceiver (for parts), $40; or all above plus antenna, $475. All in like new condx. F. H. Marz, 21 Rockne St., Huntington, L.I., N.Y.

PRINTED Circuit boards. Hams, Experimenters. Catalog 10¢. P/M Electronics, Box 6288, Seattle, Washington 98188.

TRADE Or sell: S-108 mint, $75; Eico 470 K 'scope, in mint condx, $75; L200A linear, new, $45.00. 6N2 VFO, $35. Need: PMR-12A linear; 500 W up. Haynes, 9600 SW Highway, Oaklawn, Ill.

SELL: NC-300 receiver w/100 Kc calibrator, in perf. condx. Used vy little; $235.00. Manual is included. Can ship express collect or will deliver within reasonable distance. K3HGX, P.O. Box 8873, Philadelphia, Penna. 19117.

COLLINS KWS-1, 75A4 and SX-101 station for sale. The equipment is in A-1 operating condx and appearance is exclnt with no signs of wear. This station has been used approximately 100 hours and has not been altered in any way. Serial numbers are as follows: KWS-1, 759; 75A4, 3139; receiver has three filters 800, 2,100 and 6,000 cycles. Please make offer. W9IBA, 1146 Long Valley Road, Glenview, Ill. Phone: Park 4-5505.

TRADE INS, late 1963 Models: National NCX-3 transceiver with AC/PS, $385; Drake TR-3 transceiver with AC/PS, $545; Hammarlund HQ-100A, $149.50; HQ-110A, $195; HQ-145X, $225; HQ-170A, $290; HW-180A, $345.00; HX-50 SSB transmitter, $350.00; HXL-1 linear amplifier, $325.00; Drake 2B, $225.00; Sonar Four bander SSB transceiver with AC/PS, $495. Limited stock. No trades. Satisfaction guaranteed. Slep Electronics, Drawer 178, Ellenton, Florida. Phone 722-1843.

SELL: SB-33 transceiver, $350.00 or your best offer. S. Coleman, W5BYJ/9, 1831 Happy Hollow Road, West Fayette, Ind.

HAM Equipment. Buy sell, trade. Lupi, 1225 Hillside, N. Bergen, N.J.

SALE: HT-32A and HQ-170C, $650.00; Prefer local deal, like-new condx. Ph 879-5319, Chester, N.J. WA2DDV.

COLLINS 75A-2, $200; HT32, $300; both; $475. First check or money-order. Delivered within 50 miles. Trelease, 305 E. 40th St., N.Y., N.Y. 10016.

NC-303, $325; Ranger, $175; Antennas, miscellaneous equipment. Write for list and picture. Richard Molz, WA2LKW, 47 Shire Oaks, Pittsford, N.Y.

FOR Sale: SX-100, in gud condx, ART-13, Globe Scout, 2 VFVMs, Gonset Converter, tube-checker, 556S, Shure mic, all for $325.00. Will ship. Dannie Neeley, WA8IQL, Box 143, New Vienna, Ohio.

SP600JX, New condition, 6 + 2 New Amplydyne 60W xmttr. Sell or trade; Need mobile transceiver. WB2LXJ, 4379 Furman Ave., 238th St., N.Y.

SALE: Riders 2 thru 5, 7 thru 13, 16 and 18. Best offer F.o.b. Ken Conrad, 5482 Crittenden Road, Akron, N.Y.

SALE: Two-meter Pawnee transceiver, used less than 10 hours, in immaculate condition: $170: Johnson 250 Matchbox, $40: Johnson TR switch, $15; Pawnee wired by graduate EE. K5HSO, 2416 Mesilla, N.E., Albuquerque, N.M.

HEATHKIT SSB Twins: HX-20, HR-20, HP-23 A.C. supply, mike, cables and manuals. Factory aligned, $300. Will ship or deliver. W1MBX, 2389 Winsted Road, Torrington, Conn.

KWM-1 mobile mount, AC and DC supply. Excellent looking and working condx. Car to house in 30 secs. $380. Richard Kelly, WA2CMY, 130 Pontiac, Webster, N.Y.

WANTED: Parts for R-390 receiver, I.F. strip audio amp. calibration osc. mtg. kilocycle change dial. Need not be operating or complete. James E. Oshel, WA4PRO, Rte. 1, Highway 117, Oak Grove, Ky.

SELLING My antique tube collection: W.E. VT'ls, $2.50. Choice of following $1.25 each: W.E. VT2's, VT5's, 231D, RCA-CX220, 12A's, 01A's, 99's, 00A's, 865's. See April QST cover. Samkofsky, 201 Eastern Pkwy, Brooklyn 38, N.Y.

PERSONALIZED Match Book with your Call Letters, fifty books, $2.95 postpaid. Attractive Silver, Green, Red, Black, White colors with Gold or Silver Letters. Check or money order to Callmatch Company, P.O. Box 101, Springfield, Virginia.

SELL B&W 5100B, in exclnt condx, $200. Sorry, no shipping. C. Wallen, W2RFV, 112 Jefferson, Stratford, N.J.

WRONG Frequency? Change crystal frequency with this crystal etching kit, supplies everything needed. $1.00; deluxe model, $2.00. Guaranteed Ham Kits, Box 175, Cranford, N.J.

VALIANT F/W, $225. Heath SWR Bridge, $10; 60 ft. Air force twist lock towers, $50. Globe Scout 680A, $45. K3MMS, 3 Archer Lane, Scarsdale, N.Y. Tel: SC-3-7641.

HT-37. Sell in good condition: $250. Prefer pick-up deal. W2-PZS, Phone 609-5873509 Trenton, N.J.

FOR Sale: Globe Scout 680, $60; Globe LA-1 linear, $70; both factory wired. Heath VF-1, $10. WA9AXQ, LaPorte, Ind.

FOR Sale: Johnson Viking II, 6N2, D-104 mike PTT stand, all in exc. condx with manuals, $210. Will deliver within 125 miles. Will sell separately. All inquiries answered. W8FZ, 1303 Adams, Saginaw, Mich.

VALIANT: Must sell because of college. Factory-wired, in perf. condx. Best bid around $265. David, K8RMT, 3536 Riddle, Cincinnati 45220.

LEAVING The air: 75A4 #2453, 50-cycle filter, HT-32, HT-33, Drake 2B, Ranger. Best offer, no shipping, sry. W1AGS.

WANTED: Super Pro to 30 Mc. Best price. Details to W2CE.

WANTED: TA-33 ant. W2PAV, 914 EL 6-5814.

FOR Sale: 80-10 mtr. KW xmtr. B&W 504A to PP813's. All power supplies and VFO in 36" cabinet, $200 or trade. WA2-JVO, 830 Robinwood Rd., Westwood, N.J.

BEST Offer, cash or trade takes all or separately 75A4, HT-37, 600L. Want: KWM2, SR150, etc. W1HEZ, 7 Kirk, Springvale, Maine.

SELL: Globe King 500B: $340.00; Mosley TA-32 beam, $35.00; DX-40 with VFO and Novice xtals, $45.00. Dave Steffens, 656 Cascade Rd., Cincinnati, Ohio 45215. Phone 825-8333.

WANTED: One or more audio filters Federal FT-2409, 110 cycles. State price of each, inc. postage, and the quantity available. WAØBGZ, Bruce D. Mull, 117 Suffolk, Hoyt Lakes, Minn.

WANTED: Heathkit Model XV-1 VOX. K5YYI, 901 North Evans St., El Reno, Okla.

SELL: Heath HX-11 xmtr, $25 and Mosley V-4-6 vertical with 80M loading coil, $15.00. Call or write to Larry Kraus, 147 Croydon Rd., Yonkers, N.Y. Tel 914-SP-9-4741.

SELL: 75A-4, Speaker, 6.0 kc, 3.1 Kc, in exclnt condx recent Collins checkout, serial No. 3901, $42.00. K2HWP, 125 Amherst Ave., Syracuse 5, N.Y.

CLEANING The shack. Component bargains galore. Transformers, meters, tubes, capacitors, resistors, sockets. You name it, I've got it. Stamp for list. Ken Maas, W9AZA, Burlington, Wis.

HALLICRAFTERS FPM-200 transistorized transceiver with two VFO. Sold new for $2650.00. Will sacrifice. Will also send further information. WA6TLS, 7549 E. 4th Place, Downey, Calif.

EICO 720 xmttr in exclnt condx. No scratches. Priced to sell at $42.00; also Hallicrafters S40-B, in gud condx also, $49. WA4-EWB. Bill Smitherman, East Bend, N.C.

WANTED: Ranger. Quote price. Thomas Ambruster, W2VVK, 127 Fowler Ave., Haddonfield, N.J.

FOR Sale: Gonset 2-meter linear, 2 new 826 tubes in it, $60.00. Newton Amateur Radio Club, Darell Preston, Secy-Treas., Mt. Hope, Kansas 67108

MATCHED Gonset Super Six converter and new Gonset Super-Ceiver, $40.00. Viking mobile VFO, $12.00. W9NZS, 204 Belle Plaine, Park Ridge, Ill.

SALE: Gonset G-50, 6 meters VFO. Like new condx. F.o.b. Chesapeake, Virginia, $250.00. WA4KGI, 2923 Kilbride Rd., Chesapeake, Virginia 23517.

MINNEAPOLIS Hams! Swap excellent Jafco 20-ft. inboard Seaskiff (only 400 hours use) for KWM-2, or equal value gear. See it at Cochranes Boatyard, Excelsior. Then you contact George Carson WØJV, 316 Lee, Iowa City, Iowa.

SELL: Link 120-watt FM base station. Fine for six meters, $60.00: KWM-2, PM-2, MM-1 Bandspanner, $1050.00. In exclnt condx, never mobile. F.o.b. Dallas. Melton Goodwin, W5EEY, 11421 Fernald Ave., Dallas, Texas 75218.

STOP! Send in a buck for the next 10 bargain-packed issues of The Ham Trader. Buy, sell, trade! Box 153B, Franklin Square, N.Y.

DISCOUNTS! Reconditioned gear: Trial privileges. CE100V, $399.35. Zeus, $399.35; KWM-2, $716.15; KWM-1, $296.55; HT-37, $333.50; DX-100, $117.15; Invader, $372.10; NC-109, $99.45; NC-125, $84.35; Swan 40, $138.70, and hundreds more. Write for free Blue Book listings. World Radio Lab, Box 919, Council Bluffs, Iowa.

20W transistorized 40M transmitter with 110/12v PS, $29. Reavis, 9727 Westport Road, Independence, Missouri.

JOHNSON 500, AM SSB CW with RTTY kever, $550; 2 new Eimac 4-400, $30 each; NC-300 with calibrator, $220; G-77m $135; Super Six, $30; Master Mobile motor loading coil, $12; HT-18, $25; SX-71 with 6M, $100; 24-hr. clock, $5; 2 Stromberg-Carlson model AU-42 audio amplifiers, $15 each. W7OAG, 349 North 250 East, Orem, Utah.

COLLINS 75A4, two filters, perfect condx. First offer over $400. R. C. Martin, K4MDR, 3016 Surrey Lane, Chamblee, Ga.

HAMMARLUND HQ-110C, $135.00. K4RCV, Bolles, Jr., 109 SE 13th Ave., Ft. Lauderdale, Fla.

75S-1 mint condx. Want cash or part trade. K6VJE, 10234 Vista La Cruz, La Mesa, Calif.

FOR Sale: One Model G-GA-6006S-40 amp, 12-volt, external Auto-Lite generator, rebuilt. Cost new $173.10. Asking $80. Call Howard Motors, Inc., Hartford, Conn. 246-1631, Parts Dept.

SELL: Perfect HT-41 linear, like new. Make an offer over $215. Contact Bill, P.O. Box 3332, Lafayette, La.

SELL SX-110, recently factory realigned with matching speaker, perfect, $125.00. VF-1 with power supply, $15.00. Also have Conn Alto saxophone. Make an offer. WA1AUO, 9 Myrtle St., Brattleboro, Vt.

FOR Sale: Johnson 275W Matchbox w/SWR, $75. Both hardly used. Will ship. R. Aberle, 33 Falcon Dr., Hauppauge, N.Y.

SELL: Vesto 61-ft. tower, new, never erected, complete with crankover head, mast clamp, thrust bearing, motor plate, wooden platform, $475.00. F.o.b. Erie, Penna. Save $164.50. W3LOS, 138 Chautauqua, Erie, Penna.

COLLINS KWM-2, $840; 30L1, $385. Station control 312B-4, $140. All equipment is less than 7 months old and practically brand new condx. WA2REQ, 212 RN 3-8726.

SELL: VHF 152A, $35.00; DB23, $30; Eicor 1000 Tape Recorder, $50; Zenith 1000D transistor transoceanic, $125; half constructed Cosmophone 55, most parts. Want SX115. Chester Benson, W9IFB, 732 South 14th St., Richmond, Ind.

FOR Sale: Central Electronics 20A and Drake 1A, both for only $185. Both are in excint condx. Gaylord Ottun, Sargent, Nebraska.

BOOST Reception 3.5-30 Mc. SK-20 Preselector kit, $18.98. Boost modulation—AAA-1 Clipper-Filter kit, $10.99. Reduce noise, NJ-7 Noisejector, IF, wired, $4.49. Postpaid! Literature free. Homstrom Associates, Box 8640-T, Sacramento, Calif. 95822.

KWM-2 516F-2 AC Supply. Brand new, never used. Best offer. Trades considered. Belvidere, Box 1103, New Britain, Conn.

FOR Sale: NC-88, QF-1, DX-35, VFO; TCM-300W. WB2FJF, Bob Grittith, Ark Road, RFD 2, Mt. Holly, N.J.

APACHE TX1, $175; HQ-110C, $135.00; GPR-90, $330. All look and work like-new. Will deliver in Calif. K6LLE, 4761 Barbarossa Dr., San Diego.

HT-32A, immaculate, $375.00. Might accept Valiant as partial payment. K2QIL.

WANTED: Heath HR-10 ham rcvr, in excint condx. WN2LDJ, 1117 Logan Ave., Bellmawr, N.J.

GONSET 2-mtr. Communicator II, in gud condx. W8FAX, Box 182, Allen Park, Michigan

RANGER, S-76, vy clean. Best cash offer takes it. Arch Bowans, Monroe, Iowa.

WANTED: Gonset Communicator III, 2-meters. In gud condx. W2BQM, 92 Lagoon Blvd., Massapequa, L.I., N.Y.

HEATH HR-10 rcvr and spkr, $60 or your best offer. Don, K7SDF, 510 Columbus, Salt Lake City, Utah.

HINTS & Kinks. Want back issues, good, clean copies, #1 thru #4. K8NDZ, P.O. Box 343, Lancaster, Ohio.

SELL: C-E 100V, around $425.00; Drake 2A, $160, in excint condx. Prefer Calif. deal. Write: K6PZL, School Way, Watsonville, Calif.

SELL: NCX-3, absolutely spotless, $265.00. Transistor supply, $80. KWS-1, excint condx, $635.00. Ray Jones, W2AEV, 111 Hillside Rd., Farmingdale, N.Y.

FOR Sale: HQ-120, in excint condx. 250V pwr. supply; 2E26 mobile xmttr. Barry Goldstein, W2ROH, Dunster B-43, Cambridge 38, Mass.

HEATH MT-1 "Cheyenne" mobile transmitter. New, used less than 5 hours, $75. John Cronin, 3400 East Stanford Dr., Phoenix, Ariz. 85018.

LITTLE Used, spotless HT-37, new April 1963, $275. Pick-up deal only. Blosser, W8DBK, 80 Samuel Lord Drive, Chagrin Falls, Ohio. Tel CH 7-7085.

COLLINS 32S-1, 516F-2 combination, $410; Drake 2B, 2BQ, 2AC combination, $230; KW Warrior, $190. Write for details. K8HYD, 428 East Early Drive, Miamisburg, Ohio.

KWM-2, 30L-1, 312B-5, AC and DC supply, mobile mount, all perfect, original cartons and manuals. Highest offer. KØJXW, 270 S. Pershing, Wichita, Kans.

COLLINS KWM-1 with 516 F-1 AC supply, $375. With 516E-1 DC supply, mobile mount and cables, $150 extra. Cash or certified check. Tex Hendrix, RD 1 Malvern, Penna. Tel: 215-NI 4-4383.

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RANGER, in excint condx, spare final, spare modulators, manual, mike, key, relay, $130. "Gimix," $2.00; Bird 72R coax reversing switch, $5; Vibroplex, $10. D-104 mike, mint condx, $10. Cleaning excess, stamp for bargain list. Want: 4-element, 20 meter, full-size beam. WØLWZ, 1030 So. Dudley, Denver, Colo. 80226.

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STANDARD Coil turret tuner, 13 channels 27 Mc IF, late model, takeoff coil, instructions, 9.00; 630 chassis, 14BP4, above tuner, $12; pick-up deal only. Heathkit garage door opener, receiver, built, less transmitter, unused, $60; pickup only. RK-61 R/C tubes, $.50. Mac II with dry wet-cell, $10. Want 40-20 15-10 doublet traps, guns. Sam Bases, 19 Standish Ave., Yonkers, N.Y.

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304TLs for sale. These tubes have never been used. Limited number so order now! $35.00 each. Tri-Band rhombic antenna also available. 20, 15, and 10 meters. This antenna has given better results than any other commercial antenna I have had. Superior forward gain and tremendous front-to-back ratio. You will get optimum signal reports with this antenna. 2000 watts PEP. 600 ohms impedance. Low Q. Easy to match. Complete with copper wire, insulators, and termination resistor. Length approx. 300 ft. Only $44.00. Only one antenna, so order now! Russ Hilliard, 2020 Vineville Ave., Macon, Georgia.

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HEATH Comanche, expert wiring, excint condx, $53. Will trade Ameco converter CNS0-W, 14-18 Mc. IF., barely used, for CN144W. John, WA2PBN, 1035 Summit, Westfield, N.J.

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TV-FM Sweep generator and marker, Eico Model 368, in excint condx, $60 or your best offer. 3 Seaman St., New Brunswick, N.J. Tel: KI 5-4287.

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COLLINS 75S3, Station control 3124B, and 32S1 complete, $1100. KWS-1, 75A-4, and Johnson KW Matchbox with bridge, $1200. K2ISJ, Mat Courtenay, Riverhead, N.Y. Tel: 516-PA-7-2771.

WANTED: Antique tubes, xmtting and rcvg, BO fils OK. W2DYU, 277 Herrick Ave., Teaneck, N.J.

ELMAC A54H, PTT, Gonset Triband converter, 20 meter Hustler antenna, extras, $70; Vocaline 465 Mc. transceiver, $19. WA2WYH, 2366 E. 23rd, Brooklyn 29, N.Y. Tel: NI-8-2078.

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FOR Sale: Heath HX-10 "Marauder" transmitter, wired by professional technician, $290; Heath HW-12 80 meter SSB transceiver with HP-23 power supply, $130; Hallicrafters HA-1 "T.O. Keyer" with "El-Key" keying mechanism, $70; Hallicrafters CRX-3 aircraft monitor, $70. Colin Bradley, WA2YUN, 678 Averill Ave., Rochester 7, N.Y.

FOR Sale: New HA-5 Deluxe VFO, registration card, $60. New B & K Dynamatic VTVM, registration, $60. Millen 90801, never used, w/tubes, $50. National Converter Cabinet containing one each 1¼, 2 and 6-meter National Converters, for use NC-300 or 303, $75. 20 xtals, various 5005 to 5500 Kc, lot: $15. Will pay postage. W3PQK, 615 Market St., South Williamsport, Penna.

SELL: 75S-1, 32S-1 (solid state power supply homebrew), $800, or your best offer. W8EXQ, R. Baldwin, 5505 Harschel Dr., Toledo, Ohio.

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SALE: DX-100B. SX-99. In excint condx. RR #6, Box 1066, Kokomo, Ind.

SELL: 75A-4 and KWS-1.Perfect condition. Package deal only. $995 F.o.b. Add $50 if I have to crate. Phone 203-755-1121 day or 203-482-8931 nites. R. Corbett, 45 Prospect St., Torrington, Conn.

KW Pwr supplies. Gray Deluxe Bud 82 in. cabinet on casters with 3100V-1.2 KV transformer, 872-A sockets, 10,000 V insulated filament transformer and 500 Ma. choke, mounted on bottom. Meter and ventilating panels, top mounted blower and interlock switches. Reasonable. Sorry can't ship. Powerstat Type 136, 2.8 KVA 0-140 volts, new $38.00. Simpson 3½" rect. meters: 0-10, 0-50, 0-100, 0-750 Ma., 0-10 v., new $7.00 each. K1GPK, 5 Macomber Ave., Springfield, Mass. Tel. (evenings) (413) 782-2048.

SELL: DX-100 xmtr, in exclnt condx, manual, new tubes. Drake 2B recvr, spkr, Q-mult., xtal calibrator like new condx, both $350.00. Milt Freed, WB2GFI, 43 Greenway, New Hyde Park, N.Y.

UNSULLIED: 32V-3 $275; HQ-110 with free matching speaker, $169; Auto-Mate K5/50 keyer w/tubes and El-Key, $65; Amphenol RG-8/U (200 ft.), 9¢ ft. and RG-8/U polyfoam, 12¢ ft (60 ft). All cable is new. L. O. Stir, Jr., 626 2nd St., Portsmouth, Ohio.

SSB: Sell HT-37, immaculate, $250. Philbrook, 501 Westcott St., Falls Church, Va.

SELL: Frequency meter LM-14. In new condx. Has modulation, etc. Calibration book perfect. $69 F.o.b. No. Salem, N.H. Joe Harms, Mystery Hill, No. Salem, N.H.

SELL: SX-110, in excint condx, $115. WB2CHY, 670 West Shore Trail, Sparta, N.J. 729-5745.

KWM-2, new, 20 hours use, $850. 516F-2, $85. H. L. Dunlap, 199 Meadowbrook Dr., Marietta, Ga.

"HOSS Trader" Ed Moory offers brand new equipment on cash and no trade basis: New Galaxy 300, $199; Swan SW-240, $275; SB-33, $319; Hunter Bandit, $439; 75S-3, $529; Spitfire Linear, $139; NCX-3, $309; new TH-4 Hy-Gain beam and demo Ham-M rotor, $168; demo 2-B, $219; Demo TR-3 $459. Used bargains: KWM-2 in sealed carton, $939; demo 30L-1, $419; new Adcom 350-12 Dc supply, $99; 75S-1, $289; 32S-1, $399; 2-B $189; Galaxy III, $289; new Gonset GSB 201 linear, $249; new RG-8/U coax 8½¢ ft, SR-150, $399; SR-160, $239; 20-A, $89; LA-400, $49; HT-37, $279. Terms cash. "Ed Moory" Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WHitney 6-2820.

FOR Sale: TS-323/UR UHF freq. meter $125; BC-221-AL, $79; LM-13 $79; Collins 310B-3, $115. Vilagi, W8BBA, 9514, Johnnycake Ridge, Mentor, Ohio.

FOR Sale: Hammarlund HQ-170 with LW six-meter Preamp. Rig looks like new. Lowell K. Powell, P.O. Box 307, Ahoskie, North Carolina, W4VSJ.

FOR Sale: Heath Apache, $175; Mohawk, $180; Warrior, $190 or all for $500. All with manuals, all in excint condx and on the air at W3KDF, John H. Possehl, 957 Netherwood Dr., Norristown, Penna.

SALE: Gonset Communicator III, in excint wkg condx. Cables, mike, 5 xtals and bracket stand for mobile use included. $175. Julius Rothlander, 7427 Grant Ave., Pennsauken, N.J. WA2-TSC.

COLLINS 32V-3, in perf. condx. $275 F.o.b. Chicago. Dick Karl, W9DHT, 2836 Leland Ave., Chicago 25, Ill. Tel: KE 9-4655.

COLLINS Mobile rack #351D2 and mobile supply #MP-1, in xcint condx, $185. K1AMD, J. Katz, 10 Berkeley Ct., Hamden, Conn.

MOHAWK with 360° vernier dial for sale: $250. John Hawkes, VE3CIX, 703 Second St. E., Cornwall, Ont., Canada.

COLLINS S/Line 32S-1, 75S-2 noise blanker, c.w. filter. Make offer. W5HXW, 1234 Glen Cove, Richardson, Texas.

EXCITER Power supplies, triple output, 600V, 240V, 150V reg, rack mounting, $67.50. Contact Dick Tims, K6ZFS, 2239 Farringdon Ave., Pomona, Calif.

"KID From Texas" gives immediate delivery on the new SW-400 transceiver, SP-400, $65; NCX-3, $249; SR-150, $399; SX-101, $159; Valiant, $149; large stock of new equipment on hand, Drake, SBE, Gonset, Swan, National: 75A-1, $199; 75A-2, $229; 75A-3, $279; 75S-1, $299; 75S-3, $489. Send for new list of reconditioned equipment. SW-175, $159; SW-140, $149; SW-120, $149. Drake 2-A, $169; 2-B, $189; Viking II, $99; Ranger, $119; 20-A, $99; HQ-129X, $79; L-o-n-g trades on all transceivers. Bryan, W5KFT, Edwards Electronics, 4124-34th St., Lubbock, Texas. SW 5-2595.

BC-610E or later, wanted for personal use. Maybe modified and/or repairable. Please state condition and accessories. All offers answered. Will pick up East Coast or Mid West. R. J. Dorn, W2FMB, 34 Warren St., Whippany, N.J. Area Code 201-TEL 887-4511.

SELL: Irving Hiverter, 6-meter AM, CW, SSB transmitting converter. WA2HLW.

SWAP: 120 bass accordian, woman's size, in exc. condx. Cost $300. For gud condx ham receiver, any make. K3FOU, 6022 N. 13th St., Phila. 41, Penna.

APACHE: Most beautifully wired in existence, $165. Bill Zimmerman, K9MSN, 3825 Wilcox, Downers Grove, Ill.

SELL: Johnson Ranger II, in mint condx. $235.00. Woodie Weiss, 300 Joan Dr., Fairfield, Conn. 06432.

CASH for Drake TR-3 and AC supply. W5FTW, 5811 Elysian Fields Ave., New Orleans, 70122.

DX-100, all Heath modifications, ready for SSB, Mic, spare tubes; $120 F.o.b. Orange, Texas. Absolutely mint condx Mosley CM-1 ham rcvr, mtchg spkr, $135. Ron Goforth, P.O. Box 1373, Orange, Texas.

FOR Sale: Clegg Zeus and Interceptor. Used 100 hours, like-new condx, $900. Edward Pardocchi, 117 Woodbine St., Brooklyn N.Y. 11221, Tel: GI-5-0922, 8 PM to 11 PM except Mondays 6 PM to 8PM. WA2UXD.

WANTED: Pay premium prices for a Collins VFO 70E-14 and old callbooks 1930 and back. W5WB, 702B N. Fillmore St., Amarillo, Texas.

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1964 EDITION

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By A.R.R.L.

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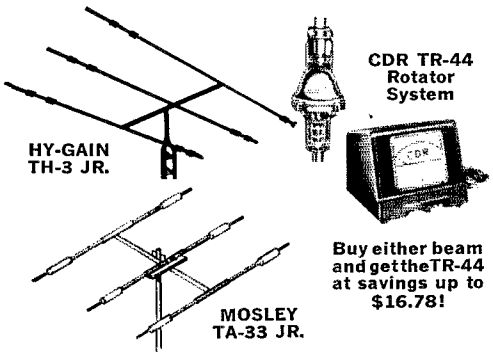

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86 SX 569-AF	mast section	2	7.50

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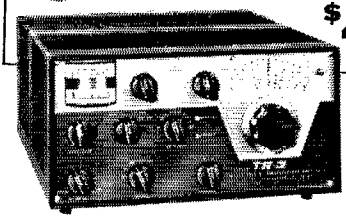

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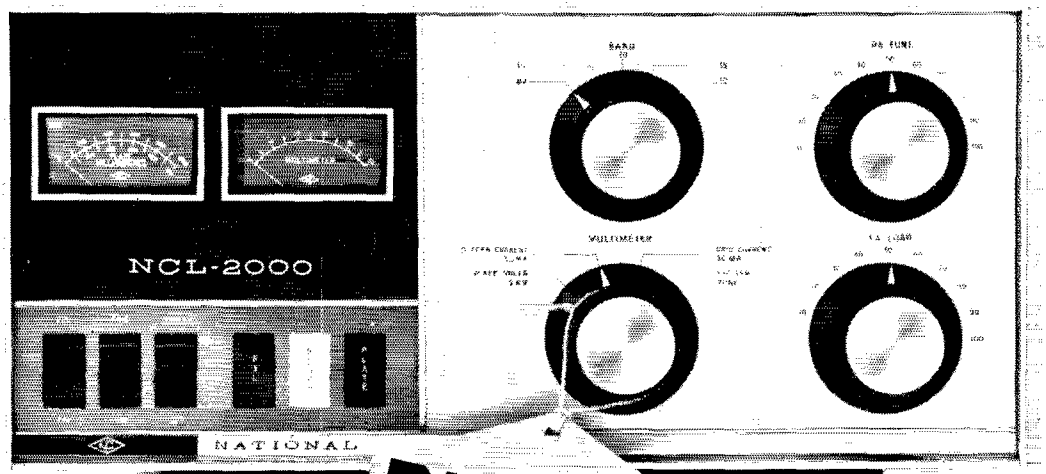

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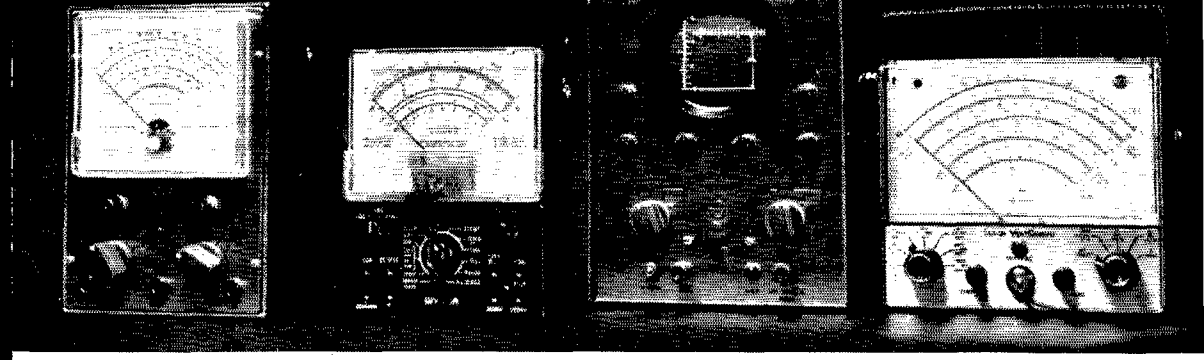

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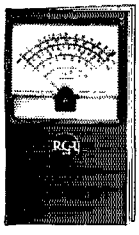

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