

March 1955

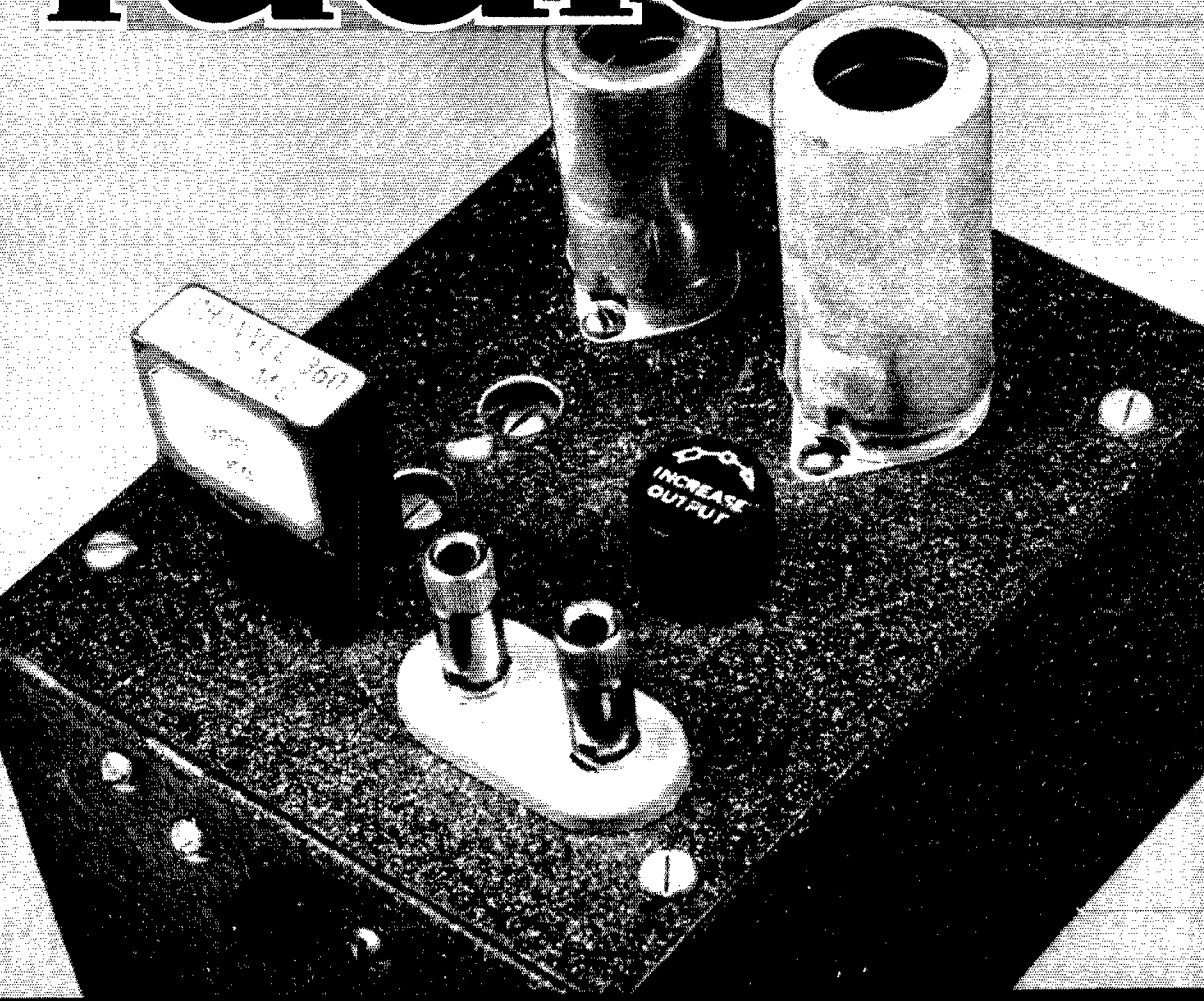
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devoted entirely to

amateur radio

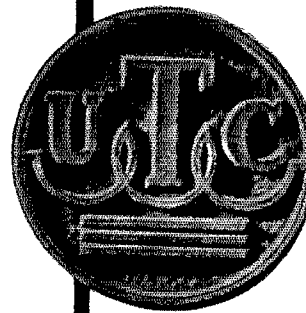


PUBLISHED BY THE AMERICAN RADIO-RELAY LEAGUE

THE STANDARD OF COMPARISON FOR OVER 20 YEARS

HIGH FIDELITY TRANSFORMERS

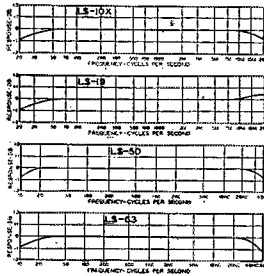
FROM STOCK... ITEMS BELOW AND 650 OTHERS IN OUR CATALOGUE B.



TYPICAL UNITS

LINEAR STANDARD series
These Standard audio transformers are made to the highest standards of accuracy and precision. They are designed to provide maximum efficiency and low distortion through winding and assembly. They will provide maximum response within the audio spectrum.

Hum balanced core structures and multi-tap secondary windings are secured from the extremely low inductive reactance. These are the most high fidelity units available. They are in stock types from 100 ohms to 50,000 ohms.

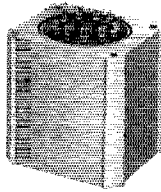


LS-10X Shielded Input
Multiple line (50, 200, 250, 500/600, etc.) to 50,000 ohms... multiple shielded.

LS-19 Plate to Two Grids
Primary 15,000 ohms.
Secondary 95,000 ohms C.T.

LS-50 Plate to Line
15,000 ohms to multiple line... +15 db. level.

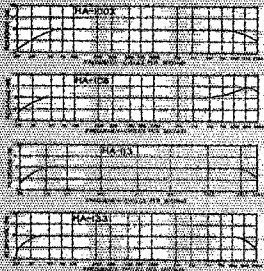
LS-63 P.P. Plates to Voice Coil
Primary 10,000 C.T. and 6,000 C.T. suited to Williamson, M.F. ul. linear circuits.
Secondary 1.2, 2.5, 5, 7.5, 10, 15, 20, 30 ohms. 20 watts.



CASE LS-1 LS-2 LS-3
Length 3 1/4" 4-7/16" 5-13/16"
Width... 2 3/4" 3 1/2" 5"
Height... 3 1/4" 4-3/16" 4-11/16"
Unit Wt. 3 lbs. 7.5 lbs. 15 lbs.

HIPERMALLOY series

This series provides virtually all the characteristics of the Linear Standard group in a more compact and lighter structure. The frequency response is within 1 db. from 30 to 20,000 cycles. Hipermalloy nickel iron cores and hum balanced core structures provide minimum distortion and low hum pickup. Input transformers, maximum level +10db. Circular terminal layout and top and bottom mounting.

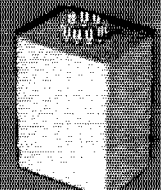


HA-100X Shielded Input
Multiple line to 50,000 ohm grid... tri-alloy shielding for low hum pickup.

HA-108 Plate to Two Grids
15,000 ohms to 135,000 ohms in two sections... +12 db. level.

HA-113 Plate to Line
15,000 ohms to multiple line... +12 db. level... 0 DC in primary.

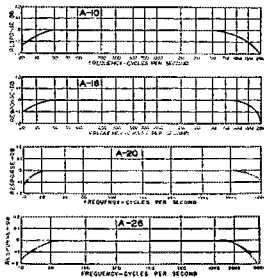
HA-133 Plate (DC) to Line
15,000 ohms to multiple line... +15 db. level... 8 Ma. DC in primary.



CASE HA-108 HA-113 HA-133
Length 3 1/4" 3 1/4" 3 1/4"
Width... 2 3/4" 2 3/4" 2 3/4"
Height... 3 1/4" 3 1/4" 3 1/4"
Unit Weight 2 lbs. 2 lbs. 2 lbs.

ULTRA COMPACT series

UTC Ultra Compact audio units are small and light in weight, ideally suited to remote amplifier and similar compact equipment. The frequency response is within 2 db. from 30 to 20,000 cycles. Hum balanced coil structure plus high conductivity die cast case provides good inductive shielding. Maximum operating level is +7db. Top and bottom mounting as well as circular terminal layout are used in this series as well as the ones described above.

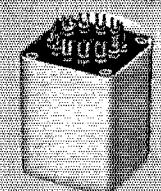


A-10 Line to Grid
Multiple line to 50,000 ohm grid.

A-18 Plate to Two Grids
15,000 ohms to 80,000 ohms, primary and secondary both split.

A-20 Mixing Transformer
Multiple line to multiple line for mixing mikes, lines, etc.

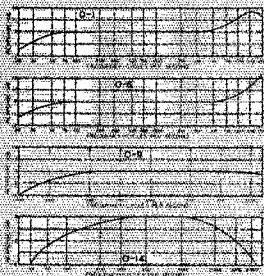
A-26 P.P. Plates to Line
30,000 ohms plate to plate, to multiple line.



A CASE
Length 1 1/2"
Width 1 1/4"
Height 2"
Unit Weight 1/2 lb.

CONDENSER series

UTC Condenser units are ideal for portable equipment which are similar to the Condenser units are extremely compact and fully integrated and sealed in a rugged die cast case providing the optimum response within the audio spectrum. Maximum operating level is +7db. These units are also available in our stock series which provide plug-in case. The plug-in case provides plug-in terminals for easy change into audio ally shielded for high hum shielding.

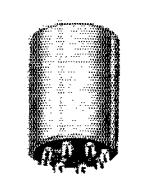


C-1 Line to Grid
Primary 50, 200/250, 500/600 ohms to 50,000 ohm grid.

C-6 Plate to Two Grids
15,000 ohms to 95,000 ohms C.T.

C-9 Plate (DC) to Line
Primary 15,000 ohms. Secondary 50, 200/250, 500/600.

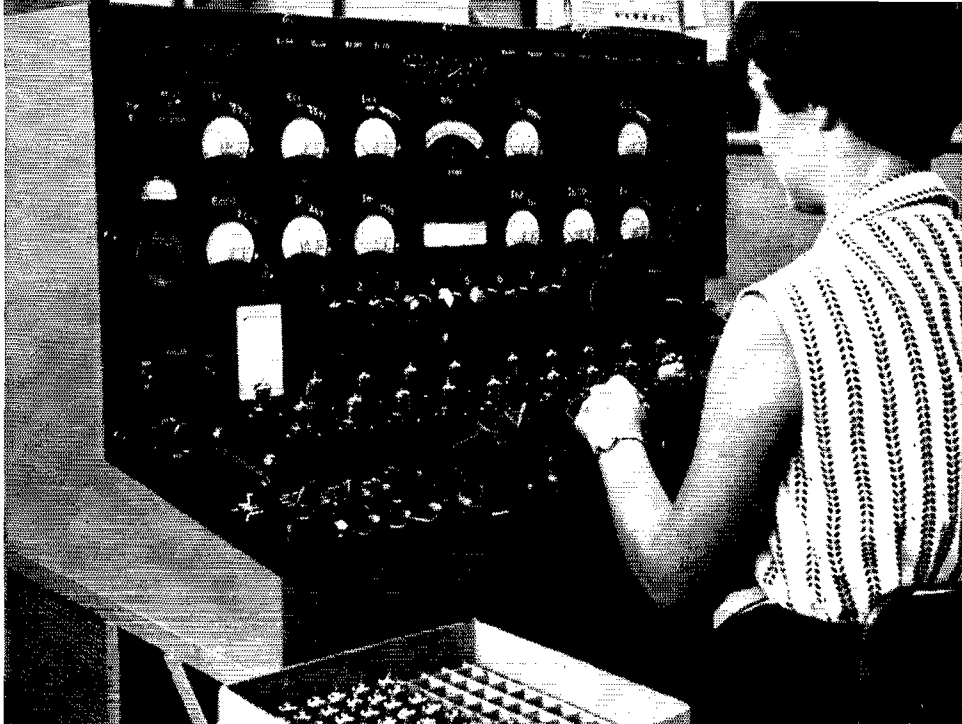
C-14 50:1 Line to Grid
Primary 200 ohms. Secondary .5 megohm for mike or line to grid.



DUNCER CASE
Diameter 7/8"
Height 1-3/16"
Unit Weight 1 oz.

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Instrument dials say if the tube plate current is correct . . . if transconductance equals the prescribed value . . . if no undesirable reverse current flows in the grid . . . if there is no tube short, open circuit, or vacuum leak.

G-E tubes that pass these individual tests, must run the gauntlet of quality-control checks for over-all satisfactory performance. Are microphonics at a minimum? Does life-testing leave tube characteristics unchanged? Only if the

answers to these and many other questions are "yes" can G-E tubes be cartoned and shipped.

The tubes your G-E tube distributor sells are the best that precision manufacture, rigid inspection, and thorough testing can produce. Install them with confidence! *General Electric Co., Tube Department, Schenectady 5, New York.*

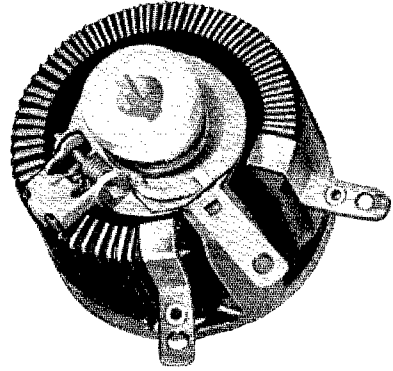
★ ★ ★

General Electric congratulates the winner of the 1954 Edison Award, Benjamin S. Hamilton, W6VFT, La Mesa, California. The judges named Mr. Hamilton as the amateur whose achievement was most noteworthy, because he provided San Diego County, California, with "an outstanding Civil Defense and disaster-emergency radio network". Recognition given to Award-winner W6VFT and to others whom the judges cited, was equally a tribute to the public-spirited efforts of radio amateurs everywhere.

GENERAL  **ELECTRIC**

MALLORY HAM BULLETIN

Mallory Type "K" Rheostats for 25 to 500 watts



In the course of experimental work, you occasionally run into a spot where you need a power rheostat or high-wattage voltage divider. When you do, we believe that Mallory Type "K" Vitreous Enamel Resistors will give you performance comparable to that which you have been getting from other Mallory wire-wound controls in lower wattages. This series is available in a complete range covering ratings from 25 to 500 watts.

One of the first things you will notice about the Series "K" control is its smoothly operating sliding contact, mounted snugly in its unique, spring-loaded and hinged carrier.

The firm direction of force exerted by this assembly eliminates completely the problem of "rocking" contacts which has plagued power control users for years. The specially compounded copper-graphite contact lubricates the resistance element, at the same time that it reduces the contact resistance between the two parts. A flexible pigtail connection provides a direct electrical path between the contact and the center collector mechanism.

Perhaps the most outstanding feature of this whole assembly, however, is its construction which allows the contact to be lifted from the resistance element for cleaning purposes without distorting or disturbing the applied force. Incidentally, the contact is almost as easy to replace as the brushes in a small electric motor.

The spring collector and shaft assembly is spring-

loaded to assure virtually constant electrical conductivity for the life of the control. In addition, all Series "K" controls above 25 watts are equipped with a copper-graphite buffer plate as a part of the collector assembly to reduce erosion as well as assure positive electrical contact. The shaft is centered and insulated from the electrical circuit by means of a high quality steatite bushing.

The body of each Series "K" control is formed from electrical grade porcelain and each turn of the resistance winding is uniformly wound on this form to provide an even progression of resistance change vs. shaft rotation. A non-alkaline, non-hygroscopic enamel is applied carefully to the winding, and then heated to a hard, glass-like finish for maximum protection to the vulnerable parts of the winding.

The smaller sizes, 25 through 150 watt, are equipped with conventional threaded bushings for panel mounting; sizes above 150 watt are equipped with set screws. All sizes have panel locating lugs which may be adjusted for universal mounting. Suitable knob and dial plate are supplied with each.

A brochure containing dimensional drawings of these controls, plus catalog listings, has been prepared. For your copy, write to us at Box 1558, Indianapolis 6, Indiana. Meanwhile, check with your Mallory Distributor, and take a good look at these power controls. Their construction alone will inspire confidence in their ability to operate properly for a long, long time.

P. R. MALLORY & CO. Inc.
P. O. Box 1558
INDIANAPOLIS 6 INDIANA

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MALLORY

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S-53A The finest small communications receiver built and ideal where maximum performance is required in small space. Several steps better than the S-38C, but not quite up to larger S-40B. Covers Broadcast Band 540-1630 kc plus four short-wave bands covering 2.5-31 and 48-54.5 Mc.

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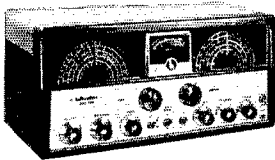


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- Provisions for coaxial output fitting.
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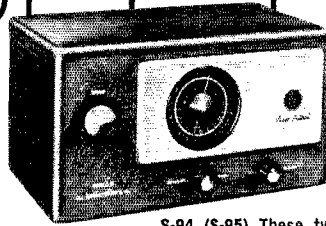
Model SX-96 Selectable Sideband Receiver

- Covers Broadcast 538-1580 kc plus three S/W 1720 kc-34 Mc.
- Double conversion with selectable crystal controlled second oscillators.
- Selectable sideband reception of both sup-

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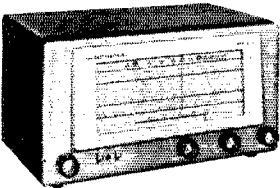
- CW operation with AVC on. Delayed AVC.
- Calibrated bandspread—"S" meter—double superhet. Precision gear drive dial system.
- 10 tubes, 1 rectifier and voltage regulator.

COMPLETE



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HAM



S-38D Low cost unit with high priced performance over Broadcast Band 540-1650 kc plus three short-wave bands from 1650 kc-32 Mc. Electrical bandspread operates over large easy-to-read dial. Headphone tip jacks on rear and powerful built-in PM speaker. Oscillator for reception of code signals. Four tubes plus rectifier. 105/125 V. 50/60 cycle AC/DC.

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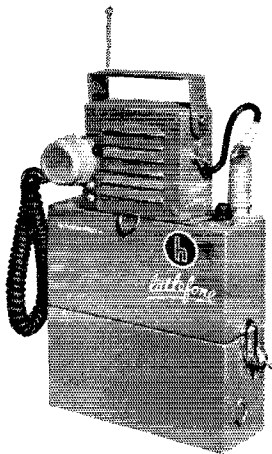
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Section Communications Managers of the ARRL Communications Department

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 QNT. **ARRL Field Organization station appointments** are available in the areas shown to qualified League members. These include ORS, OES, OPS, OO and OBS. SCMs also desire applications for SEC, EC, RM and PAM where vacancies exist. *All amateurs in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).*

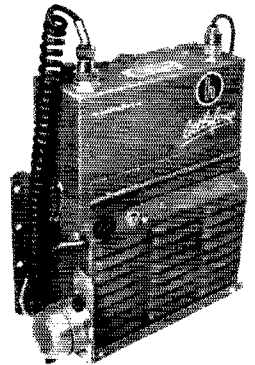
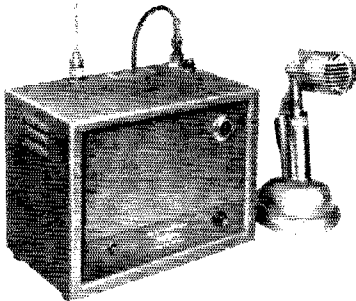
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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the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

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

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

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

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



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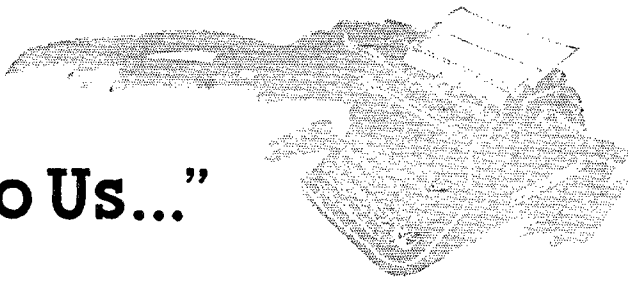
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"It Seems to Us..."



FCC's 20TH ANNIVERSARY

The Federal Communications Commission last year marked its 20th anniversary of existence as the federal agency regulating all forms of radio and wire communication.

Old-timers will recall that most radio matters were administered by the Department of Commerce prior to 1927; the Radio Act of that year created a Federal Radio Commission, with duties obvious from its name. Our affairs were handled by FRC until the Communications Act of 1934 designated a Federal Communications Commission to take over radio regulation from FRC, and to have in addition responsibility for wire telephone and telegraph matters. The 1934 change had no particular effect on amateurs or on radio in general, for it was simply administration by substantially the same Commission and staff as FRC. The anniversary seems an appropriate one to look back to our regulatory status two decades ago.

The new Commission inherited from FRC (in reality, from itself!) a fairly sound set of amateur regulations — they having been completely revised, in consultation with the League, a year earlier. It was also an extremely simple text; that the one printed page of regulations existing slightly more than 20 years ago has grown to more than 10 pages of fine print today is a measure of the increasing complexity of even the amateur phase of the art.

In June, 1934, there were 46,390 amateur radio operators; today there are approximately 125,000. In those days licenses were issued in Classes C, B or A for three-year terms, a relatively new set-up from the earlier one-year licenses of the generally-comparable Temporary, First Class, and Extra First Class tickets. (Comparable, that is, except for the Temporary certificate, which like our present Novice license had a one-year nonrenewable term.) There were 32 quarterly examination points, compared with 61 at present (plus thousands more volunteer amateur examiners under our current procedures.)

The code speed was 10 w.p.m. and you had to copy the text in longhand — no printing. One year's experience was required before taking the Class A test, which license entitled

you to the delights of voice operation in 3900-4000 (that's as big as the 'phone band was) and 14,150-14,250 kc. A commercial 'phone license waived the technical exam. Flunking any exam made you wait 90 days before tackling it again — it's now 30 days. The power limit, as always, was a kw. If you used any of the bands below 14.4 Mc. you had to put a filter on your power supply, but raw a.c. was permissible above that point. It is worthy of note that we had "gone d.c." for even the lower bands only a few years earlier. You could operate mobile only above 56 Mc. (meaning, in effect, the 56-60 Mc. band), and *only* in aircraft — there was no mobile operation as we know it today. The license automatically granted portable privileges in any band, but this was also a brand new regulation; only a year earlier separate portable licenses and calls were required for such operation.

The bands were:

1715-2000 kc.
3500-4000 kc.
7000-7300 kc.
14,000-14,400 kc.
28,000-30,000 kc.
56,000-60,000 kc.

You could also operate anywhere above 110 Mc.; no one else was using those "microwaves" in 1934. But it was pretty tough to generate any r.f. with gear then available; even to get to 56 Mc. a lot of hams were removing "lossy" bases from tubes.

For 'phone operation any amateur could use:

1800-2000 kc.
28,000-28,500 kc.
56,000-60,000 kc.

with the Class A boys additionally entitled to 75- and 20-meter voice. You could transmit music if you were engaged in bona fide tests of modulation gear.

In the interests of strict accuracy, we should point out that amateurs were assigned one additional band: 400,000-401,000 kc. To our knowledge no amateur ever had a QSO there. As the story goes, the band was earmarked for us, years and years ahead of any possible practical use of that territory, because that frequency was calculated, (erroneously, as it turned out) as one for which the parabolic

reflector of the common electric heater could be used for beam purposes.

It should be noted that the few differences between the over-all band limits above and those we have today are largely a result of international regulatory agreements and not arbitrary rulings by the Commission; FCC has always assigned amateurs in this country practically every kilocycle permitted under international treaty. In the formation of the U. S. viewpoint toward international regulation the Commission has been an unqualified supporter of the amateur, as of course have most other Government agencies concerned. In this field during the last twenty years we recall particularly the 1936 FCC hearings, looking toward the Cairo world conference of 1938, and the 1944 hearings, looking toward the Atlantic City conference of 1947, at both of which — as in every conference since 1927 — amateur radio was practically on trial for its life. We know, with pardonable pride, that the testimony put into the records on behalf of amateur radio established pretty thoroughly our right to continued use of our frequencies because of our record of operation in the public interest, convenience and necessity. Yet many of the contributions of amateur radio are intangibles, and it is indeed a rare group of men who are possessed of sufficient wisdom and vision to weigh these against the hard and cold facts and statistics of the commercial users, and come up with the answer they have.

The progress that amateur radio has made these past twenty years could never have been made without the help and cooperation of a Federal agency, representing the established Government viewpoint toward encouragement of scientific endeavors on the part of its citizens as an advancement of the national interest and culture. To the Commission as an agency, the League extends its sincere appreciation. Equally as important, to the many individuals on the staff who have over these years worked in our interest, the League on behalf of all amateurs extends its warm thanks.

OUR COVER

Nowadays accurate frequency checking is an important responsibility of every amateur. The secondary frequency standard shown on this month's cover is designed for just that purpose, as well as being compact and economical. It is capable of supplying 50-kc. check points throughout the communications spectrum. In addition, it can be used with high-frequency crystals for identification of the points. The unit is described in detail starting on page 14 of this issue in "Frequency Marker with 50-Kc. Intervals."

The author, Beverly Dudley, ex-9BR, is now editor of *The Technology Review* at the Massachusetts Institute of Technology. A former ARRL staff member, Mr. Dudley was an Assistant Technical Editor of *QST* just twenty-five years ago!

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted as of February 15th. Changes will, as usual, be announced by W1AW bulletins. Figures are megacycles. A0 means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.c.w.; A3 is a.m. 'phone; A4 is facsimile; A5 is television; F1 is frequency-shift keying; n.f.m. designates narrow-band frequency- or phase-modulated radiotelephony; and f.m. means frequency modulation, 'phone (including n.f.m.) or telegraphy.

3,500-4,000	— A1
3,500-3,800	— F1
3,800-4,000	— A3 and n.f.m.
7,000-7,300	— A1
7,000-7,200	— F1
7,200-7,300	— A3 and n.f.m.
14,000-14,350	— A1
14,000-14,200	— F1
14,200-14,300	— A3 and n.f.m.
14,300-14,350	— F1
21,000-21,450	— A1
21,000-21,250	— F1
21,250-21,450	— A3 and n.f.m.
26,960-27,230	— A0, A1, A2, A3, A4, f.m.
28,000-29,700	— A1
28,500-29,700	— A3 and n.f.m.
29,000-29,700	— f.m.
50-54	— A1, A2, A3, A4, n.f.m.
51-54	— A0
52.5-54	— f.m.
144-148	} A0, A1, A2, A3, A4, f.m.
220-225	
420-450	} A0, A1, A2, A3, A4, A5, f.m.
1,215-1,300	
2,300-2,450	} A0, A1, A2, A3, A4, A5, f.m., pulse
3,300-3,500	
5,650-5,925	
10,000-10,500	
21,000-22,000	
All above 30,000	

¹ Peak antenna power must not exceed 50 watts.

In addition, A1 and A3 on portions of 1,800-2,000, as follows:

Area	Band, kc.	Power (watts)	
		Day	Night
Minn., Iowa, Mo., Ark.,	1800-1825	500	200
La. and east, including	1875-1900		
Puerto Rico and Virgin			
Isla.			
N. and S. Dak., Neb.,	1900-1925	500*	200*
Colo., N. Mex., and west,	1975-2000		
including Hawaiian Ids.,			
Texas, Okla., Kansas	1800-1825	200	75
	1875-1900		

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled and have a maximum power input of 75 watts.

3,700-3,750	A1	21,100-21,250	A1
7,175-7,200	A1	145-147	A1, A2, A3

Technician licensees are permitted all amateur privileges in the bands 220 Mc. and above.

A Compact Dual Beam for 20 and 40 Meters

Two-Band Operation with Simplicity

BY L. J. JENSEN,* WØMIQ

• WØMIQ has built a simple compact dual rotatable beam for 20 and 40 meters. After preliminary adjustments, bands can be changed instantly at the flip of a switch. The system is fed with a single coax transmission line with low s.w.r. on both bands. The boom is only 15 feet long, and the elements 24 feet, so it will fit in almost any backyard.

THE recent revival of loaded antennas has not only made it possible for the ham with a small backyard to put up a rotatable array for 20 meters, but it has also made a 40-meter parasitic beam mechanically feasible for the average ham. A logical development of this principle is the use of a single set of elements for two-band operation, simply shorting out loading coils, or portions of them, for the higher-frequency band. Element spacing is not a problem because a spacing of approximately 0.1 wavelength at 40 meters, where maximum gain occurs with the parasitic element tuned as a director, becomes 0.2 wavelength spacing at 20 meters. This spacing is close to optimum if the parasitic element is adjusted as a reflector. The loading coils can be shorted out by means of relays.

The photographs and sketches show the construction of a two-element beam covering 20 and 40 meters. The boom is 15 feet long, and the elements are 24 feet long. The array is easily turned with a TR-4 TV rotator.

Loading short elements, especially when the

elements are close-spaced, results in a high- Q circuit in which the reactance will vary rapidly with a change in frequency. Thus any matching adjustment will hold over only a relatively small portion of the band. This can be alleviated to a considerable degree by using a pair of conductors for each element, and fanning them, as shown in the photographs. This, in effect, increases the size of the conductor. The curves of Fig. 1, made with a Millen s.w.r. bridge, show that with a match at the center of the 7-Mc. band, the s.w.r. does not exceed 1.75 to 1 at the ends of the band. At 14 Mc., there is the added benefit of wide spacing. These curves were made with a single matching adjustment for both bands.

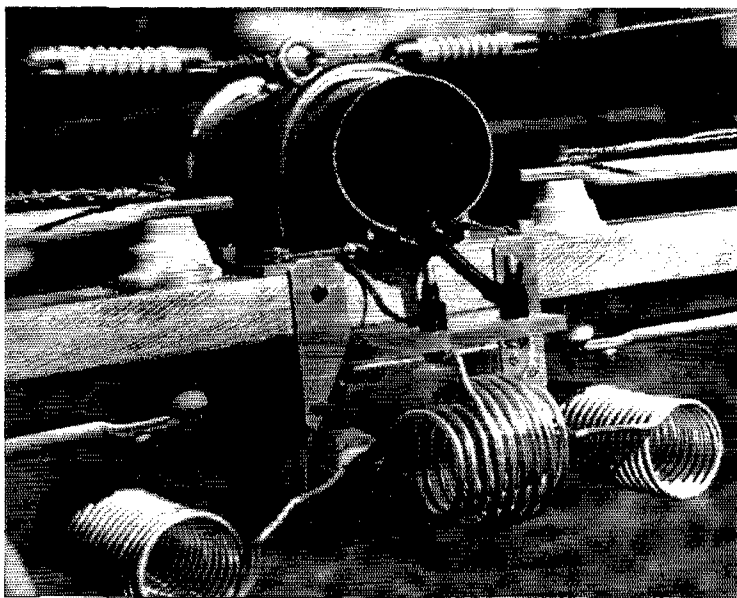
The transmission line (52-ohm coax) is inductively coupled to the center loading coil. On 20 meters, the radiator element is shortened only sufficiently to permit the use of enough loading-coil inductance to provide adequate coupling to the link. Loading inductance is added to make the electrical length of the elements suitable for 7-Mc. operation. A pair of relays shorts out the 40-meter loading coils in each element when operating on 20 meters.

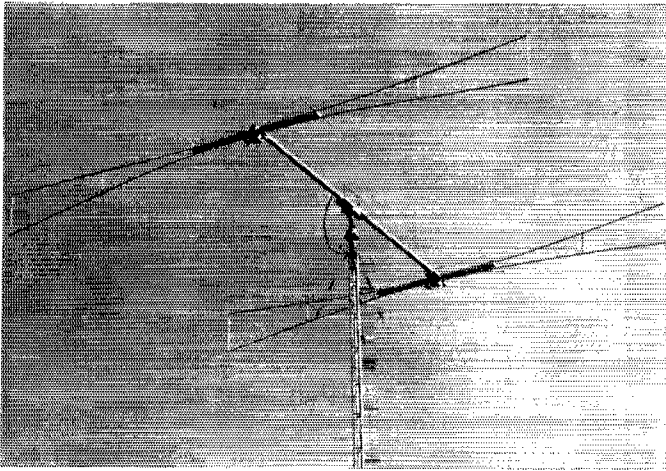
Construction

The boom is a 15-foot section of 3-inch diameter ST-61 aluminum tubing with $\frac{1}{16}$ -inch wall. A guy wire, connecting the ends of the boom, runs over a truss at the center of the boom to add rigidity. The boom is fastened at its center to a mounting, shown in one of the photographs, by means of two large U bolts. This mounting permits the boom to be tilted in either direction for adjustment of the loading coils merely by re-

*20 West 9th St., Kansas City 5, Mo.

◆
This view shows the assembly at the driven-element end of the boom. Except for the link winding and coax-cable connection to it, the assembly at the parasitic end of the boom is identical. Shielded relay control wires also are run through the boom, emerging through a hole in the boom, and entering the relay box at the rear. Vertical guys are attached to the insulators at the ring-bolt in the end of the boom, and horizontal guys to the inner ends of the upper-element conductor. The metal base and angles between the boom and redwood support help to stiffen the mechanical joint. The outer braid of the coax cable is connected to the boom. Weather-proof tape is used to seal the coax cable and reduce corrosion at electrical joints.
◆





◆
 The elements of this dual 20-40-meter beam are only 24 feet over all, and the boom is 16 feet long. The elements are fanned for broadbanding.
 ◆

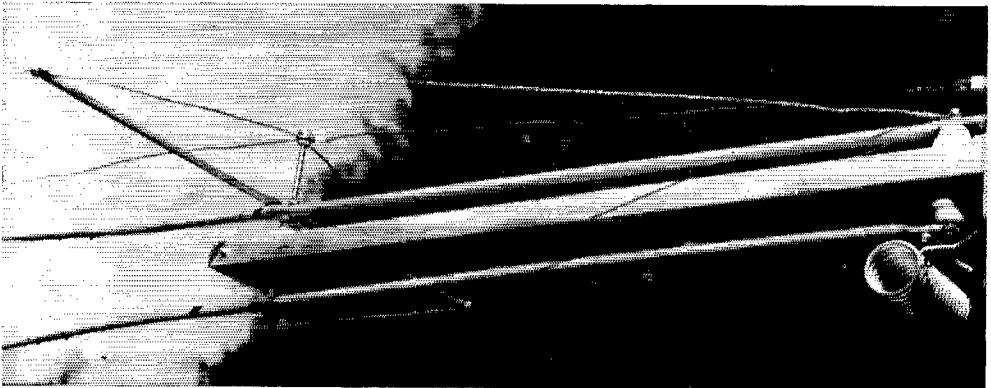
moving one of the hinge bolts or the other.

Similar U bolts at each end of the boom support a mounting for the antenna elements. These mountings are of redwood, $1\frac{1}{8}$ inches thick, $3\frac{3}{4}$ inches wide and 7 feet long.

Each half element is made up of two 12-foot lengths of ST-61 aluminum tubing, $\frac{1}{2}$ inch in diameter with $\frac{1}{16}$ -inch walls. At each of the inner ends, the tubing is flattened and drilled for the threaded rod of a feed-through insulator. At the outer ends of the supports, the elements are attached to similar feed-through insulators by means of clamps fashioned from sheet metal. The threaded rod of the outer feed-through insulator is made to extend about 6 inches above the top of the insulator. This extension serves as a vertical truss in bracing the elements. Also attached to this insulator with a sheet-metal strap is a 30-inch length of $\frac{1}{2}$ -inch aluminum tubing that will serve as a horizontal truss. The ends are guyed to the vertical truss at the feed-through insulator.

The two conductors of each element are fanned out at the ends so that their tips are separated 30 inches. The spreaders are made of the same material as the elements, and are flattened at the

Each element is guyed both vertically and horizontally. The vertical truss is a brass rod extending above the outer feed-through insulator. The horizontal truss is a piece of aluminum tubing attached to the same insulator with a clamp. Similar clamps anchor the element conductors to the insulator.



ends and drilled for screws that fasten them to the elements. The tips of the elements are similarly flattened and drilled, but the elements are not flattened for the short intermediate spreaders, since this would weaken the elements. The short spreaders are placed as shown in the photograph.

A system of guy wires is used to brace the elements both vertically to prevent drooping, and horizontally to reduce whip. Copper-clad stranded steel guy wire used in TV work is good material for these guys. The guy wires are insulated from the boom, but not from the elements. On each side of the boom, a guy wire runs from a strain insulator fastened to the boom, over the truss at the outer feed-through insulator, and thence to the upper bolt at the short spreader.

The horizontal guys run from the stand-off insulators at the inner ends of the elements to the horizontal truss, and thence to a bridle at the short spreader. This bridle is simply a piece of guy wire loosely spanning the spreader.

The relays that short out the 40-meter loading coils are enclosed in standard $3 \times 4 \times 5$ -inch aluminum boxes. The relays should be of the antenna-changeover type with good insulation and heavy-current contacts, such as the Ad-

vance AT/2C. I was able to pick up some surplus 28-volt models at \$1.29 each,¹ operating them from a 100-ma. selenium-rectifier supply.

Leads to the loading coils are brought out through 1-inch ceramic feed-through insulators set in the sides of the boxes. These feed-through insulators also serve as mountings for all coils except the link coil. The latter is fastened to a piece of ¼-inch polystyrene sheet attached to the red-wood support for the elements. The mounting screws also serve as terminals for connecting the coax line to the link. The coax line is fed through the boom to a point near the center where it leaves through a hole to an anchorage on the mast.

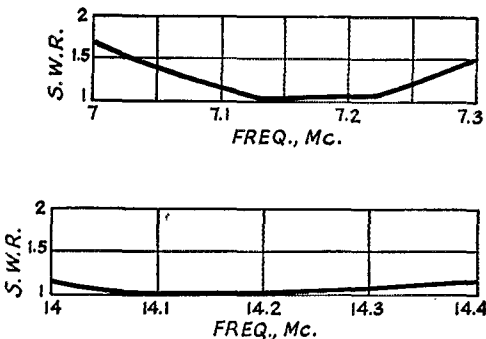


Fig. 1 — Curves showing s.w.r. measured on transmission line feeding the dual beam.

The loading coils shown are wound with heavy-duty aluminum clothesline, although ⅛-inch to ⅜-inch copper tubing, or No. 8 copper wire could be used. The 20-meter loading coil in the driven element has 8 turns 1½ inches in diameter, turns spaced approximately the diameter of the conductor. The link coil has 5 turns, similarly spaced, 2 inches in diameter. The 40-meter loading coils in the driven element each have 20 turns 1½ inches in diameter. In the parasitic element, the 20-meter coil has 11 turns, and the 40 meter coils 18 turns each, all 1½ inches in diameter.

After completion, the entire beam was sprayed with two coats of acrylic or plastic lacquer. All exposed electrical connections were first covered with plastic tape and then sprayed.

Adjustment

The parasitic element should be adjusted as a reflector for 20-meter operation first, with the 40-meter loading coils shorted out and the driven element open at the center. In my case, it was made 5 per cent electrically longer than a half wave for 14.2 Mc. With a grip-dip meter coupled to the 20-meter loading coil, the resonant frequency should be adjusted to 13.5 Mc. by squeezing or spreading the turns as necessary. If this does not suffice, it may be necessary to add or subtract a turn. Then, with the shorts removed from the 40-meter loading coils, the coils should be adjusted for element resonance at 7.5

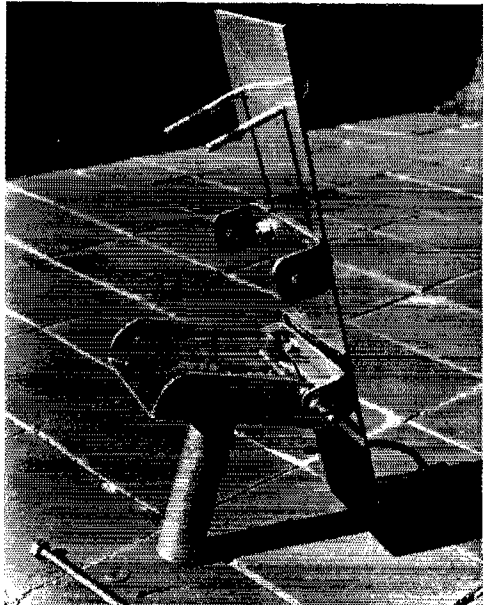
Mc. This gives an electrical length about 4 per cent shorter than a half wavelength — a proper length for operation as a director.

Attention should now be turned to the driven element. With the 40-meter loading coils shorted out, the output terminals of a 52-ohm s.w.r. bridge should be connected to the link terminals, and a suitable r.f. source fed to the bridge. Following recommended procedure,² the 20-meter loading coil should be adjusted for minimum s.w.r. Then, with the shorts removed from the 40-meter loading coils, these coils should be adjusted similarly.

The 52-ohm coax line may then be connected and a recheck of the match made by connecting the bridge to the transmitter end of the line. Adjustment should be made as close to the final elevation as possible. If the adjustment as checked with the s.w.r. bridge at the input of the line does not hold after the array has been put in place, the s.w.r. measurements will show the frequency of minimum s.w.r., and thus the direction in which the driven element should be retuned.

If greater f.-b. ratio is desired, the procedure will be the same, but it should start out with a greater electrical length (lower resonant frequency) for the reflector, and a shorter electrical length (higher resonant frequency) for the director.

In conclusion, I want to thank WØPUB whose ever-ready strong arm enabled countless experiments to be completed with success.



The tilting mount for the boom. The stub is an 8-inch piece of 1½-inch pipe welded to a channel of ½-inch steel. This channel is 8 inches long, 6 inches wide, and the sides are 2 inches high. The mounting plate (with U bolts in place) is of ¼-inch hardened aluminum, 6 inches wide and 24 inches long. The U-shaped strips attached to the mounting plate are of steel strip ¼-inch thick and 2 inches wide, case-hardened after processing and fitting. The pins are ⅜-inch steel with nuts welded at one end and cotter-pin holes at the other. The boom may be tilted in either direction.

¹ Potter Radio Co., 1314 McGee St., Kansas City, Mo.

² Measurements Chapter, *ARRL Handbook*, 30th edition, et seq.

Frequency Marker with 50-Kc. Intervals

A Compact, Low-Cost Unit Using Surplus Crystals

BY BEVERLY DUDLEY *

• Here is a frequency standard built around the low-frequency FT-241A crystals, and using a multivibrator to obtain markers every 50 kc. throughout the communication spectrum. The oscillator circuit is one that will work with high-frequency crystals as well, and thus provide spot checks for identifying the 50-kc. harmonics.

A FREQUENCY MARKER providing spot frequencies at intervals of 50 kc. per second is a useful piece of measuring equipment for the radio amateur, not alone because it permits accurate determination of the amateur band limits, but because it provides means for calibrating receivers, variable-frequency oscillators and similar gear. The frequency marker described in this article provides crystal-controlled marker frequencies at 50-kc. intervals up to at least 30 Mc.

Power to operate the unit is taken from the 60-cycle line. The frequency marker contains its own power supply, consisting of a 6.3-volt 1-ampere filament transformer, and a half-wave selenium rectifier and resistance-capacitance smoothing filter comprised of C_1 , C_2 , and R_1 . Protection against short circuits to ground is provided by the ground coupling capacitor, C_{12} , in the output circuit.

The crystal oscillator uses a 6AK5 pentode in an electron-coupled Pierce oscillator circuit, with the screen of the pentode serving as the plate of an equivalent triode while output to the multivibrator is taken from the plate of the pentode. The frequency of oscillation can be adjusted over a small range by means of the variable capacitors C_3 and C_4 . Capacitor C_4 is used to raise the frequency, whereas C_3 lowers the frequency slightly. Both of these capacitors are mounted on a single ceramic base as a double trimmer, and each has a capacitance range of from 10 to 170 μf . A series capacitor, C_5 , was used to reduce the

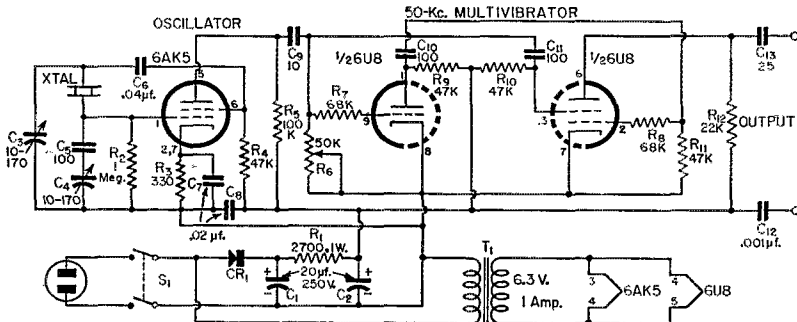


Fig. 1 — Circuit of the 50-kc. frequency marker. Resistors are $\frac{1}{2}$ -watt composition unless otherwise specified. Capacitances in μf , except where specified otherwise.

C_1 , C_2 — Electrolytic.

C_3 , C_4 — Dual ceramic-mounted trimmer.

C_5 , C_9 , C_{10} , C_{11} , C_{13} — Mica.

C_6 , C_7 , C_8 , C_{12} — Ceramic or paper.

CR1 — 75-ma. selenium rectifier.

S1 — D.p.s.t. slide.

Except for the 115-volt a.c. source of power, it is entirely self-contained in a standard metal case, 3 by 4 by 5 inches in size. It uses a low-frequency crystal, such as are now readily available on the surplus market in FT-241 or FT-243 holders for two dollars or less.

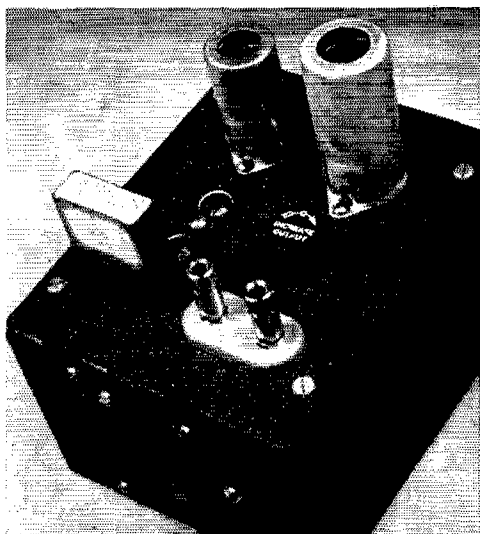
Circuit

As the wiring diagram, Fig. 1, shows, the marker comprises a 6AK5 crystal-controlled oscillator, followed by a 6U8 triode-pentode frequency-controlled multivibrator adjusted to provide marker frequencies at intervals of 50 kc. Output is ample for communication-type receivers up to 30 Mc.

maximum capacitance of C_4 to about 60 μf . Output from the plate of the 6AK5 is fed to the grid of the triode section of the 6U8 multivibrator.

The frequency divider consists of an electron-coupled multivibrator. When free running (i.e., not controlled by the crystal oscillator) its frequency range extends from about 30 to 80 kc., depending upon the setting of the frequency-adjusting resistor, R_5 . When the multivibrator is frequency controlled to operate at 50 kc., R_5 has a value of about 23,000 ohms. Aside from the feature of electron coupling, which virtually eliminates effect of load on operation of the frequency marker, the only unusual feature of the multivibrator circuit is the use of series resistors in the grid circuits. These are not necessary but

* 22 Temple Street, Belmont 78, Mass.



This unit generates frequency marker signals at 50-kc. intervals, using surplus crystals in the 400- to 500-kc. region as the primary frequency source. In this front view the oscillator tube is at the left rear and the multivibrator tube at the right.

are used as an aid in producing a reasonably good square-wave output at 50 kc.

Adjustment

The oscillator goes into oscillation easily when the crystal is plugged into its holder. The multivibrator is, perhaps, easiest adjusted by coupling its output to a communications-type receiver and varying the resistance of R_6 until marker frequencies are produced at intervals of 50 kc. This adjustment is most easily done in the broadcast band, or a similar low-frequency band of a multiband receiver. Proper adjustment is that for which the note in the receiver is sharp and clean. It will probably be found that the desired condition of operation can be obtained with R_6 adjustable throughout a small range of angular rotation. If adjustment is made by means of a receiver alone, the midpoint of this angular rotation is probably the best adjustment, but a check at the high-frequency end of the receiver is advisable.

If a cathode-ray oscilloscope is available, it can be used to permit the output to be adjusted more nearly to a square wave. This is done by connecting the



Power-supply components are at the top in this interior view of the frequency marker. Most of the oscillator and multivibrator circuit components are mounted on the Vector sockets for the two tubes.

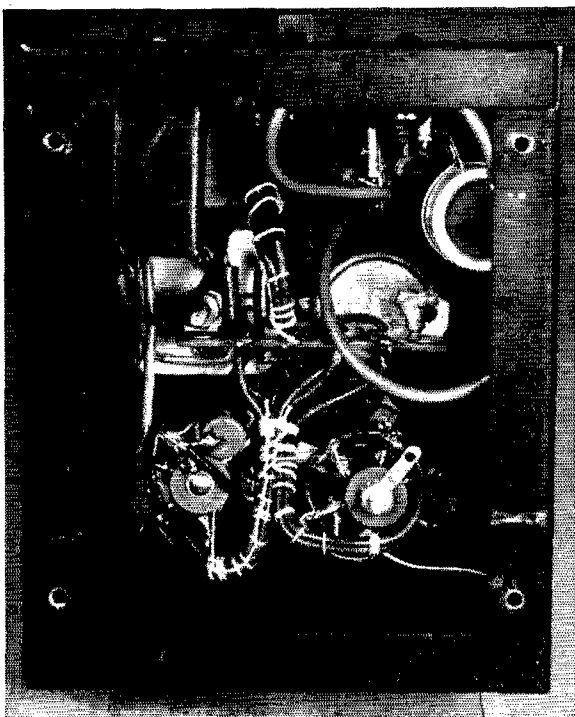
output of the multivibrator to the input terminals of the vertical-input amplifier of the oscilloscope. The oscilloscope sweep circuit should be adjusted to provide horizontal sweep of from 10 to 50 kc., and the synchronizing adjustment should be advanced to lock the trace into a stationary pattern showing several cycles of waveform of the multivibrator. The resistor R_6 may then be adjusted to that value of resistance which yields the most nearly square wave on the screen of the oscilloscope.

Operating Data

Power consumption is small (approximately 10 watts) and thus the unit may be left running continuously. Very little drift—only a few cycles per second—is observed in warming up, however, so for most frequency measurements it is not really necessary to leave the unit running. The crystal frequency can be adjusted to exact value by varying C_3 or C_4 until the output is in zero beat with signals received from WWV.

A score of crystals have been used with this frequency marker and in all cases oscillation occurred readily. The multivibrator has synchronized easily with crystals whose fundamental frequencies were 200, 400, and 500 kc. The oscillator also worked well with crystals having frequencies of 1000 and 5000 kc., but the multivibrator would not synchronize at all with the 5-Mc. crystal, and only with difficulty and not too satisfactorily with the 1-Mc. crystal. This is in accordance with usual good practice of not using multivibrators for dividing the frequency of the

(Continued on page 120)



Overtone Crystals—How and Where To Use Them

Some Circuits and Their Adaptation to V. H. F. Gear

BY EDWARD P. TILTON, WIHQ

THOUGH we've used overtone crystal oscillator circuits in v.h.f. work for quite a few years, it's a safe bet that the vast majority of all hams who employ overtone techniques have little understanding of what actually goes on in such oscillators. Several types of overtone crystal circuits were discussed in detail in *QST* some years back,¹ and this information appears in boiled-down form in all recent editions of the *Handbook*. It is suggested that the reader go over these references, as what is to follow is supplementary to them.

All overtone oscillator circuits have one basic feature in common: some method of introducing additional feed-back, beyond that normally present in simple oscillator circuits. The difference between the various overtone circuits lies mainly in the method of controlling the feed-back. The idea is to give the crystal a little extra regenerative kick, on the frequency of the desired overtone, to encourage oscillation at that frequency rather than on the fundamental. There should be only just enough to accomplish this, without causing the stage to take off on a frequency determined by the tuned circuits, rather than by the crystal.

How Crystals Work on Overtones

The frequency at which a quartz plate will

¹ Tilton, "Overtone Crystal Oscillator Circuits," *QST*, April, 1951, page 56.

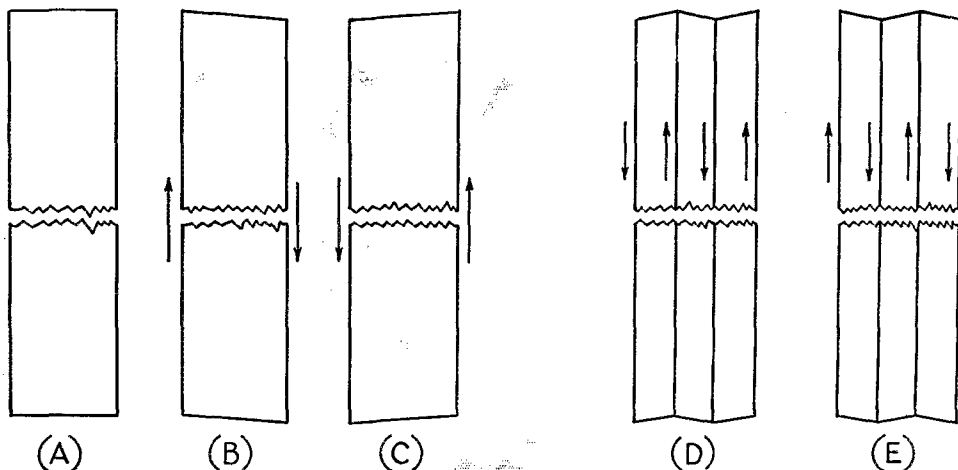


Fig. 1—How crystals oscillate at fundamental and overtone frequencies. The crystal, A, is shown at successive peaks of the cycle, when oscillating on its fundamental frequency, B and C. When oscillation is on overtones the crystal is broken down into layers, as shown at D and E.

• The economy and circuit simplicity that are achieved through the use of overtone crystal oscillators have a price: the need for some care on the part of the user, to be sure that they are adjusted and operated properly. Overtone crystals and circuits should be thought of as tools useful in attaining certain ends, rather than as an all-inclusive technique to replace other methods in v.h.f. circuit design. Here the good and bad features of overtone circuitry are sorted out, to enable the v.h.f. man to decide whether they are right for the job at hand.

oscillate is determined by the way it is cut from the main crystal, and in the case of frequencies we're interested in here, by its thickness. The crystal, Fig. 1A, is deformed mechanically during oscillation, as shown in greatly exaggerated form in Figs. 1B and 1C. When the crystal oscillates on an overtone (the fundamental frequency divided by some *odd* number) it breaks down into separate layers. There are three layers for a 3rd-overtone oscillation, five for 5th, and so on. The overtone crystal looks like Fig. 1D and 1E, again greatly exaggerated. There is no fundamental-frequency oscillation at this time, nor is it possible to develop oscillation on even multiples.

When we remember that a crystal is actually a very thin plate, we can see why some work perfectly on their design frequencies, but refuse to oscillate on overtones. And it is obvious why extreme care must be taken in grinding and mounting crystals where overtones higher than the third are to be used. A 7-Mc. BT-cut crystal is only about 0.014 inch thick. This means that the overtone layers, even for 3rd-mode operation, are less than 0.005 inch in thickness. For 5th mode they are less than 0.003 and for 7th, 0.002 inch thick! This doesn't allow much for variations in thickness due to imperfect grinding. Even a tiny scratch on the surface may destroy overtone-mode operation entirely. The slight convex curvature usually imparted to the surfaces of standard crystals also may prevent high-order overtone oscillation.

The method of mounting, too, may have considerable bearing on how well the crystal will work in overtone service. Pressure mounting, as in the FT-243 type of holder so commonly used, clamps the crystal in place and tends to inhibit overtone oscillation. In general, crystals mounted in the small CR-7 type of holder, with electrodes in the form of plated areas on the crystal surfaces, tend to work better on overtones than do pressure-mounted types. The capacitance of the holder may be an important factor in the attainment of high-order overtones, and here, again, the CR-7 holder and mounting method are superior.

Just about any crystal that will work well on its intended frequency will oscillate reasonably well on its 3rd overtone. Higher overtones are generally unsatisfactory with crystals ground for fundamental use. The 5th may be found, but with a majority of run-of-the-market crystals it will be low in output and very critical in adjustment. This applies to crystals between 5 and 12 Mc. Lower than 5 Mc., the crystals are thick enough so that 5th and sometimes higher overtones can be developed. Fifth-mode operation of 3.5-Mc. crystals, for instance, may be quite satisfactory. We keep hearing about this or that pet circuit that makes possible the development of high-order overtones with any crystal, but many hours of tedious adjustments with any number of circuit variations and with hundreds of crystals have convinced the writer that trying for overtones beyond the 3rd with crystals higher than about 5 Mc. is a waste of time and patience, unless crystals ground especially for overtone service are used.

Overtone Circuitry

With crystals ground and mounted for overtone use, even simple circuits will work satisfactorily, provided that there is a tuned circuit at the overtone frequency, as in Fig. 2A. This is suitable for use between 12 and 54 Mc., the range over which relatively inexpensive 3rd-mode crystals are currently available. There is some overlap between 12 and 20 Mc. as to whether a crystal is an overtone type or not. Most manufacturers supply overtone crystals for any frequency above

12 Mc., though fundamental crystals can be made up to about 20 Mc.

The simplest circuit, Fig. 2A, ordinarily does not provide enough feed-back to make fundamental crystals in the 6- to 9-Mc. range take off on the 3rd overtone, however, so some provision

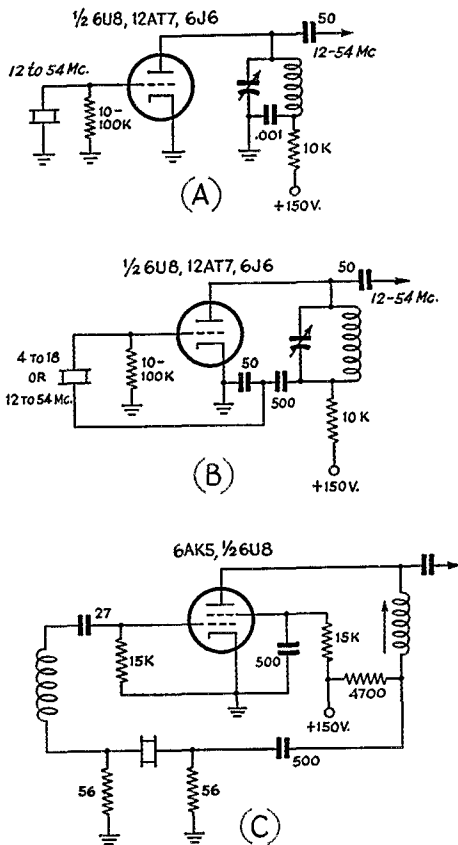


Fig. 2 — Three circuits for use with overtone crystals. Circuit A, the simplest possible overtone circuit, is suitable for use with crystals processed for overtone service. Circuit B introduces more feed-back, and may be used with fundamental-type crystals. The circuit at C is for obtaining high-order overtones with crystals that were processed for 3rd-overtone use. It was sent in by W9MB1, who reports use of it for direct control at frequencies as high as 216 Mc. In all three diagrams, the tuned circuits are resonated at the frequency of the desired overtone. The grid circuit in C may be tuned with a capacitor for greater range.

must be made to increase and control regeneration. In addition to the circuits we've been using for several years¹ there are variations such as the one shown in Fig. 2B. This circuit was first used in *QST* through the courtesy of the Robert Dollar Co. and W6EFT. The feed-back element here is the smaller of the two capacitors connected between the low side of the plate coil and ground. Decreasing the capacitance increases the feed-back, though the value of 50 μ f. has been satisfactory in several applications in which we've tried many types of crystals. This takes only one

(Continued on page 120)

Flexibility in the Antenna Coupler

A Wide-Range Antenna Tuner and Coax-Matching Circuit

BY T. H. PUCKETT,* W5JXM

• Antenna couplers don't seem to have changed much over the years, but matching the coupler to a coax line is becoming increasingly important to amateurs. Here is a unit which performs both functions in one package.

THE advent of low-pass filters and pi-tank output circuits has just about made some form of transmission-line impedance matching a must in amateur stations. Also, if a balanced antenna and transmission line is used, most amateurs these days prefer to put in some

anced to single-ended conversion, and an adjustable L - C section for matching to the coax transmission line.

The complete circuit is given in Fig. 1. Barker and Williamson type TA plug-in coils are used for T_1 , the balanced-to-single-ended converter. These are designed for this purpose, being made of tinned wire so that taps may be easily made. Two clips are furnished with each coil for making taps.

The antenna side of the circuit is a more or less conventional plug-and-jack arrangement which may be connected for either series or parallel feed. Fig. 2A shows the plug arrangement for parallel feed, and B for series feed. The taps on

Fig. 1—Complete schematic of the coupler. T_1 should be as required for series- or parallel-tuning of the particular antenna-feeder system used (Barker & Williamson type TA antenna coil used in the unit pictured).

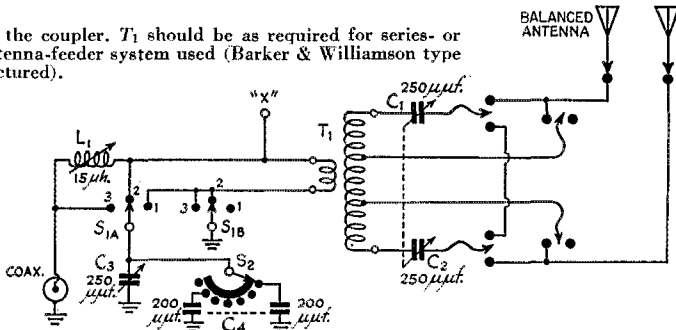
C_1, C_2 —250- μf . variable, 3000-volt rating (see text).

C_3 —250- μf . variable, 1000-volt rating.

C_4 —Nine 200- μf . 1250-volt working, mica condensers.

S_1 —2 poles, 3 positions, steatite.

S_2 —10-position progressive shorting (Centralab P1S section, steatite).

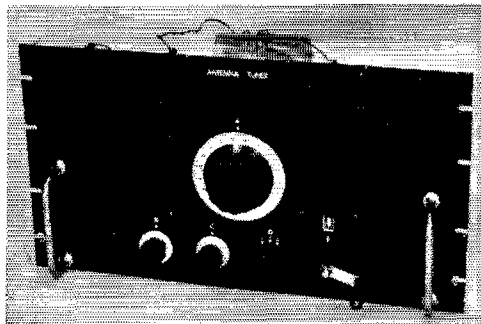


device to convert to unbalanced coaxial line because of its greater convenience in installation. This antenna coupler is designed to perform both of these functions in one package, and to have enough range to accommodate any of the usual amateur antenna-feedline combinations. This is achieved by using plug-in coils for bal-

the coil are not needed for series feed, but are indicated because the same coil might be used for both series and parallel feed at different times. Dummy jacks are provided for storing the taps.

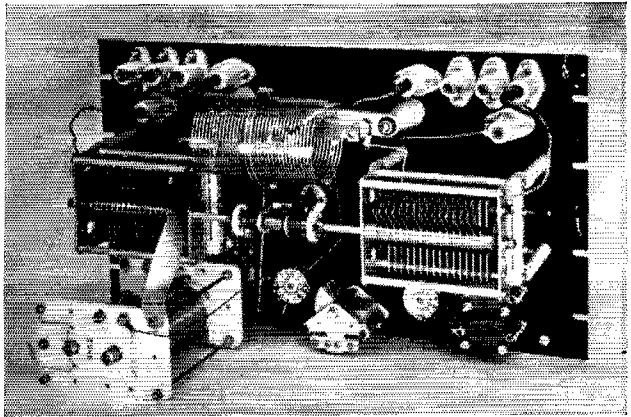
The antenna tuning capacitors C_1 and C_2 have a maximum capacitance of 250 μf , each, which is considerably more than is necessary to resonate the 80-meter coil. However, it is sometimes convenient to have the extra capacitance available, as some antennas couple considerable reactance into the tuner which must be canceled out to achieve resonance. As it was expected to use this coupler only on the 80-, 40- and 20-meter bands, no great thought was given to the rather large minimum capacitance of these capacitors. If regular 15- or 10-meter operation is planned it is suggested that 150- or even 100- μf . capacitors be substituted. Also, it would probably be wise to make the circuit a little more symmetrical. As may be seen in the back view, one capacitor is much nearer the variable inductor than the other, and has an aluminum support bracket fastened to it.

The coax line side of the unit may be set to three different configurations by the circuit switch S_1 . These are shown in Fig. 3. A shows the switch in position 1, where the fixed link is



Front view of the coupler. The large center dial controls the antenna tuning capacitors through a right-angle drive. The two knobs at the lower left control the matching-section capacitance, the switch controls the matching-section circuit, and the counter dial drives the matching-section variable inductor. All controls have arbitrary letter designations.

Rear view of the coupler. The antenna feed line comes in from the top. The L - C matching section components are along the bottom. The 80-meter coil is plugged in. A standard 10½-inch aluminum rack panel is used as a mounting base. The output coax connector is behind the variable inductor.



series tuned. B shows the switch in position 2, with an L - C matching circuit that is useful when the impedance looking into the link is high. C, position 3, is useful when the impedance looking into the link is low.

Switch S_2 is a progressively shorting ten-position switch which can connect nine 200- μf . fixed mica capacitors, C_4 , in parallel with the 250- μf . variable capacitor, C_3 . This gives a total capacitance range of about 2000 μf . The variable inductor L_1 is a 15-microhenry job, Barker and Williamson No. 3852, which is driven from the front panel by a B & W No. 3902 100-turn counter dial.

Operation

A standing-wave ratio bridge of some kind is an excellent indicator for adjusting the coupler.

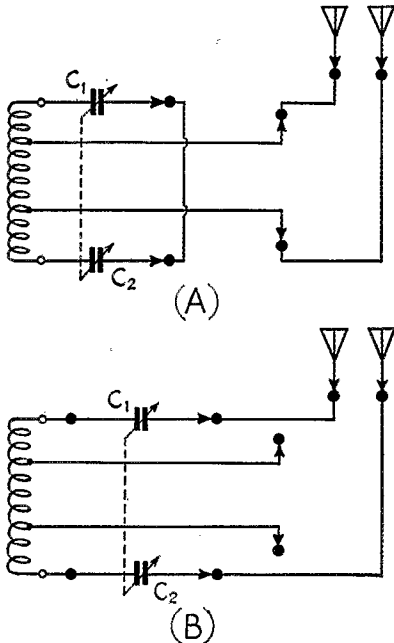


Fig. 2 — (A) shows the plug connections for a parallel-tuned antenna-feed line combination. (B) shows the connections for series tuning.

The controls are simply manipulated to produce a null on the s.w.r. bridge. If one of the "Micro-match" type is used, it may be left in the line continuously. A calibration chart should be prepared which lists the control settings vs. frequency.

The suggested operation of the coupler when it is being calibrated is as follows: Set S_1 on position 2, and C_3 , C_4 , and L_1 on minimum capacitance and inductance, respectively. Plug in the proper coil and adjust the antenna tuning capacitors, C_1 and C_2 , and the coil taps, if used, to give resonance. This would be indicated by a dip on a standing-wave indicator. Then adjust C_3 , C_4 and L_1 until the line is matched. Try the other two positions of S_1 if necessary. Position 2 of S_1 is preferred, as it should give the best

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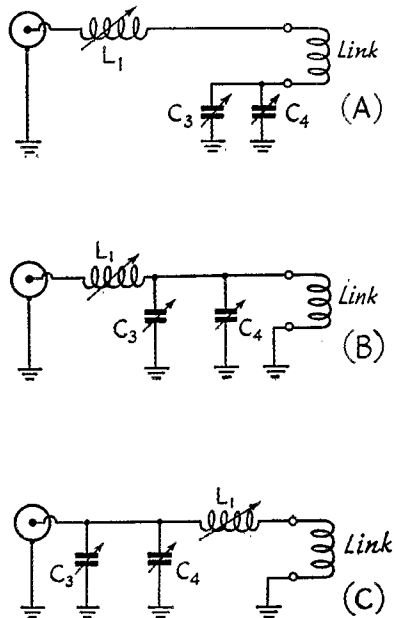


Fig. 3 — The three possible matching section circuit arrangements. (A) shows S_1 in position 1, (B) in position 2, and (C) in position 3.

Low-Noise Receiver Design

Reworking a Receiver for Maximum Sensitivity

BY HARRY LONGERICH,* W2GQY/4, AND ROBERT D. SMITH,** W5LHD

• This is an interesting article telling how two amateurs were able to improve considerably the performance of a commercial receiver. We think you will be interested in the reasoning and the circuitry involved. However, it should be pointed out that the improvement that can be expected with any receiver will be in proportion to the poorness of its present performance and the lack of outside noise at one's location—you can't expect these changes to help a currently-good receiver or one in a noisy location.

AFTER spending several hundred dollars for a new receiver, most of us feel rather pleased with ourselves—if we didn't, that hollow sensation in the hip pocket would be hard to bear. But how about a few months later, when the novelty has worn off and we've settled down to some serious DX operating? Are there ever any little gnawing doubts? Probably more often than most of us would care to admit. The crux of the situation is that while one receiver may have better selectivity, stability, or operating con-

venience than another, they are pretty much alike so far as front-end performance is concerned. This is because the industry long ago settled on pentode r.f. amplifiers and pentagrid mixers as the accepted standard. Obviously, two r.f. stages are better than one or none, but manufacturer X's r.f. amplifiers or mixers will have essentially the same noise figure as those of manufacturer Y.¹

As it turns out, low-noise amplifiers have been easiest to build for the v.h.f. bands because of the small frequency coverage (percentagewise) demanded of most v.h.f. receivers. External noise is lowest in the v.h.f. bands, and hence full advantage can be taken of low-noise r.f. amplifiers. Generally accepted theory considers that external noise (static, etc.) is so strong below 25 Mc. that it is useless to use special circuits to reduce internal receiver noise on our general operating frequencies. While this is essentially true, we believe the critical frequency to be more in the order of 10 Mc., indicating low-noise circuits for three of our most important DX bands. This figure of 10 Mc. is somewhat variable, depending on local conditions; certainly the man who lives under a trolley line is little concerned with internal set noise at virtually any frequency.

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** Lieut., 6207th AC&W, APO 74, % Postmaster, San Francisco, Calif.

¹ Two r.f. stages are not necessarily better than one. If a low-noise mixer is used, one good r.f. stage should be sufficient, and it would lessen the chances of cross-modulation in the front end. — Ed.

Testing Your Receiver

Here is a simple test to determine whether or not a lower noise figure would help your own receiver: set it to or near your favorite DX band (use your regular receiving antenna), tune in a frequency entirely free of any signal, advance the

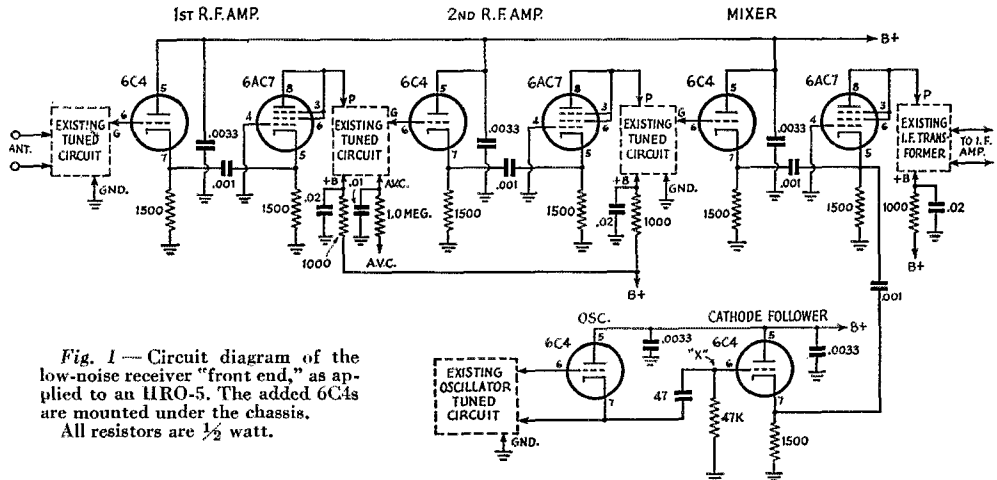


Fig. 1—Circuit diagram of the low-noise receiver "front end," as applied to an IRO-5. The added 6C4s are mounted under the chassis. All resistors are ½ watt.

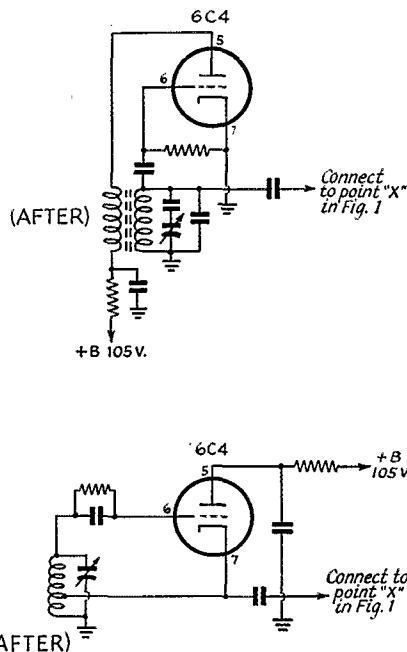
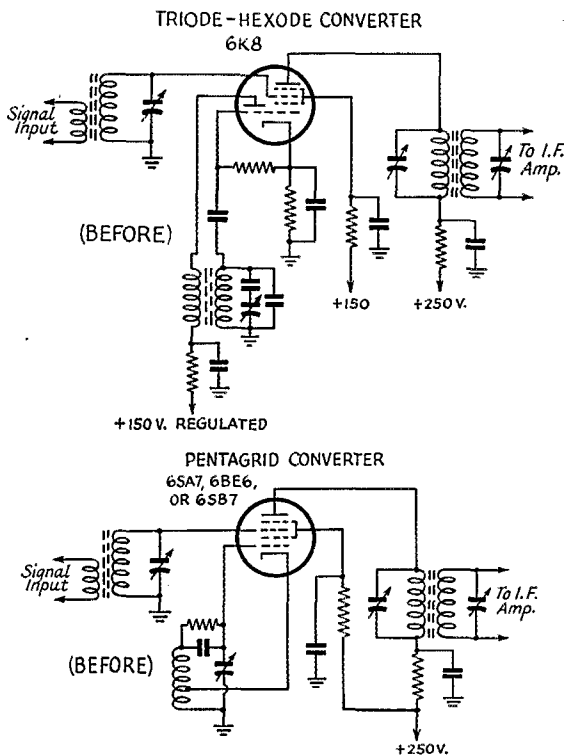


Fig. 2 — Typical oscillator circuits, before and after modification.

gain until the noise is at a comfortable level, and now substitute a resistor having the same value as the antenna input impedance, usually about 300 ohms. If there was not an appreciable decrease in noise when the antenna was replaced by the resistor, your receiver can stand improvement; most of the noise remaining is being generated within the receiver.

We made the above test on a modified HRO-5, and found that internal set noise masked much of the weak-signal DX. In the course of testing this and other receivers, another interesting fact came to light. Literature covering weak-signal reception, available to us, generally states that the first r.f. stage is the most important since its noise is amplified more than that of any other stage. This apparently does not hold true for the average amateur receiver; a considerable amount of noise is contributed by the pentagrid mixer or converter stage. Further research into the subject disclosed that pentagrid mixer and converter tubes available today have an equivalent noise resistance ranging from 62,000 to 300,000 ohms;² in addition, conversion transconductance is low. Economic factors and construction convenience have generally dictated the use of conventional mixers or converters, because they are simple and inexpensive and perform fairly satisfactorily for most medium frequency applications. However, at frequencies above 10

² *Radiotron Designer's Handbook*, 4th Edition, page 938.

³ The more elements there are in a vacuum tube, the greater the noise that is produced, because of the random division of the cathode current between the elements. See Terman, *Radio Engineer's Handbook*, page 294.

Mc., they may leave quite a bit to be desired.

R. F. Amplifiers

The triode is the least noisy vacuum tube amplifier known. A check of tubes narrowed our choice to a triode-connected 6AC7, or the miniature version, the 6AH6, since they have the highest g_m and therefore the lowest equivalent noise resistance of available triodes.³

A straight triode amplifier is not practical because it will oscillate without neutralization, and neutralization is impractical in multiband receivers. The grounded-grid amplifier overcomes this objection, but in turn has the drawback of heavy input-circuit loading. To overcome this disadvantage, the cathode follower is made to order. The high input impedance of a 6C4 cathode follower stage decreases loading of the tuned circuit, resulting in greatly increased input-signal voltage, and improved r.f. selectivity; while the low output impedance of the cathode follower matches the input of the grounded-grid stage. Our experience has shown the combination to be relatively noise free.

Mixer

Since the grounded-grid amplifier and cathode follower proved so successful, it was decided to try the combination in the mixer stage. Cathode injection looked like a good bet.⁴ The circuit was incorporated in the modified HRO-5 and it

(Continued on page 128)

⁴ Goodman, "Some Notes on Improving Small Receiver Performance," *QST*, December, 1953.

The Multimatch Antenna System

Unique Design Providing Essentially Constant Impedance Over Several Bands

BY CHESTER L. BUCHANAN,* W3DZZ

• For a long time, hams have been searching for a single antenna that could be fed efficiently with a low-impedance transmission line on several bands. At last a simple but ingenious design by W3DZZ provides a solution. He has applied some well-known but neglected principles to both wire and parasitic-beam antennas.

RADIO transmitters and receivers have enjoyed rapid development in flexibility to the point where changing bands is a matter of only spinning a dial or two and flipping a couple of switches. In contrast, the operation of a single antenna on several bands is usually done only at the expense of high standing waves on the feed line, because of the wide variation in antenna feed-point impedance from band to band.

Some work done by the author several years ago in connection with a dual-band parasitic array¹ has led to the development of a simple wire antenna covering five bands, from 80 to 10 meters. This antenna can be fed with a low-impedance transmission line without incurring excessive s.w.r. on any of these bands.

Basic Design

The fundamental principle of the system can be explained with the aid of Fig. 1. In Fig. 1A,

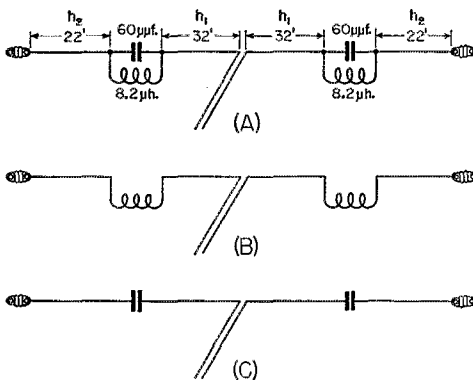


Fig. 1 — Sketch illustrating the three fundamental modes of the multimatch antenna.

* 4671 Lacy Ave., Washington 23, D. C.

¹ Buchanan, "Duo-Band Ham Antenna," *Radio & Television News*, December, 1950.

² Morgan, "A Multifrequency Tuned Antenna System," *Electronics*, August, 1940.

sections h_1 constitute a half-wave dipole for some frequency f_1 . This dipole is terminated in lumped-constant trap circuits resonant at f_1 . Additional wire sections, h_2 , extend beyond the traps. If the system is excited at frequency f_1 , the traps serve to isolate the dipole much as though insulators were inserted at these points.²

At frequencies much lower than f_1 , the traps no longer isolate the dipole, but act simply

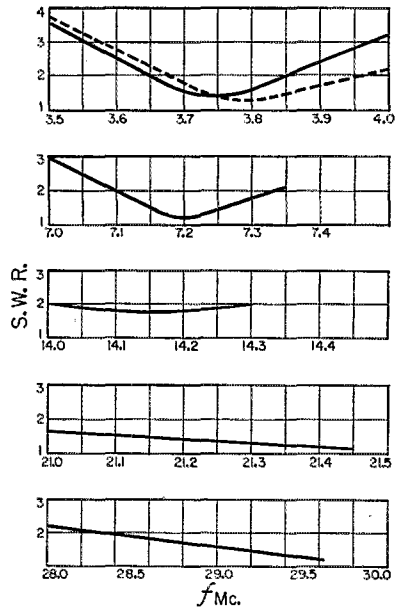


Fig. 2 — S.w.r. measurements made on the antenna of Fig. 1A. The dashed lines show measurements made on a 122-foot dipole in the same location for comparison.

as loading inductances in a second dipole whose electrical length is made up of h_1 , h_2 and the inductive reactance of the traps, as in Fig. 1B.

At frequencies much higher than f_1 , the traps again cease to isolate the sections, the traps now acting as series capacitances, as in Fig. 1C.

Another important consideration in this multi-band system is that low impedance at the center feed point of the antenna occurs not only at its fundamental resonance but also at any odd harmonic of the fundamental.

By applying these principles, and by proper selection of the values of L and C in the traps, and choice of lengths for h_1 and h_2 , it has been possible to arrive at a design where the system operates as follows:

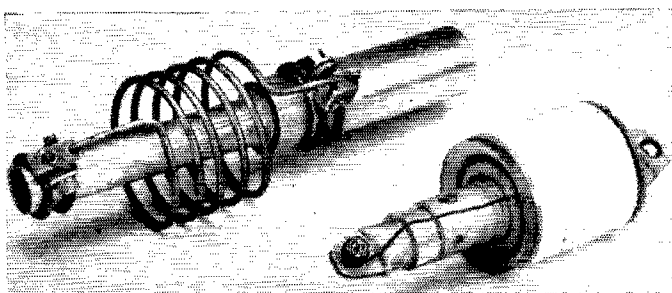
- 1) Sections h_1 form a half-wave dipole resonant

in the 40-meter band. The traps, resonant at the same frequency, isolate this dipole from the outer sections.

2) The inductive reactance of the traps is such that the entire system, including sections h_2 , resonates as a loaded half-wave dipole for the 80-meter band.

3) The capacitive reactance of the traps at higher frequencies is such that the entire system resonates as a $3/2$ wavelength antenna on 20, $5/2$ wavelength on 15, and $7/2$ wavelength on 10 meters.

The antenna is fed with 75-ohm Twin-Lead, and Fig. 2 shows the results of s.w.r. measure-



Lightweight weatherproof traps made by the author. To the left is the type inserted in beam elements, while the other one is suitable for wire antennas.

walls, molded around the inner conductor. The polystyrene is also flowed into a series of holes in one end of the outer conductor so that the strain of the antenna will not pull the assembly apart. The inductor is wound with No. 14 wire and is concentric with the capacitor. The inductor is weatherproofed by molding it in insulating material. Other construction might be used, of course. As an example, a conventional inductor and capacitor could be enclosed in a plastic box, suspended across an insulator. This would, however, add to the weight.

A Three-Band Parasitic Beam

The principle of isolating sections of an antenna with resonant traps has been applied to a parasitic beam antenna that operates on 10, 15 and 20 meters. This array with dimensions is sketched in Fig. 3. The array is a five-element job on 10 meters, with two reflectors spaced approximately 0.15 wavelength, and two directors spaced approximately 0.2 wavelength. On the other two bands, spacings are approximately 0.22 wavelength for the reflector and 0.29 for the director. On 20 meters, the approximate spacings are 0.14 and 0.2, respectively.

Fig. 4 shows a breakdown of a suggested method of construction of the three main elements. Each element starts out with a 12-foot center section to which various sections are added at each end. Provision is made for adjusting the length from the center of the element to the first (28-Mc.) trap, the length between traps, and the section on the outside of the second (21-Mc.) trap. The photograph shows an example of the array traps used by the author. Here,

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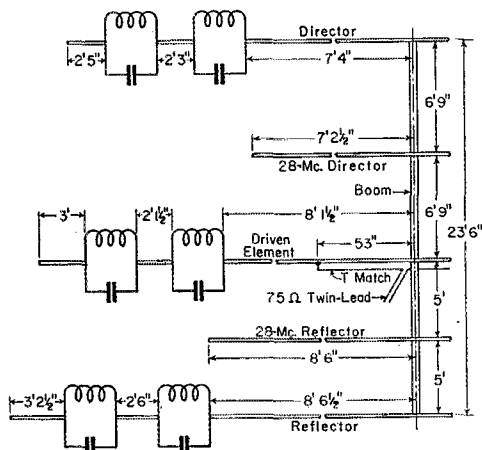


Fig. 3 — Dimensions of the 3-band parasitic beam found optimum at W3DZZ. Dimensions are, of course, duplicated on the opposite side of the boom.

ments made across each band. Proper dimensions are given in Fig. 1A.

Trap Construction

The values of C and L used in the traps are quite critical. The capacitance should first be adjusted accurately to $60 \mu\text{mf.}$, then the inductance should be trimmed until the trap resonates at 7200 kc. This should be done before the traps are inserted in the antenna. The inductance will be approximately $8.2 \mu\text{h.}$ The traps made by the author are 6 inches long and weigh only 6 ounces and the Q is well over 100. They will withstand the voltage developed by a 1-kw. transmitter. Samples are shown in the photograph. The wire-antenna capacitor is made up of concentric lengths of 1-inch and $3/4$ -inch aluminum tubing separated by polystyrene tubing with $1/8$ -inch

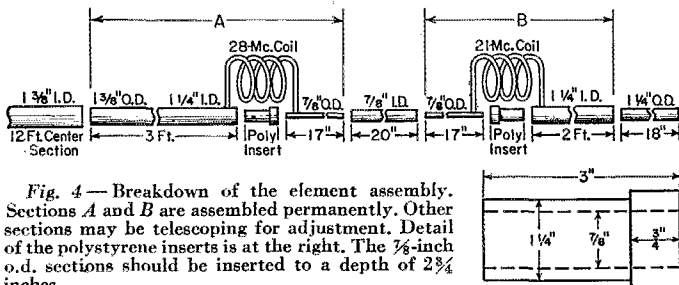


Fig. 4 — Breakdown of the element assembly. Sections A and B are assembled permanently. Other sections may be telescoping for adjustment. Detail of the polystyrene inserts is at the right. The $1/8$ -inch o.d. sections should be inserted to a depth of $2 3/4$ inches.

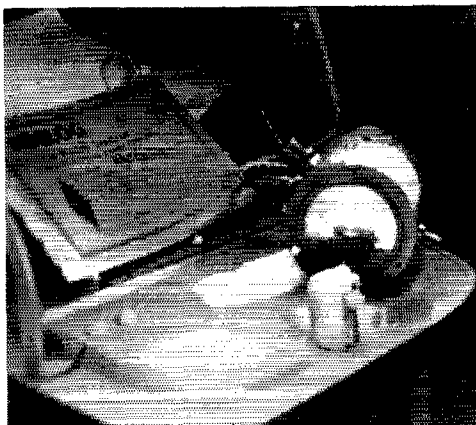
The "Hidden Gem"

A Field-Strength Indicator for Mobiles

BY CLIFFORD ABEL,* W8IWB

• All mobileers will find this little gadget mighty convenient and valuable. A simple field-strength indicator helps to tell you when you are getting the most out of your rig on any band.

ONE of the main problems besetting today's struggling mobileer is getting maximum power output from his installed equipment. Considering the relatively low-power input and poor antenna radiation efficiency with which he must contend, the mobile operator can ill afford the additional losses of improper antenna or transmitter tuning. After the transmitter and antenna of his choice have been installed, he must make the most of it no matter what his power input or what the inherent efficiency of his antenna system may be. What could be a better method of making the most of it than by measuring the relative strength of the radiated field as



The field-strength indicator is mounted on the inside of the glove-compartment door, oriented so that it can be seen easily from the driver's seat. The antenna banana plug is at the left rear, the sensitivity control is at the upper left, and the slug screw of the inductor at the lower right. Small holes in the top of the can provide access to the sheet-metal screws holding the unit to the glove-compartment cover.

the antenna and transmitter tuning are changed! In other words, use a field-strength indicator.

Nearly any type of field-strength meter could be used to do the job. A de luxe commercial meter borrowed from a fixed station or a simple crystal rectifier in series with the low-current scale on your volt-ohmmeter will work with a proper pick-up antenna. But most desirable is a

unit which is an integral component of the mobile system — an indicator that will give a relative power-output measurement from minute to minute, and day to day.

You may have already been convinced of the value of a mobile field-strength indicator, but then the question arises of where to put the thing. Your under-dash mounting space may be pretty well used up by now, so why not stick it in the glove compartment? In there it's completely out of the way and out of sight. Better

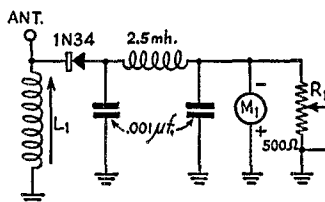


Fig. 1 — Circuit of the field-strength indicator. L_1 and M_1 are discussed in the text. L_1 should be approximately 200 μ h.

yet, if you mount it on the inside top of the glove-compartment door, it will take up little of the useful space in the compartment. When the door is opened, the indicator drops down into a position where the scale can be seen easily, and the compartment light illuminates the meter for nighttime operation. Two small sheet-metal screws can be used for mounting.

Construction

The circuit, shown in Fig. 1, is conventional, and none of the values is critical. Nearly any type of crystal detector can be used, and the meter movement can be anything from 50 μ a. to 2 ma. or more, depending upon the size and placement of the pick-up antenna and your transmitter power output. All the components are housed in a small tin can. The round can is available and cheap, and takes up less space than other types of housing. It doesn't look half bad if it's new and shiny, or if you give it a coat of black crackle paint. The can is the 8½-ounce size. That's the same diameter as a can of Campbell's soup, but somewhat shorter. Of course, the smaller the meter you can find, the smaller the can may be. The pick-up antenna lead-in comes in to a banana plug. Thus, the whole assembly can be detached quickly from the car and can be used anywhere that a field-strength indicator might be needed. By using the terminals on all the fixed-mounted components and one 3-point soldering-terminal strip, all the other components may be mounted easily and compactly.

(Continued on page 130)

*783rd AC&W Squadron, Charleston, W. Va.

Transmitter Hunting – Seattle Style

A De Luxe D.F. System for Ten Meters

BY J. ALAN DUNCAN,* W7OTA

• This story on hidden-transmitter hunting should strike a response in every mobile ham. It includes, along with other useful information, descriptions of a special S-meter circuit and a direction-finding loop with suggestions for mounting.

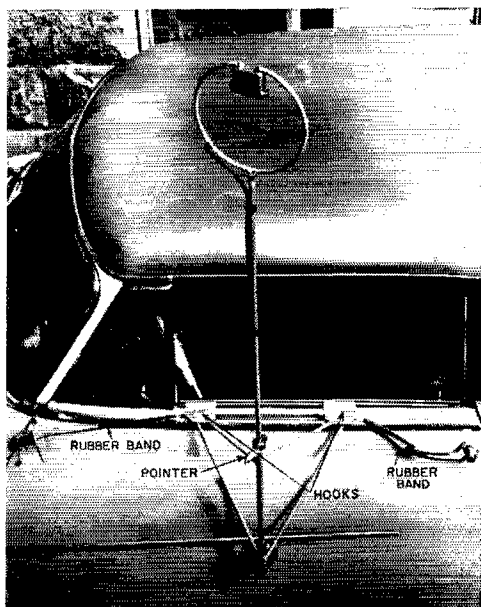
WITH civil-defense and disaster-relief training on the steady increase throughout the nation, it becomes more and more necessary that amateur mobile stations be kept ever alert and active, so they may supply that vital communication link so important if the situation should arise. Hidden-transmitter hunting has been found to be one of the best drills for keeping the mobiles trained for this type of activity, because it develops the qualities required for successful emergency mobile communication. It also affords more thrills, more opportunity for technical development, and more participation by the whole family, than most other phases of amateur radio. The mobile operators in the radio clubs of Seattle, Washington, have been kept active on 29 Mc. almost continually since Don Newman, W7CO, first brought hidden-transmitter hunting to Seattle some five years ago.

Various methods and techniques are used to locate the hidden transmitter, depending upon the equipment on hand and the ingenuity of the hunter. Some mobileers do remarkably well with just their transmitting whips, using the directional characteristics of the car, and by determining the signal strength by ear. The author prefers a more exact method, however, and describes the following equipment and tracking technique for those mobileers who would use a more scientific approach to this exciting sport.

The Loop

Essentially, a directional loop and a signal-strength meter are the required auxiliary equipment for successful hunting. The author's loop is a one-turn resonant circuit, nine inches in diameter, requiring about 65 $\mu\text{f.}$ of capacity to tune it to 29 Mc. The signal is fed from the loop to the receiver through a 50-ohm coaxial cable which is gamma-matched to the loop. Fig. 1 shows the loop dimensions and the method of coupling the coaxial cable to it. The loop diameter is not especially critical so long as it is kept small (under about 10 inches), and any discrepancy may be compensated for in the adjustment of the variable capacitor. The dimension of the coupling

tap is shown only as a starting value. Further adjustment will be required in the tuning process. For the tuning capacity the author is using a 50- $\mu\text{f.}$ fixed capacitor in parallel with a 25- $\mu\text{f.}$ variable capacitor (Hammarlund APC-25). This tuning arrangement was arrived at after some experimenting, and has been found to be very steady and extremely easy to tune. The capacitor combination is enclosed in an old surplus capacitor casing (Sangamo type F-2) with the original capacitor removed. With a new sealed-in fiber



The loop assembly mounted on W7OTA's car. The mounting is a triangular framework of tubing or rods with plates that hook over the window frame, and a rubber suction cup at the bottom. The loop mast revolves in a section of tubing. Large rubber bands to hold the external rear-view mirror and door handle help to hold the assembly in place.

bottom cover, this makes a nice weatherproof housing.

The type of stock used, the method of mounting the loop to the car, the dimensions of the mount, etc., will certainly vary with desire and circumstances. The author constructed his loop and mount entirely of duralumin tubing, though most hunters use copper for the loop. The style and mounting are shown in the illustration.

Adjustment

Tuning the loop is a very simple process. Connect it through the coaxial cable to the an-

* 6016 45th Ave. N.E., Seattle 5, Wash.

tenna terminal of the receiver. Radiate a 29-Mc. signal with a grid-dipper, r.f. signal generator, or some other calibrated source, and tune the loop to resonance as indicated by maximum signal. The loop should also be rotated for maximum, and then rocked back and forth across maximum as the capacitor is being adjusted. Then adjust the gamma match by moving the connection back and forth along the loop until maximum transfer is indicated. This may throw the loop off resonance, so the processes should be repeated until neither causes any noticeable improvement. The loop should be tuned very carefully, otherwise a sharp null may not be obtained. Although the maximum signal is used when tuning the loop, the minimum signal (null) is used when locating the hidden transmitter. This is because the angle of minimum is so much smaller than the angle of maximum signal.

S-Meter

Difficulty is usually encountered in trying to tell a difference between maximum and minimum signal by ear as the hunter closes in, and a signal-strength meter becomes very desirable. A meter in the cathode circuit of one of the a.v.c.-controlled tubes was tried, but the change in deflection from maximum to minimum signal, as the hidden transmitter was approached, was as indistinguishable as by the aural method. The author finally came up with the amplifier-bridge circuit shown in Fig. 2. This system operates by sampling the a.v.c. voltage, amplifying the voltage change causing a change in the plate resistance of the 6C4 tube. This change in plate resistance upsets the balance of the bridge circuit (see equivalent circuit in Fig. 2B), causing a difference of potential to exist between points *D* and *B*. The resulting current flow through the meter causes the needle to deflect. Potentiometer *R*₁ is a gain control and governs, to a certain extent, the amount of deflection of the meter. Potentiometer *R*₂ is the zero adjustment used to balance the bridge. As the signal of the hidden transmitter changes in intensity, both the gain and zero controls will need adjusting. A

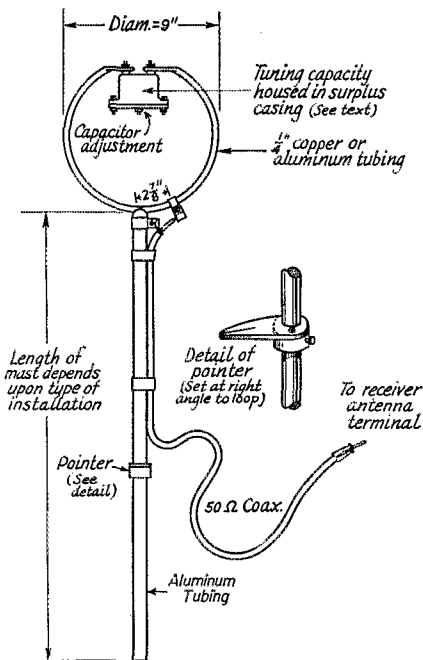


Fig. 1 — Sketch showing details of the 10-meter d.f. loop.

little technique is involved in making these adjustments during the short transmissions from the hidden transmitter, but after a couple of hunts it will be accomplished very simply. Also, the hunter will find that with a little practice, the sensitivity and gain of the amplifier-bridge S-meter can be adjusted such that full-scale

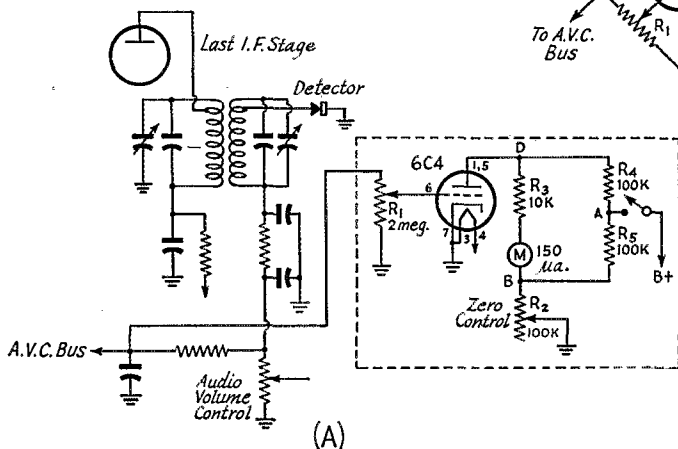
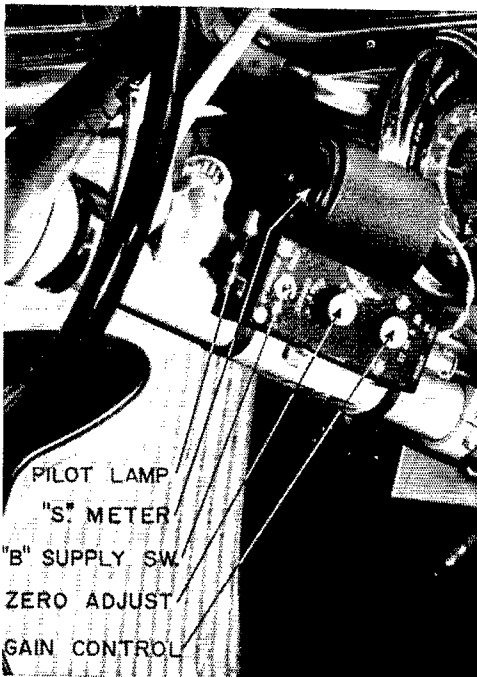


Fig. 2 — A — Schematic diagram showing the circuit of the S meter with sensitivity control and how it is connected to the receiver a.v.c. bus. B — Equivalent bridge circuit.



Close-up showing the S-meter unit mounted on the steering post.

deflection is possible (from maximum to minimum signal during rotation of the loop) regardless of whether the transmitting station is very weak and distant or whether he is within a few feet. As a matter of fact, on a particular hunt, W7CO (the hidden transmitter that night) was asked by the author at the beginning of the hunt if he was using his mobile whip or his receiving antenna for transmitting. The hidden transmitter operator replied that the hunters would have to loop in and find out. When the author arrived alongside the hidden transmitter and asked for a transmission, he was able to develop a very definite null (actually more than full-scale deflection) with the pointer directed at the rear transmitting antenna, less than four feet away.

None of the leads in this circuit need be

shielded, and the lengths are not critical. Also, don't put off making this unit just because you don't happen to have a 150- μ a. meter, as some of the boys are using 1-ma. meters with quite good results. Even the 6C4 tube may be replaced by practically any other triode tube. Half the fun is in experimenting with various values and components.

The S-meter unit may be housed in any convenient chassis or box. The author originally mounted his S-meter under the dash, next to the transmitter control unit. This was difficult to read without stopping the car, so the unit was rebuilt into a surplus pilot's control box, with the meter mounted just above in an old coil shield can. This unit was then hung on the steering column. This proved to be a very handy location. Finally a pilot lamp was installed so as to illuminate the meter and is very helpful for night hunting.

Various techniques are used to track down the hidden transmitter or "bunny" as he is referred to in Seattle. The author has used the triangulating method of pin-pointing the bunny by using a map, etc., but doesn't recommend it because it is too undependable. This is especially true in hilly country. Such phenomena as reflections, wave-polarization changes, and antenna effects will cause some readings to be in error by a considerable amount. This makes a very discouraging triangulation plot on a map, in addition to a possible waste of considerable time. The errors reduce to insignificance as the hidden transmitter is approached, however, and regardless of the system or technique used, if complete trust is placed in the loop, the hunter should eventually arrive.

Typical Operation

At 7:15 p.m., on the first and third Thursdays and second and fourth Fridays of the month, the Seattle mobileers (usually some ten cars) assemble in front of the museum at Volunteer Park. They proceed to tune their loops and ready themselves for the bunny hunt. At 7:30 p.m., the operator of the hidden transmitter calls, "QST, QST, QST. This is W7QPR mobile (or whatever

(Continued on page 134)

◆
W7OTA all set to start out on a hidden-transmitter hunt.
◆



Unidirectional Loops for Transmitter Hunting

Less Guesswork in Mobile D.F. Work

BY WARREN U. AMFAHR,* W0WLR

MOBILE hams in the Wichita area have been running 10-meter hidden-transmitter hunts each week for the past three years or more. Not long after these hunts were inaugurated, it became evident that the affairs were rapidly degenerating into rat races. Under the usual rules, where the first car to arrive at the site of the transmitter was declared the winner, the honor system for compliance with existing speed limits failed completely. It became obvious that the contests would have to be conducted along different lines, if they were to be continued on a safe and sane basis. In the interest of public safety, we felt that we could not continue to encourage speedy and hazardous driving. We realized too that our call license plates and long

• This article not only describes the construction and use of a d.f. loop that eliminates much of the uncertainty in making "fixes" in fox hunts, but it also contains some interesting observations regarding the conducting of this highly popular activity.

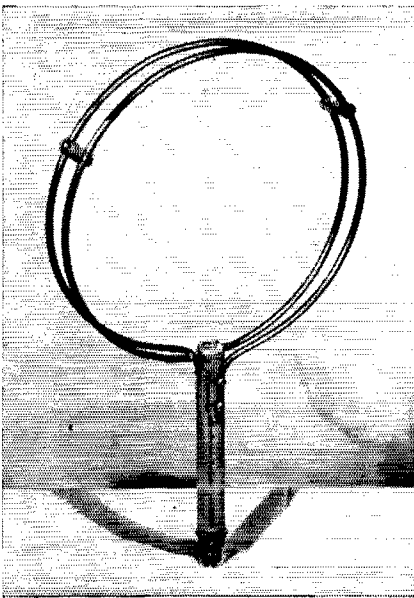
between a common starting point for all cars and the hidden transmitter. Speedometer readings are recorded at the starting point, and again when the car reaches the objective. There is no time limit, and the winner is the one who reaches the hidden-transmitter site over the shortest route.

The changes in rules naturally have brought about a search for more accurate direction-finding gear, rather than speedier cars. Perhaps the most important result has been the adoption of a unidirectional loop antenna by the hunters. It has eliminated the possibility of starting out in exactly the opposite direction, and reduced the probability of overshooting the transmitter. In eliminating the necessity for triangulation, it has simplified the hunting technique, and placed it more within the grasp of the YL and Jr. Ops.

The unidirectional loop antenna works on rather well-known principles. In simple terms, a loop that is not accurately balanced in respect to ground will exhibit two modes of operation. One mode is that of a true loop, while the other is that of an essentially nondirectional vertical antenna of small dimensions. The voltages introduced by the two modes are out of phase, and will add or subtract, depending upon the direction from which the wave is arriving.

The theoretical true loop pattern is illustrated in Fig. 1A. When the voltage introduced by the antenna mode is large, the nondirectional pattern of the vertical-antenna mode predominates, and the loop will show little directivity, as shown in Fig. 1B. When the antenna effect is small, one of the loop lobes will be reduced, while the other will be correspondingly enlarged (see Fig. 1C). When the voltages introduced by the two modes are equal and 90 degrees out of phase, one of the lobes will be canceled out, making the loop unidirectional, as indicated in the pattern of Fig. 1D.

Since the loop pick-up will usually be predominant, when the dimensions of the loop are small in terms of wavelength, the loop and antenna effects can be balanced by detuning the



The unidirectional 10-meter d.f. loop is a simple affair, consisting of two turns of copper tubing mounted on an insulating rod. Directivity is adjusted by the trimmer condenser at the center.

whip antennas could easily draw attention to us in any adverse publicity.

For some time now, we have been operating under a scheme in which precision and skill are substituted for speed and recklessness. The time element has been eliminated entirely, and all hunts are now based on the mileage covered

* 3096 Clifton, Wichita 10, Kansas.

loop so as to reduce its pick-up to equal that introduced by the antenna effect.

The loop shown in the photograph consists of two turns of 1/4-inch copper tubing, 11 inches in diameter. The two ends are flattened out,

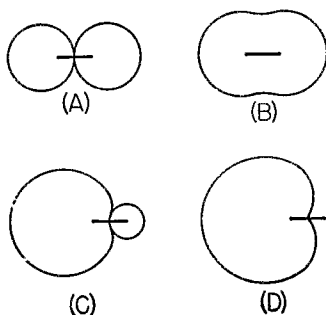


Fig. 1—Small-loop field patterns with varying amounts of "antenna" effect. The heavy lines show the plane of the loop.

and fastened to opposite sides of a 1-inch diameter insulating rod that serves as a mounting. The center of the loop is broken, and a 20- μ mf. mica trimmer is inserted in series. The ends of the tubing at the break are supported in a slot cut in the end of the insulating rod. The rod of the loop shown in the photograph is a piece of 1-inch polystyrene. However, a piece of ordinary broomstick will provide adequate insulation.

The loop is connected to the receiver input with a length of coax cable. After the receiver has been tuned to the desired operating frequency, the trimmer condenser in the loop should be adjusted for maximum background noise. If no peak in noise can be found, the condenser range value should be changed. An 11-inch loop should require no more than 5 to 15 μ mf.

Once a noise peak has been established, a signal and the receiver S-meter should be employed. (If the mobile receiver is not equipped with an S-meter, the circuit of Fig. 2 can be

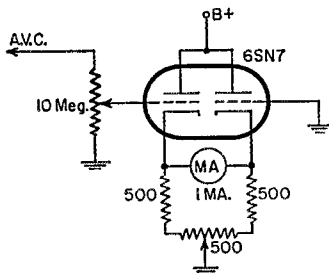


Fig. 2—S-meter circuit widely used in transmitter hunting.

added.) The capacity of the loop condenser should then be carefully reduced until the loop acquires a unidirectional characteristic. The final setting of the trimmer condenser depends upon the front-to-back ratio desired. Complete cancellation of signals from the back can be ac-

quired at the expense of a certain amount of frontal signal pick-up.

This type of loop is, of course, oriented for maximum signal in contrast to a conventional d.f. loop which is usually worked on the signal null. In the use of the loop, it will be found that resonant antennas or other objects are highly capable of receiving signal energy and reradiating it. The possibility of the loop receiving reflected signals from the mobile whip should be thoroughly investigated. Usually, the loop when used on one side of the car will be more susceptible to whip reflections than it will be on the other. This depends upon the car body contour and the distance between the loop and the whip. In some installations, it may be necessary to pull the whip down while taking loop bearings.

In the process of hunting, it is advantageous to keep the hidden transmitter on the loop side of the car. The maximum-to-minimum signal, and the exact direction, will be less pronounced if the loop has to look across a reflecting or diffusing car roof. Whenever the loop is used in the vicinity of a strong signal, some means of attenuating the antenna circuit should be used, rather than to decrease the S-meter sensitivity. Various resistor values, switched in parallel with the antenna input, will achieve this.

Those who organize, or participate in, this popular activity will find that many headaches will be avoided if the rules place strong restriction against hunting or hiding on private property. We have also found it highly advisable to notify the local police in advance of a scheduled hunt. Summer-night hunts, with dozens of dangling loops and seeking searchlights, can load the police telephone circuits with curious inquiries!

Strays

W5UXP, enjoying a late-afternoon 75-meter QSO while parked and waiting for his XYL to QRT work at WBAP-TV, was confronted by one of the station engineers: "You're 50 per cent station level on the program monitor in master control!" the ex-ham engineer exclaimed.

You just can't get away from 'em!

COMING A.R.R.L. CONVENTIONS

May 21st-22nd — Pacific Division, Fresno, Calif.

June 10th-12th — West Gulf Division, Fort Worth, Texas

June 11th-12th — Southeastern Division, St. Petersburg, Fla.

August 12th-13th — Roanoke Division, Old Point, Va.

October 8th-9th — Central Division, South Bend, Ind.

Meet the S.W.R. Bridge

Simple Instrument for Adjusting Antenna Circuits

BY LEWIS G. McCOY, WIICP

• Here is a nontechnical description of how to build and use a standing-wave-ratio bridge, an inexpensive instrument that is worth many times the small outlay for its construction. The use of such a bridge will help you to solve some antenna-circuit problems that can be solved in no other way.

Did you ever stop to wonder if your transmitter was properly coupled and matched into the antenna or antenna coupler? If you're the average ham, this problem has probably bothered you a great deal. Well, there is one simple way to find out, and it won't cost you more than a few dollars.

When working with antennas and antenna couplers, the standing-wave-ratio bridge is practically an indispensable instrument. With the s.w.r. bridge, it is possible to know when the coax line between the transmitter and antenna coupler is matched, or if a coax-fed antenna is properly matched to the feed line. When a low-

pass filter is used to attenuate harmonics, it is important to keep the s.w.r. low in the connecting line, otherwise there is always the possibility that the filter may break down. By setting the system up with the s.w.r. bridge, one can be sure the filter will be working in a line with a low s.w.r. It has been mentioned that the s.w.r. bridge only costs a couple of dollars; another attraction is that the unit is very easy to build.

S.W.R. Bridge Construction

As can be seen from Fig. 1 and the photographs, the bridge consists of four resistors, two

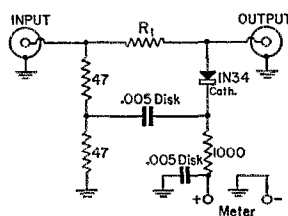


Fig. 1—Circuit diagram of the s.w.r. bridge. All resistors are $\frac{1}{2}$ watt, composition type, ± 10 per cent tolerance.

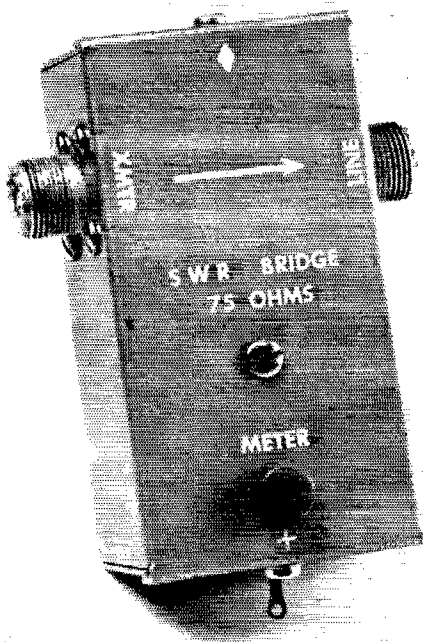
condensers, a crystal diode, an isolantite stand-off, two coax connectors and a chassis. A tip jack is used for the + meter terminal, and the chassis case for the - side. The value of R_1 will depend on the type of coax the bridge is designed for. If for 52-ohm line, then R_1 would be a 50-ohm resistor, and the value would be 75 ohms if 72-ohm coax is used. Whichever type is used, buy two resistors, because one will be used in the bridge and the other for testing the unit. All of the resistors are $\frac{1}{2}$ watt, and be sure they are composition-type and not wire-wound.

In the construction of the bridge, the resistors and the crystal should be mounted at right angles to each other, as shown in the photograph. This is done to avoid stray coupling that might give erroneous readings. The unit shown in the photographs was built in a $4 \times 2 \times 1\frac{3}{4}$ -inch channel-lock box. If this size is used, it should be simple to follow the layout in the photograph.

When soldering the leads of the crystal diode, the leads should be held by a pair of pliers in order to conduct the heat away from the crystal. Don't hold the iron to the soldering point any longer than necessary, as it is easy to damage the crystal with excessive heat.

Testing

The completed unit is connected to the transmitter with a piece of coax of the proper impe-



Top view of the bridge. Be sure to mark the input and output connectors to avoid mistakes when using the unit. The lug at the bottom end of the case offers a clip-on point for the minus side of the meter.

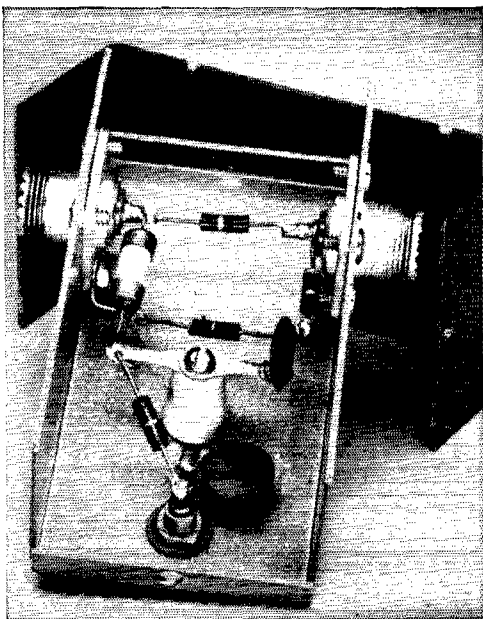
dance, the coax going to the input side of the bridge. A 0-1 milliammeter is connected to the bridge with the + side of the meter going to the pin jack and the - side to the chassis. The output side of the bridge is left open.

The next step is to adjust the transmitter output so that a full-scale reading is obtained on the 0-1 meter. A very small amount of r.f. is needed for this, so it may be necessary to turn off the final amplifier and just allow the driver stage to run. If the transmitter has a drive control, such as the Viking and Viking Ranger, it is merely a matter of advancing the drive control to a point where full-scale reading is obtained. With the meter reading full scale, the test resistor is connected between the output coax connector's inner conductor and the shell or ground side of the connector. The reading on the meter should drop to, or near, zero. If the reading is appreciably above zero, there is stray coupling between the resistor arms in the bridge, and their placement should be carefully checked and changed if necessary.

Several different resistors of the same value were tried in testing the unit shown, and in every case the reading dropped to zero, indicating that the 10 per cent tolerances were close enough for the purpose.

Using the S.W.R. Bridge

For an example of using the bridge, let's assume we have an antenna fed with open-wire line, and that an antenna coupler is used with



Inside view of the s.w.r. bridge. The resistor connected between the inner conductor pins of the coax sockets is R_1 . One of the 47-ohm resistors is on the right, connected between the inner conductor pin and the junction of a 0.001-uf. disk condenser and the other 47-ohm resistor. Note the three resistors are mounted at right angles to each other. The 1000-ohm resistor at the lower left is connected between the tie point and the meter terminal.

the open-wire line. A length of coaxial line connects the transmitter to the coupler. Such a system is illustrated in Fig. 2A. Our problem is to

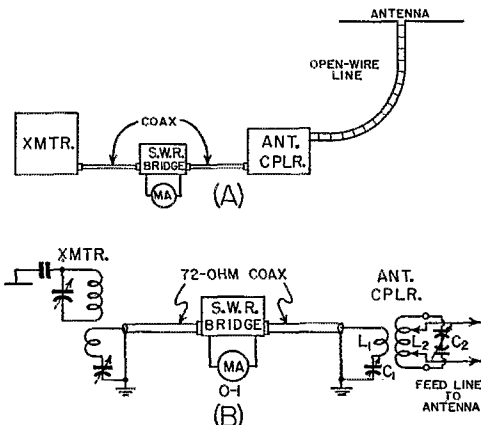


Fig. 2 — At A we see the typical layout described in the text. At B the schematic shows the actual connections one would make for using the bridge.

take the power out of the final amplifier and get it to the antenna coupler, with as little loss on the way as possible.

The Novice will probably wonder why an antenna coupler is used instead of connecting the open-wire line directly to the output terminals of the transmitter. The feeders could be connected directly to the transmitter, but it greatly simplifies coupling problems to use an external antenna coupler, particularly if the antenna is to be operated on more than one band.

Where most amateurs run into trouble with a system such as this is in adjusting the coupler and getting the transmitter to load. With an s.w.r. bridge inserted in the coax line between the rig and the coupler, it becomes an easy job to adjust the coupler to the proper operating values. An ideal set-up, for adjusting the coupler, and the link at the coupler, is shown at Fig. 2B. This coupler, incidentally, is the unit described at Fig. 13-32 in the 1953, '54, and '55 editions of *The Radio Amateur's Handbook*. Complete details are given for component values.

The bridge of Fig. 1 does not make actual s.w.r. measurements — this takes a more complicated bridge — but it shows when the s.w.r. is a minimum and as such is used to adjust the coupling system for a good match.

The first step is to set the meter to full-scale reading with the output side of the bridge disconnected. Once full-scale reading is set on the meter, the transmitter controls are not touched again for the test unless the frequency is changed. The coax line from the antenna coupler link is then attached to the output side of the bridge. The feed-line taps are attached to L_2 at or near the outside turns of the coil, making sure they are equidistant from the coil ends. The coupler capacitor C_2 is then tuned for minimum reading on the milliammeter. When this point is reached,

(Continued on page 138)

• On the TVI Front

ADJUSTING LOW-PASS FILTERS

To adjust a low-pass filter for maximum attenuation of harmonics falling in a particular TV channel, it is often necessary to unsolder the coils used in the low-pass and adjust their inductance using a grid-dip meter. A short-cut that possibly provides more accurate tuning is to insert the filter into the TV receiver antenna feed line and tune for maximum attenuation of the TV picture on the critical channel. This method may be criticized by those who take a dim view of the mismatch created by inserting a 52- or 75-ohm low-pass in a 300 ohm line — but it works! — *Kenneth Montgomery, W5ABY*

MORE ON SIGNAL SHIFTER TVI SUPPRESSION

Some months ago a method was shown for reducing harmonic radiation from the Meissner Signal Shifter.¹ It was tried and found inadequate in suppressing harmonics which interfered with Channels 2 and 4 at this location.

It was found that quite a bit of r.f. was being picked up by five 115-volt a.c. leads which go to the rear of the chassis from the switch on the front panel. These were inserted separately in shielded copper braid grounded in the center and at both ends. This reduced r.f. in the a.c. line about 50 per cent.

Further inspection revealed that the output link coils in the turret are closely coupled to the plate inductances of the 807 stage. It was reasoned that if the output coils were tuned, the harmonics should be considerably reduced. An external assembly mounted in a small aluminum box (Fig. 1) was used to accomplish this objective.

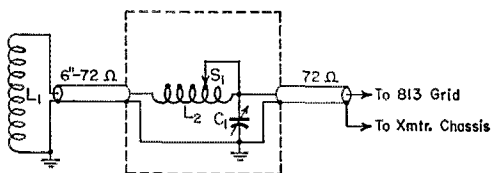


Fig. 1 — Schematic of external assembly for additional TVI suppression in the Meissner Signal Shifter.
C₁ — 75- μ f. variable (low-loss).
L₁ — Output coil of Signal Shifter.
L₂ — 10 turns No. 18 plastic insulated on 1-inch steatite form tapped as follows: 3.5 Mc. — whole coil; 7.0 Mc. — 8 turns; 14.0 Mc. — 6 turns; 21.0 Mc. — 4 turns; 28 Mc. — 2 turns.
S₁ — 5-position s.p. ceramic rotary.

The completed unit was fastened to the rear of the Signal Shifter. This unit consists of a tapped coil in series with the output coil of the VFO through a 6-inch length of 72-ohm coax. In addition, a 75- μ f. variable capacitor was connected from the output side of the tapped coil to ground. Another 72-ohm coax line was used to connect the external assembly to the untuned grid of an 813 final.

¹ McCoy, "Suppressing TVI in the Meissner Signal Shifter," *QST*, Oct., 1953.

Measurements showed that harmonic radiation was almost completely eliminated, and as further proof, the interference in the TV set disappeared. — *M. J. Grainger, KP4JE*

TVI COMPLAINT

2160 N. Mason Ave.
Chicago, Ill.

Editor, *QST*:

On Friday, January 21, 1955, I received rather unique publicity in one of Chicago's newspapers about a case of TVI that came to me via the Presidential office in Washington, D. C. Apparently some of the other news services picked up this "scoop," adding or subtracting their own twist, resulting in nation-wide radio and newspaper publicity. I received considerable mail about this matter and believe an explanation is in order.

The transmitter in use here is a Viking II, equipped with a low-pass filter. My operation is on the 40-meter 'phone band, and I have no interference on TV receivers in my own home. Extensive checks have been made with several neighbors and no TVI was encountered.

After becoming aware of this much publicized case of TVI, through the local FCC office, I had my son, who is a TV engineer and also a radio amateur, conduct an investigation. The complainant's TV receiver is one of a well-known manufacturer, about six years old. Both the audio and video on all channels (2, 5, 7, and 9) were being affected in the same manner. My son installed a high-pass filter.

Tests were conducted which proved that the cause of this TVI was definitely the TV receiver. The complainant promised to contact the manufacturer and have them install a high-pass filter.

I am writing this in the hope that it may clarify the amateurs' side of the story. — *Anthony Shragal, W9SEF*



... With the Wouff-Hong in his right hand, and typing with his left, the editor proceeds to lambaste those careless operators who have been found in large numbers outside the bands, clobbering AT&T and USN circuits.

... Continuing the theme of the editorial, the first technical article deals with a description of an extremely accurate frequency standard, written by J. K. Clapp and John D. Crawford.

... "The Old Connecticut Yankee" passes out some timely advice on "cooperating with the BCL," in his usual helpful fashion.

... How to build — and how not to build — a 20-meter 'phone transmitter is discussed by Beverly Dudley, with full plans for a particular rig, using push-pull UX-210s in the final, modulated by parallel UX-250s.

... Clark C. Rodimon explores the use of electrolytic condensers in transmitter high-voltage power supplies.

... The Old Man announces he's back on the scene, complete with Rettyynitch, Wouff-Hong and the pot of boiling transformer oil to get the Young Squirts back on the straight-and-narrow.

... George E. Fleming describes a high-gain direct-coupled power amplifier for audio frequencies, with comment on the relative merits of transformer, condenser and direct coupling.

... Some constructional hints are described by George Grammer, including the use of old tube bases as coil forms, shielding, winding copper tubing, and insulating shafts from metal panels.

... Station W9BVII is featured as the station of the month, and with good reason. The three-tube exciter unit is laid out in a unique circular form, and both exciter and driver are shielded. The final is a UX-852 running about 450 watts input.

A Mobile S.S.B. Receiver for 80 and 40

Using a Tunable I.F. and Crystal-Converter

BY ROBERT A. THOMASON,* W4SUD

• Here is some sound reasoning on what should go into a good receiver for mobile work, and some suggestions on how to work over a BC-453-A to meet those requirements. If you have a BC-453-A that is now gathering dust, this is your meat.

WHAT FEATURES would an ideal amateur mobile receiver have for a.m., c.w., and s.s.b. reception? While everyone might not agree across the board, the writer believes they should include:

- 1) Exceptional frequency stability (for s.s.b.).
- 2) Good selectivity ($2\frac{1}{2}$ kc. at 6 db. down).
- 3) Adequate sensitivity.
- 4) Plenty of bandspread.
- 5) Good calibration (reset within 2 kc.).
- 6) Built-in automatic noise limiter.
- 7) Automatic volume control.
- 8) Stable b.f.o. (with switch control).
- 9) Separate a.f. and r.f. gain controls.
- 10) Independence of b.c. receiver.
- 11) Low image response.

Wait a second! That's a lot of receiver. You've got to make it fit somewhere in the family jalopy and operate it from an average car battery. Well, then, let's make the next two features:

- 12) Compactness (under-dash mounting).
- 13) Reasonable power consumption (100 ma. at 250 volts).

Assuming these specifications could be met, who could afford it? Also, the average amateur does not have the "know-how" or test equipment to build it. So we have:

- 14) Moderate cost.
- 15) Simple construction.

This receiver was realized in the writer's mobile station by converting a BC-453-A low-frequency (190-550 kc.) Command receiver.

At this point, the one drawback this receiver does have should be mentioned: Limited frequency coverage (3.5 and 7 Mc.).

This is rather serious for many mobile enthusiasts. However, by adding a high-frequency converter with output on 40 or 80 meters, the higher frequencies can also be covered with the possible partial loss of stability, bandspread, and calibration, depending upon the quality of the converter.

Changes & Additions

The following additions and modifications were performed on the BC-453-A to obtain our almost-super mobile receiver:

- 1) Add a crystal-controlled pentagrid converter (6BE6). This is mounted on the rear apron of the receiver originally occupied by the dynamotor. The Command receiver is used

as a tunable i.f. amplifier from 190 to 550 kc. A different crystal is used for each 360 kc. covered. The crystal switch could include a crystal for WWV or perhaps a local broadcast frequency.

- 2) Add one stage of audio amplification (6C4) between the second detector and power amplifier. The stage is mounted on a small subchassis underneath the receiver.

- 3) Add a.v.c.

- 4) Add shunt noise limiter (1N34).

- 5) Add a.f. and r.f. gain controls.

- 6) Replace all 12-volt tubes with their 6-volt equivalents. The 12A6 was replaced by a 6V6.

- 7) Rewire all heaters in parallel.

- 8) Replace the antenna trimmer capacitor with a unit that is screwdriver-adjusted from the side. The capacitor thus released was used as a b.f.o. pitch control.

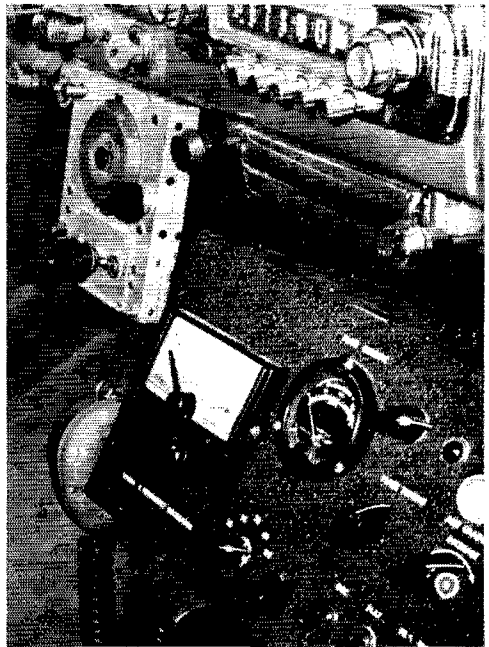
- 9) Add speaker and matching transformer.

Details

Let's take each feature and study how it can be accomplished.

The frequency stability is exceptional in this unit. The crystal-controlled high-frequency oscillator, together with the excellent stability found in these receivers, makes s.s.b. reception easily possible even while driving over rough roads.

The BC-453-A has an intermediate frequency of 85 kc. and has six tuned i.f. circuits. This gives good selectivity. The selectivity with minimum coupling in each i.f. transformer is just sharp



A BC-453-A with a few revisions makes a good tunable i.f. amplifier for a mobile receiver. One is shown here tucked under the dash.

* 1825 Cherokee Drive, Owensboro, Ky.

enough for s.s.b. reception. (The coupling can be varied by unscrewing the knurled cover and adjusting the fiber rod.) "Up" position is minimum coupling. More coupling is desirable for a.m. (except for exalted-carrier reception).¹ The noise

an r.f. gain control. This was retained in the final design for s.s.b., and an audio control was added for normal a.m. reception. In the writer's installation, this receiver is independent of the broadcast set except for the speaker.

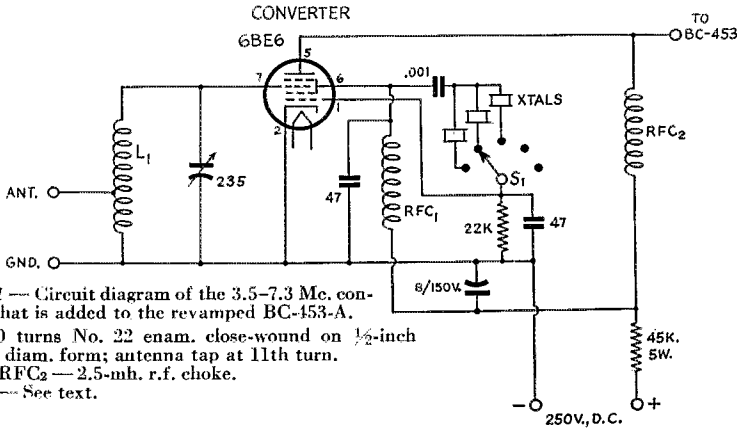


Fig. 1 — Circuit diagram of the 3.5-7.3 Mc. converter that is added to the revamped BC-453-A.

L₁ — 40 turns No. 22 enam. close-wound on ½-inch diam. form; antenna tap at 11th turn.
RFC₁, RFC₂ — 2.5-mh. r.f. choke.
XTALS — See text.

figure is better than the usual noise found on the lower frequencies.

The entire dial covers 350 kc., giving plenty of bandspread. (Two crystals are required in the h.f. oscillator to cover all of the c.w. portion of the 80-meter band.)

By using a 3500-ke. crystal in the h.f. oscillator to cover the 75-meter 'phone band, a dial reading of 500 kc. is 4000 kc., 450 kc. is 3950 kc., and so on. The calibration will stay put indefinitely.

The automatic noise limiter was added at little additional labor or expense. It will prove

When it was first tested on a long-wire antenna, this receiver had rather high image response. However, when it was installed in the car and the center-loaded whip used as an antenna, the images dropped to a negligible value. The tuned antenna apparently acts like an additional front-end tuned circuit.

The over-all dimensions are 5 by 5½ by 11 inches deep, exclusive of speaker and power supply. This is small enough for under-dash mounting in almost any car.

The power consumption is 100 ma. at 250 v.

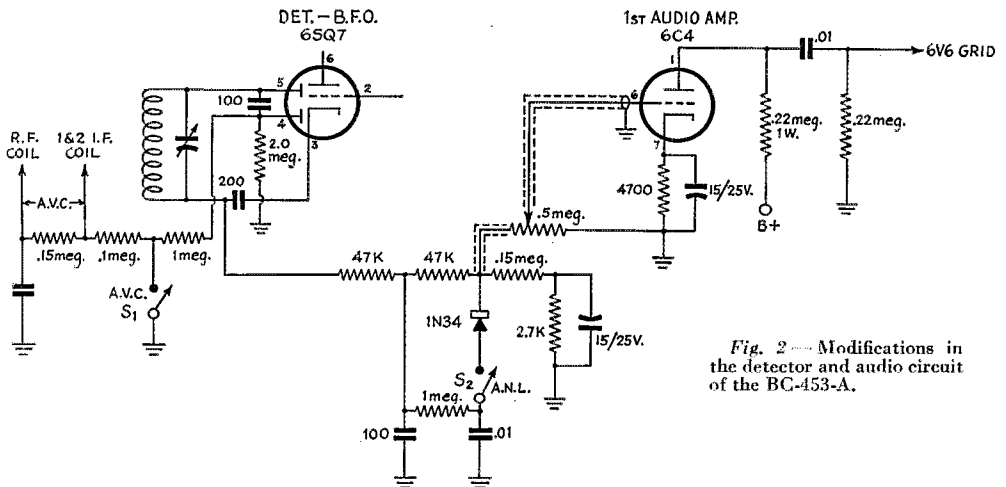


Fig. 2 — Modifications in the detector and audio circuit of the BC-453-A.

more valuable if the higher frequencies are covered with an outboard converter. A.V.C. was also easily added and requires few additional parts. The b.f.o. operates at 85 kc. and is very stable. The antenna trimmer capacitor is used as a pitch control. Normally, the BC-453-A is used with only

¹ Goodman, "Selectivity and 'Phone Reception," *QST*, March, 1954.

This can be furnished by a small dynamotor, or by the broadcast receiver power supply, if its regular load is switched off while operating the BC-453-A.

The Command receiver used in our car was removed from the hamshack where it was serving as a Q5-er. It was felt the loss was more than offset by the addition of a good mobile receiver.

For those who do not own a BC-453-A, remember that although the price is considerably higher than a few years back, they are still well worth their money. Even at today's prices, this modified receiver costs less than the cheapest commercial converter.

The modifications are simple and require a minimum of test equipment. The average amateur should have no difficulty in this respect.

The 6BE6 crystal converter is built into a homemade metal box that just fills the space on the rear apron of the receiver. The simplicity of the circuit can be seen in Fig. 1. The only caution the builder should observe is to keep L_1 and the r.f. chokes well separated. The controls, C_1 and S_1 , are mounted on the rear of the metal box. The side may be more convenient if space is available in the reader's car. However, it is only necessary to adjust them when changing bands, so the rear mounting is satisfactory.

The regular antenna post was removed and the hole plugged. A wire was soldered to the small mica condenser that was originally tied to the antenna post and then run along the inside top of the cabinet to the converter in the rear. This will minimize stray pick-up on the i.f. intermediate frequency. It is necessary to remove the top cover and variable-condenser cover in order to reach the antenna post. While these covers are removed, small holes can be drilled for the wire going to the converter. The heater choke mounted just below the dynamotor plug underneath the chassis was removed and discarded. This gave more working room. The wires going to the dynamotor plug were left as originally connected. The heater, B+, and ground leads were thus convenient to the converter by soldering to the banana plugs.

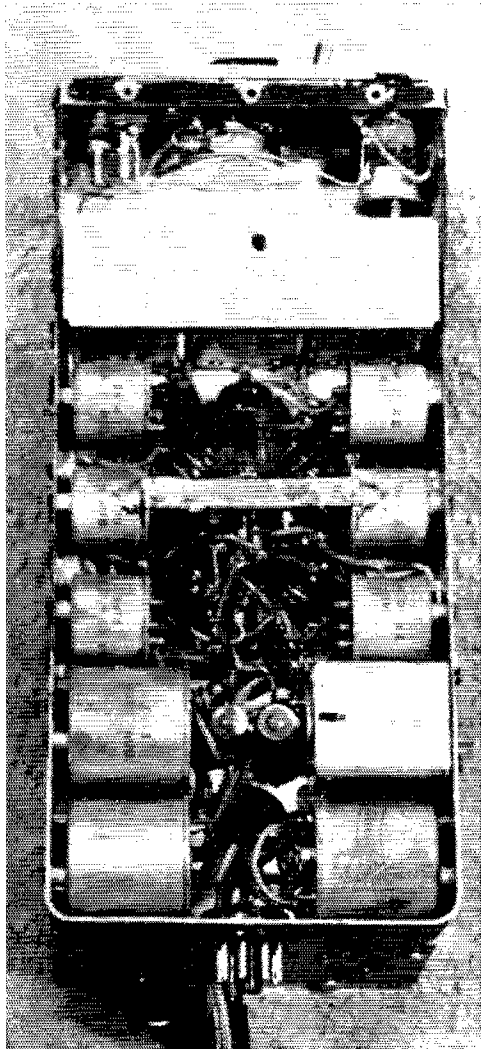
The socket on the rear of the receiver was removed and the hole enlarged to $1\frac{1}{64}$ inches. This permitted the installation of a conventional octal tube socket. Plugs for these sockets are made by Amphenol and are available at most distributors. The only wires retained on this plug were ground, heater, B+, and audio output. The others were cut loose at their source and removed.

The wires and neon lamp were removed from the antenna trimmer condenser; then the stator plates were connected to Pin 6 of the 6SQ7 (formerly a 12SQ7). The antenna trimmer thus became a b.f.o. pitch control. A 30- μ f. compression condenser was mounted on the side of the chassis to serve as a screwdriver-adjustable antenna trimmer. There is sufficient gain in the receiver for this antenna trimmer to be omitted entirely, if desired.

The small metal box and condenser mounted on the front panel should now be removed to make room for the audio and r.f. gain controls, b.f.o., a.v.c., and a.n.l. on-off switches. This makes things quite crowded, and miniature components should be purchased for use here. All the wiring going to the small metal box should be cut at its source and removed, except the green and red wires; these are r.f. gain and b.f.o.

"off," respectively. The r.f. gain control is a 20,000-ohm unit, and is connected to a switch that grounds it to turn the b.f.o. on. The wiring for the other controls is shown in Fig. 2.

The output transformer used in the original set was retained and a 2000-ohms-to-voice-coil transformer mounted at the speaker. This made



Under chassis view of the reworked BC-453-A. The metal strip running across the chassis at about the center is used to support the 6C4 socket.

a little less modification work than replacing the output transformer. Also, it made 2000 ohms output impedance available for headphones.

If the receiver is used for s.s.b. reception, for the sake of stability it would be more desirable to mute the receiver at the speaker rather than to remove B+ during transmitting periods. This is not a necessity even for s.s.b. reception, if the builder wishes to use his receiver supply for a portion of the transmitter.

(Continued on page 186)



Hints and Kinks

For the Experimenter



THREE-WAY SWITCH FOR THE SIMPLEST MODULATOR

OPERATORS who employ the "Simplest Modulator" for casual 'phone operation with their existing c.w. rigs must remember to unplug the modulator whenever the mode of operation is changed from 'phone to c.w. Of course, if the cathode of the final is keyed and if the modulator output terminals are connected in parallel with those of the key, the unplugging motion is unnecessary. However, in installations where the oscillator or a low-level stage is keyed, it is necessary to disconnect the modulator so that the r.f. output tube may work at normal input.

The circuit shown in Fig. 1 shows how a single-pole three-position switch has been put to use

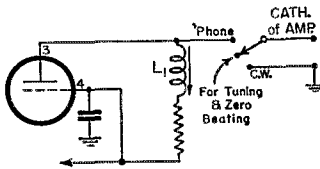


Fig. 1 — Circuit diagram of the switching system described by W3PVY.

with the transmitter and modulator used here at W3PVY. Two of the switch positions provide for rapid change over from 'phone to c.w. operation, and the center or third contact allows the final to be disabled during zero-bearing or tuning adjustments.

To clarify the circuit of Fig. 1, it should be mentioned that all components other than S_1 are parts of the modulator circuit appearing on page 15 of September, 1953, *QST*, and page 250 of the ARRL *Handbook*, 31st edition.

— Ed Rittenhouse, W3PVY

CONVERTING FILAMENT TRANSFORMERS FOR PLATE-SUPPLY USE

IN searching for miniature power transformers for such low-power items as grid-dip oscillators, etc., I have found it convenient to make my own, using small filament transformers. Since most of these have the low-voltage winding wound on the outside, it is a easy to remove the few filament turns to make room for the rewinding.

The procedure is simple. Count the turns removed to determine the turns per volt ratio for the core. Now rewind the filament turns with a smaller size wire. Follow this with the "high-voltage" winding using the number of turns per volt previously determined. The wire sizes should be chosen so the I^2R losses in the two secondaries

under load do not exceed the rated I^2R loss for the removed turns. This allowable loss is fairly flexible and can be exceeded by 50 per cent or so for intermittent duty or where some ventilation is present.

— Ben Vester, W3TLN

[ERROR'S NOTE: Additional data pertaining to the rewinding of transformers will be found in Chapter 7 of *The Radio Amateur's Handbook*.]

IMPROVED AUDIO CIRCUIT FOR THE 50-MC. C.D. UNIT

ALTHOUGH the circuit to be presented is intended primarily for use with the 50-Mc. unit described in May, 1952, *QST*, it deserves consideration by anyone embarked on a speech-amplifier project designed with carbon-microphone input in mind.

The new circuit, shown in Fig. 2, uses a 6U8 triode-pentode as a replacement for the 12AT7 originally employed in the microphone input and the amplifier-clipper stages of the c.d. unit. Not only does the revised arrangement retain all of the desirable features discussed in the original constructional article, but it increases the gain of the speech amplifier by 10 db. or more. This represents an improvement over the 12AT7 line-up and eliminates the need for crowding the microphone so that full modulation may be obtained.

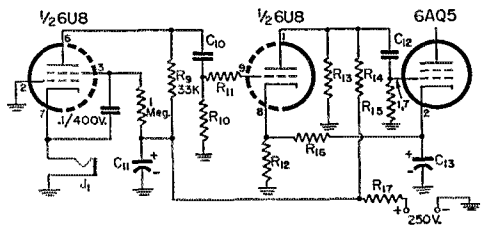


Fig. 2 — Schematic diagram of the revised audio circuit for W1CTW's 50-Mc. c.d. unit.

In Fig. 2, the pentode section of the 6U8 is used as the microphone coupling tube and the triode section is employed as the voltage amplifier and clipper. The schematic shows that a 0.1-megohm screen dropping resistor and a 0.1- μ f. screen-to-cathode capacitor have been added to the circuit and that the plate resistor for the input stage has been increased to 33,000 ohms. It should be pointed out at this time that the values of the plate and the screen resistors are quite critical from the standpoint of maximum obtainable gain. Further study of Fig. 2 shows that the component values and the wiring origi-

(Continued on page 140)

You Can't Beat F.M.!

Advantages of "Almost-N.F.M." for V.H.F., with Practical Application in a 48-54 Mc. Exciter

BY DON H. GROSS,* W3QVC

SOME of the brethren may think me a bit daft for saying so, but for v.h.f. voice work nothing excels the right kind of f.m. Perhaps a few hardy souls will want to venture through the technical difficulties of single sideband on frequencies above 50 Mc., but aside from such a remarkable feat, a.m. is definitely inferior to f.m., if the latter is properly used. Go ahead and laugh, but please read on.

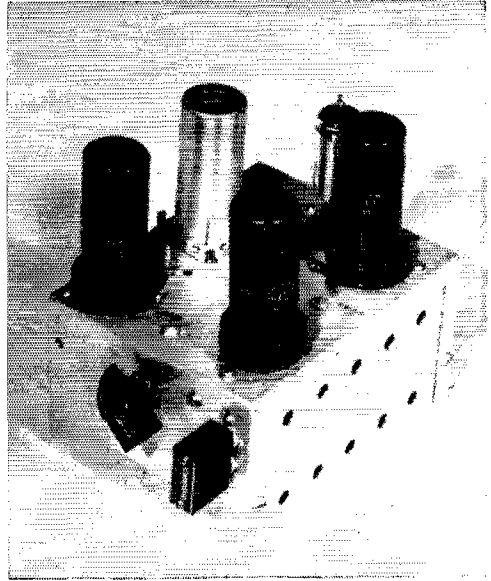
The word has gotten around pretty well that f.m. eliminates high-powered modulators, and that it is far better than a.m. when it comes to TVI or BCI. We can also see that the high grid drive and higher plate dissipation and voltage ratings necessary for a.m. make it difficult when we approach the u.h.f. region. Then, too, a 100 per cent modulated a.m. transmitter in the 420-Mc. band is limited to 12.5 watts antenna power (since 50 watts *peak* is the law), while up to 50 watts antenna power is legal with f.m. But we usually see a tendency to be apologetic about the communications value of f.m. This is mainly because most of our thinking since the war has been in terms of strictly narrow-band f.m., where second-order sidebands are kept insignificant so that our signals will occupy no wider channels than a.m.

In order to keep to true n.f.m., the modulation index must not exceed 0.6. Under these conditions, as the venerable *Handbook* says, "so far as effectiveness is concerned, a narrow-band f.m. or p.m. transmitter is about equivalent to a 100 per cent modulated a.m. transmitter operating at one-fourth the carrier power." At this rate, n.f.m. is enough to discourage any self-respecting DX man. Add to this the horrible method of detecting f.m. signals by slight detuning on an a.m. receiver, as nefariously practiced by most of us, and anyone with a brain in his head would conclude that if you want a signal without any vitamins, if you want your voice drowned in a waterfall of noise and clobbered with QRM, just use f.m.

Whoa There!

However, dear friends, we have been overlooking a juicy item. Above 52.5 Mc. (and on some frequencies below) we aren't confined to the narrow-band version of f.m. What if we crank the audio gain up to give us a modulation

index of 1.0? Second-order sidebands appear, but they are still relatively weak.¹ The happy part is what happens to the first-order sidebands. Now they have some real zip. Put this signal through an i.f. amplifier of 6 or 7 kc. bandwidth,



The W3QVC f.m. exciter is a compact package. At the right front is the 6AG7 oscillator, with the modulator behind it. Left is the tripler, with the 5763 doubler in the back corner. The voltage-regulator tube is visible in back of the modulator. Note ventilation holes in the side of the bottom cover.

detect it with a good ratio detector or discriminator-following-a-limiter, and presto—f.m. comes into its own!

Rummage through the old *QST*'s published just before the war and there you will see the beginnings of a development in amateur f.m. that was nipped in the bud at Pearl Harbor. Look, for instance, at that fascinating article by Murray Crosby on "Bandwidth and Readability in Frequency Modulation," page 26 of March, 1941, *QST*. There we see that for maximum readability of weak signals the deviation ratio should be 1.0, and that such an f.m. signal is always more readable than a.m. In fact, at some weak signal levels this "almost-n.f.m." signal is as readable as an equivalent 100 per cent modulated a.m. signal of *four times* the power. Thus the tables are turned. If it is transmitted and received properly, you can't beat f.m.

* 1146 Prospect Road, Pittsburgh 27, Pa.

¹ In most locations there is not so much v.h.f. QRM that the extra bandwidth would matter much; and in any case heavily-modulated a.m. transmitters in the region above 144 Mc. are already using more space than f.m. with a deviation ratio of 1.0.

How To Get Good F.M. Above 50 Mc.

Reactance-tube modulation of a self-excited oscillator just isn't stable enough for good narrow-band work on v.h.f. W1VLH has the right idea in his phase-modulation exciter.² A crystal oscillator provides the necessary stability. Reactance modulation of a tank circuit provides phase modulation. The only difference between a p.m. and an f.m. signal is that with p.m. the frequency deviation rises in proportion to the modulating audio frequency (assuming that the amplitude of the modulating wave is held constant), while with f.m. the deviation is the same for all audio frequencies. So the secret of turning p.m. into f.m. is to make the output of the speech amplifier vary in inverse proportion to the audio frequency. Only the r.f. section of an exciter is to be described here, but the speech amplifier that is used with it ends up with a 6SJ7 having an effective load resistance of 50K. A 0.006- μ f. condenser across this load gives the proper inverse frequency response. A clipper-filter circuit is also used, and this is most desirable.

A Phase-Modulation Exciter

The exciter shown here is a straightforward, highly stable affair with sufficient output at 48-54 Mc. to drive an 832 tripler to 144 Mc. It uses single-control tuning, for compactness and simplicity of operation. Crystals for 8 to 9 Mc. plug in the front. Shielding, short wiring, and voltage regulation of the oscillator screen all serve to give excellent isolation of the grid-screen oscillator circuit from the phase-modulated plate tank, even though both operate at the same frequency.

The 6AG7 reactance modulator has enough gain and plate-current capacity to provide adequate deviation at 50 Mc., and more than enough for multiplication to higher frequencies. About two volts of audio (at normal voice frequencies) gives proper deviation for the 144-Mc. band. Some care has been taken in by-passing the

screen and cathode of the modulator, as well as in adjusting the grid to ground capacity, in order to eliminate v.h.f. parasitic oscillations.

The plate tank tuning range is determined by L_1 , C_1 , and other circuit capacities across L_1 . Tracking is accomplished through adjustment of L_2 , C_4 , L_3 , and C_5 . TVI is prevented by proper shielding and by-passing. An electrostatically shielded output link helps further in coupling out only the desired frequency. All tubes have protective cathode bias. Power supply requirements are 300 volts at about 125 ma., and 6.3 volts a.c. at 2.7 amp.

Construction

The exciter is built in a $3 \times 4 \times 5$ -inch aluminum box (Bud CU-3005 Minibox). Holes are drilled in the cover opposite the mica trimmers C_4 and C_5 to allow adjustment after assembly. They may then be covered with adhesive tape.

The crystal was at first mounted in the center, but had to be moved closer to the oscillator tube to achieve proper isolation from the rest of the circuit. A small aluminum shield partition is placed between the 6AG7 oscillator and the tuning condenser; the cathode by-pass condenser is placed so as to shield the plate contact on the tube socket from the grid; and RFC_1 is small, with a short lead to the screen grid. All these precautions carefully isolate the crystal circuit, to achieve maximum stability.

A small-diameter octal socket allows the tripler tube to be mounted in its limited space. Don't dope the tripler plate coil until its circuit is aligned. Note that the center section of the tuning condenser is used for the oscillator plate; the front section for the tripler plate; and the rear section for the doubler plate. Insulated 'phone tip jacks are used for grid-circuit metering. The modulator screen by-pass in the photographed unit is a mica condenser; a disk ceramic condenser is specified because it is cheaper.

Adjustment and Operation

The initial tune-up procedure is as follows:

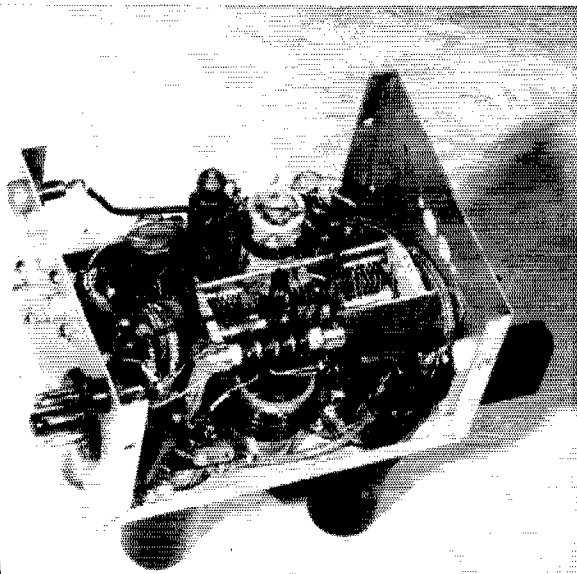
- 1) Put the bottom cover on, but without its screws. Set C_4 to minimum capacity. Plug in the highest frequency crystal to be used, and connect a high-impedance voltmeter between J_3 and ground. Adjust the main tuning condenser for maximum negative voltage. This should be about 130 to 150 volts.

- 2) Change the meter to J_4 , and tune C_4 for maximum negative voltage, which should be around 70 to 90 volts.

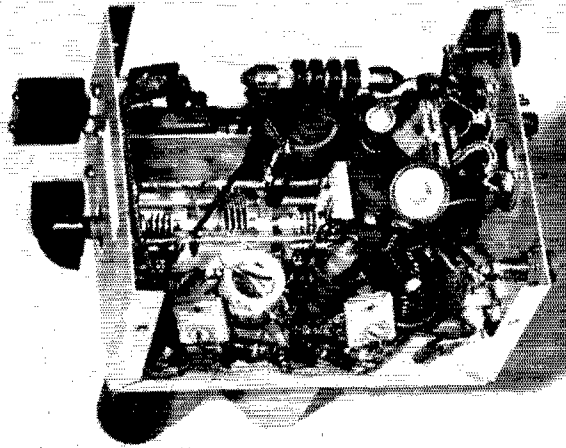


Bottom view of the oscillator-modulator side of the f.m. exciter. Note the small shield partition for isolating the crystal circuit. Two phono-type jacks are for audio input and r.f. output. Tip jacks are for measuring tripler and doubler grid voltages.

² Southworth, "A Phase-Modulation Exciter for the V.H.F. Man," *QST*, August, 1954.



Bottom view from the tripler-amplifier side. In the foreground are the tripler plate coil and the two mica tracking trimmers. The doubler tank coil is at the right.



3) Plug in the *lowest*-frequency crystal and tune the gauged condenser for maximum voltage at J_3 .

4) Adjust the slug in L_2 for maximum voltage at J_4 .

5) Repeat Steps 1 through 4 until no further adjustments are necessary. The spacing of the turns of L_2 may have to be changed if the slug does not give enough tuning range in the right direction. Remember that minimum inductance is with the slug all the way in. Inductance also decreases as the turns are spread apart. When you are sure the slug will properly align L_2 , dope the turns in place.

6) Now for the output tank. With the *highest* frequency crystal, tune the gauged condenser for maximum voltage at J_3 . Then tune C_5 for maximum output.

7) Try the *lowest*-frequency crystal. Tune the gauged condenser for a maximum voltage at J_3 again. Note which direction, if any, C_5 must be tuned for maximum output. If you had to increase its capacity by tightening it, squeeze the turns of L_3 together a bit; if you decreased C_5 , spread L_3 a little. You will have to remove the bottom cover to do this; be sure to replace it before checking alignment.

8) Repeat Steps 6 and 7 until no change in C_5 is necessary for Step 7.

The exciter is now aligned. Screw on the bottom cover. After this, all you do is plug in the desired crystal and tune the knob for maximum output.

Frequency deviation is adjusted by controlling the output of your speech amplifier. The optimum adjustment is that which gives maximum output without appreciable distortion, at a moderate signal level, in a receiver with a 6- or 7-ke. i.f. bandwidth, equipped with a ratio detector or limiter-and-discriminator. The u.f.m. adapters advertised for a number of the standard commercial ham receivers fill the bill perfectly.

My thanks go to my good neighbor, Andrew B. Potter, for the photographs used in this article.

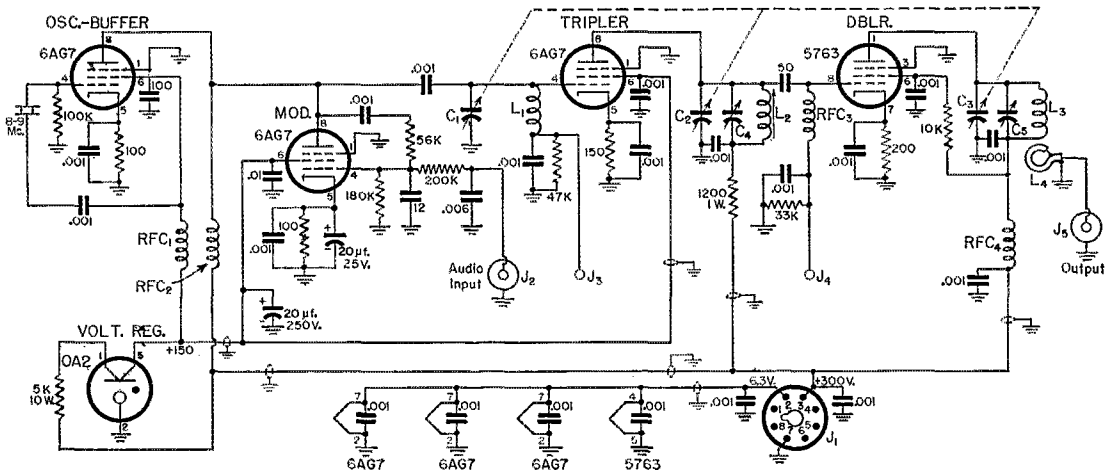


Fig. 1 — Schematic diagram and parts information for the v.h.f. f.m. exciter. Capacitor values 0.001 and larger are in microfarads. All resistors $\frac{1}{2}$ watt.

C_1, C_2, C_3 — 3-gang variable, 25- μ f., per-section (Bud LC-1847).

C_4, C_5 — 3-30- μ f. mica trimmer.

L_1 — 18 turns No. 20 enam., close-wound on 1-inch diam. form (National XR-2).

L_2 — 5 $\frac{1}{2}$ turns No. 20 enam., $\frac{3}{8}$ inch long, wound on $\frac{3}{4}$ -inch diam. brass-slug form (National XR-73).

L_3 — 5 turns No. 12 enam., $\frac{1}{2}$ -inch diam., $\frac{3}{4}$ inch long.

L_4 — 1 turn RG-58/U coaxial cable around cold end of L_3 ; end of inner conductor soldered to outer

braid; end of outer braid left unconnected. Leave outer insulation on.

J_1 — 8-pin male chassis fitting.

J_2, J_5 — Phono-type coaxial fitting.

J_3, J_4 — Phone-tip jack.

RFC $_1$ — 50- μ h (National R-33).

RFC $_2$ — 2.5-mh. (National R-100).

RFC $_3$ — 1 mh. (National R-300).

RFC $_4$ — 7 μ h. (Ohmite Z-50).

• Recent Equipment —

The 5100 Transmitter and 51SB Single-Sideband Generator

ANY amateur interested in a complete 'phone/c.w. transmitter in the 150-watt class, to which he can later add s.s.b. with a minimum of effort, will do well to consider the new Barker & Williamson 5100 Transmitter and its companion unit, the 51SB Single-Sideband Generator. When the two units are tied together, switching to c.w., a.m. or s.s.b., or any amateur band, 80 through 10 meters, is simple and quick.

The 5100 Transmitter

Designed for table-top operation, the 5100 is 22 inches wide, 11½ inches high and 14¾ inches deep. It weighs 83 pounds. The r.f. line-up consists of a 6BJ6 VFO (in the 160-meter band) followed by two 6BJ6 buffer stages. The second buffer stage is grid-block keyed, and serves as the crystal oscillator when crystal-controlled operation is demanded. The frequency-multiplication section of the transmitter uses up to four 6AQ5s, depending upon the multiplication requirement, and this entire section is broadbanded and consequently requires no tuning in operation. The output stage uses two 6146s in parallel, with a pi-network output circuit. A small variable condenser across the grid circuit of the output stage trims the circuit and serves as an excitation control. Recommended operation of the 6146s permits a power input of 135 watts on 'phone and 150 watts on c.w.

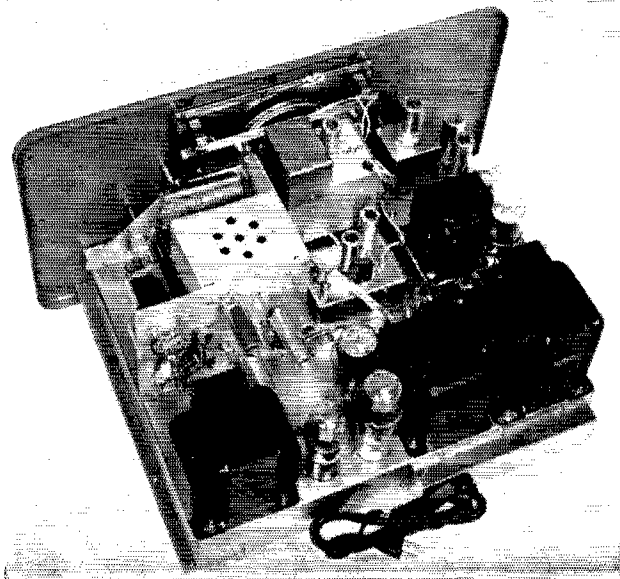
The audio section of the 5100 uses a 6U8 triode-pentode speech amplifier, 6AQ5 trans-

former-coupled driver, and a pair of 6146s for modulators.

A low-pass filter is included in the transmitter, which makes it mandatory that the transmitter work into the same load resistance (75 ohms) on all bands. All leads entering or leaving the package are filtered, as a further precaution against TVI. The manufacturer states that the low-pass filter has a minimum attenuation of 85 db. over the TV range, with over 100 db. at Channel 2. The instruction book devotes two pages to suggested antenna systems, apparently to allay any fears that working a transmitter into a given load resistance may represent an insurmountable obstacle. Actually, of course, it is the only way a transmitter with a built-in low-pass filter of this type can be operated, and it has the advantage that the pi-network circuit can be properly designed for the same Q on all bands.

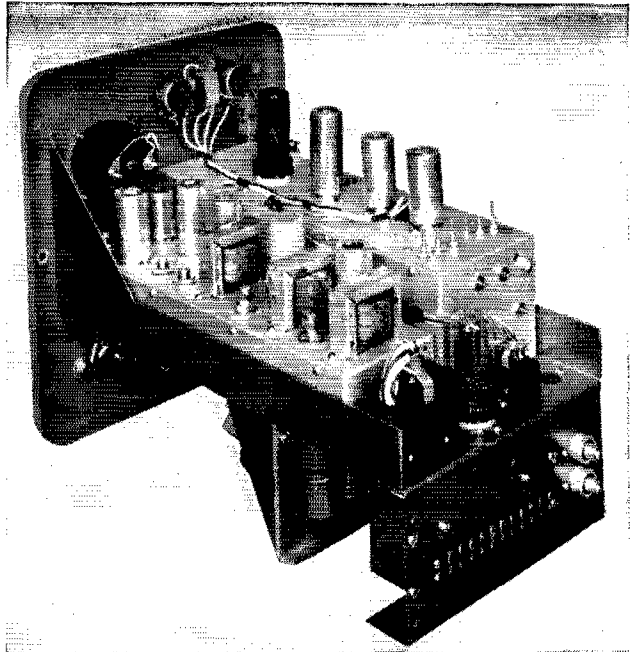
Two power supplies are included in the transmitter, a high-voltage one for the 6146s and a low-voltage one for the other stages and for bias voltages. A pair of 5R4GYs is used in the heavy supply and a 5V4G handles the job in the other supply. Two VR tubes take care of the regulation problems.

One bit of unusual circuitry can be found in the frequency-multiplier section where, for d.c., one pair of 6AQ5s is connected in series with the other pair of 6AQ5s across the 600-volt high-voltage supply. This is a good way to utilize a power supply to best advantage, but it is the



A top view of the 5100 Transmitter shows how the construction has been broken down into subassemblies. The r.f. output section can be seen at the left near the panel, while the 6146 modulators are at the right near the panel. The four tubes in the r.f. multiplier section are mounted horizontally.

This view of the 51SB Single-Sideband Generator shows the audio subassembly in the foreground and the r.f. section behind it. The audio phase-shift network is housed in the gray metal-tube envelope between two small transformers.



first time we have seen it in a piece of commercial gear. A similar dodge was used a few years ago in a mobile rig described in *QST*.¹

For c.w. operation the screens of the output 6146s get their power from the low-voltage supply; on 'phone the screens are fed from the high-voltage supply through a dropping resistor, so that modulation is applied to both plates and screens. For tune-up on either 'phone or c.w., the voltage

of the big supply is reduced by dropping the line voltage through a resistor.

The owner of a 5100 doesn't have to give up the unit when going to higher power — terminals at the rear permit utilizing the audio power (up to 75 watts) to drive a larger modulator.

Looking at the 5100 from the operating stand-

¹ Harrington, "Ten-Meter Mobile With Remotely-Tuned VFO," *QST*, August, 1951.

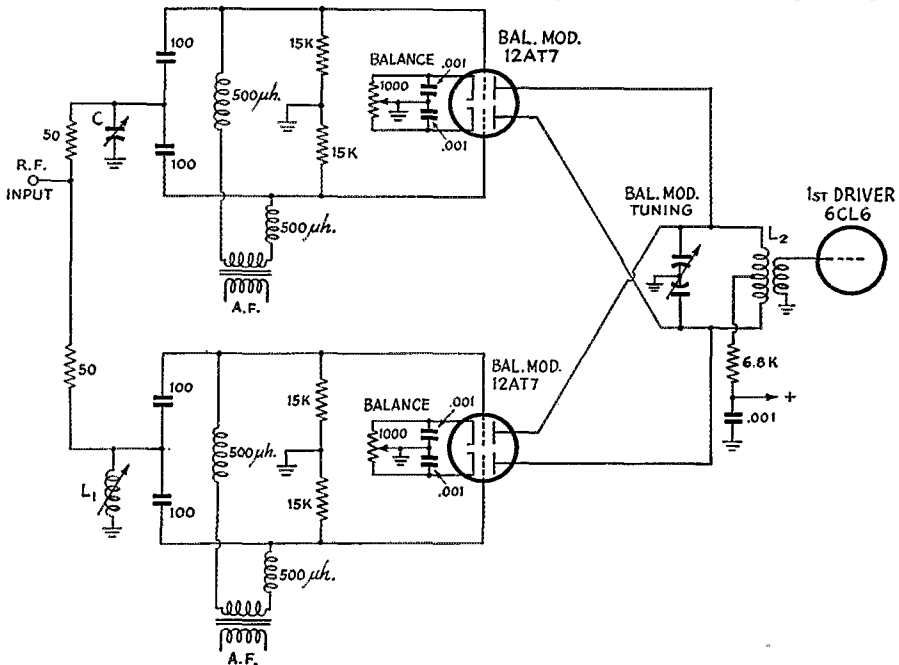
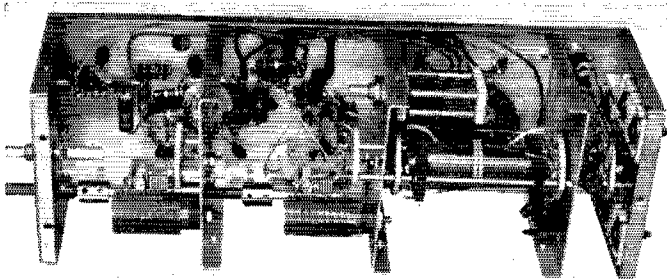


Fig. 1 — Simplified schematic of the balanced modulator circuit used in the 51SB. The r.f. phase shift is obtained by proper constants at L_1 and C . In the actual unit, these constants are switched for each band change, as is L_2 . Sideband selection is obtained by reversing the polarity of one of the audio channels. One cathode of each balanced modulator is opened for carrier unbalance when tuning the following r.f. stages.



The r.f. subassembly of the 51SB, with the hands-wind shaft and the balanced-modulator tuning shaft removed to permit better visibility of the parts. The compartments, from left to right, are 6V6 amplifier (the shield straddles the socket), 6CL6 amplifier, balanced modulators, and r.f. phase-shift networks.

point, the front panel carries the VFO knob (a large one), bandswitch, meter switch for measuring grid and plate current of the output stage and plate current of the modulator, a CW-VFO-PH switch for selecting the mode and for spotting frequency, and A.C., Tune-Operate and Plate switches. Once the band is selected, the operator has only to set the VFO and adjust the plate tuning and loading controls of the output stage, touching up the excitation control also, if necessary. The VFO frequency can be easily read on the slide-rule type scale.

The 51SB Single-Sideband Generator

The companion s.s.b. generator for the 5100 is a small $10 \times 11\frac{1}{2} \times 14\frac{3}{4}$ -inch package that is placed to the right of the transmitter and tied in electrically with interconnecting cables and mechanically with bolts. Once it is properly connected to the 5100, it is a relatively simple matter to change from s.s.b. to a.m. or c.w. and back again.

The 51SB takes r.f. at the output frequency from the 5100 multiplier section and generates s.s.b. at the output frequency through audio and r.f. phase shifts. Fig. 1 shows a simplified schematic of the two balanced modulators. The audio section of the 51SB uses $1\frac{1}{2}$ sections of 12AT7s in cascade before the audio is introduced into the audio phase-shift network. A 3500-cycle cut-off low-pass filter ahead of the network protects the network from audio frequencies beyond its range. From here the signal is amplified and then transformer-coupled into the two 12AT7 balanced modulators. The voice-controlled break-in and antitrip (for loudspeaker operation) circuits use 12AT7s and a 6AL5. The output of the balanced modulator is amplified through a 6CL6-6V6 chain to build up the amplitude to the point where it is sufficient to drive the pair of 6146s in the 5100 transmitter. Two tuning controls are included in the s.s.b. generator: the balanced-modulator output circuit and a ganged control for the 6CL6 and 6V6 plate circuits. The r.f. phase-shift networks are broadbanded and do not require adjustment. Consequently, the tune-up procedure of the 51SB is quite similar to the tune-up of any series of r.f. stages, and the operator does not have to be familiar with how s.s.b. works to put the rig on the air. A switched meter in the unit monitors the grid current of the 6146s and, by using a pair of germanium diodes, the output of the 6V6 driver. The r.f. output position

is used to set up the two carrier-balance panel controls.

The voice-operated control circuit closes a three-pole double-throw relay that provides a keying circuit for the transmitter, an antenna relay control circuit, and a receiver-silencing channel. Adjustable voice-control threshold and hold-in controls are available inside the unit, as is the antitrip sensitivity control. The unit can be used "push-to-talk" from a switch on the microphone or with full voice-controlled break-in, as desired.

Most of the panel controls have been mentioned, but in addition there is a carrier-unbalance switch (for tune-up), upper or lower sideband selector switch, bandswitch, tune-operate switch, and an audio gain control. In operation it is necessary, of course, to make sure that the bandswitches on the 51SB and the 5100 are set to the same band. A minor inconvenience, but nothing to worry anyone who has gone this far in equipping a complete station, is the necessity for changing microphone from unit to unit when going from s.s.b. to a.m., but this could be solved by using two microphones or a shielded switch.

All of the power leads leaving or entering the 51SB are filtered, in keeping with the TVI precautions in the 5100. A 5Y3G in the power supply handles the plate-power requirements of the exciter.

General

In both the 5100 and 51SB, considerable use has been made of subassembly type construction. This is illustrated in the accompanying photographs. The subassemblies are a production expedient, of course, but they also contribute to shielding within the unit.

Instruction books for both units are careful to give step-by-step instructions for all operations, and anyone who takes the time to read them should have no trouble.

Of special interest to home constructors of s.s.b. gear is the little audio phase-shift network used in the 51SB. It is similar to others on the market in that it provides a 90-degree shift over the 300-3000-cycle range, but this one is completely enclosed in a metal-tube envelope of the size used for a 6J5. Thus, plug-in convenience and good shielding are provided in a very small package. This unit, the B & W Model 350, is marketed separately.

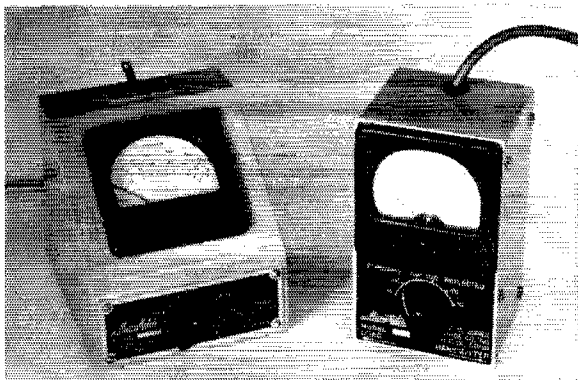
— B. G.

260 Series Power-SWR Meters

THE newest additions to the MicroMatch line of instruments for measuring power and standing-wave ratio feature operating convenience: With these meters it is no longer necessary to reverse the r.f. input and output connections in making measurements of forward

line balances out the forward voltage and responds to the reflected voltage, which is rectified by CR_2 . The voltmeter, a 0-200 microammeter with appropriate series resistors for several usable voltage ranges, can be connected to either circuit by means of the single-pole single-throw switch.

The two types of indicator units, Model 262 at left, 263 at right. The principal difference is in the switching arrangement used for measuring forward and reflected power and for changing the full-scale range.



and reflected power, as was the case with the original MicroMatch. The Models 261 and 263 each consist of essentially two MicroMatch bridges arranged back to back so that one reads the outgoing voltage continuously while the other monitors the reflected voltage.

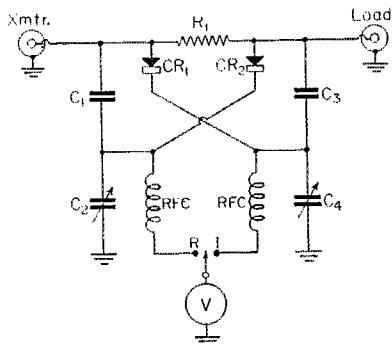


Fig. 1—Basic circuit of the back-to-back bridges used in the Models 262 and 263 MicroMatches.

The basic circuit by which this is accomplished is shown in Fig. 1. R_1 is the series resistance of the original MicroMatch circuit. CR_1 is the voltmeter rectifier for reading the forward voltage. The bridge formed by R_1 , C_1 , C_2 and the transmission

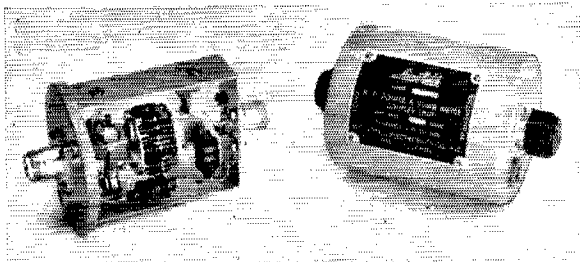
line balances out the forward voltage and responds to the reflected voltage, which is rectified by CR_2 . The voltmeter, a 0-200 microammeter with appropriate series resistors for several usable voltage ranges, can be connected to either circuit by means of the single-pole single-throw switch.

Both models consist of a "coupler unit" and an "indicator unit." The former contains the actual bridge and the latter the voltmeter and multipliers. The coupler units are identical in both models except for the line connectors; regular coax fittings are used on the 261 and "N" type fittings on the 263. The indicator unit for the Model 261 (it has a separate number, 262) uses a variable resistor as a multiplier, with calibration points for 10, 100 and 1000 watts full-scale reading marked on the resistor scale. The Model 263 indicator uses an individual factory-adjusted variable resistor for each of the same three ranges and selects them with a switch. The meter calibration is in watts and is the same on both indicators—0-10, 0-100, and 0-1000—and the same type of meter is used in both. The actual power delivered to a load is found by taking the difference between the forward and reflected power readings. The voltage standing-wave ratio is found by taking the ratio of the forward to reflected power and reading the corresponding v.s.w.r. in instruction book chart.

Either coupler can be left in the transmission line continuously, provided the power does not exceed one kilowatt with an s.w.r. of 1 to 1. The bridges are designed for 52-ohm lines.

The circuit of a measuring instrument is rarely

Internal construction of the coupler unit is shown by the view with the cover removed, at the left. The unit comes furnished with protective caps for the coax connectors as shown at the right. The units are designed for use with 52-ohm lines.



the whole story of its performance, as the sources of error are seldom obvious. The accuracy of a bridge of this type is almost entirely determined by the selection of components and the method of construction. The inside view of one of the coupler units shows the special constructional arrangement adopted to maintain accuracy over the frequency range from 3 to 225 Mc., and to pre-

vent the coupler from introducing an impedance "bump" in the line. The insertion loss is stated to be less than 0.1 db.

Couplers and indicators can be obtained separately. The instruction book with the coupler contains circuit information for home construction of an indicator unit, in case only the coupler is purchased. — G. G.

The RME-100 Speech Clipper

THE advantage of speech clipping should be quite well known by this time. Modulation percentage is limited by the amplitude of the modulating wave form, rather than by average modulating power. The speech clipper increases the ratio of average modulating power to peak amplitude by clipping the peaks of the wave form. This increases the average percentage of modulation, improving the intelligibility without increasing the transmitter power. Since clipping introduces distortion in the form of harmonics, a filter for the harmonics follows the clipper.

The RME-100 consists of a two-stage preamplifier, using a 6SC7 dual triode, followed by a 6H6 clipper and a harmonic filter. Power supply is included in a unit measuring 5 by 6 by 7 inches.

The circuit is shown in Fig. 1. The unit is designed to be inserted between the microphone and the first stage of the speech amplifier, and a switch is provided for cutting the unit in or out of the circuit. The gain is limited to about 6 db. at the maximum clipping level so that a minimum of readjustment of the speech-amplifier gain control is necessary when the clipper is switched in or out.

About 15 millivolts of audio is required to produce a full 24 db. of clipping. This is usually obtained from a crystal or dynamic microphone when talking normally with the microphone at a distance of about 3 inches. The clipping control

switch has 5 positions, 0 to 24 db. in steps of 6 db.

The clipper feeds into a low-pass filter, attenuating frequencies above 3000 cycles at the rate of about 20 db. per octave, and limiting the sideband width. At the low-frequency end, the amplifier has a roll-off characteristic attenuating



The RME-100 Speech Clipper in its streamlined cabinet.

frequencies below 300 cycles. The output impedance is 47,000 ohms, and the input impedance of the stage into which the unit feeds should be a minimum of 100,000 ohms. Hum level is 40 db. below signal at average clipping level. — D. M.

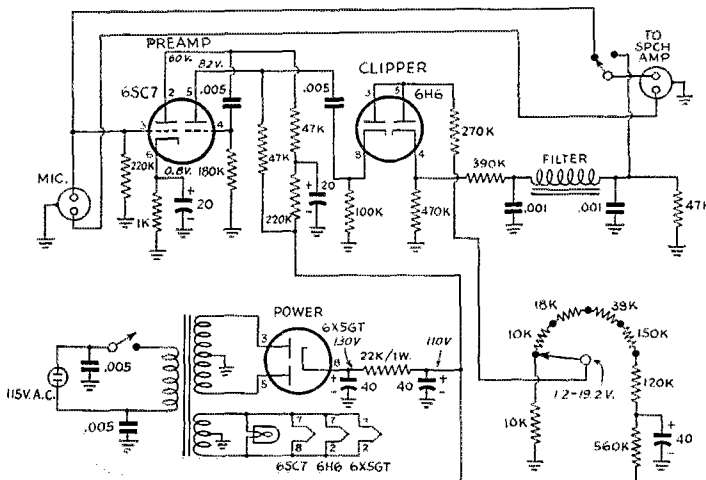


Fig. 1 — Circuit of the RME-100 speech clipper. All resistors $\frac{1}{2}$ watt unless otherwise specified. All capacitances in μ f.

The P-500 Power Amplifier

THE Lakeshore Industries P-500 power amplifier is another in the current crop of power amplifiers designed primarily to boost the power level of a single-sideband signal. It uses a pair of 5514 triodes in push-pull, with multiband tuners¹ in the grid and plate circuits to cover the amateur bands from 80 to 10 meters. As a consequence, there is no bandswitch of any kind, and the panel has two dials, for the grid and plate tuners, and a knob for controlling the

and the bias supply are at the rear of the chassis, as are the connectors for r.f. input and output. The bias supply to be used will, of course, depend upon the plate voltage available. The factory recommendation is a plate supply of 1000 to 1250 volts. The output terminals provide for connection to either balanced or coaxial line.

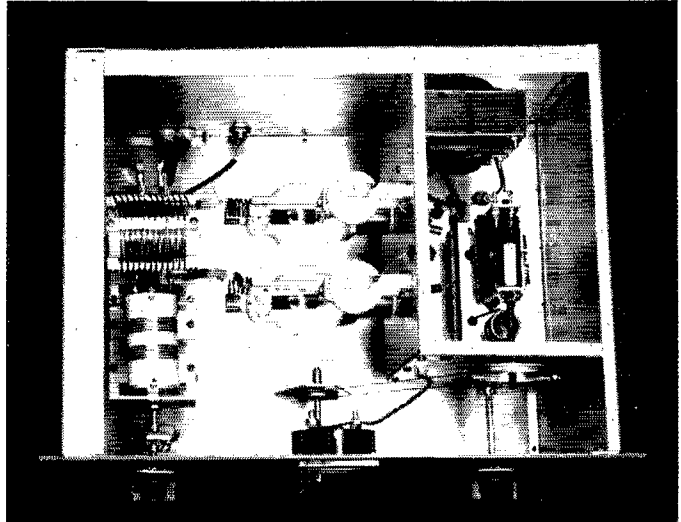
Circuitwise, the P-500 is similar to any other neutralized push-pull triode amplifier, except perhaps for the use of tapped parasitic r.f. chokes

◆

The Lakeshore Industries P-500 power amplifier uses a pair of 5514 triodes mounted horizontally. Multiband tuners both in grid and plate circuits eliminate the need for a bandswitch. Normally, the grid-circuit compartment is covered by an aluminum plate.

The construction of this unit is interesting in that no normal "chassis" is used. The grid compartment is a box within the larger box that makes up the unit. A cane-metal top covers the box shown here, and the whole unit then fits into a painted cabinet.

◆



grid-circuit coupling. A 0-500 milliammeter on the panel is connected in the filament return to ground and reads the total of grid and plate currents.

The line cord coming out the rear of the cabinet connects to the filament transformer — terminals for connecting to the plate supply

¹ King, "No Turrets — Just Tune!," *QST*, March, 1948; Johnson, "Multiband Tuning Circuits," *QST*, July, 1954.

in the plate leads and 56-ohm resistors in series with the neutralizing condensers. (A number of triode amplifiers used as linears seem to require these resistors; e.g., the 811-A amplifier described in March, 1951, *QST*.) Loaded parasitic-suppression chokes are also used in the grid circuit, together with a 2700-ohm swamping resistor for better driver loading.

— B. G.



Operational Readiness Vital to Successful Disaster Work

Operational readiness is the key to success in disaster communications service and for public service operations where the time element is important. Two recent examples of alertness and operational readiness follow:

In the first instance, an earthquake rocked the Fortuna, Calif., area at 1956Z hours on 22 December 1954, causing extensive property damage. T. V. Conroy, A6GQY, of Fortuna immediately established an emergency link with Sixth Army Headquarters and with the Civil Defense

Coördinator for Region One, Col. T. Monroe. The circuit was in operation at 2004Z, just eight minutes after the initial shock. Communication was maintained continuously until 0215Z on the 23rd when it was officially determined that services of the Sixth Army Engineers would not be required. A6GQY reports that circuit discipline on 4020 and 4025 kc. was excellent.

Five days earlier, on 17 December 1954, a radio link was set up between Clovis (N.M.) Air Force Base and Goose Bay, Labrador, to provide medical information concerning an airman who had been bitten by a rabid dog. Stations A5HJF and AA5WSP were instrumental in this operation. A relay was established between Goose Bay Dispensary and the Clovis Air Force Base Hospital so that additional information could be transmitted. The Air Force MARS emergency frequency of 3838 kc. was used.



Correspondence From Members-

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

GOLDEN NETWORK

Granite City, Ill.

Editor, *QST*:

The hams in this area did a wonderful job of collecting pledges during the 38-hour telethon for the benefit of Cerebral Palsy victims. The entire St. Louis, East St. Louis, Granite City, Madison, Venice, Alton area was blanketed by mobile operators who gathered in the gold as it was pledged via land line to several hundred operators at the Keil Auditorium Cerebral Palsy headquarters. About \$50,000 was pledged and picked up by the mobile hams. W0QDF was the spark plug who mustered the hams into the drive and created an efficient mobile pick-up network, but just about every operator in the area deserves credit for having given of his time to make the drive the success that it was. Hundreds of fixed stations were involved, all controlled by W9AIU, the Egyptian Radio Club Headquarters.

— Egyptian Radio Club, Inc., W9AIU

21-Mc. VIOLATIONS

Pleasant Street
Rochdale, Mass.

Editor, *QST*:

Several times while operating 21-Mc. 'phone there have been more W stations in the foreign 'phone section than there has been DX.

This may be attributable to the fact that the band is fairly new or that the majority of receivers do not have too accurate frequency markings, or none at all for the band. Of course, there is also the possibility that some Ws do not know the limitations of the American 'phone band on 21 Mc. So, I would recommend that in the near future a listing be made of 21 Mc. showing the frequency restrictions and pointing out the band limits. I hope this note will possibly save someone from receiving a "pink" ticket for out-of-band operation.

— Kenneth Schofield, W1RIL

[EDITOR'S NOTE — As shown again in "Happenings" this month, the voice segment is 21,250–21,450 kc.]

NOVICE CHANGE

331 Forest Drive, S.E.
Cedar Rapids, Iowa

Editor, *QST*:

I should like to hear some discussion on proposing a change in Novice regulations to extend the term to "one year or to the 13th birthday." I think the younger guys and gals should be given a break. What do you say gang?

— R. Ray Weeks, W0LPK

FOR THE BIRDS

Hobbs, N. Mex.

Editor, *QST*:

I think it's about time I had my say about one of my pet gripes: c.w. in the 'phone bands. This is for the birds! I'll admit c.w. was here first, and it undoubtedly has its place in ham radio, but I personally think it is a thing of the past.

I think the 'phone bands should be reserved for 'phone operation. After all, if c.w. operators are going to be allowed to have large portions of each band set aside for their exclusive use, with big keep-off signs posted to 'phone men, it is only fair that 'phone men should enjoy the same rights.

Any night you can hear c.w. and teletype all over the 75-meter 'phone band, while there are wide-open spots all over the c.w. portion.

I was enticed into ham radio by the reduced code-speed requirements of the Novice ticket, and now I am being booted out by the c.w. and Sloppy Splat-Band operators. Don't misunderstand me; I like ham radio. I've learned enough radio since going on the air as an amateur to pass my commercial 'phone exam.

All I'm asking is fair treatment for all hams. If a man wants to operate c.w., that's his business, but if the FCC is going to let him have his run of 'phone bands, then let the 'phone men into the c.w. bands.

— M. J. Clark, W5UWQ

IT'S FOR THEM

326 So. Walnut Street
Cookeville, Tenn.

Editor, *QST*:

There has been quite a big blow for the past few years about putting both c.w. and s.s.b. off the air. Or at least off the 75-meter 'phone band. Both of these modes of transmission seem to bother the a.m. 'phone men. I think the principal reason for this is the fact that most of the a.m. 'phone men have forgotten what their b.f.o.'s are used for . . . if they ever knew. Anyway, they couldn't read c.w.

What I would like to know is this: Would it be possible to put a.m. 'phone (the kind with a carrier and two sidebands) off the air completely?

There is a good argument for this action. Both c.w. and s.s.b. rigs are much more economical to build and operate. They are both less likely to cause TVI. They both can be operated with greater spectrum economy.

In a 15-ke. segment, only one a.m. 'phone station can be operated without interference. (I have heard several of the kilowatt-give-or-take-a-hundred-watts rigs around here that are much broader than 15 kc.) But in the same 15-ke. segment, two s.s.b. stations and ten c.w. stations may be operated without cross-interference. This is figuring the s.s.b. stations as being 3000 cycles wide and the c.w. stations operating within 900 cycles of each other, which is entirely practicable.

I would like to hear from other hams and get their opinions on the proposal of outlawing a.m. 'phone. The time has come that we cannot waste any parts of our crowded amateur bands!

— Al Brogdon, W4UWA

R.F.D. No. 2
Bradford, Ohio

Editor, *QST*:

A year or so ago, when s.s.b. began to be an issue, I was violently and openly opposed to any part of it. However, this past summer I had plenty of time to do some considering of the issue. After careful study and consideration of the subject, I had to admit that perhaps some of my personal and "technical" opinions didn't add up to the right answer — that is, what I wanted them to add up to. I went so far as to visit a s.s.b. station, and talked over the rig. It made sense. After some more study I bought an exciter, built an amplifier, with the purpose in mind of finding out for myself what s.s.b. had and didn't have to offer.

I found out some of the following things. The s.s.b. group of operators, by the somewhat more technical nature of their equipment, are trying to do a good job, and are forced by the criticisms of others in their group to radiate a reasonably good signal. The group is immediately critical of a bad

(Continued on page 142)

Happenings of the Month

NATIONAL AMATEUR RADIO WEEK

Senator Prescott Bush of Connecticut, joined by Senator William A. Purtell of Connecticut and Senator George A. Smathers of Florida, has again this year introduced into the Congress a Resolution (S. J. Res. 25) to designate one week in the month of June each year as National Amateur Radio Week. The text follows:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States is authorized to designate one week in June of each year as National Amateur Radio Week, and to issue a proclamation inviting the people of the United States to observe the week with appropriate exercises to further and stimulate interest in amateur radio in the United States.

The measure has been referred to the Judiciary Committee of the Senate. If passed by the Senate, the bill will then go to the House for similar action. We understand that the Federal Communications Commission has endorsed the bill this year, and this action is interpreted as affording the measure a better chance than last year, when a similar resolution died in Committee. It is the intention of the language, if adopted, to select each year the week ending with the annual ARRL Field Day tests.

In introducing the bill, Senator Bush addressed his colleagues on the Senate floor as follows:

Mr. President, radio amateurs in the United States have made invaluable contributions toward the advancement of radio. In times of emergency, local and national, they have performed essential services to the public by providing a network of communications linking agencies dealing with disasters.

Connecticut is especially conscious of the contribution to the general good made by these men and women, affectionately known as "hams," because the American Radio Relay League, their official organization, has its headquarters in our State, at West Hartford. . . .

The month of June was selected because during that month each year is held the American Radio Relay League's annual field day in which more than 7000 amateurs throughout the country set up portable and emergency-powered radio communications in remote areas and man the gear in shifts for 24-hour periods. The purpose is to demonstrate the skill of volunteer amateur radiomen in providing emergency communications service in the event of disaster — military, civil or natural.

The week of this event would be a most appropriate one for designation as National Amateur Radio Week.

At this point interested amateurs and club groups who would like to see such a "week" can help by writing brief letters to members of the Senate Judiciary Committee urging favorable action on the resolution; individuals and groups

in the states represented on the Committee can be most effective. The list of Senate members, who can be addressed simply at the U. S. Senate Office Bldg., Washington, D. C., is:

Arkansas — John L. McClellan
Idaho — Herman Welker
Illinois — Everett M. Dirksen
Indiana — William E. Jenner
Maryland — John Marshall Butler
Mississippi — James O. Eastland
Missouri — Thomas C. Hennings, jr.
North Dakota — William Langer
South Carolina — Olin D. Johnston
Tennessee — Estes Kefauver
Texas — Price Daniel
Utah — Arthur V. Watkins
West Virginia — Harley M. Kilgore
Wisconsin — Alexander Wiley
Wyoming — Joseph C. O'Mahoney

The League is of course filing a statement urging its adoption, in language similar to that shown on page 53 of May 1954 QST.

F.C.C. REGION CHANGES

In January FCC completed the revision of its regional-office set-up by dropping the regional office at Detroit and redesignating supervisory responsibilities to the Chicago regional office in the case of the Detroit district office (No. 19) and to the New York regional office in the case of the Buffalo district office (No. 20). This action has no effect on amateur examination schedules, but is of interest to TVI committees in the Detroit and Buffalo districts since they will now have liaison with new regional offices.

The total of regional offices is now reduced to six, those at Houston and Anchorage, Alaska, having been closed last year.

REEXAMINATION AMENDMENT

To clarify the eligibility of applicants for amateur licenses to take another examination after having failed one, FCC has modified the language of Sec. 12.49 of our rules. It now says:

Eligibility for re-examination. An applicant who fails examination for an amateur operator license may not take another examination for the same or a higher class amateur operator license within 30 days, except that this limitation shall not apply to an examination for a General Class license following an examination conducted by a volunteer examiner for a Novice, Technician or Conditional Class license.

The principal effect is to make it plain that failing applicants for Novice and Technician Class licenses, now all handled by mail, have the same privilege as those failing Conditional Class — i.e., to appear before an FCC examiner and take the General Class exam without waiting 30 days. In fact, they can go up the very next day if they wish.

(Continued on page 144)

QST—Volume III

Part I—Foreword to Sumner B. Young's (WØCO) Index †

VOLUME III was the first complete volume to be produced under the guidance of a full-time editor. Its twelve issues extended from August, 1919, to July, 1920. Much information lies between its covers; but to collect and to organize it is often very difficult.

By all odds, the most important story recorded in this volume was the development of amateur "tube" transmitters by a small group of experimentally-inclined and progressive amateurs; and it is a pity that the material in *QST* is of such nature that only a few of the individual participants can now be identified.

No large-scale shifting over to c.w. transmitters occurred, although some unsupported general statements published in the magazine may imply the contrary. Later, there was a quickening of interest in c.w., during the period covered by Volume IV; but the real rush came only after the results of the first successful "Transatlantics" had been announced, in January, 1922. See Volume V.

Back in the days covered by the two postwar issues of Volume II, there had been some signs of interest in c.w. methods of transmission, even before the Navy had lifted the "lid" on "sending."¹

Volume III's first offering of information on the subject was an unsigned article called "More About V.T. Transmitters."² It showed a circuit "found quite satisfactory on some sets supplied

the government during the war," and specified the size of an antenna coil for 200-meter operation. A second circuit "developed by the Marconi Company especially for use with the Marconi-DeForest V.T., and said to give the best results for that tube of any circuit tested," was diagrammed.

An unusual feature of this article was a suggestion that c.w. sets be developed which would use the same tubes for transmitting and receiving; and a sketch showing a possible application of the idea was given. The author (whoever he was) added: ". . . We believe that the ideal c.w. set of the future will incorporate some such feature as this."^{3A}

An announcement at 24, 30, September 1919, probably referring to the DeForest Telephone & Telegraph Company, read as follows:

We are promised that soon the amateur world will have a bulb transmitter complete, designed primarily as a radiophone but also an efficient c.w. telegraph, and at a reasonable price. It sounds almost too good to be true but we believe it can be done. This set is being developed by a prominent commercial company and should be announced soon.³

The "Liberty Number" (November 1919), under "Straits," carried this important call for information, at page 32:

Anybody working c.w. sets on 200 meters? We'd

lengths were not stated. Rectifier-tubes were used to produce h.v. plate current.

⁴ I can testify, from experience, that the early amateur c.w. transmitters simply would not work on wavelengths much below 300 meters.

See the "Editor's Note" appended to E. W. Whittier's article, "A Sure-Fire C.W. Circuit," at 29, July 1921 (Volume IV).

In a "C.W. Building-Contest," conducted by the Radio Club of Hartford, it was specified that the operating wavelength of the transmitters entered in the competition should not exceed 200 meters. Only two sets submitted would "get down" even as low as 200 meters. These were built by F. H. Schnell (1MO) and J. C. Randall (1ANQ). Both rigs would operate as low as 180 meters. See 24 to 25, September 1921 (Volume V).

At 13, November 1921, McMurdo Silver stated that it was then possible to operate an amateur transmitter, efficiently, below 200 meters (Volume V). At 63, January 1922 (Volume V), Kruse (in a letter) stated that c.w. transmitters could easily be operated below 200. At 50, February 1922 (Volume V), a "Stray" reported that 9ZT could "put out" one ampere of c.w. on 125 meters, but that he could find nobody who was equipped with a receiver tuning down that low.

† "QST—Volume I" appeared in October, 1954, *QST*, p. 40; "QST—Volume II" appeared in February, 1955, *QST*, p. 42.

¹ At 19, June 1919, J. O. Smith, traffic manager of the League, said that many stations were then installing, or planning to install, undamped transmitters; and he pointed out some of the great merits of these sets.

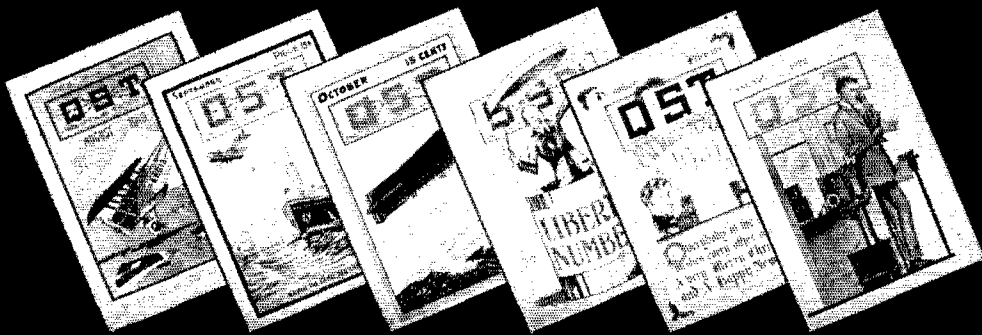
Warner's "Essentials of V.T. Transmitters" had appeared, at 3 to 6, July 1919.

An unsigned article called "On Resuming Transmitting," at 18 to 19, July 1919, had characterized v.t. transmission as "perhaps the most important development of wartime radio from our standpoint." [Italics by S. B. Y.]

² 22, 24, September 1919.

^{3A} This suggestion was repeated, with approval, at 48, February 1920, in the article "Auto-Modulated C.W. Telegraphy."

³ See the ad of the DeForest Radio Telephone & Telegraph Company, on the inside back cover of the November, 1919, issue. The set operated on 60-cycle 110-volt a.c.; and the "tested ranges" were stated as: "telephone 10 to 20 miles," and "telegraph 50 to 75 miles." The price was \$200.00, complete, including bulbs. The operating wave-



be glad to have a description of any that are proving successful. We're afraid we're going to have lots of trouble with 200-meter undamped. The frequency is so high that an extremely precise adjustment of the heterodyne frequency must be made at the receiver.⁴

On the same page, right below this item, another Stray referred to the shortage of suitable transmitting tubes for amateur use:

The only power tube available for us seems to be the so-called Marconi tube, made by Moorhead and licensed by DeForest for the use of three electrodes. The Marconi Co. have enjoined DeForest from the manufacture of the Oscillon, on the grounds that it violates the Fleming patents. It takes rather a stretch of the imagination to see how this can be.⁵

A motor generator, designed to produce h.v. d.c. for plate circuits in tube transmitters, was first advertised in *QST* in the December, 1919, issue. The International Radio Telegraph Company, of 326 Broadway, New York City, offered a 100-watt unit (200 ma. at 500 volts) for \$75.00, f.o.b. factory.⁶

In any event, a small and diversified group of amateurs decided to pioneer in the tube-transmitter field. It is difficult to identify and to locate them, in most instances, from the pages of *QST*; but a few published items are of limited assistance.

⁵ I can testify that a fairly active "black market" for various tubes developed around Greater Boston shortly after the "lid" was lifted on transmitting. "Western Electric" transmitting tubes, rated at 5 watts, could be had for around \$10.00 or \$15.00 apiece.

A "Stray," on page 32 of the November, 1919, issue, stated that the Marconi v.t. was a pretty good tube, however; and this paragraph cited the success achieved by a hurriedly-constructed transmitting set which had been installed aboard the U. S. S. *George Washington*. Using one Type "RH" Moorhead tube, that ship had worked Otter Cliffs, Maine (on c.w.), while 1200 miles out. The plate voltage was only 750. The wavelength used was not stated.

A "Stray" (at 24, December 1919) spoke of "salvaged" VT-2s for amateur c.w. transmitters. I am glad that some "salvaging" was done. A year or two would have been wasted, if "irregular" supplies of tubes had not been tapped.

⁶ 54, December 1919. Also, see the "Stray" at 24, December 1919, which reads: "At last a cheap and good motor generator set for high-voltage d.c. has arrived. . . . Its lack heretofore has been the big drawback to amateur V.T. transmission. . . ." [Italics by S. B. Y.] For a scheme for converting "ceiling-fan" motors into h.v. d.c. generators, see "Strays," at 43, June 1920.

Motor generators were considered an expensive item by most early hams. Also, the noise and vibration from them were annoying.

Some of the biggest boosts later given to c.w. work were furnished by the development of other means of producing h.v. d.c. First came the electrolytic rectifier; and then came rectifier tubes, plus filter systems.

On the advent of the electrolytic rectifier, see: "An Electrolytic Rectifier for C.W.," by P. J. Furlong (1FF), at

At 34, February 1920, J. O. Smith declared:

. . . The short-wave c.w. set has arrived. There is no doubt but that the development of these short-wave c.w. sets will greatly add to the interest and welfare of amateur radio. A few of these sets are now in operation in the Atlantic Division. . . .

At 48, February 1920, it is recorded that 2AB (N. Y. City) worked 3ZH (Trenton, N. J.) on buzzer-modulated telegraphy, with 1.1 amperes in the antenna; and that 8DA (in Ohio) heard 2AB's signals "very QSA."

At 28, March 1920, Entwistle's Report identifies Stuart Briggs and Fred Bowditch (both of Brookline, Mass.) and Francis Pray (of Somerville, Mass.) as the owners and operators of "undamped transmitters."

The April, 1920, issue of *QST* contained an article (probably by Warner) entitled "The Advent of Amateur C.W."⁷ This mentioned some of the "pioneers":

. . . 2ZV, Richmond Hill, L. I., is using a 340-meter wave for c.w. telegraphy, compensated wave 350 meters, with an antenna current of 6 amperes, representing 350 watts. The oscillating equipment is two Type P plotrons. This station should be good for 1500 miles.

. . . Others we know of are 2ZL, 2FS, 2AB, 2EX,

17 to 18, 28, February 1921 (Volume IV). For its later development, see: "A Symposium on Aluminum Electrolytic Rectifier Operation," edited by S. Kruse, at 20 to 25, June 1922 (Volume V).

On rectifier tubes, plus filters, see the following references. In Volume III: "Construction of a 500-Volt Rectifier Transformer for C.W. Work," by Robert Muns (2ACQ), and editorial note thereto appended, 17 to 19, June 1920. In Volume IV, see: 9, September 1920; and 36, November 1920 (Russell's report). Volume V references: 28 to 29, October 1921 ("S" Tubes, with smoothing filter); 25, April 1922 ("Rectifier Battle," at Third and Fourth District Convention); and 12, March 1922 (only three of the successful stations in the "Second Transatlantics" used tube-type rectifiers).

On h.v. synchronous rectifiers, see the following reference in Volume V: 18 to 19, June 1922 (editorial note). The synchronous rectifiers never achieved wide use.

At 49, November 1920 (Volume IV), Arthur K. Ransom, in a letter, expressed the opinion that the need for producing h.v. d.c. was the biggest obstacle to the widespread adoption of c.w. transmitters by amateurs.

⁷ 13, 14, 16, April 1920.

Note that NSF, the Naval Radio Laboratory at Anacostia, Washington, D. C., is mentioned, in this same article (p. 13), as "testing bulb sets of various powers on 200 and 425 meters, using straight and chopped c.w."

Also note that some experimental work by the Glenn L. Martin Co., of Cleveland, is mentioned: ". . . One set puts 2.5 amperes in the antenna on 180 meters with 250 watts input, and the other set 4 amperes on 270 meters with an input of 350 watts. . . ." [Italics by S. B. Y.]

The Glenn L. Martin Co. stations used Air Service calls (UM and CMC). See 13, April 1920.



2ZM, 8XK, 8YO, and 2XX, 2XX, ex-2XG, the station of Mr. Robert F. Gowen at Ossining, New York, has secured perhaps the best distance to date, signals being nightly QSA in Little Rock, Arkansas. Voice modulated and straight undamped are used.

. . . Probably the most interesting work is that done by 2ZL, the station of our traffic manager, Mr. J. O. Smith. *That the c.w. is proving up is attested by the fact that 2ZL is junking its spark set as outgrown.* The equipment consists of a few small oscillators in parallel, with an antenna current of 1.2 amperes, straight c.w. on 275 meters. . . . Traffic has been put thru to Ohio and Massachusetts by this station when the spark signals were powerless to combat QRM and QRN.⁸ . . . [Italics by S. B. Y.]

J. O. Smith's "Operating Department Report" (at 28, April 1920) adds no more c.w. stations to the list, but makes this encouraging comment:

. . . Short-wave c.w. transmission has done much more than was expected of it, in that it has turned out to be a very docile, tame and willing worker, instead of a fly-by-night, unreliable, unsteady means of communication. More power to it. . . .

At 34, January 1920, the "Calls Heard" list of L. E. Furrow (420 Lake St., Troy, Ohio) states that on December 8, 1919, he heard station DA and station 3ZH working one another, both on c.w. and on 'phone. *This is the first mention of v.t. transmissions by amateurs which I have been able to find in that particular department of QST.* DA was probably an unlicensed station.

The one-tube 20-watt c.w. transmitter of Mr. Carter, of Cleveland (call UM), is referred to in 8DA's list of "Calls Heard" at 42, March 1920. The call UM appears also to have been used by the Glenn L. Martin Aircraft Co., at Cleveland; and it is said to have been an old Air Service call. See 13, April 1920, and the editorial note to the letter from H. V. Simmons, at 54, July 1920. However, it may well be that Mr. Carter's station, signing the call UM, was an unlicensed station. 8DA (at Salem, Ohio, 60 miles away), stated that he worked UM regularly.

Don Mix (1TS, of Bristol, Conn.), whose "Calls Heard" lists eventually earned him the nickname of "Sleepless Wonder," reported hearing several stations on 'phone and modulated

⁸ The final paragraph in this article (16, April 1920) contains this interesting language: "The Editor urges the adoption of c.w. by all serious experimenters as a field of highest interest and unlimited possibilities, but with the warning that they'll have to learn transmission all over, for the old dope of spark days will not apply. QST hopes in the near future to establish a special laboratory for c.w. experiments looking toward the development of sets particularly adapted to 200-meter relay work."

⁹ He listed the following: 2XG ('phone and modulated telegraphy); 2XJ ('phone); 2XX ('phone and modulated telegraphy); 2ZL (spark and modulated telegraphy); 2ZV (spark and modulated telegraphy); 8CO ('phone); and 8XU (spark and modulated telegraphy).

A few more early tube sets can be identified by referring to other lists of "Calls Heard," in later numbers of Volume III of QST.

At 44 to 45, July 1920, 1TS reported hearing 1AW on spark and 'phone; 2FS on spark and c.w.; 2XB on c.w. and 'phone; and 2XK on spark and modulated c.w.

At 46, July 1920, the Waverly (N. Y.) Radio Research Assn. reported hearing 2XA (on "Tel").

8LF (Crafton, Penn.) reported hearing 8CB (on spark

telegraphy. See his list at 51, April 1920.⁹

The May (1920) issue of the magazine contained another leading article (unsigned) entitled: "An Experimental C.W. Transmitter."¹⁰ It featured the Colpitts circuit, described as "a little complex, but beautiful in principle."¹¹ For amateur use, Western Electric VT-2s, General Electric VT-14s, and Class II Marconi bulbs were recommended.¹²

This May (1920) issue also contained a statement by J. O. Smith, at page 26, indicating that many amateurs desiring efficient transmitters had installed c.w. rigs. No statistics were given.

At page 31 of this same number, R. H. G. Mathews (9ZN) said that he was thinking of adding a $\frac{1}{2}$ -kilowatt c.w. transmitter to his station during the coming summer or fall of 1920. This was real news, because in March (1920) 9ZN's spark, on 275 meters, had established a new record for amateur stations.¹³

The June (1920) issue carried an announcement that the Nola Radio Club (of New Orleans, Louisiana) was experimenting with radiophones and c.w. sets.¹⁴

At page 51 of the same issue, O. A. Guldedge (4AT), of Ft. Pierce, Florida, announced (by letter) that he had installed a DeForest "Oscillation" radiophone; and that he would send out "music, speech, and c.w. signals," at stated times, on 200 meters.

A well-written article, showing touches of true wit and humor besides, was published at 15 to 17, July 1920: "C.W. for the Amateur," by Howard L. Stanley (2FS).¹⁵ He described a c.w., m.c.w., and 'phone transmitter which he had developed with the help of 2ZL (J. O. Smith).

More generalities appeared in Warner's editorial (called "C.W.") at page 24 of the July, 1920, issue:

Reports from all over the country show the gradual but sure trend from spark to undamped in amateur radio, just as we thought would develop, and we are glad to see it.

We are strongly in favor of c.w. and are going to do all we can to help it along. . . .

We are on the eve of a great transition in amateur methods. We plead for the undamped the serious consideration that its many advantages merit.

and "Mod."), during May, 1920. His list is at 55, August, 1920.

The later list of the "Sleepless Wonder" (1TS), found at 55, August 1920, which records results obtained at Bristol, Conn., between May 18 and June 20, 1920, speaks of working 1AY, who used spark, Mod. c.w., and 'phone; and of hearing 2QR's spark, c.w., and 'phone signals.

Note that the Editor of QST had announced (at 48, February 1920) that he would be pleased to receive reports of amateur v.t. transmissions.

¹⁰ 5 to 8, May 1920.

¹¹ 5, May 1920.

¹² 6, May 1920. The article added that only the Class II Marconi tubes were "now regularly available on the market for communication purposes."

¹³ On March 9, 1920, 9ZN's 275-meter spark set was copied aboard a vessel lying in Colon, Panama. On March 12, 1920, the same ship heard him when 200 miles south of Balboa. See 8, May 1920. (Incidentally, the next day—March 13th—the vessel caught fire at sea and was destroyed. All hands were saved. See 8, May 1920.)

¹⁴ 45, June 1920. The club is identified on 38, June 1920.

In the same issue, Traffic Manager J. O. Smith (2ZL) was equally vague as to how many stations were shifting over to tube sets, and where those stations were, although he said that a *trend* was developing:

. . . The long-heralded change from spark to continuous-wave transmission is now in full swing, and in quite a number of cases spark sets have already been discarded. . . .

Amateur radio is now in transition from spark to c.w., and a complete change-over is merely a question of time.¹⁶ . . .

I wish I felt competent to make a fairly accurate estimate of how many amateurs were actively engaged in c.w. work, as of July 1, 1920, and concerning their geographical distribution; but I simply cannot do it. My best guess is, that as of that date, there were not over 200 v.t. transmitters in operation, in amateur stations, in the entire U. S. A.

This brings us to a study of the data published (in Volume III of *QST*) bearing on the number of licensed hams in the United States, and indicating their distribution throughout the nine Districts.

The material is incomplete, and unanalyzed. *QST* published lists of calls of new amateur stations, as follows: 42 to 43, November 1919; 10 to 14, December 1919; a separate supplement to the January, 1920, issue, containing 15 pages of call letters; 39 to 40, April 1920; 35 to 36, May 1920; 35 to 36, June 1920; and 41 to 42, July 1920. The January, 1920, supplement was a cumulative affair. Starting with it, and adding

further amateur calls published thereafter (and eliminating all calls published by way of correction), I get the following picture:

District	Total Licensed Amateur Stations Therein
First	458
Second	350
Third	181
Ninth	159
Fifth	119
Sixth	100
Fifth	65
Seventh	56
Fourth	33

Total Licensed Amateur Stations in the 9 Districts 1521

The main trouble with these data is that they give us no inkling of the dates as of which the various lists were accurate and complete.

Evidently, the Editor's idea was to devote two pages per issue to the publication of new calls, and to catch up as best he could, at this unchanging rate;¹⁷ and I have now confirmed my suspicion that these lists were a good distance behind the actual march of events, as of (say) July 1, 1920. It is a pity that somebody like Edgar Felix did not get the correct and complete figures from government sources and analyze them for *QST*'s readers.

Mr. Entwistle presented some interesting facts re the number of licensed amateur stations in the First District in the June (1920) issue, at page 25. Just when he "put pen to paper" is not stated; but he said:

¹⁵ Anybody who had the experience of working with one of the early "tube" sets will get a good laugh out of Stanley's description of his troubles.

Looking back at my log for July 21, 1920, I find that I first tried to operate a tube transmitter (built for me by the Atlantic Radio Co. of Boston, Mass.), on that date. All I accomplished was the burning-out of the plate-current meter, and the melting of the glass envelope on one of the four "VT-2" transmitting tubes.

After 1DH (E. W. Whittier, himself) had made some repairs, I got ½ amp. into my antenna, at Duxbury, Mass., on Saturday, August 7, 1920.

My first contact was a local — 1RAA. I worked him on c.w. and buzzer-modulated c.w. on August 8, 1920. The "radiophone" part of my rig wouldn't work at all.

On Sunday, November 21, 1920, after more help from Whittier, and after I had moved my set back to Dorchester, Mass., I got 0.7 amp. into a big "cage" antenna, at my station (1AE), on 260 meters; and I worked 1PAI, and was heard by 1KAY, in Portland, Maine.

More changes, made mostly by 1DH (who worked for Atlantic Radio), followed. The first real traffic handling which I ever did, on c.w., was in the early hours of Sunday, December 26, 1920. Between 1:18 A.M. and 2:34 A.M., I sent 9 messages to 1TS (Bristol, Conn.), on 260 meters. 1TS kindly helped on the receiving work.

On January 27, 1921, I received written permission from H. C. Gawler, RI of the First District, to operate on c.w. at 325 meters, for 30 days, commencing February 15, 1921, to try to establish reliable communication with 2ZL. Some interesting results followed.

Mr. J. O. Smith (2ZL) really had a fine station. At 27, April 1921 (Volume IV), it was referred to as being probably the most powerful amateur c.w. station. See, also: editorial, "The Berries!" at 29, March 1921; and 48, May 1921. (Both in Volume IV.) Also, look at 13, April 1920; and 28, April 1920. (Both in Volume III.)

¹⁶ 26, July 1920. The reports of the division managers

which follow Mr. Smith's general remarks (in that same issue) shed little light on the subject, either.

Entwistle (New England Division) made this statement (at 27, July 1920): ". . . One significant fact that stands out as inspiring is the gradual C-W-izing of New England. The following have c.w. sets: Wood, Arnold, Winchester; 1CK; 1XF, Providence; Mass. Radio School; 1YC; 1AY; 1QP."

The Northwestern Division Report (33, July 1920) includes these words by Acting-Manager Hertz: ". . . The tests conducted by 7CR, 7ZB and 7CW with the Forestry service radiotelephone sets have made us reluctant to hang up our 'phones. It is interesting to note that the c.w. radiating 0.46 ampere and spark signals radiating 1.5 to 2 amperes, both at Portland, are equal in audibility at 7CW, about 40 miles distant. . . ."

The Ontario Division Report (34, July 1920) states that there are presently four amateurs with c.w. sets in the City of Toronto, with others ready to build tube sets almost at once. The situation is described thus: ". . . A great transition seems to be taking place in the Toronto district. Everything seems to point to the fact that c.w. and radiotelephony are going to entirely replace spark telegraphy in this district with all advanced amateurs in the very near future. . . ."

The evidence, in other words, of an actual "shifting-over," was very indefinite, and very "thin."

Astute amateurs who had experienced the advantages of c.w. sets could confidently *predict* the end of spark transmitters; but nobody except a small group of "pioneers" had yet "gone over" to tube sets.

¹⁷ See 39, April 1920: "Fellows, devoting a half dozen pages per issue to calls got to where it detracted from the reading value of *QST* and seared us. Then we hoped to publish monthly supplements carrying advertising to finance the thing, but the Post Office Dept. has just come out best in an argument on that. So we resume in *QST* — two pages a month until we get them all. You can cut out this sheet and keep it with the January supplement."

At the time of writing this report there are 1125 licensed amateur stations of the first and second class in the First Radio Inspection District with probably 90% of the total number of the former grade. Only one special amateur license has been issued, and that is located at Springfield, Mass. (Mr. Sabin). One additional school license has been issued, to Dartmouth College, call letters 1YB. The other technical school license was granted previously to the Rhode Island State College, call 1YA. Naturally the distribution of these stations varies from state to state and in different parts of the same state. *Greater Boston has the greatest density per capita; Wollaston, the most of any one city.* . . . [Italics by S. B. Y.]

Note that the number of licensed amateur stations in the First District alone, according to Mr. Entwistle, totaled 1125. His report probably was written sometime in May (1920), and possibly was written in April of that year. The time lag between the list of calls published in *QST* and the actual licensings of the stations themselves is strikingly illustrated, when this 1125 figure is compared to the 458 First District calls printed in *QST* up to and including the July (1920) issue, and when it is compared with the total of 1521 calls for the entire U. S. A., so published.¹⁸

It is interesting to see that the Fourth District still occupied the last position in total number of stations licensed.¹⁹

¹⁸ Including the July (1920) list, at 41 to 42, July 1920, a grand total of 1521 U. S. A. calls and 58 Canadian calls had appeared in the *QST* lists.

The late Clinton B. DeSoto, at page 61 of *Two Hundred Meters and Down*, said: ". . . At the end of the fiscal year, June 30, 1920, the number of amateur stations had grown to 56 per cent of all stations licensed by the U. S. Government. The Department of Commerce reported that there were 5719 amateur stations, fifteen times as many as all other types of land stations put together. Although this was 370 fewer than in 1917 when all amateur stations were closed down, the disparagement was not due to decreased interest but to the fact that a number of amateurs were either still in the service or were fully occupied in commercial operating or manufacturing activities. . . ."

The best estimate which I was able to make, from the data in *QST* before I found this reference, was: 5000 amateurs as of July 1, 1920. I reached this by first multiplying 1521 by 2.45. (The "2.45" was obtained by dividing the First District "published" figure into Entwistle's First-District figure.) The multiplication gave 3726.45. To this, I added 1200 (my estimate of 2 months' new licensing), getting 4926.45. This I rounded off to 5000. Such are the "fruits" of incomplete figures.

¹⁹ Look back at: 163, 185, July 1916; footnote 8, page 7, of my "Foreword to the Index to Volume I of *QST*"; 32, April 1917; and pages 11 to 12 of my "Foreword to the Index to Volume II of *QST*."

²⁰ The only amateur experimenters referred to, in *QST*, so far as I can see, were R. H. G. Mathews (9ZN), who was chief engineer of the Chicago Radio Laboratory, and some members of the Nola Radio Club, at New Orleans, La. See "The Underground Antenna Adapted to Amateur Waves," by Mathews, at 14 to 16, June 1920; and at 18 to 19, July 1920. The item re the Nola Radio Club is under "The Affiliated Clubs," at 45, June 1920.

The first reference to underground antennas for amateur use that I have found in *QST* appears in an advertisement of Chicago Radio Laboratory, at 44, August 1919. It points out the merits of an audio amplifier. This ad states: "Static elimination by use of the Rogers underground antennae is perhaps the most striking and far-reaching discovery made during the war. By this system 'static' is absolutely elimi-

As more and more stations came onto the air, the QRM problem became acute, especially around the larger cities.

In addition to the suggestion that tube transmitters be used in place of the "good old" spark sets — an impossibility until such time as power tubes and other essentials should become generally available to amateurs, and until decent c.w. receivers should be produced — two technological approaches were recommended. One of them was the use of highly-directional underground receiving antennas; and the other was the use of wavelengths below 200 meters, by low-powered spark transmitters.

As to the use of underground antennas, the literature is scanty. It is certain that only a very few amateurs actually experimented in this field. The need for elaborate shielding of all leads to the underground wires, and the necessity for employing elaborately-shielded receivers, or completely-screened receiving rooms, offered serious practical drawbacks. However, a handful of amateurs made the effort. They found some refuge from static, and verified the fact that at short wavelengths, underground antennas exhibited marked directional properties.²⁰

— . . . —

Part II of WCO's index to Volume III of *QST* will appear in our April issue. — Ed.

nated, the only atmospheric interference being due to ground strays. In cutting out the static, however, the signal strength on 200 meters is also reduced to about one-eighth of the value of the same signal on the ordinary antenna. In order to render ordinary signals readable on the underground antenna it is therefore necessary to use one or more steps of amplification. . . ."

Mathews had become acquainted with the work done by Rogers, and with the later experiments conducted by A. Hoyt Taylor (Lt. Commander, USNRF), through his (Mathews') association with the Great Lakes Radio Laboratory during World War One. See 30, November 1919. For Taylor's articles on short-wave and long-wave spark and undamped reception, with subterranean or submarine wires, see: "Short-Wave Reception and Transmission on Ground Wires (Subterranean and Submarine)", 7, *Proc. I.R.E.*, 337-361 (August, 1919); "Long-Wave Reception and the Elimination of Strays on Ground Wires (Subterranean and Submarine)", 7, *Proc. I.R.E.*, 559-583 (December, 1919); and "The Use of Ground Wires at Remote Control Stations," 8, *Proc. I.R.E.*, 171-190 (June, 1920). (The last of these 3 articles was written by Taylor and by A. Crossley, Lieut. (j.g.), USNRF.)

The best practical results had been obtained, in the Navy, in the reception of long-wave spark and undamped trans-Atlantic signals; and after April 7, 1918, all such reception, at the Belmar, N. J., station, had been conducted by the use of submarine wires, "balanced" against a "ground" wire, or against a loop antenna. See pages 570-572, Volume 7, *Proc. I.R.E.* (December, 1919).

Some success with the reception of ship-to-shore traffic on 600 meters had been demonstrated. See descriptions of "Remote-Control Stations" at Great Lakes, Hampton Roads, and New Orleans, at 175-189, 8, *Proc. I.R.E.* (June, 1920).

On the transmitting side, the best work had been between Great Lakes and Chicago, a distance of 36 miles. (See 7, *Proc. I.R.E.*, 360, August 1919). The first transmissions — about January, 1918 — had been on 340, 600, and 720 meters. (See 7, *Proc. I.R.E.*, 356). A few weeks later, 450 and 550 meters had been used. (See 7, *Proc. I.R.E.*, 357). At Chicago, Mr. A. L. Howard's receiving station had been utilized. (See 7, *Proc. I.R.E.*, 356).

Strays

Recently W5TYM rounded up, from Hq. and other sources, background material for a ham radio story to be used in his company's house organ. There must have been some potent arguments there — John Wood of the public relations department is now WN5FLS!

On January 31st the Henry Radio Store, Butler, Mo., was broken into and the following equipment stolen: two Collins 75A-3s (serials 1573 and 1585), one Collins 32V-3 (serial 1489), one Elmac PMR-6A (serial 3096) and one Elmac PSR-12 (serial 554).

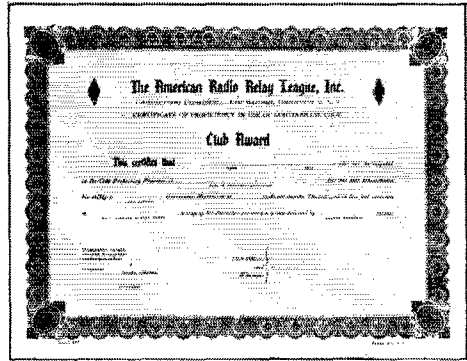
A reward will be paid by Robert Henry, owner of the store, to anyone giving information leading to the arrest and conviction of the person or persons participating in the crime. Compensation will also be made for the return of the equipment.

In recent measurements by the National Bureau of Standards the velocity of light has been redetermined. Using the molecular constants method, the new value obtained was 299,792,000 ±6000 meters per second; by the radio interferometer method, the new velocity value was 299,795,100 ±3100 meters per second.

We are saddened to report the passing of Theodore G. Deiler, Engineer-in-Charge of the FCC 8th Radio District. In 1919, Mr. Deiler began his career with the Radio Division of the Department of Commerce. While with that organization he became Supervisor of Radio at New Orleans, La. With the transfer of the Radio Division to the Federal Communications Commission, he was designated Inspector-in-Charge and later became Engineer-in-Charge.

Mr. Deiler was very well-known and respected in the radio industry and among amateurs. The thousands of commercial and amateur radio operators who were licensed under his supervision will mourn his passing.

There are many new amateurs in and around Davenport, Iowa, thanks to the Davenport Radio Club. W0HMM reports on a new series of classes sponsored by the DRAC incorporating the best training features of lectures, films, and experiments. After observing a few of the lectures, the faculty of St. Ambrose College volunteered full use of the college laboratory and projection rooms to the Davenport club, in recognition of their outstanding program.



Your club's educational program may be able to utilize the club code award shown. Any reasonable amount of these certificates will be forwarded to your group, for certifying both receiving and sending proficiency. The club code awards and a sample course outline can be obtained from the League's Communications Department.

Transient U. S. armed forces personnel in or near Southampton, England, are invited to attend meetings of the Southampton Group of the RSGB. The get-togethers take place on the first Saturday of each month at 1 Prospect Place, Southampton. Those interested should telephone either G3TR, 68839, or G3CCE, 22478.

Members of the Montreal Amateur Radio Club, sponsors of the 1954 W/VE Contest, attend presentation of trophies donated by Emerson Radio of Canada. The large cup is retained by the club; the miniature goes to Russ Wilson, VE6VK, winner of the contest. *Front row (l. to r.):* B. Halickman, VE2AKT; Ethel Pick, VE2HI; Alex Reid, VE2BE, ARRL Canadian Division director; R. Grant, VE2QQ, Emerson manager; H. Ward, VE2XZ, president of MARC; C. Lockhart, Emerson asst. manager; Gordy Webster, VE2BB, MARC contest chairman. *Back row:* R. W. Phillips, VE2EY; T. Lott, VE2AGF; D. Bromwich, VE2HY; J. Miller, VE2TA; H. Moray, VE2ZN.



YL NEWS and VIEWS



BY ELEANOR WILSON,* W1QON

AMONG our YLs there are some (too few, alas!) who are "dyed-in-the-wool" v.h.f. operators. They concentrate the bulk of their operating and experimenting on the higher frequencies — they do what they can to create activity and interest in the world above 50 Mc.

Liane Waite, W2FBZ, is another! YL who is so enthusiastic about v.h.f. operation that she is happy to do what she can to help swell the population in the upper segment of the ham bands. And, as W1HDQ has said, "this is the gal who has won several Northern New Jersey section awards in our v.h.f. contests, and has a few times posted the top score for the country." In the Sept., 1953, V.H.F. Party, Liane followed in second place nationally



W2FBZ

another leading YL v.h.f. operator, W8BFQ. Referring to Margaret and Liane, W1HDQ wrote in *QST* for Jan., 1954: "... two topnotch v.h.f. YLs whose untiring efforts have earned them the respect of v.h.f. men everywhere." In the June, 1954, Party, Liane made the country's high score in the single-operator class.

Liane writes:

I have been licensed since 1951, starting in as a Novice. Unhappy with conditions on 80 c.w., I was instrumental in getting my husband (W2FBR) to build gear for 2-meter operation.

*YL Editor, *QST*. Please send all contributions to W1QON's home address: 318 Fisher St., Walpole, Mass.

† See Apr., '53, department for information on other v.h.f. YLs.

COMING YL GET-TOGETHERS

April 23rd — W1 YLs, Sheraton Plaza Hotel, Boston. Write WITRE for details.
May 20th-22nd — LARK Convention, W9 YLs, Allerton Hotel, Chicago. Write W9MYC.
June 24th-27th — First YLRL International Convention, Hotel Miramar, Santa Monica, Calif. W6UHA, General Chairman.

We met a congenial group of local hams who were interested in higher frequencies, and I believe that, more than anything else, caused a continuation of interest in those bands, even after obtaining the General Class license. We became interested in contests, which I feel is one of the greatest ways for checking gear and promoting the building of new gear. Because of this, we got on 220 and 432 — at the same time we were on 6 and 2 meters. We are interested in 1215 and hope to be on that band by next spring.

There is quite a challenge to me in operating frequencies where it is possible to accomplish something that has not been done before. We are interested in carrying on any v.h.f. schedules which would be desirable to set up, and we have two goals. One of them is to work Florida on 2 meters; the other is to work England.

May Liane soon realize both goals, and may her words encourage more YLs to take to the higher frequencies.

Reminder!

YLs and OMs — don't forget your date to meet in the Sixth Annual YL-OM Contest on March 5th-6th and 19th-20th. Complete details were on page 49, February *QST*.

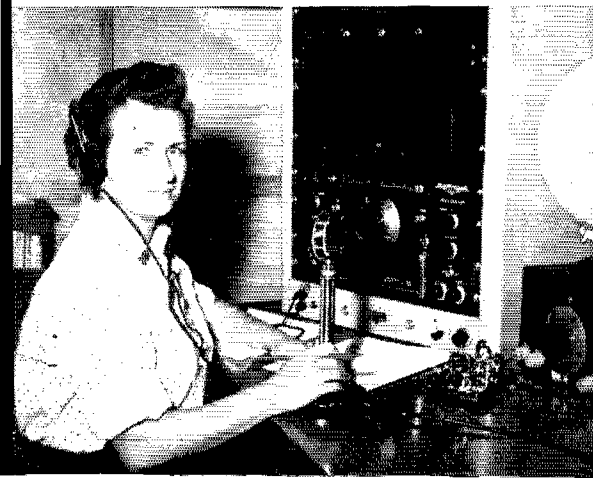
And speaking of OMs — we are encouraged and perhaps a bit flattered to realize how much mail for his department comes from them. The proverbial "battle of the sexes" seems nonexistent in our hobby; rather, the spirit is one of mutual respect, enthusiasm, and cooperation. We're always pleased to hear from OM readers and hope that their interest in the distaff side will continue!

Keeping Up with the Girls

W5TJU, YLRL 5th District chairman, reports the organization of the Texas YL Round-up Net which meets Thursdays at 0930 CST, 3880 kc. W5WXY, Bernice, is NCS with W5ZTB as alternate. Pat also observes that the Southern Belle Net has changed its meeting time to 0830 CST (3920 kc., Fridays). . . . New members *K6s* AYJ ELL, *KN6s* EXQ EXV GRA GQW IDL IHD, *W6s* HVC QGC QOO TMB bring the Los Angeles YLRC membership up to 55. For the club's annual Christmas party, W6QGK, Harryette, trimmed a tree with small pieces of radio components and topped it with a miniature 16-element 2-meter beam designed by KN6GMX, Jayne. At the January

(Continued on page 148)

WITRE, Barbara Harrington, of Topsfield, Mass., turned in the highest claimed 'phone score in the Eastern Mass. section during the 1954 Sweepstakes. Licensed in 1951, Barbara has been on one band or another ever since. Currently she operates 10, 15, 20, 40 and 75, with 20 her favorite band. Holder of a 'phone WAC certificate, she has worked 78 countries with 56 confirmed. She is alternate net control with W6UHA of the 20-meter YLRL net. A registered nurse, she is the XYL of WIJEL and the mother of two daughters, 5 and 7, both of whom are working at learning the code.



The World Above 50 Mc.

1215-1300 2300-2450 3300-3500 5650-5925 10,000-10,500 21,000-22,000 30,000-?

CONDUCTED BY EDWARD P. TILTON, W1HDQ

ALONG about the last week in January each year you can measure v.h.f. activity with a ruler — a ruler alongside the logs mailed in to Headquarters following the Annual V.H.F. Sweepstakes. Time was when a pile an inch high looked big for a v.h.f. contest. But you need the better part of a one-foot scale for the eighth running of this popular event, January 8th and 9th.

When you look through the comments accompanying the entries, you find things like "Never heard so many signals in my life" — "Activity here was at an all-time high" — "Had to peel the signals off in layers" — "New contacts were made right up to the last minute!" Nobody reported conditions as being good, but there seems little doubt that the 1955 event will break all previous records for v.h.f. contests.

At least a dozen participants reported more than 200 contacts each, K2CMB/2 leading with 248. W2TBD made 225 contacts on 144 Mc. alone. The country's top score, so far, is W2UK's 6336 points, made possible through the amazing total of 18 ARRL sections worked on 144 Mc.! Last year's record score of 3952 points, by W1RFU, was topped by at least 8 contestants, with W2RGV, W1UIZ/1 and W1RFU all over 5500 points.

Club records seemed sure to fall, though the big-club totals have not been checked as we write. The South Jersey Radio Association seem to have maintained their near-monopoly on V.H.F. SS gavel awards, their claimed total for 1955 running over the 50,000-point mark. Their perennial competitors, the York Road Radio Club, from just across the Delaware River, outdid their previous efforts, and it looks like a close one between these two rivals. Several smaller clubs posted totals that would have been good for top place a few years back, and the num-

ber of clubs participating was well up over previous years.

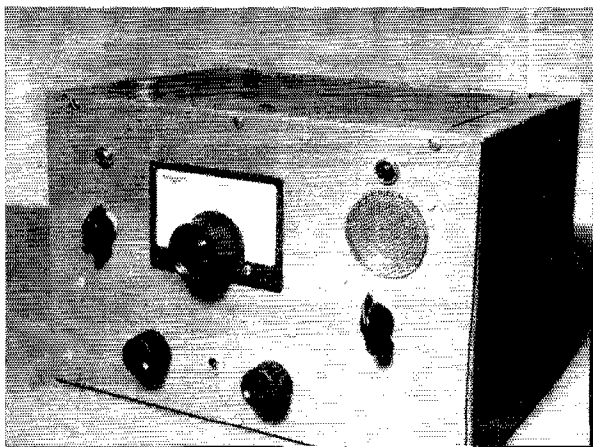
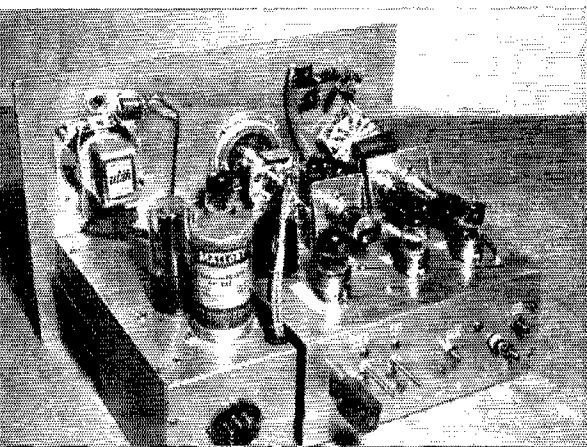
Propagation appeared close to the winter average, from your conductor's vantage point. This would have meant a quiet Sunday afternoon and evening in years past, as the field would have been pretty thoroughly covered by noon of the second day. But not in 1955. The 2-meter band, particularly, was jumping with activity, right down to the last minute. There was never an hour, including those just before dawn on Sunday morning, when it was not possible to make hay in this contest. In many areas you no longer post a winning total and get anything like a normal night's rest in a V.H.F. SS week end!

Through the Middle West many operators reported conditions the worst they'd seen all winter. Particularly west of the Mississippi, contacts were made only over short distances. But still we find reports coming in, in better than former numbers, from most of this territory. Far-western v.h.f. men, too, report the going rough, but there are some good W6 and W7 logs coming in, with the deadline for their mail still a few days away as we write.

There was heartening evidence of new v.h.f. activity in many quarters. They won't hit a high spot in the national scoring, because of their lack of point-building section multipliers, but the Albuquerque V.H.F. Club came through with 20 logs. A goodly number of reports came from North Carolina groups, whose principal complaint was that stations they should have been able to work in Virginia and farther north didn't turn their beams around to the south often enough.

Checking a contest of this magnitude is not done in an idle hour; it will be some time before the final results are known. But one thing is sure:

One of the more popular items of v.h.f. gear described in *QST* in the past year was the "One-Package 2-Meter Station" by W1VLH, in the April, 1954, issue. These pictures show an adaptation of the design by W2NGN, who followed the original closely circuitwise but modified the layout to fit a more commonly-available case,



The 8th V.H.F. Sweepstakes provided a week end of competition that will not soon be forgotten.

Here and There on the V.H.F. Bands

More on the Sept. 18th fireball: In December QST, page 68, we reported strange doings on 144 Mc. that appeared to tie in with the appearance of a fireball in western skies the night of Sept. 18th. At that time we knew that W0TJF had heard W5VWU, and that several New Mexico stations had heard unidentified DX, apparently reflected from the region around the fiery visitor. In response to our request for information on any other reception of this sort, W0VEC, Lincoln, Nebr., sends us the following:

At about 2130 CST, W0VEC heard a c.w. station on 144 Mc. say, "—SO GA W?FAG DE W7VMP". Undoubtedly, the station being worked was W5FAG; At 2143, W5VWU was heard by W0VEC and called, following reception of his CQ. The signal had risen to a peak of S8 to 9, in a series of bouncing fades, and it faded out in the same way. The entire period of reception was about 30 seconds. The W7VMP signal was steadier, about S1.

The 2-meter reports from various parties appear to span a period of half an hour or more, yet reports of the fireball's appearance relate to only a few minutes, at the most. It appears possible that the reception reports resulted from a fairly general meteor shower, of which the fireball may have been merely one spectacular part. We suspect that quite a bit more of this sort of thing would be observed, if 2-meter activity were maintained regularly on the scale that prevails during a v.h.f. contest week end.

Here's a fellow who really has had antenna trouble! W4CVQ, Raleigh, N. C., had just put up 24 elements each for 220 and 144, when Hurricane Hazel dropped a tree across his guy wires. All antennas, including a 6-meter beam, a "d.c.-band long wire," and the above, toppled 110 feet to the ground. Next, a 32-element 144-Mc. beam was erected, and seven days later a turkey flew into it. (Jake says the array looked as if the invader was a bomber!) The latest in the line of 2-meter beams is a 24-element, W2NLY-style collinear, horizontal. It works out better than the 32-element for Jake's requirements, as it is less critical as to direction.

This can be important in an area where much searching of the band is required, and this certainly applies to North Carolina, though things are looking up there on 2. The V.H.F. SS file contains quite a batch of logs from North Carolina entrants, for the first time. Several of the boys complain that they couldn't work out of the state because the stations to the north didn't turn their beams down that way often enough.

W4CVQ is another of those fellows who is working miracles with 82Gs. His pair run very easily at 500 watts input on voice, and have been pushed to 800 watts input without undue heating.

W4DWU, Falls Church, Va., thinks that all 2-meter men must use old call books. He was formerly located in St. Petersburg, Fla., and he still has to spend quite a bit of time disillusioning excited 2-meter ops who think they have just snagged a Florida station.

How consistent is communication over a 450-mile path on 144 Mc.? Some idea can be gained from results between W8BFQ and W1HDQ. Both stations have good locations, but the terrain in between is very rough, all the way. In the period between October 25th and the end of the year, a schedule kept at 1715 EST produced identifiable signals each way on 24 tries. This figures out to quite a bit better than half the time, when equipment troubles and inability of one or the other to keep the skeds are included. Tests consisted of only two minutes of transmission each way. Experience the previous winter, and through last spring, indicated that when 5-minute transmissions were made by W8BFQ, at least some recognizable signal could be heard by your conductor just about every try. Similar results, or better, have been achieved in nearly all parts of the country, and over paths that appear even more formidable than the one between West Richfield, Ohio, and Canton, Conn.

There is increasing interest in extended-range tests in many quarters, as word gets around that hops of several hundred miles can be worked regularly on 144 Mc.—if sufficiently good equipment and antennas are used. W5FAG, Albuquerque, N. Mex., is making nightly tests with W6WSQ, W6NLZ, and W7LEE at 2200 MST. Hub has a low-noise converter and a selective i.f. system. His antenna

2-METER STANDINGS

Call States Areas Mtes			Call States Areas Mtes				
W1RFU	19	7	1150	W6WSQ	3	3	1390
W1HDQ	19	6	1020	W6BAZ	3	2	320
W1CCH	17	5	670	W6NTLZ	3	2	360
W1EY	46	6	750	W6MNU	2	2	240
W1EEO	15	5	475	W6GCG	2	2	310
W1UIZ	15	6	680	W6QAC	2	2	200
W1AZK	14	5	650	W6EXH	2	2	193
W1MNF	14	5	600	W7VMP	1	3	417
W1BCN	14	5	650	W7JU	3	3	247
W1ECS	14	5	540	W7LEE	3	2	240
W1DJK	13	5	520	W7YZU	3	2	240
W1MMN	10	5	520	W7JUO	2	2	140
				W7RAP	2	1	165
W2ORI	23	8	1000	W8BFQ	29	8	850
W2UK	23	7	1075	W8WV	28	8	1200
W2NLY	23	7	1050	W8WJC	25	8	775
W2AZL	21	7	1050	W8RMH	22	8	690
W2QED	21	7	1020	W8DX	22	7	675
W2BLV	19	7	910	W8WRN	20	8	670
W2OPQ	19	6	—	W8BAZ	20	8	685
W2DWJ	17	5	632	W8JUV	20	8	650
W2FAC	17	5	600	W8JW	18	7	800
W2UTH	16	7	880	W8RWW	17	7	630
W2PAU	16	6	740	W8WSE	16	7	830
W2PCQ	16	5	650	W8SRW	16	7	700
W2LHL	16	5	550				
W2CPT	15	5	—	W9EFX	23	7	725
W2RNV	15	5	—	W9FVJ	22	8	850
W2AMJ	14	5	450	W9BQC	22	8	820
W2GNZ	14	5	500	W9KLR	21	7	690
W2BRV	14	5	590	W9BPV	20	7	1000
				W9GUA	20	7	750
W3RUE	23	8	850	W9KPS	19	7	650
W3NKM	17	7	680	W9MUD	19	7	640
W3BIB	18	7	970	W9REM	19	6	—
W3BNC	18	7	750	W9LFL	19	7	—
W3FPH	18	7	—	W9ALU	18	7	800
W3TDF	17	6	720	W9JGA	17	6	720
W3KWL	16	7	720	W9WOK	17	6	600
W3LNA	16	7	720	W9ZHL	17	6	—
W3TDF	16	5	570	W9MBL	16	7	660
W3GKP	15	6	800	W9BOV	15	6	—
				W9LEF	15	6	780
W4HHK	26	8	1020	W9PCT	15	6	760
W4AQ	22	7	950	W9JNZ	15	6	560
W4PCT	21	5	—	W9DDG	14	6	700
W4JFY	18	7	330	W9FAN	14	7	680
W4MKJ	16	7	665	W9QKM	14	6	620
W4UMF	15	6	600	W9GAB	14	6	570
W4QXC	14	7	500	W9JLA	13	7	540
W4JEC	14	5	720	W9ZAD	11	5	700
W4WCB	14	5	740	W9GTA	11	5	540
W4TCR	14	5	720	W9JBS	10	5	760
W4UBY	14	5	435	W0EMS	27	8	1175
W4IKZ	13	5	720	W0HED	24	7	870
W4JFU	13	5	720	W0GUD	22	7	1065
W4ZBU	10	5	300	W0ONQ	17	6	1090
W4UTDQ	10	5	350	W0INI	14	6	830
W4WUW	8	6	625	W0OAC	14	5	725
W4TLA	7	4	850	W0TJF	13	4	—
				W0ZBJ	12	7	1097
W5RCL	21	7	925	W0WGG	11	5	760
W5JTI	19	7	1000				
W5QNL	10	5	1400	VE3AIB	20	8	990
W5CVV	10	5	1180	VE3DIR	18	7	790
W5AJJ	10	4	1280	VE3BQN	14	7	790
W5MWW	4	570	—	VE3DQ	13	7	800
W5ML	9	3	700	VE3BPR	12	6	715
W5ABN	9	3	780	VE3AOK	12	5	350
W5ERD	8	3	570	VE3AQG	11	7	800
W5VX	7	4	—	VE1QY	11	4	900
W5VY	7	3	1200	VE7FJ	2	1	365
W5FEK	7	2	580				
W5ONS	7	2	950				
W6ZL	3	3	1400				

is a 16-element array, but a 64-element job is nearing completion, as is a 1-kw. final stage. Activity and equipment on 432 Mc. are improving, also. W5s NSJ EDK FJE and FAG all have crystal-controlled gear and low-noise converters on that band, too.

W5VWU, formerly of Albuquerque, has moved to Florida, taking with him a 1-kw. final and all the other gear needed to do outstanding work on 144 Mc. We may get that Florida activity yet — if John doesn't let that climate get him down too soon. Another prospect for 2-meter DX tests: W7LHL, Seattle, Wash., is making a winter project of the construction of a high-powered final stage and a big horizontal beam.

As 2-meter activity becomes more universal around the country, a closer tie-in between v.h.f. men and the ARRL field organization might well be made a major objective of SCMs and other ARRL officials. One way that this aim can be served is to arrange for more frequent and widespread transmission of ARRL Official Bulletins on the v.h.f. bands. W9USI, Wilmette, Ill., transmits bulletins on 144 Mc. as regularly as possible at 1930 CST nightly. He runs through

(Continued on page 144)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD/9

Who:

Well, the first half of the 21st ARRL International DX Competition now is history. How're you doing? Hah, if you think you goofed, here follow some early and tragic DX Test flashes from around the country. For your 1955 All-American All-Call-Area All-Star DX Test line-up, Jeeves nominates:

W1 —, *Orson A. Roundlot*, whose imagination was working so well that every number he heard was meant for him. So far, best score he ever (thought he) made.

W2 —, *Zeke N. Peck*, an expert touch-typist, who kept his entire log on a mill but didn't notice the ribbon break during the first hour.

W3 —, *Watkins D. Matterby*, who spent the whole first Test week end tearing apart his factory-built kw. Then found it had stopped working because the XYL had kicked out the wall plug while dusting.

W4 —, *Warren N. Beetup*, whose beam rotator froze in the southeast quadrant as the Test began. Came out of the first week end with 638 KP4s.

W5 —, *Hugh R. Buggybud*, who got panicky and signed W4 —/5 instead of W5 —/4. Must work his 293 contacts all over again to correct the mistake.

W6 —, *Don B. Sophani*, who ran out of logsheets and scrap paper early in the Test. Used his tool-chest stock of sandpaper as an emergency measure and wore out 35 ball-point pens.

W7 —, *Wayne E. Wether*, who didn't get out worth a dern after he complained bitterly to the power company about an annoying power leak. They licked it by dropping his line level to 37 volts.

W8 —, *Willie Everbreath*, who sought to cash in on 1.8-Mc. multipliers and rushed out to erect a long-wire with a spool of No. 8 Copperweld. Got it unwound, all right, but it sprang back into a roll from which he was finally extricated eighteen hours later.

W9 —, *Otis S. Terrybell*, who invited 147 friends and neighbors over on the week end preceding the Test, thereby assuring subsequent peace and quiet for an all-out effort. As the party guests arrived, found he had misread his calendar — that was the Test week end.

W0 —, *Prettywell Schott*, who swapped his smooth triple-conversion superhet for a nifty 5-element rotary in the interests of a higher score this year. Sat down to make a killing as the Test began, then committed suicide; no receiver.

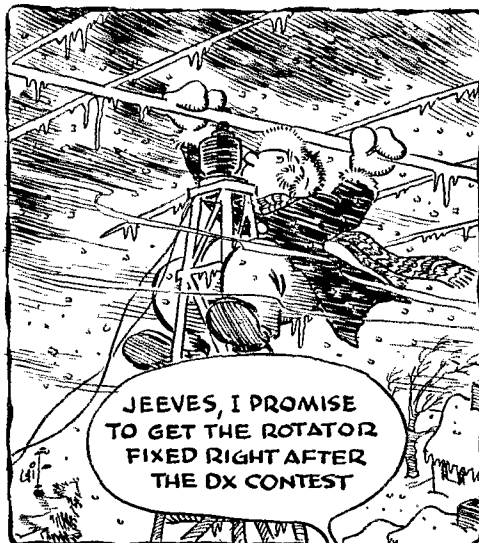
Our K, VE and VO friends were having their problems, too, but the foregoing brief grief accounts should suffice. No one need despair, though, for the last portion of the Test is still to come. Plenty of time to boost that tally — good fishin'!

What:

Or should we have said good *fission*? That's just about what it takes to crack through the Test pile-ups around some of those gaudy numbers leaking through. We'll save a line or two this month by being a bit arbitrary, using Greenwich Time exclusively. And so to press . . .

Twenty 'phone, first off. W9RBI caught up with CR7CF (14,105) 19, GC6FQ (157) 15, HC8GI (159) 23 on Gala-

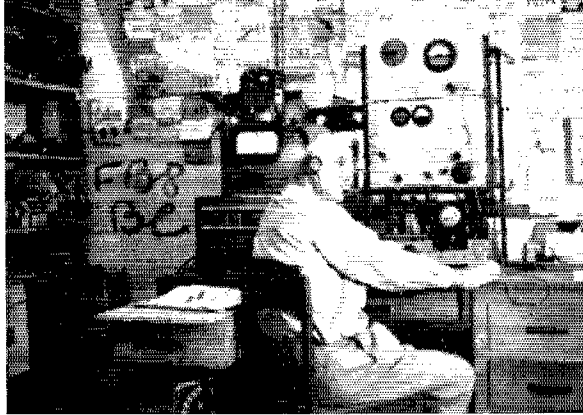
pagos, HK0AI (205) 16 of San Andres, M1B (114) 15, VQ8AR (146) 18, VS2DQ (195) 14 and 3V8BP (158) 16-17 EL9A (325) 21, ET3Q (325) 17, MD5FA (185) 9 of Suez, MP4KAC (185) 14 and ZD3BFC (115) 21 hooked up with CN8LE W9WHM collected EASAI, KA0LJ (285) 22, TF5SV (110) 16, VQs 4RF 5EK (150) 21 and a ZD3. FB8BL (91) 21 and ZD2DCP (140) 21 were gottaways That Iwo item, KAs 3RR and 8SC worked W6UED, while W4BYJ settled for SP2AA and an HK0 SWL S. Tonsi, Wisconsin, heard the boys grappling for ET2US (190), FM7WN (160) 18, KAs 2IM (140), 8FC (198), OQ5s FC (125), FO (100), VPs 2KM (162) 17-18, 7NG (200), VQ2DT (141) and 5A4TL (130) "200" DX Club sleuths tracked down ACs 3PT (190) 16, 4LM (270), 4NC (103) 12, CR8AB (170) 18, LZ1KAA (128) 14, MP4QAH (100) 13-14, OY2A (142), UB5KBE (100-150), VK1PG (132) 15, VP8AQ (118) 0, VU2AK (160) 14, YI2AM (110) 14, YJ1AA due back on soon, ZC3AC (163) 10-14, ZDs 2RWW (198) 19-20, 9AB (170) 23, 9AC (130) 20, ZSs 2MI (90-110) of Marion Isle, and 8I (345) 17-18 Northern and Southern California DX Clubs cornered CR6s AT (121) 21, BX (143) 20-21, FB8BC (170) 5, FY7s YE (220-280) 17, YZ (125-185), GC2FZC (200) 16, HA5KBA (157) 15, KB6AQ (230) 19, SV1AZ (98) 17 of Crete, VK1DY (94) 8, VQ8CB (100) 15 of the Chagos, VSs 1FS (199) 14, 4HK (30-200) 10, 5KU (25) 12-16 and ZD6BX (68) 17 West Gulf DX Club's *DX Bulletin* calls attention to 14-Mc. radiotelephones CN2AD (220) 9, CRs 6AC 22, 6CK (155) 21, 7AU (190) 21, 7CZ (139) 21, 8AC 8SA (53), 19AA, DU7SV (94) 7, EAs 9BC (129) 14-15, 9DF (187) 19 of Rio de Oro, 8AC (195) 9, EL2X (337) 18, FB8s HB (143) 22, BN (100-197) 19, BP (115-195) 18, XX, FF8BB (146), FL8AI (150) 18, FQ8AK (125) 21, FY7YA, HB1MX/HE (101) 15, HZs 1AB (150) 14, 2AEH (105) 15, KT1WX (175) 14, MP4s BBL (70) 14-15, QAD 16-18, OK1MB (109-348) 15-20, PX1YR (130) 21, SP9s KAB (195) 15, KAD (138) 16, UB5KAB (132) 13, SPKs 1AC (145) 8, 9RH (118-145) 5-7, VPs 1GG (169) 2, 2DA (106) 22, 2KM (140) 17-18, 3YG (135) 22-23, 5AE (147) 19 of Turks, 8AO (158) 5, VQs 3RJB (142) 21, 6LQ (119) 21, 8AL (115) 18, imminent VQ9NZK, VRs 4AE (180) 8, 3A, VS4BG 14, VU2AL, YN4CB (186) 22-23, YU1s AD (140) 14-15, GM (105) 16, ZD8AA, ZM6AT (160), ZSs 3AH (130) 15, 7C (167) 21, 7D (125) 19-20, 9G (165), 3V8BI,



*New Mailing Address: Effective immediately, please mail all reports of DX activity to DX Editor Newkirk's new address: 4128 North Tripp Ave., Chicago 41, Illinois.



One of Portugal's outstanding DX enthusiasts, CTICB runs 250 watts to the VFO rig at left, likes his S-40 inhaler and loads up a 20-meter half-wave skywire. A picture of the Portuguese Indian station of CR8AB, CTICB's son, appeared last month.



Madagascar now sprouts hams by the dozens where formerly they were rarities. FB8BC often can be found on 15, 20 and 40 meters running 25 watts of 'phone to a VFO-807 ensemble. His favorite time for W/K-hunting is 1700-1900 GMT. (Photo via W9RBI and ZS6BW)

(107-130) 8-15, 4S7s WA (208), YL (155) 14 and 4X4GB (100) 17 Newark News Radio Club 20-meter A3 loggings: AP20, CN2AB, CRs 4AG 4AL 6AG, CTs 2AG 3AN, DU1AL, EA8s AV AW, ET2AB, FF8AY, FM7WQ, FO8AD, GD3s ENK IBQ, HR1s CB BG, HV1CM (200) 13, IT1BXX, JA4BB, KAs by the dozens, KGs 4AO 4AR 6SB, KR6s AF HJ, KV4BB, LX1WA, OQs 5CX 5FL 5FN 6DZ, PJ2s AB AF AI AK, ST2NW, TA2EFA, TG9MB, YO2KAB, VP2s 2DC 2GW 3HAG 7NV, VQs 2FU 3ES 4AQ 4ERD 4EZ, VSs 1FL 2BQ, ZD4BR, ZEs 2KE 6JI, ZS3P, 4X4AD 5As 1TT 2TZ 3TF 4TJ 4TL 4TR 4TY 4TZ and 9S4AD.

Twenty c.w. next, and the slot's a-jumpin'. ET3S (65) 16-17, VK1AC's 100-watter (45) 14-15, VP8AQ (80) 1-2, VQ6LQ (60) 20, ZA1BB (50) 18, ZD2DCP (85) 21-22 and enigmatic UB5KBE (70) 15 answered W8YIN W9AVJ (W9GVZ) got that UB5 as well as EA8AX (83) 21, ET3GB (63), FG7XB (79) 18, JAs IACA ICC 1TD 2AN 3AF 3BN 3DM 4AF 6AD 6AO 6FB 6HK 7DK 8AQ, KA3AC (59), KG6AAL (60), VK1EG (44) 14 of Antarctica and ZB1CH (52) 16. All those JAs hovered between 14,040 and 14,070 kc. OY2Z (30) 13, SV1AZ (105) 16, VP8BD (95) 14 and ZD6BX (83) 20-21 came back to W9RBI. CN8IE picked off AP2K (70) 9, F9QV/FC (70) 8, TF3MB (70) 12, UB5KAB (70) 10 and VP8AO (50) 20. At K2BZT we find EL5B (37) 17, ET3LF (19) 18, JA1CR (37) 22, KM6AX (75) 22, OQ5s CP (22) 19, ER (30) 18, VQ2JN (62) 18, YN1PM (10) 19, a ZA1, ZD4BQ (73) 22 and ZESJO (56) 18. WISSZ raised CN8EL (75) 13, FB8AP (71) 16-19, GD3UB (40) 15, PJ2CK (95) 12, SP2KAC 13 and ZB2A (25) 18-20

..... XG6A, a cutie giving QTH as Gulf of Mexico's Guanto Island, regaled many of the gang around 14,013 kc.

..... W1OJR went at it hammer and tong, landing stuff like CR7s AD (75) 20, AF (55) 19, MB (22) 17, CT3AB (90) 20, EA8s 8BM (22) 18, 9AP (20) 18-19, an ET3, an FP8, FM7WP (25) 13, HP2TP (95) 16, OQ5LL (60) 21, SP3PK (10) 15, an Antarctica VK1, VQs 3FN (35) 18, 4FG (25) 18, 4FK (15) 20, ZEs 3JL (19) 18, 3JP (63) 20, 4JE (65) 19, ZS3HX (52) 17 and 9S4BS (38) 17. HC4MK (90) 23 and HK4BD also came back but weirdies WA1AB and CU3YY escaped Vic's net. The cream of W4TFB's bumper 14-Mc. c.w. crop are DU7SV 23, EA9DF 23, GC2FZC (65) 15-16, H18WA 22, an HK6, I1BLF (42) 15-16 of Trieste, JAs 1AQ 0, 3AB 23, LZ1KAB 21, OD5LC 18, ST2AC (37) 19-21, VQ2AS (65) 21, VR2BZ (56-70), YO3GY 18 and ZC4IP 16. Don's ill luck included EA8AX (50) 21, FM7WD, MP4QAH (40-72) 15, OX5UD (40) 17, SV8WY, a VQ6 and ZS7D (28) 19-20. W6QPM reached 126 by way of FQ8AX, FY7YE (35) 13, GD3IBQ (70) 16, HA5KBA (85) 13-14, ISSV (47) 16, OY4XX (30) 16, VQ4RF and ZESJJ. ET3Q (50) 20, Turks' VP5AB and 4X4DK (100) 15 enraptured W9KXX. W4YZC made off with CR6AI (21) 18, EL2X, KA2CR, PJ2AJ and a ZD6 thanks to his new 3-w. whirler. Two fixed elements are enough for W3UXX to bag CR7LU (30) 20, a GD3, HR2AD, KG4AN, ST2NG, TI2RI, VQ2IM, ZESJP (14) 9, ZS3K and SA1TC (46) 19. W2WZ fancied FQ8AG (23) 21, LZ1KAA (41) 13-14, MP4s BBE

(77) 13, BBL (75) 13-14, VU2AL (55) 13 and 4S7LB (47) 14. JAs 1SR 3CS 7AD 8BL 8AA (not Iwo), KAs 2CG 2GC 8SE and KX6NA (134) hit the spot with W7PUA. A DXamination of doings here and there, at W1WAI: EL2P (45) 13, an ET3, FM7WM, W2GVZ: a DU7, a ZA1, W3WPG: CN8FQ, W6BIL: an ST2, a ZB2, W6SGF: FO8AC, JA3AB, KA2USA, BS 4-5, TI2BX, W7RVD: JAs 1NI 1XR 2LC 3BK 5CP 8AA 8BR, that KD6AT, KR6s KS OY, OQ5PU (25) 20, W3DLZ: one FG7XE (20), OD5LJ (25) 14-15, ZB6JF (23), ZS7D (27) 19-20, W0PWN: HR1JZ, W0VFM: FAs 8RJ (28) 14-15, 9VN (76) 20, VP3VN (54) 14. CE6AD (22), CR5JB (40), HH3DL (36), HR1MC (32), LU "Z" boys 2ZC (28), 7ZM (40), 7ZL (82), TA3US (38) and VP8AZ (20) answered W4ZAE. AP2R slipped Mick's hook. I1BNU/Trieste (35) 16, SP9KAD (40) 15 and ZB1JRK (17) 20 are among the many goodies spotted by San Diego DX Club stalkers. SCDXC's Bulletin and NCDXC's DXer specify 14-Mc. code catches EA8 9AR (55) 18, 9AB (12) 9, ET3AB (53) 15, FB8s BC (65) 18, BK (90) 0, XX (40) 13, ZZ (40) 15, GC8NO (53) 17, HE9LAA (64) 16, HZ1s AB (94) 15-16, HZ (53) 16-17, KP6AK, LX1AC (31) 15, LZ1KSP (73) 15-16, MIL (72) 15-16, OQ6DZ (28) 18, VK1PG (65) 8, VQ8CB (50) 19, VSs 4HK (35-160), 5KU (24-60) 20, ZB1s BF (22), BU (65) 15-16, CO (17) 15, ZD6RD (52) 17, ZSs 2MI (150) of Marion, 3B 20 and 9S4AX (50) 15. WGDXC's DX Bulletin spotlights CRs 5AD (25) 20, 6CU (1) 21, 8SA (53), CS3AC (90) 16, CT2AF (58) 22, FB8s BL (83) 20, BR (25) 17-19, FB8AE, FK8s AO (88) 21, AP (30) 14, FO8s AB (80) 4, AK (65) 4, FR7ZA (18) 18, HA5s KBA (85) 13-14, KBN (68) 14, HV1OR, HZ2AEH, KC6UZ (80) 22, KJ6AZ (93) 23-0, KH6OR/KM6, LZ1KPP (49) 14, OD5AX (69) 14, OQ5HI (60) 18, OYs 2Z (53) 13-23, 3GA (81) 15, SP3s AK (29) 14, AN (50) 14, PK (41) 15-16, SV7AZ (80) 13, UA1DH (62) 14-15, VQs 2DR (17) 19-20, 2GW (40), 2W (00) 22, 21, 3BM (78) 19, 5EK (69) 19, VR2CG (52) 16, VU2EJ (52) 14, Y1ZAM (60) 14, YO3RD (12-28) 15, ZB1AU (10) 13, ZC5SG (50), ZEs 4JE (3) 18-19, 5JE (62) 19, ZP9AY (50) 13, 3V8AN (25-45) 13 and hopeful ZD8AA of Ascension.

Forty is sporty, especially from the c.w. angle. K6EC put the bite on CN8GB (15) 22, CR9AF (22) 16, KG4AE (12) 2, KR6KS (17), VP8BD (24) 2 and VS6DD (15) 8. Ev also encountered characters AI1BC (21), JK2OR (29) and KD6AT. EA8BF (40), ET2FQ (18), FG7XB (23) 12, LZ1KAB (25), TG9MB (22), VP8AO (12) and YS10 (8) contacted, or were heard by, W4ZAE. A 7-Mc. QSL from VK5LF/MM, QTH off the South Australian coast, confirmed that he used a 5-watt 25L6 rig when working W2OBX. W4TFB worked CN8GB 6, FAs DA 6, RJ0, ZZ7, I1BNU/Trieste 3, EG6GX 10, LU "Z" brethren 1ZT 2ZC 2ZI 4ZB 8ZC 8ZS 9ZM and a healthy helping of VP8s. CRs 4AL (10) 3, 7CD (6) 4, 7CI (27) 3, EL2s C (12) 22, X (12) 22, HK0AI (7) 4, LZ1KSI (18) 8, TR5TP (10) 0, TG9LM (7) 0, VQ4EZ (13) 11, ZC4PB (18) 22, ZS7D (13) 21 and 3V8ES (11) 21 swapped 73 with W4YHD. Jim also heard, or heard about, 7-Mc. possibilities UA2AC, VQ4BNU, VS6CG

(29), VK9RH of Norfolk, ZAs IKAB 4KBA (9) and 4S7NG (25) W7JLU did fine with JZ0DN (12) on Biak Isle, KC6CG (30), KG6IG of the Volcanoes (25) and VK9AU (40). UA9s KFA and KJA (28) wouldn't come back WN3ZOG managed nice Novice-style DX in snagging CN8MM (190) 0. Any other Novices working Africa on 40? CE3DZ, HH2LR, TF3MB, JAs 1AFF 1KM 2LC 3JA 3LK 5AA and many Europeans QSOd W6RZS's 813 40-meter frolicking hither and yon, at W1FAI: HC1LE (25) 12. K2ALA: CT3AB, EA6AE, TF3AB, VP7NG, a Trieste II, W3WPG: EA9DF, HA5KBA, OE5AH, ST2AR. W4WR Y: an FG7. W4YZC: EA9AC, HR1JZ (20) 3-4 W5CAY: DU7SV (20) 9, an HK0, OK1MB. W7UKA: a DU, JAs 1EA (6), 2BL (2), 3JA (6) 7-Mc. c.w. club surveillance, by WGDXC: QX3AY (28) 2-3, ZS3HX (20) 4, SCDXC: FB8ZZ (20) 7, VK1s EG (20) 7 and DY (20) 7.

Forty 'phone, courtesy NNRC digging: CR6BC, CT2AG, EA6BK, HI6TC, HR1FM, JA1s AEA AGU, KG6GX, KJ6AZ, TG9s LR VS, VK9s FM OK RC RM, VPs 1RS 2GW and VS2CP. Definitely a band that separates the men from the boys!

Eighty c.w. came into its own of late and no mistake. Though spotty at times, the north Atlantic path treated the whole U. S. A. to Europeans by the logflits. FA8DA (10), KL7s APZ (9), AWB (10), FAJ (8), KM6AX (32), OKs 1DE (9) and 2KSV (9) fell prey to W9GVZ at W9AVJ. G2PU around 3800 kc. had a stand-out 'phone signal The better items at K2BZT include CT2BO (10) 1, HA5KBA (3) 5, LA2HE (10) 6, OE2JG (7) 4, OKs 1MB 1KTW 3AL and 9S4AX (3) 1. Hayden also riddled five Swedes, eight Germans and 14 Britons EL2X made the long hop into the ledger of W7JLU on 3510 kc. VK5KO also nabbed the Oregonian W4YZC captured GD3UB, OKs KBW KTI, YV5BJ, many Gs and a 984 A CT2. OZ4X and TI2BX (6) 1 will QSL W1WAI W9UDK bagged an EL, KL7PI, OX3AY and many Europeans with his 12-foot-high window. George also was among the unlucky ones to catch the phoney 3.5-Mc. FG7XB Jeeves' recent misinterpretation of W2ESO's report, switching Gene's heard and worked items, was not in the nature of a base canard. OE3SE was a new number on 3.5 Mc. for W2ESO W2QHH made off with HB1MX/HE, a KM6 and ZK1BG, all lovely 80-meter munchings The DX Bulletin adds EA9AP (14) 0, FA9VN (13) 6, HB1HQ/HE (20) 7, ZS3K (12) 5 and 4X4GB (1) 2 to the 3.5-Mc. stew.

Fifteen 'phone continues its able role as a substitute for old friend ten during the latter's m.u.f. vacation. W9RB1 took a liking to 21 Mc. after sessions with FB8BC (220) 18, KW6BB (270) 22-23, VQ2FU (220) 18, YU1GM (255) 17, ZB1AUV (170) 19, ZSs 7C (150) 17, 9I (240) 16 and 4X4DX (15). Ross advises that VP5AE of Turks has rocks on 21,140, -180, -200, -220 and -310 kc., A3 W1CTW has 61 countries on 15-meter c.w. but still seeks his first Asian QSO in 30 years. The ARRL DX Test now in progress ought to do it! KA2KC and KJ6AZ bounced back to W6UFD; KC6AA and TI2BX likewise to W6SGF, all A3 W6ZZ made it 67 on

CAUTION

Under this country's treaty obligations and on formal notice received from other nations, FCC-licensed amateurs are warned to engage in no communications with stations in the countries listed below. This is in accordance with FCC Public Notice of December 21, 1950 (p. 23, Feb., 1951 QST), and as since revised.

French Indo-China (Cambodia, Laos and Viet-Nam), Republic of Indonesia, Iran, Korea, Thailand.

Prefixes to be avoided: F18-XW8-31V8, PK (Netherlands territories excepted), EP-EQ, HL and HS.

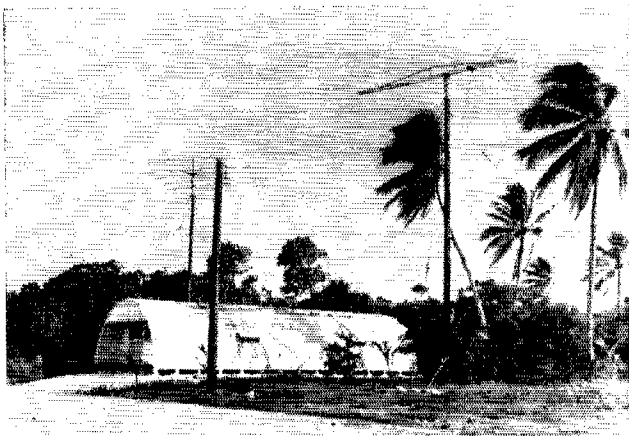
21 Mc. via ZM6AR. Miles also grabbed KA2KS, KV4RD, VP6GT, some ZLs and ZS3AB From W8YIN we hear of CR6BH (225) 18-19, VQ2AW (165) 20 and ZD6BX (50) 19 NNRC's most recent roster of 15-meter 'phones: CN8s MF MM, DU7SV, ELs 2X 10A, FA3JY, OB18USA, OQ5s BI GU, VP3YG, VQs 2ST 3CB 4BF 5CJ, ZC4JA, ZD9AD, ZEZJK, ZSs 3AB 3BC 7G and 4X4BG WGDXC found FY7YC (40) 19-20 and ZE5JJ (30) 20 using c.w.

One-sixty c.w. grudgingly gave ground under persistent onslaughts. W1BB and W9PNE reached 28 and 17 countries worked on Low Band, respectively. Several hands were out after their last continents for 1.8-Mc. WACs but the going was rough. This DX is being worked or heard by W/K/VE/VO participants: G2s AJ HX PL, G3s ABM AJZ BKF BRU ERN EHV GGN GIO HDZ HIS HKQ HRW IGT JDK JED JEQ JJZ JOJ JVL PU QD, G5s JU RI VB, G6s GM LB PD, GD3FBS, GB3s HCG IVJ, GMs 2BUD 3HRZ, GW2INO, EI9J, HB9CM, KP4s CC DV KD, KV4s AA BB, LU3EL, OKs HI KTI, TI2BX, VP7s NG NM, YV5DE, ZC4GF and ZL380s W9PNE writes: "Very anxious for Asian QSOs. DX must stay below 1835 kc. to be readable here. Best frequencies are 1826 to 1831 kc., and 1870 to 1875 for those who can operate outside the U. S. A. band." By next month's deadline the dust should be settling after completion of both the 160-meter Transatlantic Tests and the 21st ARRL International DX Competition. Scribes W1BB, W3RCQ and W9PNE undoubtedly will fill us in on further 1.8-Mc. developments. Until then we'd better make the most of what's left of this sunspot minimum and squeeze the last DX drops out of old 160. Good luck!

Where:

Guadeloupe QSL info courtesy W4LVV: Cards should be sent directly to FG7XA and FG7XB. If you desire your return QSL to arrive direct, send a stamped self-addressed envelope to W4LVV at Box 104, Miami; otherwise they'll reach you via bureaus W4LVV also notifies that he's closing out his duties as VP5BF (Caiicos) QSL secretary. The VP5 now is believed to be Jamaica-stationed. Over

W0YDZ, who made his "How's" photographic debut last month, has this exotic W0YDZ/KG6 layout perking on Guam. A 5-element 14-Mc. rotary appears at left; the lethal-looking object at right is a 10-element 10-meter job.



4000 VP5BF Caicos cards have been distributed; if you still have one coming, ship that stamped self-addressed envelope to W4LVV VP5AE, of Grand Turks, desires similarly-prepared envelopes from those who wish direct QSLs: Maj. D. E. Evelyn, PAA, Grand Turks Island via Patrick AFB, Fla. Otherwise, QSL via W8LMO and await your confirmation via the bureau route "Still awaiting permanent quarters so I haven't yet unpacked. Expect to be settled shortly and hope to be on the air thereafter." So writes W4VE, ex-KA9AA-KR6AA, who expects QSL inquiries at the address to follow — full QSO data necessary W1s ARR CTW MX OJR SSZ IED WAI WPO ZDP, W2s OLU WZ, K2BZT, W4s TFB YHD YZC, W6s SGF UED ZZ, K6EC, W7JLU, W8YIN, W9s AVJ CFT EU GVZ RBT RTY, CN8IE, PJ2CJ, NCDXC, NNRC, OVSU, SCDXC and 200-DXC got the goods on:

ex-AR1WW (QSL to W3VLG) CN8EB (QSL via W3WDI) CN8HX, F. Murray, WIIRE, 29 Ferry St., Boston, Mass. CR6CW, Box 1400, Lubango, Angola CR7MB, Box 12, Quelimane, Mozambique ex-DL4WK, Capt. M. S. Arbogast, K6DOM/7, Hq. 9470 Tech Unit, AEPG, Ft. Huachuca, Ariz. ex-DL4YK, SFC E. F. Diehl, jr., 9470 Tech Unit, Det. 1, AEPG, Ft. Huachuca, Ariz. EA8BM (QSL via URE) EL2C (QSL via W1JOJ) ex-EP1AL (QSL to W3VLG) ET3LF, Box 114, Addis Ababa, Ethiopia ET3Q, Box 1636, Addis Ababa, Ethiopia F7EH (QSL to W1SWX) GC6FQ, Col. P. Northey, ex-G6FQ, Pendeen, Mont Felard, Jersey, C.I., U.K. HCAMK, Box 2327, Quito, Ecuador HK4BD, Box 2263, Medellin, Colombia HPIAW, Box 586, Panama, Rep. of Panama HZZAEH, APO 616, New York, N. Y. JZ0DN (QSL to PA0DN) KA2GC, SFC G. I. Clineman, Sig. Opns. Co., 8060 AU, APO 343, San Francisco, Calif. KA2KC, L. Cox, Box 14, Navy 830, FPO, San Francisco, Calif. KA2RR, Staff USN COMSTS W. Pac. Area, Navy 3923, Box 73, FPO, San Francisco, Calif. KA2WL, NAF, Navy 875, FPO, San Francisco, Calif. ex-KA9AA-KR6AA, Co. F, Westervelt, 54th Med. Gp., Ft. Benning, Ga. KL7BHL, PFC C. Wrathford, 333 C/R Co., APO 949, Seattle, Wash. KL7BNU, Western Electric Co. Unit, APO 722, Seattle, Wash. KR6OY (QSL via W7UMH) ex-KW6BB (QSL to W6UMP) KZ5DK, Box 500, Balboa Hts., C. Z. KZ5MN,

Box 415, Amador, C. Z. OE6JR, J. Rauschl, Graz, Austria OE6YR, Ursula Rauschl, Graz, Austria OK1HI, J. Hyska, Cechova 31, Praha XIX, Czechoslovakia OQ5HI, Box 634, Elisabethville, Belgian Congo SV1AZ, Box 15, Candia, Crete



Wherever there's a far-flung expeditionary outpost you'll invariably find ham radio. Together, these two QSLs are a unique collector's item, both stations having been active at the same time from opposite polar ice caps. Nope, they didn't QSO.

UB5KBE, P.O. Box 352, Odessa, Ukraine, U. S. S. R. VPIRS, R. Squires, 1144 Pickstock St., Belize, Br. Honduras VP5HQ (ex-MD1A), Caribbean Sig. Sqdn., Uppark Camp, Kingston, Jamaica VP5LE (QSL via VP5AD) VP7NX (QSL via W6RRG) VP8BG (QSL via W5GEL) VP9CB, P. R. Gendreau, 1604 Materiel, APO 856, New York, N. Y. VQ3JJP, H. J. Powell, Mafia Island, Tanganyika W1VDR/KH6, C. J. Brown, 3721 Radford Dr., Honolulu, T. H. XG6A (QSL via LMRE) ex-ZK2AA, W. Scarborough, 18 Norwich St., Auckland, N. Z. ZS3AH, J. Swart, P. O., Okahandja, S. W. Afr. ZS3F, C. P. Stemie, Posbus, P. O. Box 1113, Windhoek, S. W. Afr. ZS3P, P. C. A. Ferreira, P. O. Box 586, Windhoek, S. W. Afr. 4X4FW (QSL via IARC) ex-5A2CE, L/Cpl. Baker, 9 Med. Wireless Tp., MELF 12, Middle East ex-5A2CH, 139 Rectory Rd. Gp., Essex, England.

Whence:

Asia — JA1CV raps out a DX column for Japan's *Radio Experimenter* and regularly schedules K6DV, Kazu runs 100 watts to a five-stage VFO-807s arrangement on 10 through 40 meters, receiving with a homebrew 10-tuber British authorities continue attempts to obtain ex-AC4RF's release from a China mainland prison WGDXC Asian tidbits: HZ2AEH gets around with a BC-610, 51J and 3-element spinner. W1JRA is confident of obtaining a permit for hamming in Afghanistan. VU2JP does QSL chores for ACs 3PT 3SZ 4NC and has Sunday 0500 GMT skeds with the latter. V81GH (ex-GM3AVO) occasionally visits Labuan and Nicobar. EP3SS has hopes for early relaxation of Iranian ham radio prohibition KD6AT's bearing appears to be Korea; too bad.

Africa — "I hope to go on a DXpedition to Ifni sometime in March provided I can obtain a visa and license to operate there. At present I'm making up a schedule for submission to the Spanish consulate in application for license and visa. I hope to be there at least one week and will operate mostly 20-meter 'phone." This from CN8IE (W0LRF) VQ4E1 and ZD6BX chorus a few don'ts for all DX hunters: QRM from indiscriminate and ill-timed calling is an omnipresent bugbear; only the rankest DX rookie should be caught calling a station before he hears its signals, unless it be on schedule. QSYing with final amplifier on is another frequent curse. Overlong transmissions are nuisances; let the rare-DX station set the pace and tone of QSO. Stepping on another fellow's final transmission is strictly for the boors; wait until you hear an SK from each end of a QSO before



Not far removed distancewise, but rare by reason of its small ham population, is Guadeloupe, F.W.I. A burst of activity on the part of Antoine Noel, FG7XB, however, has put this country in the logs of many happy amateurs recently. Look closely at the neat set-up above and you'll see Antoine's 10-watt transmitter — smaller than the bug — in front of the receiver. To the delight of U. S. A. DXers, FG7XB is currently plugging away at his WAs on 20- and 40-meter c.w. (Photo via Salt Creek Radio Club, W9AVJ)

barging in, and if both ends aren't audible, be careful. Working DX with a non-T9x signal is no accomplishment; you'll only be worked in self-defense. . . . RSEA (East Africa) has discontinued its WEA (Worked East Africa) certificate award. They add, "We hope to issue a new certificate with revised rules in the near future and will send further details when available." . . . Present active ZD6s include BX EF HJ HN JL and RD. . . . NCDXC and SCDXC Africanisms: ZD3BFC looks forward to two more years on 20 and 40, A1 and A3. ZS5JY is about to put his rotary atop a 150-foot h.c. tower and rival ZSISW hoisted his wide-spaced job to the 115-foot level. ZSs 7C 8E and 9H regularly are heard.

Oceania — In WIA's monthly organ *Amateur Radio* we note that top Aussie DXers per call area are VKs 2NS with 195 countries, 3BZ 224, 4LR 210, 5FL 143, 6RU 199, 7LZ 116 and 9GW 150. . . . Yank hams interested in the NZART (New Zealand) WAP and WAZL awards can save time and postage by writing WØUB. Roy will forward full details upon receipt of requests accompanying stamped self-addressed envelopes. . . . SCDXC and NCDXC Oceanograms: FØ8AD QRTd in favor of European TV activities. YR6AC is preparing a rig for Piteairn action. FK8AL, just back from France, goes at it with p.p. 807s. Routine relief of Australian expeditory outposts may see VKIs DC and ZM replacing AC DJ and GA on Macquarie; VKIs AWI and RA may spell EG in Antarctica. EXP4BBD still endeavors to crack the red tape wrapped around his future DU license on Luzon.

Europe — This month sees the arrival of European DX excitement. USKA (Switzerland) throws its annual Helvetia-22 ball from 1500 GMT, March 19th, to 1700, March 20th. All amateurs are invited to participate, 'phone and/or c.w., on all bands from 3.5 through 30 Mc. Stations outside Switzerland will strive to work as many HB stations in as many Swiss cantons (states) as possible. "CQ HB" or "CQ Switzerland" is the key. Scoring is simple: 3 points per band-QSO, this total to be multiplied by the total number of band-cantons worked. The exchange is the usual RS or RST report followed by the contact number (001, 002, etc.). But it's a task to tell the players without this scorecard of canton abbreviations which will be appended to HB9 or HB1 call signs: AG, Argovie; AR, Appenzell; BE, Berne; BS, Basle; FR, Fribourg; GE, Geneva; GL, Glaris; GR, Grisons; LU, Lucerne; NE, Neuchâtel; NW, Unterwald; SG, St. Gall; SH, Schaffhouse; SO, Soleure; SZ, Schwyz; TG, Thurgovie; TI, Tessin; UR, Uri; VD, Vaud; VS, Valais; ZG, Zoug; and ZH, Zurich. Logs, a separate sheet for each band, may be sent to USKA Traffic Manager HB9CZ. Certificates of merit are to be awarded to the three highest entries from each DXCC List country. And don't forget that USKA offers a classy H-22 sheepskin to each amateur who can submit proof of contact with all of Switzerland's 22 cantons. 'Tain't easy! . . . REF (France) sponsors an opportunity for amateurs throughout the world to further DUF award aspirations. Dates: radiotelephone, 1200 GMT, March 5th, to 2400, March 6th; continuous wave, April 16th-17th, same hours. All amateur hands may be used and the exchange is the same as that for the H-22 shindig. A "CQ REF" ought to set the ball a-rollin'. Logs, scores and comments can be addressed to F8TM, REF, BP 4201, Paris RP, France. . . . DL4OR may attempt some HVIORing about the time you read this. . . . URE's EA5 contingent threw an on-the-air QSO spree over the past three months which netted lucky parties interesting DFV (Diploma Fallas Valencia) certificate awards. The deal was held in conjunction with *Junta Central Fallera*, Valencia's recent "Festival of Fire" spectacular. . . . ON4s LJ and QX, Antwerp area members of UBA (Belgium), call attention to the WOSA "Worked Only Stations in Antwerp" diploma now available world-wide. W/K/VE/VO aspirants must obtain QSLs from five QSOd Antwerp ON4s, 'phone and/or c.w. For full details write ON4QX. . . . G3JOQ, radiop aboard British lifeboat *Aries* on its transatlantic test cruise last summer, writes: "On behalf of the captain and crew of *Aries I* wish to thank hams for their kind and able assistance. The QSLs which they will receive will be 'collectors' pieces' for there will be only nine at the most for U. S. A. out of a total of 140." . . . W8SHW, who recently completed a tour of U. K. duty, desires to express thanks to the G gang for outstanding hospitality received. Maurice befriended over 50 British amateurs and was a participant or interested observer in many of their organizational and operational undertakings. . . . PJ2CJ points out that a few PJ-

prefixed Netherlands calls were issued in error. PJ calls henceforth will be N.W.I. issues exclusively. . . . PAØGER wants a tracer on 1952 SVØs WO and WW, also noting that SVØWM is ex-WØSGC.

Hereabouts — FG7XA paid a recent personal visit to W4LVV and the two got together on the Guadeloupe QSL problem. XA took back with him a BC-348Q inhaler to augment the 6V6-807 rig he uses, as well as antenna wire for himself and FG7XB. Both radiops are with PTP, the French version of CAA. W4LVV also supplied Andre with much miscellaneous gear plus some extra crystals to help the boys duck the pile-ups. . . . TI2BX's XYL has taken to hamming *con gusto*, assisting in keeping the Westlake installation warm for a good part of each day. TI2BX works all bands, 160 through 15 meters, and one of their fortes is the accumulation of MM QSOs. The Westlakes picked off 78 countries in less than eight months of casual DXing. A Viking II, an NC-183 and several beams are employed. . . . Two more states on 160 will give W2QHH WAS on six bands. A new Ranger rig and a higher skyhook are bound to help. Howy now has 111 countries collected on 3.5 Mc. and has QSOd some 400 YLs 'twixt DX sprees. . . . WICTW tells a story about the neophyte DXer who thought CN2s and CN8s were Chinese Novices! . . . YN1PM is ex-W1ØEK-W4SXD and expects to remain in Nicaragua indefinitely. Paul has a c.c. 25-watter readily workable on twenty. . . . W3UXX could use a hint or two regarding means of securing VS9BC's QSL. . . . W4KRR dropped in on a January meeting of the San Diego DX Club held at K6EC's diggings. . . . Old-school DXer W9FLH, now relaxing with a 40-watter while contemplating a better DX QTH, would like a tip toward up-to-date info on old friend prewar J2GX, father of the yagi. . . . The Salt Creek Amateur Radio Club gang at W9AVJ prepared for the 21st ARRL DX Test with a vengeance. Up went a 6-elementer on 10 meters, 108 feet high; 5 elements on 15 meters, 100 feet up; and 5 more on 20, only 92 feet skyward. . . . Big-sigger W4ESK now is back in the DX badlands as W7ESK, according to SCDXC sources. . . . WGDXC has it that YN4CB has DXpeditionary eyes focused on the Great Corns; VP8AQ uncorked a batch of QSLs Statesward; and FP8AP sports a new 81s rig courtesy WØAIW.

— — — — —

Deign to dig the new Chicago address of your conductor; we'll try to hang onto this one for a while. (It's a wonderful spot for Jeeves to continue his indoor-loop antenna experiments.)



Ham radio provides valuable release and relaxation at our outposts in the Far North. Call signs VE8OG, VE8SD, VE8SM and VE8YT are in use among the ten members of the Frobisher Bay, N.W.T., Amateur Radio Club shown here. (Photo via W4HYW)

Net Know-How

Improving Emergency Communications Effectiveness

BY E. S. VAN DEUSEN,* W3ECP

• In any emergency operation, the ability to handle third-party traffic promptly and efficiently is a "must." W3ECP bases his recommendations on experience gained in actual emergency net operations.

AMATEUR RADIO exists as a hobby because it qualifies as a service.¹ The extent of our service is limited by our ability. The responsibility for furthering these abilities is up to each one of us. Experienced traffic men will undoubtedly want to add to the following observations and suggestions for improving operations during an emergency. All hands will agree, however, that almost all amateurs are extremely coöperative during a communications emergency. The occasional operator who fails or refuses to coöperate during such a period deserves short shrift, with thorough application of the Wouff-Hong and the Rettysnitch.

The operator who learns of an emergency and experiences the universal desire to help may unnecessarily delay and complicate the flow of traffic, if he has little or no concept of acceptable net procedure. He can best serve by familiarizing himself with the situation by *listening*. Careful listening will enable an operator to locate stations and places and to get a good idea of the over-all situation so that he will best know *how* to help if needed. A desire to help through transmitting is often more hindrance than help. If you're not needed, silence is the biggest help! Eagerness to aid isn't an excuse for breaking into the net. Proper procedure by the net control should provide opportunity periodically for additional stations to report in. Only when urgent information pertaining to the situation at hand should be made known to the NCS is breaking-in permissible. Having once reported into a net, however, every station should monitor the net until he is excused by net control.

C.W. Circuits Always Advisable

In the initial stages of an emergency, much may depend on a single station's ability to communicate with the unaffected area through use of "flea-power" c.w. equipment. When commercial power fails, there may or may not be an emergency a.c. source available. On the other hand, there undoubtedly will be auto storage batteries in the area. Reliance on such primary

power sources requires the ready availability of suitable vibrator or dynamotor units. It is obvious that c.w. circuits should always be provided whenever and wherever possible, as either the primary or a secondary channel into the affected area. No single emergency situation has been observed recently in which the amateur effort could not have been aided materially by the use of *both* 'phone and c.w. In several recent situations involving 'phone emergency networks, a request for supplemental c.w. circuits, or an inquiry regarding the possibility of setting up such circuits, has been included in the operations shortly after the net had been organized.

NCS Qualifications

Efficient management of a net of any sort, and especially one working under emergency conditions, requires firm discipline by a suitable net control station. The NCS should be capable of hearing and being copied by a majority of the participating stations. This individual (or group) should be thoroughly familiar with control procedures, and cognizant of the propagation conditions that currently exist on the band in use. He should be able to think logically and quickly. Real competence as a control station can best be attained by practical experience. Book learning alone can't replace the knowledge gained from hours spent listening to net operations, analysis of the various situations which arise, and thinking out a better way of handling them if you had been NCS. A frequent turn as NCS is an invaluable aid to put your ideas into action and test your reactions.

Net Discipline the Responsibility of the NCS

The supreme authority for priority and traffic routing is the net control station. In an emergency the first station becoming aware of the situation should assume control and retain it until some station better qualified (by virtue of experience, location, or ability to contact a greater number of participating stations) becomes available. When a previously organized and trained net is involved in the incident, this is fairly simple to accomplish. Generally speaking, the most effective emergency networks are organized before an emergency. In many cases, however, the net organization is evolved *after* the situation arises. When this occurs, the station first assuming control must exercise a high degree of common sense in analyzing facilities which become available, and should act quickly and without rancor in turning over control to a better qualified station

* Route Manager, ARRL; 3711 McKinley St. N.W., Washington 15, D. C.

¹ ARRL manual, *Emergency Communications*.

that reports into the net. On the other hand, until such a transfer is made, no other station has any right to attempt to usurp the control function.

In prolonged operations involving the services of a succession of net control stations, a complete list of stations active in the circuit at the time, the areas they serve, and the outstanding traffic, if any, should be given to his successor by a control station who may be leaving the net.

Experience with established traffic nets has conclusively demonstrated the increased efficiency which results from the use of at least two or three adjacent channels. One frequency, preferably the center frequency, should be used for monitoring by all stations, and transmission by the net control. The additional channels are used as message-clearing frequencies. On c.w. nets, a separation of 5 kc. is sufficient; on 'phone, a wider dispersion may be desirable.

When FCC declares a general state of emergency, a 10- or 15-kc. band segment may be designated exclusively for emergency communications (Section 12.156, FCC Rules and Regulations). With this in mind, it's logical to start net organization (under these conditions) on two channels about 8 kc. or so apart, and modify the arrangement as the situation develops. During such an emergency period, "guard" stations should be assigned the specific job of transmitting the FCC order and warding off interference.

Provisions of the Law Must Be Observed

A possible law violation (Section 605 of the Communications Act) may inadvertently occur when press representatives are permitted to be present in the amateur "shack" during emergency operations, especially when the operation is being handled by 'phone. They should be reminded that the Act states that the content of the communications may not be divulged to or used by any person or persons except the addressee or his agent. "Pirating" of traffic is an obvious violation of the Act. When situations arise in which a station may be in a position to deliver or expedite certain traffic that has been copied during monitoring, permission must be obtained from the transmitting station to accept the message. Only when this station releases its own commitment does the monitoring or requesting station become authorized to handle the traffic. Under no circumstances is a listener permitted by law to put pirated traffic on another net; this might easily result in duplicate delivery of two widely differing versions of one message, in addition to being a distinct violation of the secrecy provisions of the Act.

Accuracy Is More Important Than Speed

Accuracy first should be the motto governing all traffic operations. It is especially applicable to an emergency situation when lives and property safety often depend on the messages being

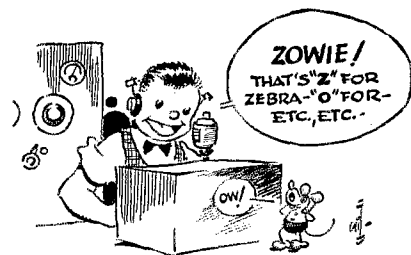
handled over the amateur network. Accuracy is more readily achieved when uniform message procedures are employed. Uniformity of the message form is very important. In emergency situations, it is always desirable to include the filing time which is frequently omitted from the message preambles routinely handled on normal amateur circuits. The use of standardized texts such as the appropriate ARL-Numbered Text² and the "book message" method and, whenever possible, a combination of both, can result in the movement of a surprisingly high volume of traffic when applied with common sense. The receiving stations should withhold a "Roger" (voice) or "QSL" (code) for any message until it is certain that the entire message has been completely and accurately transcribed.



More effective voice intelligibility is obtained by the use of words instead of c.w. abbreviations. (In military practice, accepted 'phone procedure prohibits the use of coded c.w. prosigns and requires the use of the worded meaning.) For example, the use of QRX³ instead of "wait" may be misconstrued as QRS unless phonetics are used to clarify the letters QRS. You'll wind up by saying the one word "wait" anyway, so use it in the first place and you'll avoid confusion and time loss.

Many 'phone operators speak too rapidly for the average operator to copy. The time spent in securing "fills" or confirmations often takes longer than would have been required to clear the entire message if it were transmitted at a proper rate. It is very helpful to speak in phrases, allowing time between phrases for the receiving operator to copy legibly. As a rough gauge, transmit the

(Continued on page 150)



USE PHONETICS FOR TRULY-DOUBTFUL OR DIFFICULT WORDS ONLY AS REQUIRED

² Note last sheet bound into ARRL Logbooks. — Ed.
³ Actually, QRX means: I'll call you again at a specified time. — Ed.

Three Stormy Sisters

Part II† — Hazel

BY GEORGE HART, WINJM

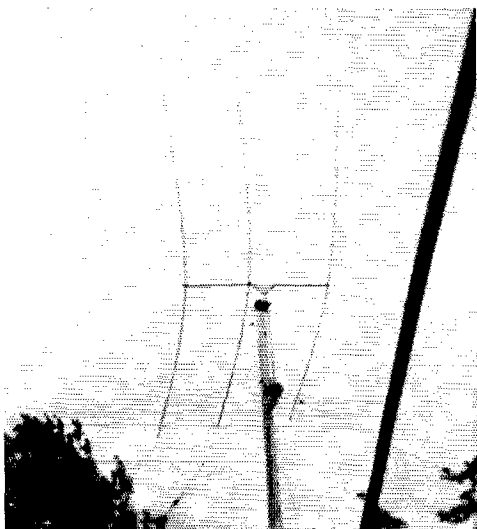
COVERING more land area than either of her older sisters, Hazel probably did by far the greatest amount of damage. We received reports from each section on Hazel's route, plus a good many reports from sections on her fringes. And this gal had *some* fringes. Although she passed through Central Pennsylvania and Western New York, Hazel produced sixty-mile-per-hour gales and torrents of rain in many areas not more seriously afflicted.

On the evening of October 14th, Hazel approached the Carolina coasts. The South Carolina Emergency Net was already in operation under PAM W4FFH, assisted by W4HDR and W4HMG. At 0130 Georgetown EC W4ZGP assembled his AREC members W4s FTN GIF KTI COA and DYP to place W4ZGP/4, the club emergency station, on the air. This station was manned throughout the night.

At 0300 W9MQV/4 reported into the net from Myrtle Beach, and also remained on through the night. W4LLH helped maintain contact with the coastal stations through the night. Communication and power lines began to fail by 0800 Friday morning and weather reports from W9MQV/4 and W4ZGP/4 enabled the Weather Bureau to determine that the hurricane went inshore at Murrells Inlet, S. C., at 1000 Friday.

Continuous contact was maintained with the Georgetown and Myrtle Beach stations with on-

† Part I of this article appeared in January, 1955, *QST*.



W4KFC's beam elements don't always have this graceful curve. This is a shot taken during the height of the storm in Annandale, Va.

• We asked for them, and we got them — more reports on activities during Hazel than we could possibly use. In this second installment of the hurricane story, we have tried to stick to facts and credits in condensing volumes of report material into a few *QST* pages.

the-spot reports being sent showing the extent of the damage as it happened. Intercepts of ham operations as provided by W4FFH were being broadcast over radio and TV stations in Charleston. W4ULH/mobile was sent from Florence, while mobiles W4UOQ and W4QRH were sent from Charleston. These emergency stations were confronted with a most serious situation. All communications and power lines were out. There was urgent need for troops, blankets, emergency rations and medical supplies. Through W4ULH/m and W4HDR in Columbia, Myrtle Beach authorities were advised where rations and blankets were available, and that National Guard troops were being ordered into the area. Shortly W4UOQ/m with W4ZRH riding with him reinforced W4ULH/m. Police officials and reporters rode with W4ULH/m to tie in with police radio and the outside to conduct emergency operations. Georgetown power failed about 1000 and control was shifted to W4ZGP/4 from his car, using a long wire to replace his mobile antenna at 1400. Then mobile W4s ZGP COA and KTI cruised Pawleys Island and near-by beaches. The amateur mobiles coordinated with other units to provide communications with damaged areas.

On Friday W9MQV/4 was back on the air by 1730. Weather reports by ham radio assisted the Weather Bureau to give an early all clear.

In Florence, EC W4AUL had mobilized his AREC group W4s DXW TSU VAM VOH ULH and LLH long before the storm struck. W4LLH maintained contact with W9MQV/4 all night Thursday. W4ULH/m was dispatched to the coast Friday morning. W4s AUL DXW TJA and TSU helped dispatch ACL trains. On Saturday morning the AREC membership cards permitted amateur mobiles to cruise into restricted areas to continue their work. Only those messages of highest urgency were accepted for delivery. On Saturday evening, W4s ZGP DYP and FTN set up a transmitter unit at Myrtle Beach and operated all night.

Operations were carried on for days after the storm with W4FFH conducting the net almost continuously, assisted by W4s HDR ZIZ and HMG. W4BNN provided contacts with Dillon

When Hazel decided to take a jaunt overland, Myrtle Beach, S. C., was the first to feel her fury, and Al Powell, K4AQQ, was there waiting for her. From this compact station layout, K4AQQ (who was signing W9MQV/4 at the time) provided sole contact with Myrtle Beach for many hours.



and W4MPR with Marion county. The following stations deserve special recognition: W4s ZGP FTN GIF KTI COA DYP UOQ ZRH ULH FFH HDR LLH AUL DXW TSU VOH VAM ZIZ HMG STN TWW IZD K4ADP USN W4MPR BNN TWW TJA and W9MQV/4. PAM W4FFH logged 168 stations reporting to assist.

EC W4SOD reports that Lumberton lost power at 1051 Friday, October 15th, and he, from his mobile rig, became the only contact from the area.

In Raleigh, W4HUW operated entirely on emergency power from 1330 October 15th until 2000 October 16th, mostly in the Tar Heel Emergency Net. Among those reported as participating, W4HUW lists W4s ACA APP AHY AWM AUL AWC AJT ANU ATC AEF BMD BUA BFB BTZ BDH BIP CCG CPL CVQ DIU DJC DCI DRC DVR DXJ EFX EPI ED EC EYZ FRH GNF GJS GOB HZX HPS HAY HCB HSO HUW IBT INL ISH JZQ KYI LWU LPN LR LGT LVZ MVP MPR MBR MDR NC NHV NTQ NYN NRN NY PZE QI RXH RCZ RRV RJ RRH RAZ RNA SCS SGD SVD VZW VWM VUA WSS WUW WDN WTF YPZ YPI ZMG ZQB ZQA ZEA ZAV, K4s NAW NRI WAR FDY WBK, W3STU/4, K2BSC, and W0WDJ. The net handled about 2000 messages from October 14th to 20th.

The Virginia 'Phone Net and the Old Dominion Net combined forces on 3835 as the Virginia Emergency Net starting on October 14th and operating continuously until the evening of October 16th. FCC declared 3830 to 3840 kc. a clear frequency within 1000 miles of the coast. Doing yeoman service as NCS were the following: W4s PCC (operated by W4s BTL GPS LNX JXE KQC SBZ UGO ZZV and W8NYH) TFX HQN SIE TVO ONV VYG NV SB and BTL. W3BHK served almost continuously as liaison with Washington, assisted by W3OHI. W4VYZ acted as relay to handle traffic between the Pentagon and Fort Monroe, Va. W4KX lists the following known participants: W4s AAD ACA AHY AJA APP AWQ/4 BCW BGZ BIG BLR BMH BSM BUS CKI CLD CSC CYK/4 DWP DXJ EC FPR FV CWY/m GBD HJH JAQ JAU JG KAV KBE KDJ KSE KX LAS LHC MAN MRH MT NBA NPT NY OGX OKM OM/m OXY PHL PJT PMF QCA QEL/4 QIE/m RCZ RDI/m RGN/m RGZ RJW RLA RTV TFZ TJA TJW TLA UBC

ULZ UMC VAH VOD VW VYZ WEL WLQ WUW WYI/m YCC YKB YVG ZBU ZCL ZMG ZNT ZUQ; WN4FTD; K4s ABQ AF AIR MC NRT; W1UKZ/4; W2FYT; W3s BHK BM BRC JE JTU/4 LUV/4 LZY NOL OHI HDV STU/4 TVJ/m TYU UF WBJ WVF/mm WZN YYP; K2FBD; W9GWY/4.

In Hampton, W4AJA was on the air from 0800 on Saturday until the same time Sunday morning, when c.d. control W4RGN took over. W4VYZ handled a crucial message to Fort Monroe via W9GWY/m near Washington. The following stations in Hampton participated: W4s AJA RGN MAN/m VYZ/m RTZ QCA/m ZXL GZD/m JCM. W4RGN and W4QCA operated on emergency power.

In Norfolk, EC W4PAK alerted the AREC gang at 1900 on October 14th, and 29 mobiles and two net control stations turned out. Participation was on both the VFN frequency of 3835 and the local 29.6 Mc. frequency. By 1500 on Friday the winds had reached 100 m.p.h. and things started to happen. Communications were handled for the power company, the Weather Bureau, Civil Defense, and local Red Cross and emergency traffic was being handled as fast as the net could take care of it. All transmitting was done with auxiliary power equipment. When the 75-meter antenna blew down at the control station, W4PWX and W4LCW maintained communication for Norfolk.

EC W3WN of Frederick, Md., reports a close tie-in with Frederick police, working with them from the time Hazel hit Frederick (1745, Oct. 15th) until about 2100. Mobiles were dispatched with policemen to points of hazard. The Frederick net mobilized without being alerted.

In the Washington area, W3KZQ, W3NL, and W3ECP were early on the job getting the Washington Mobile Radio Club organized at the request of the D.C. Chapter, American Red Cross. W3WLA took over net control on 29,520 kc. at 1615 on October 15th and checked in mobile stations to take part (almost 100 per cent). W3KZQ conducted the 1800 roll call on emergency power. W3ECP maintained close contact with the Red Cross during the blow. Stations listed as active: W3s AQZ DAH DZZ ECP EOY EQH FVD FZ IEF IZL KZQ MAX MBZ MSU MYA NDL NL NUT ODK OLK OPO QBC



Hazleton, Pa., was one of the cities hard hit by Hazel. EC W3DUI activated his small group and operated on emergency power. That's him at the telephone, while W3OHK uses the mike.



RCZ RXJ SFY THP WAM WLA WOX WXA
WYP YAE ZER, W4s: BF BFN DWD EFJ
EHO GEB JCI JKK JSG KCX KMG LL OP
TNQ TTA UEQ VYP YWF ZZ.

The AREC of Washington County, Md., was alerted by both Civil Defense and Red Cross and by 1415 October 14th seven AREC members had three fixed stations and five mobile units ready for action. By 1800, fourteen AREC members were monitoring 3827 as well as assisting the MEPN and the VFN with emergency traffic, with five mobiles and one portable power unit on a stand-by basis. The alert was secured at 2030. Stations on deck: W3s CIQ CKJ CSX EHA NZT OAY OXL OYX RAH SCC TJV VAM WWM YRK.

The Maryland Emergency Phone Net was active on 3920 kc. At 1155 on the 15th, the emergency plan was put into effect. At 1650, FCC declared 3815-3825 kc. an emergency channel. The frequency clearance was withdrawn at 2200, but many members continued operating throughout the night. The following day operation continued, most traffic being relay of information north and south concerning the extent of the damage. As conditions deteriorated Saturday night, FCC gave voluntary clearance on 3820 at 1800. The net was official signed off at 2000. W3FWR submits this list, with apologies to anyone left out: W3s AKX AVL ADQ AED BM BSV BRU BHK DKT EHA EPC EQK FRV FWR FII GA GD HWR HXN HWZ HL IJF JZY JE JQN JH KMT KVM KAN KZH KAV LZY LUV MCD MAX NJT NST NNX NNS OHI OIK OKZ PMQ PRL PQT PYP PV PGB QDI QAN QQH RU RMD SSC SZW SOG SPT TJV TDV TUX TAT UNV UAC UQS UAB UWV UF VAM VPN VZZ VCN VVV WKB WTF WBY WV WBP WEH WEM WZN YWK YYF ZME ZA ZZK, K3s FBD WBJ NAR WAS, W2FUW, W4s BUS HZ NFD.

Mobiles in Anne Arundel County under EC W3SLG got together as prearranged at 1700 on the 15th and manned the control center, using emergency power since regular power was off. Net Control W3VPR (manned by W3JKU and W3SLG) contacted State Control W3WBP on 29.64 Mc. W3TRG/m was assigned to handle Red Cross communication. W2UQS/m was stationed at Edgewater police station. Telephones

failed at the control station at 2000, and all communications were handled on 6 and 10 meters. Clearance from emergency was obtained at 2200. Damage was slight. Other mobiles in the act: W3s NLX LHK VU NAE OEJ TRG UKO UQS.

In Allegany County, amateurs under EC W3PMQ installed six-meter equipment at the police station and the club room of the Mountain Radio Club at the American Legion building. The call W3YMW was used. The following amateurs participated: W3s ECU MGO KMT UAB UAC, W3s YII YIJ and W8GHS.

The Radio Officer of Maryland's Fifteenth C.D. District, W3QLG, was called upon to provide communications and enlisted the aid of W3s FMG WCW KLA and WN3YLQ, all with mobiles on two or ten meters. The mobiles went into action at 1730 October 15th. Evacuation was their main task, the mobile units being placed at the disposal of the c.d. officer in charge. All communications and power were out in the area until the following day. Mobile units were released at 0400 October 16th.

W3AVL reports for Southern Maryland that considerable damage was wreaked by high winds in that area, after weather reports had indicated that the hurricane would pass to the west. Electric-power failures occurred at intervals from 1100 until 1700 on the fifteenth, at which time power in the entire area was shut off, and telephone service also was out. W3AVL operated with emergency power. On Saturday W3AVL/m traveled to St. George's Island where information on the amount of damage to houses and other property was reported via W3PPY.

In Cecil County, W3VZZ started organizing the local net at 1430 on the 15th. At 1600 his power went off, so his station was set up at the fire house, with the help of WN3ZVX and W3TXR. The station was put on the air, immediately reported into the net and started handling traffic. The county c.d. director was much impressed with this operation.

As a result of this operation of Maryland amateurs during Hazel, a letter was received by State Radio Officer W3JE from Maryland Governor McKeldin saying, in part: "It is gratifying to me to know that our State has such a magnificent communications network which can be utilized in the event of any large-scale disaster. I compliment you and your associates for your outstanding organizational activities and hope that my congratulations for a job well done can be extended to your membership."

On Friday night October 15th from 1800 to 2000 Hurricane Hazel unleashed its fury on Delaware. W3SQV, chairman of the local "Blue Hen

Mobile Group," at about 1700 called the Net on 29,520 kc. and offered service to the Wilmington Red Cross and the Delaware State Police. Those standing by were W3s FFF NNK PCZ QWR QZI SQV TDU TKM UO and W4ANL/3. The group was released by the Red Cross and the State Police at 2130.

W3BHK did a great deal of relay and contact work for Washington Red Cross during the hurricanes. During Hazel alone he indicates 60 sent, 40 received, 33 relays and 22 patches. He operated 48½ hours, 5½ of them on emergency power.

In Montgomery County, Pa., EC W3CNO reports communication established with state-level key station W3OJE at 1920 on the 15th, and set up monitoring watches on 28,888 and 29,493 kc. between the hours of 1800 and 2100 EST. The following stations called in: W3s TER/m TWQ VST. W3s HYU and IGW were listening. All stations had mobiles available in case of need. The net was secured at 2100 EST.

York County (Pa.) got the brunt of the storm, and by 1500 on the 15th power was off in large sections of the county. W3GES took over as Acting EC and took part in the Pennsylvania Fone Net, acting as NCS for a part of the time. Earlier, W3GES had alerted three other local amateurs with mobiles and had offered services to the local Civil Defense and Red Cross. W3GES was assisted by W3VNJ and W3WWF.

Hazel roared toward the Philadelphia area in the late afternoon of the fifteenth. The city's c.d. volunteers were alerted and manned the c.d. centers, starting at 1800. Members of the Phil-Mont Mobile Club checked in from their radio-equipped cars and stood by for assignments. The Fox Chase Control center lost power after 1900, but a generator on a c.d. rescue truck was utilized to supply power. The centers were allowed to "secure" at 2145. A partial list of participants as submitted by EC W3DYL: W3s SQW VKO ULR SAM YUH WMY SLP DYL NJS FPC YAX VSC OWK UQV RKP VCE VCY DFJ JWC UOE PST.

Luzerne County had some activity, reported by EC W3DUL. He got together with W3OHX, who had emergency power available, and about 1900 when power went off operation commenced from that station. The police and c.d. were served by amateur communications. W3THB and W3PVY were also on hand and two mobiles were ready.

The Pennsylvania Fone Net, under W3PYF, did an excellent statewide job during Hazel. W3PYF asked W3GES to start organizing the

net at 1525 on the 15th, while he set up his emergency power and took over the net at 1600, by which time 26 Pennsylvania stations had already called in. QRM gathered, too, and with the assistance of W2JWN, W3UKF and W3BHK FCC was asked to declare a clear channel which they did (3850 plus and minus 5 kc.) at 1915. By 2000, 21 stations had called in.

There was also activity in the local Northampton County (Pa.) Net on 29,640 kc. The Bethlehem C.D.-Red Cross stations were activated with W3QBF at Red Cross and W3NNT and W3PQX at C.D. headquarters, both on emergency power. Contact was maintained with mobiles in the stricken area at all times (W3s NF OK QMH ELH and W1UVE).

The New York State Phone Traffic and Emergency Net was in operation starting at 1700 October 15th with K2BYO as NCS. W2s ZRV UNF JNM ILI and YXE consecutively took over NCS duties, and at 2300 Oct. 15th when skip lengthened, W8PXF assumed net control, and later W9VRK. The net was closed at 0115. About 52 stations participated.

In Broome County (N. Y.) the two meter net was in operation with W2s SWF/2 OW PST/m JOJ FCG QXX HJS UJS HZP/m DOM SDA and K2CWD. The Binghamton area was badly hit, and W2SFW/2 was set up at the Binghamton Sun offices to receive reports of damage.

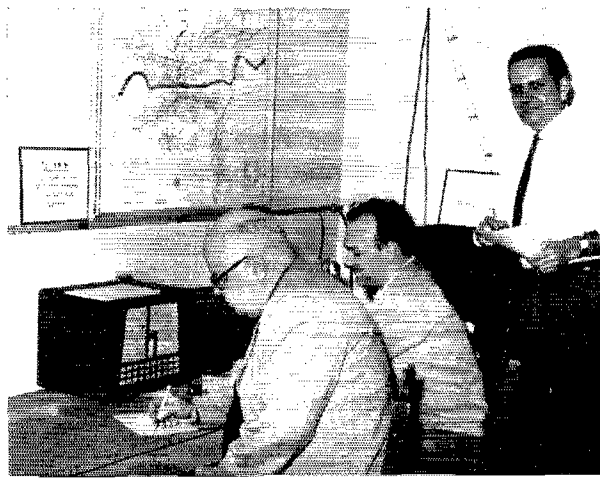
At about 2000 on October 15th, electric power and half of the telephones went out in Oswego County. EC W2ZHU/m, W2UMI and W2FFU went into action on 2 meters. W2UMI reported two fires burning in Mexico, N. Y. The AREC stood by to assist in fire communications until the fires were brought under control at 2300.

Four Oneida County stations reported in on 3925 kc. about 1730 October 15th and remained until 0100 Oct. 16th. Two meters was monitored from 1800 the 15th until 1200 the 16th.

In Seneca County, local AREC mobile stations were alerted at 2045. At 2130 Hazel struck the area, commercial power went out and many trees went down. From 2135 to 0030 the mobiles assisted in providing emergency communication for the police, who had no emergency power. At 2230 until 0030 mobiles also provided additional communications for the Sheriff's Department. Participants were W2s YPP HXK and K2s BFF HMY and DYA.

The Finger Lakes 2 Meter Net was in operation

The Northampton County (Pa.) AREC gang activated the station at c.d. headquarters in Bethlehem during Hurricane Hazel. The station operates under the call W3PQX/3 in the Delaware Lehigh Amateur Radio Net. Left to right are W3OK, W3PQX and W3NNT. (Photo by W3PYF)



from 2000 to 2300 Oct. 15th. Stations in this Net included amateurs in Monroe, Ontario, Wayne, Cayuga and Genessee Counties. Participants were: W2s BCL BLP CTA ECM OWF QY TKY UXP VBH ZHB ZS UTH, K2s BWK CEH DBB, KN2INO.

In the Syracuse area, W2BTB was kept busy with weather and radar reports to the local Red Cross Chapter Disaster Chairman, and handling a number of welfare requests for Red Cross' Home Service Department. At Red Cross headquarters, W2CRD was activated and performed valuable service all during the hurricane.

Hazel poured between five and eight inches of rainfall into the Toronto area within the space of a few hours, precipitating unprecedented floods. More than fifty bridges and culverts were washed out, and hundreds of homes near the river were washed away or damaged. The AREC plan of listening on the emergency frequencies of 3765 kc. and 51 Mc. was followed.

Of the v.h.f. group, VE31Z was the first to become active, out in his mobile at 0730 on October 16th. VE3AIB joined him at 0900, and shortly thereafter VE3BQK/m and VE3BYY came on. These four set up a v.h.f. net on 51



This innocent-looking contraption is an emergency generator. Simple enough, but it spelled the difference between being on the air and not being on the air during Hazel in a great many places. Does your AREC group have one, ready to go at a moment's notice if needed? Hazleton has, and this is it, plugging away during Hurricane Hazel.

Mc. and advised the 75 meter net control, VE3NO, of their availability. VE3IZ/m and VE3BQK/m were dispatched to Woodbridge while VE3BYY/m and VE3AIB/m went to the Weston area, both hard hit. VE3DER operated fixed to keep them in contact with telephones. The next day mobiles were dispatched to Weston to assist in the search for bodies. The 51 Mc. control station (VE3AZY/3) was moved from CD headquarters and set up in the Weston police station, with VE3DQW assisting. From approximately 1300 until 1730, communication between

various search parties and headquarters was maintained via VE3s ARV/m IZ/m and AIB/m.

This grim task was not the end of it for the Toronto gang. Communications were out in the area for several days after the hurricane, particularly in the Westmount area, and the AREC was instrumental in providing communications for emergency purposes. As late as October 24th, the Toronto v.h.f. group was working with officials in Westmount, Etobicoke, Woodbridge and Pine Grove, as well as Toronto. Mention should be made of the supplementary work of the following: VE3s AIB ATB ARV/m AZY BJB BYY BYZ.DER DQW DHG IZ and UT.

Low frequency groups were also active in the Toronto area. VE3EAM alerted VE3s BBM and EAU, then took off for Woodbridge. Arriving at 1200, Bert set up his equipment in the municipal office, and the first message he handled was from the mayor requesting troops, food, medical supplies, etc. From then on he handled a constant stream of urgent traffic to VE3BBM who relayed to VE3BJV for delivery by Toronto telephone.

Nets were also set up and operative on the ten and 75 meter bands, under VE3NG and VE3RG respectively. VE3NO did an admirable job as net control on the 75 meter net, and VE3NG turned in an outstanding performance on 10.

The Hamilton AREC group was called in on Sunday the 17th to help in the Woodbridge area. Six cars and a portable unit were immediately dispatched. They set up immediately on arrival and helped with communications for the Red Cross and Fire Department. Later, they opened a ten meter net to Toronto. In action: VE3s KM DGJ DRM AXV DRI AGJ BOW CJM EAB DHQ CJ CC AYW and BV.

All in all, a stellar job done by Ontario amateurs, especially the gang in and around Toronto. Here's a list of participants not already mentioned above: VE3s AZX ATR AWY APN AET AJA AID AIA APF AXW AMB AEU AYO AMT ANL AOE AGW AIS ANY BWA BQT BBM BJI BUT BRI BCT BBX BCR BKV BAX BLQ BIV BTY BXK BXW BJV BWE CD CP CJ DDT DHL DTO DFN DZA DUG DSG DNE DLS DEW DQX DFP DPD DEG DFA DFK DCF DNK DNA DIQ DAT DAK DOW EAO KW GK RU RH IL HZ TA NS GJ VG RW NI HO GG LN OR SI HS VZ YD VT WY VE2UQ. Our thanks to VE3KM, VE3AIB and VE3IL for their comprehensive reports.

The swirls of Hazel's skirts produced havoc elsewhere than along the path of her baleful eye. W2RTE reports activity in Eastern New York section comparable to that in Carol and Edna, nets operating on 75, 10 and 2 meters. W2RTE himself had to set up emergency power to stay with the net on Saturday. Even over in eastern Mass. the effects of the hurricane were severe enough that six members of the Falmouth Amateur Radio Association formed a net to maintain contact with Civil Defense, the Coast Guard and the National Traffic System. The amateurs who turned out were W1s QLT LYV DVS UXG and TJW with the club station W1WNM as NCS.

The six-meter gang was very active in the Toronto area during the hurricane. This is VE3AIB, one of the Toronto ECs, operating equipment belonging to VE3IZ in Weston, Ont. This set-up, from a church location, provided emergency communications for over two days from Weston.



W2ZAI reports activity in both Queens and Nassau Counties, N. Y. In Queens, the ten-meter net was in operation from 2030 on the 15th until 1300 on the 16th, with 25 stations reporting in. Six members stayed at the Queens County Control all night: W2s AFA AKR ANK CVU CJP and ZTX. Early Saturday morning mobiles W2ZTX and W2ANK were dispatched to Rockaway Beach, along with W2CJP. Traffic handled was in regard to flood damage and evacuation. The Nassau County AREC was alerted at 1630 on October 15th by EC W2FI. He set up W2FI/2 at the Red Cross, and three other stations, W2KEB, W2KPV and K2DHC (operated by W2JKX), were activated. Mobiles used both 2 and 10 meters. Forty-four stations reported into the net, three from Suffolk County.

Although considerably west of Hazel's path, flooding occurred in the Ohio River Valley. Amateur radio was called into action at Steubenville by the Red Cross, and three stations were set up. Operators taking part included W3s DNQ ERR JNL SFI EZC ZEI VGK EZH and CHF.

In the Camden, N. J., area, two and six meter nets were activated by the South Jersey Radio Association at 1800 on the 15th. W2YRW was NCS of the 2-meter net from his car at first. Later, W2PAU took control using emergency power. W2TBD assisted the local police in Medford and Medford Lakes. W2LY reported from mobile that cross-country high lines were falling near Route 38, hampering vehicular traffic. Others reporting in on the two-meter net were W2s EGP JRO PEN NFL VX ASG OQN PTM PZX, K2AFJ and KN2s GYH GYN and JEI. K2AJD was NCS of the ten-meter net, assisted by W2QBH and K2BWG. The roll call produced W2s ABQ YPQ CIJ FTO CKX TXP, K2s DWY BZK, W3s AOE/2 OEN and HEK. Many of these were mobiles. Contact was maintained with the Burlington County (N. J.) net on 29,560 kc. Operation of both nets continued from 1800 to 2200. W2YRW reports that 32 operators turned in 128 man hours of work in his area.

The Burlington County (N. J.) Radio Club also reports considerable activity during Hazel. With four mobiles and two fixed stations, the entire group of six stations was in operation during the storm: W2s EVR GOK JJV WKI WUP and ZNB.

The RACES net of Conn. Area 4 was active during Hurricanes Carol, Edna, and Hazel. The

net control station, W1TLJ, is located in the State Police barracks in Colchester, which is equipped with auxiliary power. The following radio officers were active: W1s IWY YFG UQV/1 ZYJ/1 NPB EBO KZQ NPE/1 MHF and LF. W1PHP is radio officer for Area 4.

The transcontinental Relay Net again was on alert following the path of Hazel and sending out bulletins concerning her progress, speed and direction. The frequency of 7042 was kept clear for the bulletins and reporting stations. Net stations, especially those in Hazel's path, kept close touch with their local weather bureaus both to receive and give information. The net likewise did a most commendable job of handling a great deal of long haul emergency traffic, much of it of an official nature. Many of the stations were operating on emergency power. Net manager W3CVE submits the following list of participating stations: W1s QA YEJ, W2s BO CGG EQG IFF QDM, K2BJS, W3s BFF CUL CVE DVO IA RQK/4 UUA WWQ WOR WZL, W4s AMZ ARV ATS ATC DNB DNR ENI EJQ HIH MCY MPF ONK SVG TJI UWE VPD VHH WQT, K4WBK, W6s BOM/2 EUM ULS, W7CCL, W8s AUJ CJK DNC FUM FFW IZQ ZWE, W9s JUJ NZZ RHA UIN VBZ WRO, W0s AJD CIO GBJ KA, VE3s BXF BUR DUY, KL7ATO/W9.

Epilogue

Many of those who reported also reported the many lessons they learned in operating under emergency conditions as hurricane followed hurricane into some of the most populated and industrialized parts of our country. These three diabolical visitations, similar to but more extensive than the series of tornadoes we experienced in 1952, have a parallel in atomic warfare. What we amateurs did in the hurricane emergencies we must be prepared to do in the event of nuclear attack, multiplied manifold. If the visits of Carol, Edna and Hazel can be considered in any way to be good, then it was because of the "shot in the arm" they gave to emergency preparedness everywhere they visited, and to the increased awareness on the part of public officials, Civil Defense and otherwise, of the values and potentialities of the radio amateur.



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
R. L. WHITE, WIWPO, Asst. Comm. Mgr., C.W.
PHIL SIMMONS, WIZDP, Communications Asst.

GEORGE HART, WINJM, Natl. Emerg. Coördinator
ELLEN WHITE, WIYYM, Asst. Comm. Mgr., Phone
LILLIAN M. SALTER, W1ZJE, Administrative Aide

More on FCC Suspensions. Two amateur operator license suspensions were reported in these columns last month in *QST*. Looking at eleven other 1954 amateur operator suspensions, there were some five kinds of violations that drew this type penalty. In each case the suspension required that the license be turned in to FCC and the station not be operated by *any* person for the specified period.

1) Two instances, violations of Sec. 12.157 by using "obscene, indecent or profane language" on the air, received penalties of 90 days (W4ESP), also four years' suspension (remainder of license term) was invoked in the case of another amateur licensee, now deceased, for wilfulness in committing this violation.

2) One Technician Licensee, W1UZZ, drew a 90-day suspension for operating on the 144-Mc. band contrary to his license privileges.

3) Three Novice (WN8QIY, WN9ZEV, KN6BOS) and two Technician licensees (K6AXX, W6CKW) received suspensions of 30, 90 days and for-remainder-of-license term for violations of one, or combinations of more-than-one, of the following: use of A-3 in 3.8-4 Mc., or in 7 Mc. (12.23 d-e); using call not assigned (12.158); use of unmodulated carrier for protracted periods (12.134); and for failing to keep a proper log (12.136 b and f).

4) A suspension of 30 days was made in the case of W1ZE for permitting operation by an unlicensed person, which is a violation of Sec. 12.23, and Sec. 318 of the Act, also for failure to keep an accurate log (Sec. 12.136) and failing ability to produce logs in the 1-year period prior to May 10, for FCC inspection, a violation of Sec. 12.137.

5) W6SAC's 30-day suspension was for use of power in excess of 1 kw. (12.131).

6) A suspension for remainder of license term was ordered in the case of WN9YDZ for using a frequency and call not authorized a Novice.

On Improving Message Handling. Besides the questions from amateurs newly interested in this field these days, some traffic netters are urging steps for progressively improved results . . . such as an increased use of the *service message*. *Operating an Amateur Radio Station*, page 12, gives the low-down on such between-station traffic, customarily started to get missing information, or report inability to deliver, or other aspects of the operating service. Each year for three years there has been a substantial increase of interest in traffic handling. With the trend continuing this year, we hope the "service message" will account for a proper proportion of the increase, for the great good this can do. Missing parts really should be queried at source (by originators), of course, so incomplete traffic never gets started! However, we suggest making it common practice to use the service message to get the missing parts when they are not put in by the originator. Undeliverable messages should be reported by message to originating stations in all cases. But let's stop at source, by reasonable interrogation, crippled traffic that has vital sec-

tions missing from the preamble or an insufficient address. Any service message sent not only counts in one's total but is a direct contribution to our amateur ability to handle record traffic in a praiseworthy manner.

Edison Award Winner Acclaimed. Ben Hamilton, W6VFT, ARRL SEC, of La Mesa, Calif., was honored February 10th at a Washington, D. C., public dinner presentation of the 1954 Edison Radio Amateur Award. This was in view of his outstanding civil defense communications, organizational and educational work in San Diego County, Calif. There were special citations for the notable services of Carl Theis, W8BKH, in constructing equipment for missionaries resulting in saving lives, and for the excellent amateur radio communications established and maintained by Carter Rogers, W8NCS, in the West Virginia flash flood. Besides proclaiming Mr. Hamilton award winner, the judges also adopted a resolution commending the meritorious services of more than 800 amateurs helping with emergency communications in the triple hurricane emergency. Besides the special honor to Mr. Hamilton, we regard this acclamation as a great honor and recognition of importance of civil defense amateur radio organizational work.

Observations of a Novice working in the Round-up are the subject of a letter from KN2IIW. He writes, "We can't all be perfect but calling attention to some of our operating errors in *QST* should help in improvement. I found myself going *over my speed* and having to correct errors, also extending my calls too long and repeating too much of my text. Then there is the man who has never heard a W1AW tape or so it seems . . . when he calls CQ you can only guess what it means. Another has a note like water bubbling in a pipe so it's a wonder he gets any answers outside of FCC citations. My pet peeve is a WN using a bug with jerky spacing; the dits get away from him. . . ." All amateurs will agree that a bug has no place on the air until it has been mastered in practice off the air! Sending in step with our W1AW tapes and with hand key is still a fine way to cultivate sending accuracy and judgment in "spacing." All amateurs will do well to monitor their transmitters. Use the receiver with antenna off, if no monitor is available, to check that note. It is our guess that all operators in taking part in the January Novice Round-up got useful practice in self-correction of common difficulties like poor choice of speed and calling times. Only by *practice* does one develop into a good operator who can get

most enjoyment and the best results with his gear. A specific objective such as the N-R calls for powers of coordination beyond casual work, and builds operating know-how.

DX Test in Progress. There's a second 'phone (Mar. 11th-13th) and a second c.w. week end (Mar. 25th-27th) coming up in March in the current ARRL International DX Competition. If you weren't all set for the February period it's not too late to try your hand at DX in March; and if you got a start in February you can very well extend your score in March or maybe grab off some of the new countries that will be in there! See the announcement in January *QST* if you need details. All scores and reports will be welcomed by ARRL.

Good luck, and in making out your QSLs always be sure they are sufficiently complete in information. The date, the band, the mode, the state (for amateurs working for WAS), the report for 'phone or c.w. and the fraternal spirit they convey are all part of the great tradition guaranteed by your signature, as the man behind the key or mike.

— P. E. H.

BRIEF

Conducting code and/or theory classes? Drop a line to Headquarters for a card to register your class schedule. This information will help many newcomers interested in obtaining their Novice licenses.

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 on March 15th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters on 1885, 3555, 7125, 14,100, 21,010, 52,000 and 145,600 kc. The next qualifying run from *W60WP* only will be transmitted on March 5th at 2100 PST on 3590 and 7138 kc.

Any person may 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.

Code-practice transmissions will be made from W1AW each evening at 2130 EST. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately 10 minutes' practice is given at each speed. References to texts used on several of the transmissions are given below. These make it possible to check your own copy. For practice purposes the order of words in each line of *QST* text sometimes is reversed.

Date Subject of Practice Text from January *QST*

- Mar. 2nd: *More About V.H.F. Auroral Propagation*, p. 11
- Mar. 4th: *A Cubical Quad for 20 Meters*, p. 21
- Mar. 8th: *A Discussion of Receiver Performance*, p. 24
- Mar. 10th: *A Simple Rig for Six-Meter Mobile*, p. 28
- Mar. 14th: *A One-Element Rotary for 21 Mc.*, p. 30
- Mar. 17th: *Grounded-Grid and the 304-TH*, p. 33
- Mar. 21st: *Using the 6524 Dual Tetrode on 432 Mc.*, p. 38
- Mar. 24th: *Three Stormy Sisters*, p. 42
- Mar. 30th: *September V.H.F. Party Results*, p. 57

W1AW OPERATING SCHEDULE

(All times given are Eastern Standard Time)

The W1AW fall-winter operating schedule remains in effect. Master schedules showing complete W1AW operation in EST, CST or PST will be sent to anyone on request.

Operating-Visiting Hours:

Monday through Friday: 1500-0300 (following day),
Saturday: 1900-0230 (Sunday), Sunday: 1500-2230.

Exceptions: W1AW will not observe its regular hours from 0300 April 8th to 1900 April 9th.

General Operation: Refer to page 70, September *QST*, for a chart to determine times during which W1AW engages in general operation on various frequencies, 'phone and c.w. This schedule is still in effect but is not reproduced herewith for space considerations. Note that since the schedule is organized in EST, certain morning operating periods may fall on the evening of the previous day in western time zones. W1AW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies (kc.):

C.w.: 1885, 3555, 7125, 14,100, 21,010, 52,000, 145,600.

Phone: 1885, 3945, 7255, 14,280, 21,350, 52,000, 145,600.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times:

Sunday through Friday: 2000 by c.w., 2100 by 'phone.

Monday through Saturday: 2330 by 'phone, 2400 by c.w.

Code Proficiency Program: Practice transmissions are made on the above listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. Code-practice transmissions will be replaced by Code Proficiency Qualifying Runs on March 15th and April 13th.

MEET THE SCMS

Washington's SCM, Victor S. Gish, W7FIX, first became interested in amateur radio in 1912, at which time he did some spark coil experimental work, but it wasn't until 1935 that he obtained his first license.

The rigs currently in use at W7FIX's basement shack include: (1) 6L6 crystal, 807 buffer, p.p. T-40s final for 80- and 40-meter work; (2) 6AG7 VFO, 6AG7 buffer,



813 final for 80 meters; and (3) 1626 crystal, 1625 final for 160 meters. Receiving equipment consists of a BC-312, an 8X-71, an SX-25, an EC-1, and Command receivers.

SCM Gish is assistant director of the Northwestern Division, as well as Route Manager, Official Relay Station, and Official Observer, and is a member of the North Seattle Amateur Radio Club. In addition he manages to find time to enjoy participation in the CD Parties. His copying speed is 35 w.p.m., for which he has been awarded a Code Proficiency certificate. Rag Chewers Club and A-1 Operator Club certificates also have been issued to him.

At the age of 17 Vic joined the Navy and in 1917-1918 installed the first bridge-controlled radio on the USS *Pennsylvania*. In 1941 he was physically retired, was recalled the next year to be placed in charge of the wire room of the 13th Naval District, and was released in 1945.

Vic's hobbies include printing *PAN News* and reading westerns and historical novels. His pet sports are baseball and football.



Each year at about this time the officers and directors of the League prepare annual reports to the Board of Directors outlining activities and progress during the previous year. This gives the Board members something to think about (as if they didn't have enough worries already!) prior to the annual meeting. Naturally, the officers' reports are longer and more comprehensive, since they have to do with the conduct of League affairs on a nation-wide day-to-day basis.

In the Communications Manager's annual report, there is always a section devoted to the status of the AREC and emergency work in general. That means us. We do not use the pronoun "us" in the editorial sense, referring to the writer. It means you and me, all of us who are responsible for the affairs and activities of the Amateur Radio Emergency Corps throughout the year and throughout the nation. Your NEC is not in any sense the director of amateur emergency affairs; he is the coordinator of those affairs, the point of consolidation at which the things you do are pinpointed and moulded into a presentable nation-wide picture. He is entirely and utterly dependent on you for the size and shape and completeness of that picture. At annual report time, it is his job to paint the picture, your job to supply the paint. Naturally, if you supply only a small amount of paint, the picture is really not a picture at all, but only a sketch.

That's the way it has been in past years. The EC Annual Report form goes out with the SET Bulletin. About ten per cent of the ECs return them. This year, we sent out a reminder card, and it paid off to the extent of bringing in a dozen or so additional reports. A good many ECs replied that they had nothing to report of any consequence. Others had mislaid the report forms. Some reported informally, not even knowing that there was a report form. Most of them never replied to the reminder card just as they had never replied to the initial receipt of the form in the first place; probably an extension of the developing negative reaction to receipt of any printed third-class mail.

We have said before and we'll say again that we would rather have a good, active EC who never reports than an inactive one who reports regularly (usually, that he is inactive). First things come first; if energetic pursuit of your function as EC does not leave the five minutes or so per month for a Form 5 report or the half hour or so per year for an annual report, then let it be so. The report of statistics is not all important, but it is quite important just the same.

Perhaps next year, instead of burying the EC Annual Report form in the SET Bulletin, we'll make it the subject of a special, later mailing. Will that help? It's too late now

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

C. W.	'PHONE
3550 14,050	3875 14,225
7100 21,050	7250 21,400
28,100	29,640

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other calls.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; 'phone — 3765, 14,160, 28,250 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

to send in your Annual Report for 1954, but file away a reminder to yourself to give your SEC and Headquarters the dope on your group regularly during the coming year, and fill out that annual report form you get in the fall.

We account for the two following items not by making any lame excuses — only by saying that they were deleted from our copy for June, 1954, *QST* (which already had two



Not all of our ECs are ugly old men. Meet up with W5CXM, EC for Blaine County, Okla., who not only adds charm to our unglamorous ranks but who also, from all reports, does a whale of a good organizing job in her area. Says SEC W5KY: "I wish I had a baker's dozen of ECs cut to her pattern." Not a bad idea, eh?

full pages of material), put into a "hold" file and have just come to light. Despite their tardiness, we want these items recorded in *QST*. Apologies to W2SJV and W4SPD respectively.

On March 29, 1954, a severe snowstorm hit the Buffalo area, causing traffic jams and people to be late or unable to get home. Mobilers W2LIS1, K2DVD and W2LYE, by contacting other amateurs, were not only able to get word to their own families of their predicament, but performed the same service for a great number of other motorists caught in the same traffic jams. Taking turns as NCS for the improvised net were W2s CMS and GVJ. Stations taking traffic included W2s MYN N2A UXS POM PRI ETX. K2GHF, VE3DDO.

A tornado hit the Macon, Georgia, area on March 13th, 1954, taking off the roof of W4SPD's house and all his transmitting antennas. After settling his family, he went to the home of EC W4LXE and found Stubby already on the air using emergency power, with four mobiles already out searching for stricken areas. The mobiles relayed needs of victims back to W4LXE, from whence they were telephoned to the Red Cross (W4SPD is chairman of the Macon Red Cross Disaster Communications Committee). Mobiles were manned by W4s LQW JMW LXE and ZYA. W4s UJC UMN and SPD manned the kilowatt at W4LXE. W4TAZ operated his fixed station for relay work. Although fortunately all areas were available to mobile units this time, the Macon Amateur Radio Club has begun construction of a number of two-meter hand-carried units. Others active in this emergency were W4s DZL TED YWW and KL7AQJ/4.

While traveling along Skyline Boulevard about forty miles south of San Francisco, and participating in the Skyriders Net, W6WD noticed fresh skid marks on the highway. Slowing down and investigating, he discovered that a car had crashed 25 feet off the highway into a ditch — out of sight of the road — and that two ladies and an elderly gentleman were injured. W6WD broke into the net ahead of turn and apprised them of the situation. K6EER telephoned the San Mateo County sheriff and a radio ambulance and patrol car were dispatched. While the ambulance was en route, W6WD administered first aid to the injured parties. W6ANK was not control, and the entire net remained on the air until everything was well under control. Thanks to K6EER for reporting this incident.

This is precisely the sort of thing we were talking about in August *QST* last year (p. 66). K6EER suggests that amateur mobiles equip themselves with first-aid kits in order to be the more useful in such a contingency.

A tornado struck the town of Wellington, Ala., with practically no warning at about 1330 on Sunday, Dec. 5, 1954,

causing 30 casualties and several hundred thousand dollars worth of damage. Amateurs in Anniston were alerted by W4RCU, who notified W4SUF and W4GCV. Organization began at 1430. SUF/m, in contact with GCV, was unable to reach the stricken area because of poor visibility. W4PJB, with W4VOQ riding with him, was the first to reach Wellington, after having difficulty getting through Highway Patrol roadblocks. Services were offered to the Highway Patrol, Red Cross and Civil Defense. W4s UHA and OAO undertook to establish contacts on 75 meters. The Alabama Emergency Net (AENP) was alerted and put on stand-by. Contact between the two nets, one on 75 and the other on 10, was maintained by landline. W4DZF/m was dispatched to a hilltop to establish contact with both PJB/m in Anniston and with control station W4GCV. From this point he acted as a relay station during the entire emergency, and also succeeded in establishing contact with W4EBD in Birmingham. At 1600 W4s SVM/m and SUF/m joined W4PJB/m in Wellington and operation settled down to routine. All traffic originating in Wellington was relayed by W4DZF/m to W4GCV in Anniston. W4YCO was assisting W4DZF/m. The Red Cross furnished casualty lists which were relayed to Wellington, Birmingham and Gadsden. W4s OZK and PAC/m operated from Padoden. Mobiles remained at the Wellington site until about midnight, at which time they were released. Traffic was handled for the Governor, Red Cross, Anniston Fire Dept., Anniston Police Dept., State Highway Patrol, National Guard, the Birmingham News, the Anniston Star, Civil Air Patrol and Civil Defense.

— W4GCV, EC Anniston-Oxford, Ala.

Ninety-six amateurs participated in an air-raid drill held in Pittsburgh on October 25, 1954. Ninety-three stations were available. The complete Allegheny County emergency radio system was operated in accordance with RACES plans. The network operated on ten meters, and tie-in was effected with state c.d. networks operating on 75 meters. EC W3LMM reports that the distribution of all stations in the individual zones was excellent. In one zone he deliberately refrained from notifying the control station of the yellow alert, just to see what would happen. A mobile unit took over as zone control prior to the red alert, and immediately following the all-clear the regular zone control station was active. W3LMM (who is also radio officer for RACES) feels that the drill was most successful; participation increased 100 per cent over a similar drill held last June.

Tennessee civil defense conducted a statewide alert on November 7th last year, centered around Knoxville, which was "bombed." SEC W4RRV reports that the AREC gang around the state did a good job for amateur radio. Cities represented included Knoxville, Chattanooga, Nashville, Memphis, Cookeville and Oak Ridge. The Tennessee C.W. Net was also active and received high praise from c.d. officials. In fact, one newspaper quoted the Chattanooga Area Deputy Civil Defense Director as saying that the local amateurs "can offer the best communication service in that field of anywhere I have ever seen. I am amazed at their service." Nice going, Tennessee gang.

Twelve SECs reported activities for November, 1954. Total AREC membership represented was 4330. None of the twelve was new to the reported list, so the total remains at 29 sections. We also had twelve reports for November last year. Sections reporting: Los Angeles, Western New York, New York City—Long Island, Eastern Florida, Wisconsin, South Dakota, Montana, Western Florida, San Joaquin Valley, Georgia, Colorado, Alabama.

Last December the Maryland Civil Defense Control Center was honored by an inspection visit from Maryland's Governor McKeldin. The RACES installation came in for its share of interest, as shown in the picture. The operators, left to right, are W3QLF and W3LFW. Standing, left to right, are W3JE (Md. C.D. Radio Officer), Governor McKeldin and Shirley Ewing (Md. C.D. Director).

TRAINING AIDS

If you're a member of an ARRL-affiliated club and have not seen the films available to your group, ask your club secretary to write the Communications Department for a list of current training aids. At present they include 30 films, 13 film strips, two slide collections and ten different quizzes. The demand is high but items available now can furnish your club with many a lively and educational evening.

DX CENTURY CLUB AWARDS

HONOR ROLL

W1PH.....258	W3BES....248	W6SYG....245
W6VFR.....244	Z2PT.....247	W3JTC....244
W6AM.....251	W6SN....246	W3KT....244
W6ENV....251	W3GHD....245	PY2CK....244
W8HGW....251	W6MEK....245	W2BXA....243
W0YXO....250		W5MIS....243

Radiotelephone

PY2CK....237	W1JCC....215	WINWO...212
W1PH....230	W1MOW...215	W9RBI...201
VQ4ERR...225	X1IAC....215	SM5KP...207
Z86BW....221	W3HGW....214	W3JNN...206

From December 15, 1954, to January 15, 1955, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

CT1JS.....159	W4CQE....103	W0RCJ....101
W1DIT....124	W3MVL....102	W2OXE....100
F3CB.....107	KH8ER....102	W2MFM....100
W9VP.....106	W5EDS....101	W6ZEN....100

Radiotelephone

G6BS.....120	W2GLE....114	W5KIJ....101
Z1LKG....120	W4NHF....106	W4FPS....100
	OD5BA....105	

ENDORSEMENTS

W2HUQ....240	W9ABA....180	W6ID....142
W5ARG....240	KZ5WZ....173	W2PXE....140
W8KLA....233	G6BS....170	W0DXE....132
W6VLE....230	TKXK....169	PA6ZL....131
ON4AT....229	W8LDJ....168	W8NLY....130
W6AIW....212	W8DML....160	W1BTE....120
W2HMJ....201	W8LKH....160	W5WI....120
W9HUZ....200	D11QT....153	W3KDF....120
KP4KD....200	W8MDL....150	W97MT....111
W2LDD....180	W5DMR....150	W1JEL....110
	W3MPW....145	

Radiotelephone

W6AIW....175	W9BVX....145	W2IY....130
W3KT....170	CO2BB....140	W2PXE....121
W8KML....161	C8R6X....133	W1PST....120
W2VWN....150	W8BKP....132	W5DMR....111
CO2BL....150		W8VDJ....110

W/VE/VO Call Area and Continental Leaders

W4BPD....241	VE3QD....210	VE8AW....160
W7AMX....238	VE4RO....223	VO6EP....190
W9NDA....240	VE5QZ....140	EX4RE....210
VE1HG....150	VE6DG....108	Z86WV....239
VE2WW....181	VE7HC....209	Z11HY....231

Radiotelephone

W2APU....202	W7FLA....175	VE4RO....120
W4HLA....177	W6AIW....162	VE7ZM....140
W5BGP....205	VE1CR....120	OD5AB....154
W6AM....199	VE2WW....102	Z11HY....190
	VE3KF....163	



TRAFFIC TOPICS

W0KXL brings up the matter of the need for certain ending signals in traffic net operation. On QKS (Kansas Section Net) they follow a procedure by means of which any listening station who just happens to turn on his receiver or get tuned in can tell by the ending signal used by the NCS whether or not the way is open for him to QNI.

Perhaps we traffic men ought to adopt some sort of standard procedure in ending signals, since the signals adopted by ARRL after the war were adopted primarily with the needs of the DX man in mind. We hear KN used quite often in casual contact these days. The ending signal we hear most of the time, however, is AR K, which signifies nothing except that the transmitting station is ending a transmission. According to the ARRL code (Operating Aid No. 2), it would mean the station has just called another station and wishes any station to answer him. Not very logical.

W0KXL points out that ending signals should be used in net operation, otherwise the receiving station has no way of knowing when the transmission is ended. Perhaps he has a point. Most of us have run into this difficulty in our c.w. traffic nets. Here are a few examples of some ending signals that we need:

- 1) Acknowledge instructions.
- 2) Reply desired by stations concerned only.
- 3) Do not reply, or no reply necessary.
- 4) End of QTC list (used by station reporting into net).
- 5) Stations may report into net.

We're collecting suggestions on the above. Anybody have any?

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Miscellaneous Net Reports: (1) The Transcontinental Relay Net had a traffic count of 1622 in 31 sessions, averaging 52 per session; five stations participated. (2) The Transcontinental 'Phone Net reports 14 stations handling 827 messages. (3) North Texas-Oklahoma Net handled 531 messages in 31 sessions, 854 check-ins. (4) The Early Bird Transcontinental 'Phone Net handled 1304 messages in December, making their total 9519 for the year 1954; they count each message only once, no matter how many times relayed.

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United Trunk Lines announces that its directors for 1955 are W3WV, W6DDE and W9TT. Each division averaged close to 1300 messages per month in 1954.

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Those of you who prefer 'phone and don't mind climbing out of the hay at a rather early hour might like to have a whirl with the Early Bird Transcontinental Net. This net was formed back in the late Forties. It started as a rag-chew group, but W6BPT kept reporting in with traffic, and eventually it became a traffic net primarily. It was officially unveiled as a net on December 5, 1949, meeting three times per week on 3860 kc. The net now meets daily at (yawn!) 0445 CST under the tutelage of W0BVL, who says their slogan is "To get your traffic delivered, put it on the Early Bird. They always come through."

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Another transcontinental net which is trying to get started is the Transcontinental C.W. Net (TCWN). W4BMY is doing the ramrodding on this one, and trying to do on c.w. what the Early Bird Net is trying to do on 'phone — take advantage of early morning conditions to get that traffic through. TCWN meets at 0500 EST on 3690, Monday through Saturday. W4BMY says that his greatest ambition is to get a QNI from every state in the union some morning.

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W4UWA reports a Christmas Overflow Net operating on 3525 kc. daily at 0600 CST to handle overflow traffic during the Christmas season. This net met 11 times, handled 149 messages. It was open to all comers, and had representation from the following states: Tenn., Ill., Conn., N. Y., Ind., Ga., N. J., Nebr., Pa., Vt. and Mich. W4UWA suggests a regular NTS overflow net to operate in the mornings to handle traffic left over from the previous night's operation.

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National Traffic System. We quote a short but pertinent paragraph from a bulletin by W6ZRJ, manager of the Central Valley Net (NTS section-level, San Joaquin Valley and Sacramento Valley Sections): "There are three main categories of c.w. traffic men: the iron man, the one-night-a-

week man and the occasional check-in. . . . Whatever type you feel you are, we would like you to know that there is a place in NTS and CVN for you. Without iron men, long-haul work would slow down. Without many fellows who will take one or two nights a week as NCS and be there on those nights, our nets would soon start missing sessions. But without the large amount of stations who check in only once in a while we would not have enough stations to have a net each night. Everyone is needed; everyone is welcome."

Our sentiments exactly. NTS is not a system designed for one group or one type of operator; it is designed for all who wish to participate. The only requirement in participation is this: remember that NTS has all types of operators. If the presence of types different from you (faster, slower, different modes, differing opinions, etc.) irks you, it is not the fault of NTS. We don't work by ourselves; we work together. We hope you will accept this principle, because it is one most necessary for success in any organization.

December reports:

Net	Ses- sions	Traffic	Rate	Aver- age	Repre- sentation
1RN	22*	386	0.44	17.5	86%
2RN	41	229	0.40	5.3	90
3RN	42	324	0.54	7.7	75
4RN	46	307	p.56	7	41
RN5	49	1478	0.72	30.2	73
RN6	54	400		7.4	
RN7	32	209		6.5	43
8RN	40	253	0.51	6.3	70
TEN	67	3770		56.3	68
TRN	49	136	0.28	2.8	66
EAN	21	965	1.52	46	98
CAN	23	1466		63.7	99
PAN	30	2159	1.06	71.9	93
TCC-East		276			
TCC-Central		53			
TCC-Pacific		522			
Sections**	386	3259			
Summary	892	16,192	EAN	18.0	CAN
Record	892	16,192	1.52	23.5	

* Out of 27 sessions held

** Sections reported: QKS/QKS-SS (Kans.); CN (Conn.); TLCN (Iowa); AENB & AENP (Ala.); SCN (So. Calif.); Tenn. Sectional, Tenn. Practice and Tenn. Hi-Speed; WSN (Wash.); KYN (Ky.); MSN CW & MSN Fone (Minn.).

Late Reports:

3RN (Nov.)	31	224	0.37	7.2	88%
NCN (Calif.) (Nov.)	20	104			

We continue to topple records. December traffic on NTS topped all previous records, the nearest being last year's 14,833. Net sessions increased from last year's 607, resulting in the decrease in the average-per-session noted.

Net notes: "Skip" played havoc with 1RN in December. W3ONB would like to have someone volunteer to take over 3RN. RN5 has been handling a record-breaking amount of traffic, and W4OGG has issued several fine RN5 Bulletins; representation from Southern Texas is badly needed. VE7ASR reports bad conditions greatly hampered RN7 operations during December, and NCS often fail to report; representation needed from Saskatchewan and Alaska. TEN's early session (1700 CST) handles much more traffic than either of the others. VE3GI reports a new net, the Northland Net, now represented on TRN by VE3AVS. Four out of six regions had perfect attendance on EAN during December. W9UJ is still looking for Saturday night NCS for CAN. PAN certificates have been issued to K6BGM and W7APF.

Transcontinental Corps: All three TCC Directors are struggling to keep the TCC roster full in the face of constant turnover brought about by failure of some stations to make contact with their counterpart schedules. Erratic conditions have not helped any. In the Eastern Area there are some vacancies which can be filled by application to Eastern Area Director W8UPB. Stations that can make contact with the West Coast regularly are needed. Being able to operate rather late hours would be helpful, too. In the Central Area, W0SCA and W0BDR are running the TCC schedules almost singlehanded. Out in the Pacific Area, W6HC has had his hands full trying to keep vacancies filled. Honorable mention goes to W6ADV, W6YHM and

K0WBB. The complete TCC roster as of mid-January, 1955: Eastern Area — W1AW W1EMG W1NJM W2RUF W2ZVW W3COK W4ZVF W8DQG W8FYO VE3AJR VE3BJV VE3GI VE3TM VE3VZ. Central Area — W9JUJ, W9RXD W6SCA W0BDR. Pacific Area — W4YIP/6 W6ADB W6LPW W6QPY W6UTV W6YHM W7CCL W0BEN W0CYT W0EKD W0KHQ W0EKQ K0WBB.

Gem Net (Idaho)	3638	2000 MST	Mon., Wed., Fri.
General School Traffic Net	3735	1630 CST	Mon.-Fri.
Indiana Phone Net (IPN)*	3910	0900 CST	Daily
		1700 CST	Mon.-Fri.
Iowa 75-Meter Phone Net	3970	1230 CST	Mon.-Sat.
Jefferson Parish (La.) Civil Defense Net	29,100	1900 CST	Wed.
Kankakee-Iroquois ARFC Net (Ill.)	3920	1200 CST	Mon.-Sat.
Lake Erie Network (Pa.)	29,150	1315 EST	Sun.
Lakeland Emerg. Net (N. J.)	147,150	2100 EST	Mon.-Fri.
Lee Co. (Ala.) Emerg. Net	3885	1330 CST	Sun.
Lid Knockers Net	3725	0800 EST	Sun.
Manitoba C.W. Net (MAN)*	3700	1900 CST	Mon., Wed., Fri.
McKean Co. (Pa.) Emerg. Net	3525	0900 EST	Sun.
Medina Co. (Ohio) Emerg. Net	1805	1300 EST	Sun.
Memphis Ten-Meter Mobile Emerg. Net	29,627	1900 CST	Mon.-Fri.
Memphis Two-Meter A.M. Net	145,350	2000 CST	Wed.
Memphis Two Meter P.M. Net	145,500	1930 CST	Mon.
Mesabi Range Net (Minn.)	1895	1900 EST	Mon.-Fri.
Middlesex Co. (N. J.) Emerg. Two-Meter Net	147,180	1930 EST	Wed.
Minn. Phone Net	3820	1205 CST	Mon.-Sat.
		0900 CST	Sun., Hol.
Morning Conn. Net (MCN)	3640	0645 EST	Mon.-Sat.
Morons of the Megacycles (Fla.)	29,560	0915 EST	Sun.
Muskingum Emerg. Net (Ohio)	29,616	2200 EST	Fri.
Nebraska C.W. Net *	3535	1845 CST	Daily
Nebr. 75-Meter Emerg. Phone	3983	1230 CST	Daily
New Brunswick Amateur Radio Assn. Net	3750	1000 EST	Sun.
New Jersey C.D. C.W. Net	3505.5	1900 EST	Sun.
N. Y. State Civil Defense Command Net	3993	0900 EST	Sun.
New York C.D. Net (RACES)	3509.5	0900 EST	Sun.
Northern Calif. Net (NOCN)	3635	2030 PST	Mon.-Fri.
Northern District C.D. Net (Md.)	29,510	1930 EST	Tue.
	147,180	2030 EST	
Northern Va. Emerg. Net (NVEN)	29,200	1930 EST	Sun.
Northland Teen-Age Net	3870	1330 EST	Sun.
Ont. Restricted-Speed Net (RSN)	3645	1300 EST	Sun.
Ore. State Net (OSN)*	3585	1830 PST	Mon.-Sat.
Oswego Co. (N. Y.) C.D. Net	145,150	0900 EST	Sun.
Pine Tree Net (Me.)	3596	1900 EST	Mon., Wed., Fri.
Polecat Net	3850	1215 CST	Mon.-Sat.
Pony Express Net	3920	0700 PST	Daily
		0900 PST	Sun.
Quebec Emerg. Net (QEN)	7160	1030 EST	Sun.
Queen City Emerg. Net (Ohio)	29,610	2000 EST	Mon.
Radio Amateur Club of Belleville, N. J., Net	23,600	0930 EST	Sun.
Region V Sector III C.D. Net (Mass.)	147,240	0945 EST	Sun.
	29,460	1930 EST	1st Mon.
Red Jacket Mobile Net (N. Y.)	28,730	1000 EST	Sun.
River Forecast Net (QRFN)	3725	2200 CST	Mon.
RTTY Net (Calif.)	147,850	2000 PST	Tue.
San Antonio Radio Club Emerg. Net	3855	1800 CST	Thu.
San Bernardino Area Net (Calif.)	29,200	1900 PST	Mon.
San Francisco Section Net	145,350	2000 PST	Alt. Mon.
Schenectady Emerg. Communications Net (N. Y.)	3950	1400 EST	Sun.
Sixth Regional Net (RN6)*	3615	1945 PST	Mon.-Fri.
		2130 PST	Mon.-Sat.
South Carolina Emerg. Net	3930	1930 EST	Mon.-Fri.
		0930 EST	Sun.
		1530 EST	Sun.
South Carolina Mobile Round-up	3930	1400 EST	Sun.
South Carolina Phone Net	3930	1930 EST	Mon.-Fri.
		0850 EST	Sun.
		1530 EST	Sun.
South Dakota C.W. Net *	3645	1900 CST	Mon., Wed., Fri.
So. Dak. 75-Phone Net	3870	1830 CST	Mon.-Sat.
		0930 CST	Sun., Hol.
Springfield Area (Mo.) Net (SAN)	3720	0800 CST	1/3 Sun.

A.R.R.L. ACTIVITIES CALENDAR

Mar. 5th: CP Qualifying Run — W6OWP
 Mar. 11th-13th: DX Competition (Phone)
 Mar. 15th: CP Qualifying Run — W1AW
 Mar. 25th-27th: DX Competition (c.w.)
 Apr. 1st: CP Qualifying Run — W6OWP
 Apr. 13th: CP Qualifying Run — W1AW
 Apr. 16th-17th: CD QSO Party (c.w.)
 Apr. 23rd-24th: CD QSO Party (Phone)
 May 7th: CP Qualifying Run — W6OWP
 May 12th: CP Qualifying Run — W1AW
 June 3rd: CP Qualifying Run — W6OWP
 June 11th-12th: V.H.F. QSO Party
 June 17th: CP Qualifying Run — W1AW
 June 25th-26th: ARRL Field Day
 July 2nd: CP Qualifying Run — W6OWP
 July 11th: CP Qualifying Run — W1AW
 July 16th-17th: CD QSO Party (c.w.)
 July 23rd-24th: CD QSO Party (Phone)

SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listings on page 78, Nov. 1954 QST, and page 74, Jan. 1955 QST. Please inform us promptly of any errors or omissions so that they can be included in the final May QST installment. An asterisk (*) indicates correction from previous listing; otherwise, the listing is of a net not previously included. This listing can also be used to correct and bring up to date information in the cross-indexed ARRL Net Directory, available free upon request.

Nets registered subsequent to Jan. 18, 1955, will be included in the next supplementary list, in May 1955 QST.

Name of Net	Freq.	Time	Days
Ala. Emerg. Net (Phone) (AENP)	3955	1800 CST	Daily
Arizona Net *	3685	1900 MST	Tue., Thu.
Ark. Emerg. Phone Net	3885	0600 CST	Mon.
Braintree (Mass.) Civil Defense Net	28,560	2100 EST	Mon.
Bristol (Va.) Amateur Red Cross Emerg. Net	1815	1930 EST	Mon., Wed., Fri.
Broward Emerg. Net (Fla.) (BEN)	29,400	1415 EST	Sun.
Buzzards Roost Net (Mich.) (BR)	3930	1730 EST	Mon.-Fri.
Calumet Area (Ind.) Emerg. Net (CAEN)	1805	1900 CST	Mon.-Fri.
Cape Cod and Island Net	3912	0745 EST	Mon.-Sat.
Caravan Club Mobile Emerg. Net (Texas)	3995	1300 CST	Sun.
Chattanooga Amateur Radio Emerg. Net	29,600	1700 EST	Sun.
Conn. Training Net (CTN)	3640	0900 EST	Sun.
Cranston (R. I.) Civil Emerg. Net *	29,520	2000 PST	2/4 Thu.
Doghouse Net	3860	1800 EST	Mon.
Du Page Co. (Ill.) Civil Emerg. Net	29,600	2000 CST	Mon.
East Coast Net	3595	2000 EST	Mon., Wed., Fri.
		1530 EST	Sun.
Eastern Pa. Emerg. Net	3610	2000 EST	Mon.
Eastern Pa. Net	3610	1830 EST	Mon.-Sat.
Eastern Pa. CD Net (c.w.)	3503.5	0830 EST	Sun.
Eastern Pa. CD Net (Phone)	3915	0830 EST	Sun.
Edmonton (Alta.) Mutual Aid Area Net	3765	0900 MST	Sun.
El Paso Ten-Meter Emerg. Net	29,640	1930 MST	Mon.
FARM Net	3935	1830 MST	Mon.-Fri.
Finger Lakes Net (N. Y.)	145,350	2000 EST	Fri.
Fla. Emerg. Phone Net (FEPN)	3910	1815 EST	Tue.
Fourth Regional Net (4RN)	3547	1945 EST	Mon.-Fri.
Polecat Net	3850	1215 CST	Mon.-Sat.
Pony Express Net	3920	0700 PST	Daily
		0900 PST	Sun.
Quebec Emerg. Net (QEN)	7160	1030 EST	Sun.
Queen City Emerg. Net (Ohio)	29,610	2000 EST	Mon.
Radio Amateur Club of Belleville, N. J., Net	23,600	0930 EST	Sun.
Region V Sector III C.D. Net (Mass.)	147,240	0945 EST	Sun.
	29,460	1930 EST	1st Mon.
Red Jacket Mobile Net (N. Y.)	28,730	1000 EST	Sun.
River Forecast Net (QRFN)	3725	2200 CST	Mon.
RTTY Net (Calif.)	147,850	2000 PST	Tue.
San Antonio Radio Club Emerg. Net	3855	1800 CST	Thu.
San Bernardino Area Net (Calif.)	29,200	1900 PST	Mon.
San Francisco Section Net	145,350	2000 PST	Alt. Mon.
Schenectady Emerg. Communications Net (N. Y.)	3950	1400 EST	Sun.
Sixth Regional Net (RN6)*	3615	1945 PST	Mon.-Fri.
		2130 PST	Mon.-Sat.
South Carolina Emerg. Net	3930	1930 EST	Mon.-Fri.
		0930 EST	Sun.
		1530 EST	Sun.
South Carolina Mobile Round-up	3930	1400 EST	Sun.
South Carolina Phone Net	3930	1930 EST	Mon.-Fri.
		0850 EST	Sun.
		1530 EST	Sun.
South Dakota C.W. Net *	3645	1900 CST	Mon., Wed., Fri.
So. Dak. 75-Phone Net	3870	1830 CST	Mon.-Sat.
		0930 CST	Sun., Hol.
Springfield Area (Mo.) Net (SAN)	3720	0800 CST	1/3 Sun.

(Continued on following page)

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, W. H. Wiand, W3BIP—SEC: IGW, RM: AXA. PAM: PYP, E. Pa. Nets: 3610, 3850 kc. The York Road RC of Elkins Park held its Third Annual Christmas Party on Dec. 21st. An enjoyable time was had by all members and their families, with a total of 90 persons attending. SAO's XYL was chairlady of the affair. The Club's officers for '55 are SAO, pres.; VMJ, vice-pres.; UZF, treas.; YCL, rec. secy.; ULC, corr. secy. The Car-Le RC elected the following officers for '55: HA, pres.; UBU, vice-pres.; AIW, secy.-treas.; WJY, act. mgr. The Potstown ARA elected ARK, pres.; FXX, vice-pres.; DUV, secy.; YDY, treas.; HOG, act. mgr. PYP reports the Del-Lehigh ARC set up a 50-watt phone rig on 3910 kc. at the bedside of K2CCN, a Lehigh University student stricken with polio and confined to the polio ward of St. Lukes Hospital in Bethlehem. WNs 3AQI and AQM, a brother team, with dad, NNV, their teacher, received their Novice tickets in December. AQI reports dad, is now stationed at Sampson AFB and will attend radar school upon completing basic training. The Anthracite Net (AN) is looking for more members. If you have never handled traffic and would like to get started AN will give you fine experience. Listen for CQ AN Mon. through Fri. on 3610 kc. at 1900 EST. CUL reports the new home and new rig almost completed. UOE has 29 countries worked on 80 meters with 80 watts input. ARK and TYW are newly-appointed Oos, while YAZ is the first ORS appointee of '55. Traffic: (Dec.) W3CUL 809Z, BFF 597, OZV 307, VVV 244, WUE 170, QLZ 162, TEJ 161, DUI 119, UKJ 107, UOE 103, RSC 98, GES 91, OK 51, GHY 42, YGX 41, ELI 14, PVI 13, ADE 6 (Nov.) W3NOK 126, GES 61, UOE 42, OK 26, PVI 15, ABT 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—Arthur W. Plummer, W3EQK—On Mar. 21st my term of office as SCM will expire. It has been a most interesting two years and thanks to all of you who have helped to make my work satisfactory. KLA says there is increasing interest in 220 Mc. around Baltimore. RV reports completing a Heathkit 5" scope and VTVM. JE reports WBP, Md. State Civil Defense station, is on the air each Sun. from 1400 to 1600. Visitors are welcome. JZY has 60 countries confirmed out of 97 worked. Andy is using a vertical on 20 as well as on 80-meter c.w. BKE is back on the air with his well-known call (formerly QQS in D. C.). The new Baltimore Midnight Ratchewing Net meets Sat. night on 10 meters. LXC, JLX, HWZ, PRL, and SG have been heard. TMZ is on the air with a 4-125A perking, a new 140X, with DB-23 preselector, and a three-element 20-meter wide-spaced beam. CIJQ participated in the YLRL Contest. QCB is now OO Class I. UE is NCS on 3RN on Wed. in addition to NCS on MDD on Mon. and Thurs. MCG made 89,780 points in the S5 Contest with a bad voltage regulator giving only half voltage. IGF popped 6 bypass condensers in his receiver. WKB has new vertical working on 80, 75, 40, and 20 meters. EEB has joined the ranks of OO Class I. TMZ reports 67,500 points in the October CD Party. LLD, Havre de Grace, reports plans afoot to install a Viking II and a good receiver in the Sheriff's Office in Bel Air and to operate the control center from that location. RMY is going to high-power and SZY is looking for a good home receiver. 5ZOG is moving into a new shack in Aberdeen. Attention all hams in and near and passing by and through Harford County: Check in on 29,500 kc. each Mon. at 8:00 p.m. AYS's Florida vacation and a sick spell didn't hurt his score in the W-VE Contest for which he received a nice certificate for winning in Md.-Del.-D. C. Bayard finally made WAC on phone with a QSL from 4X4BL. MCG reports he is NCS for 3RN on Fri. nights. The PVRC hopes its score in the last S5 beats FRC. The Oxen Hill contingency is composed of HVM, KDP, IKN, WV,

MFJ, and MCG. They all live within a radius of about 2½ miles and none of their scores were under 60,000. During Christmas week and continuing through Christmas Day holiday traffic was handled through the SCM in conjunction with Frank Cross, Director, and Robert Potts, Asst. Director, Baltimore Office USO, to service personnel anywhere in the world. Messages were filed at the USO office, delivered to EQK, who in turn relayed them to HXN, PKC, and WMX. The Washington Mobile Radio Club has a booklet for out-of-town hams visiting Washington D. C. containing all types of ham radio information. It is free by writing Ethel Smith, W3MSU, 177 Joliet Street, S. W., Washington 24, D. C. The BARC has completed the necessary paper work relative to modification of the station license from PSG to FT in memory of Meyer (Sam) Grossman, a charter member who died in 1954. FPQ is taking part in the affairs of PVRN and USWB. There is a BC-610, HRO-60, and three-element beam operating at the Army Medical Center, Walter Reed Hospital, Washington, D. C., as K3WBX/MARS-WRAMC. WV received a BPL Medallion. NNX is renewing beam mast as the result of "Hazel" damage. CVE reports heavy traffic for December. MDD now operates at 7:15 p.m. EST on 3650 kc. HKS reports after 3 months of inactivity. RMY now has 10-meter equipment mobile and fixed. LZM talked on "Hams and Civil Defense in Baltimore County" at the Jan. 10th meeting of the Chesapeake Club. Traffic: (Dec.) W3WV 1399, CVE 509, K3WBX 506, W3PKC 305, UE 278, RV 205, ONB 171, COK 123, FPQ 26, WIF 23, JZY 17, JE 10, NNX 4, (Nov.) W3UE 64, JE 40, MCG 30, NNX 10, EEB 8, JZY 8, TGF 6, WSE/3 5.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—PAM: ZI. Effective Jan. 1st, JRO became an Official Bulletin Station and K2HZR an Official Relay Station. EZM, Maple Shade, is doing FB with a new 40-meter vertical. KNJZAV and K2WAU are heard regularly on 2 meters handling Fort Dix traffic. CEH has a new beam on 2 meters. SDP edits the DX column for the SJRA. Give Bill your support and keep him informed on your DX activities. The SJRA Christmas Party was a big success. ASG reports heavy holiday traffic. Doc is quite active in MARS. ZI reports the N. J. 75-meter 'Phone Net is off to a good start this year with many new members. BAY has completed all antenna repairs and can now QSY any band from 2 to 160 meters. HX, HCR, and K2CLD have made repairs to the 20-meter beam at ZQ. The DVRA is planning an Old Timers Nite in Trenton on April 23rd. Contact ZI for details. MOM is recovering from a serious illness. ORA has just returned from California. Joe makes regular reports on OES activity and keeps us posted on the 6-meter Net that meets each Mon. at 2030. The Net has been in operation for several years. The Hamilton Twp. paper, *Scuttlebutt*, reports antenna-building or changing by CEH, RLY, LSS, BDA, and K2BNB. LS and VMX are doing fine jobs as Official Observers, reporting many discrepancies. The Burlington County Radio Club meets the first Fri. of each month and operates under the call K2KED. Traffic: W2RG 231, K2HZR 133, W2ASG 76, K2BG 38, W2ZI 31, YRW 13.

WESTERN NEW YORK—SCM, Edward G. Graf, W2BJV—Asst. SCM: Jeanne Walker, 2B7B. SEC: UTH/FRL. RM: RUF. PAMs: GSS, NAI. NYS meets on 3615 kc. at 6:30 and 3925 kc. at 7 p.m.; NYSS on 3595 kc. at 8 p.m.; NYS C.D. on 3509.5 and 3993 kc. at 9 a.m. Sun.; TQPN. 2nd call area on 3970 kc. at 7 p.m.; SRPN on 3970 kc. at 10 a.m.; ISN on 3980 kc. at 3 p.m. The RARA reports plenty of new 220-Mc. equipment under construction for the V.H.P. SS. This club mailed some 6,000 pieces of mail to area amateurs each year. While Secretary, RUJ was hospitalized, PSD brought Bob his own Viking and VFO to help pass the time. The RAWNY ran a WAS Contest 7-day affair in January, two sections, one for Novices, one for General Class. The KBT RC had its Monti Cadle Nite Dec. 13th. RUT just buried 50 ft. copper ground radials for a new antenna. OLF/GSB has a new VFO; operates at GSB. APH (Owego) is a new member of NYS. K2LYB requests a note from all W.N.Y. hams who would like a W.N.Y. slow-speed c.w. traffic net on 80 meters. He had fun in the SS. RQF handled the most traffic daytime. CXM (7PRZ) keeps college net skeds and a weekly sked with 7ZU and is busy with finals. EMW worked 12 countries in December with 45 watts although was busy at the Post Office. RUF, net manager, says HKA won the award for the most valuable station on the net, while BXP and OE got awards for high attendance. Traffic: (Dec.) W2RUF 1278, OE 321, K2DYB 260, DJN 150, DSR 122, W2HKA 118, ZRC 98, RQF 86, DSS 54, CXM 40, RJJ 29, WS 27, K2CUQ 20,

W2FEB 17, K2DG 14, W2EMW 2. (Nov.) K2DYB 106, DJN 45, W2WS 32, K2DG 5.

WESTERN PENNSYLVANIA — SCM, R. M. Heck, W3NCD — SEC; GEG, RYMs: NUG and UHN. PAMs: AER and LX/E/VKD. The WPA Traffic Net meets Mon. through Fri. at 7 P.M. on 3585 kc. From KWH of the Steel City ARC we learn that MTP is interested in s.s.b. YDP is trouble-shooting the receiver with the 40-meter net gang aiding. TVB is building a super VFO. 9CWL, ex-DNO, recently was in Pittsburgh for the wedding of his daughter. CTN has a good 40-meter signal in the west. WHY is increasing power to 400 watts. HSL is coming back to 40 meters with a Viking. The Washington County ARC still holds code classes. VFN is leaving for the Army. KHY is getting results with B. & W. (35 watts). SUK reports his 2200 sked each Mon. night with STY is practically 100 per cent and now he is experimenting with phase modulation p.p. 4-65As 200 watts. VEM is working out fine with home-built VFO. The Bucktail ARC now has the club station, YDW, equipped to operate 10 meters. NGZ is having transmitter trouble. LAO's antenna blew down. IIX built the Club 10-meter converter and worked a little in the SS. TYC was busy in the SS. WII is on 40-meter c.w. RMX and PTU are 10-meter mobile. TCP still is on test equipment projects. OGN is 75-meter mobile. RLH will be on 40-meter c.w. SUL is mobile. TMA is down for repairs. The Radio Assn. of Erie news is through the courtesy of QN. MMJ shows up on 10 meters with a Viking. TMK, LKJ, TIA, and STK participated in the Christmas Parade furnishing communications. Investigating 6 meters for emergency communications use are MED, LKJ, and KJM. NXX recently joined 6-meter activity. WSO acquired his General Class ticket. QMY is back on 10 meters. VNB has left for the Air Forces. New calls are WN3APB, WN3AGU, and WN3ALF, son of YWL, all of Girard. Going from Novice to General Class is ALD. Visiting RAE was IVDM/VO4. STK reports a new code class has started at the YMCA. QMY is on 10 meters. OIE has recovered from a recent accident. The Mercer County Radio Assn. conducts code classes weekly. Fourteen-year-old ZEW reports that he and 11-year-old ZEG are active on 80- and 40-meter c.w. Traffic: (Dec.) W3WIQ 5935, LXQ 200, LMM 191, KUN 190, PQQ 140, GJY 99, UHN 61, OEZ 52, UTR 47, VRZ 20, NUG 18, SIJ 18, KNQ 8, NMJ 5, NCD 4, ZEW 3. (Nov.) W3LXQ 82.

CENTRAL DIVISION

ILLINOIS — SCM, George Schreiber, W9YIX — Section Nets: ILN (c.w. 3515 kc.), IEN (phone 3940 kc.), SEC: HOA. RMs: BUK and MRQ. PAM: UQT. Cook County EC: HPG. New officers of the Chicago Area Radio Club Council are HPG, KCW, SPT, and GME. Leading the Starved Rock Radio Club are ZEN, TV, and QLZ. The Chicago Suburban Radio Assn. elected DDP, YGF, PVE, and SDN. MRT heads the Central Illinois Radio Club. Other officers are SXL and a run off for veep between OUF and QXQ, who tied. Congrats to SH and his wife on the arrival of Raymond Allen the day they bought a new home. New members of the A-1 Operators Club are LZ and HPJ. New OBS and OBS is PRN. JMG now is OBS; he also holds ORS and OPS appointments. Ev is continuing his experiments to see what really low power can do. He uses 15 watts. ABS now fishes for his DX from Sterling and CGP from Pontiac. Both are operators for Illinois State Police. ZSN, also a State operator, resigned to go into the service business. BRD and ROE exchange ideas on the life and habits of transmitting loops. One or the other is bound to come up soon with the apartment-dweller's dream. BPP tells us KSN is the new judge in Cumberland County. USI renewed his OBS appointment, LMC his ORS, and IAW his OPS. Winners in the Chicago Suburban Radio Assn. Sweepstakes were WFS with 106,920 points, and PBM with 15,457. Five clubs participated, with CSRA topping the list. Others were YLRL, CRTA, North Suburban, and Hamfesters. New calls heard in the section are Novices MRZ, KAM, MAJ, LSN, and LSO. The last two are the 14- and 11-year-old sons of KRH. A new call heard on ILN is NPC, whose traffic total appears for the first time at the end of this column. Brass Pounders certificates went out to DO, QGG, and AA in December. Incidentally we reported QGG's traffic total last month under QGG. Sorry, John. PVK is radio training officer for the Coast Guard auxiliary and got a nice break from the newspapers on his idea of using the extension ladders of the Chicago Fire Department for emergency antenna towers. OR and BRD also have been mentioned in the public prints in a laudatory manner. DRN reports good activity on 220 Mc. and now is trying to get a converter going on 430 Mc. as his transmitter works out OK. BA and KFX used their mobiles to provide transportation and communications for the Cerebral Palsy Drive in their home town. CLH qualified for 20-w.p.m. sticker on his Code Proficiency certificate. KJ built the kilowatt and had to hire movers to get it off the work bench and upstairs to the shack. JO is jammed with ham receivers he is servicing. The code and theory class of the Quarter Century Wireless Operators Assn. is going great guns, sparked by LZ, CYD, and EVA. The

latter thing speeches to the would-be hams on what a terrible thing a mike is to own and operate. The class has qualified fifteen Novices in six weeks. Keep up the good work, fellows. To holders of ORS certificates, we are going through the files and cancelling out-of-date appointments. How about sending yours in for renewal? Traffic: (Dec.) W9DO 2304, QQC 538, AA 428, UA 382, YIX 131, MRQ 86, VHD 78, LMC 62, CEE 58, NPC 40, SME 39, LXJ 31, SXL 31, STZ 16, BUK 14, BA 12, CLH 9, FRP 8, VBV 5, PHE 2. (Nov.) W9QQG 98.

INDIANA — SCM, George H. Graue, W9BKJ — The new net manager for IFN is YEO. IFN now meets at 1730 CST because of skip. QIN is considering a change for the same reason. NTA reports for IFN, 54 sessions and a traffic total of 383. The Indianapolis Club had a display at the hobby show showing kits for Novices. MZE now is DLACT. QAV has gone mobile. BBM mobilized to Florida, likewise FMJ. Officers of the TARS are DGA, pres.; UMS, vice-pres.; OVB, secy.; and RBV, treas. LBD and WQC have gone mobile. N9LVL has a Viking II. AUS has a Viking Ranger, likewise UDD. N9LDB is new in Elwood. N9LRE is new in Alexandria. Elected officers of the LCARC are PAS, pres.; MNO, vice-pres.; KRJ, secy.; MIF, treas.; and WKN, trustee. UNT has a Viking II. EHU is erecting a 20-meter beam. YFD has a vertical antenna. HRH is building an all-band rig. NCARA's newly-elected officers are NTI, pres.; PPD, vice-pres.; and SQW, secy.-treas. N9LGI is new in New Castle. ZSC is organizing for c.d. N9IMO took the Technician Class exams; he has erected a 32-element beam. IDT is new in Warsaw. LMN is new in Mentone. BOS acquired a General Class ticket. ZYO, ELJ, EUC, UVD, ZVS, JBO, and VZF are on 147.3 Mc. at New Albany. HRY is the club station of the CCRC. NZZ has a commercial radiotelephone first-class license. HTC is active on 40 meters. CEA is building 2-meter portable. HLY made CP 30. DKR has a pair of 4-65As on the air. SKP is using a Window antenna. FGX has a new VFO. KLR has 3/4 kw. on 147.3 Mc. UKG is using 300 watts with a beam on 14 Mc. Traffic: (Dec.) W9JUJ 3296, NZZ 1132, TT 892, UQP 642, SNT 452, WRO 332, GEY 251, W8IQJ/9 240, W9JBQ 232, SVL 187, EHZ 159, BKJ 124, ZRP 89, TG 84, DHJ 80, AQB 77, ZYK 76, VNV 71, YQC 66, QYQ 63, WUH 60, CMT 57, YIP 48, CC 47, CEA 46, NTA 45, CFT 36, HLY 30, STC 28, EGV 25, QR 24, KDV 23, ZIB 20, YVS 14, BDP 13, EQO 12, DKR 10, NH 6, PPS 6, SKP 6, FGX 4, PQA 3, GDL 2. (Nov.) W8IQJ/9 343.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — SEC: OVO. PAMs: ESJ and GMY. RMs: IXA, RTP, and UNJ. Nets: BEN, 3950 kc., 6 P.M. daily; WIN, 3625 kc., 6 P.M. daily; WPN 3950 kc., 1215 Mon.-Sat., 0930 Sun. Wisconsin mobile and c.d. frequency: 29,620 kc. CXY is the proud recipient of an ARRL Traffic Medallion. SZR has 19 countries on 3.5 Mc. with EL2, KM6, ON4, and SM the latest. CCO needs 4 more states for his WAS. RQK has new 14-Mc. "Short Beam." IQW is enthusiastic about s.s.b. YNO is building a 304TL final. With new 75A-2 and 4-125A rig, NYS worked KM6 and KL7 on 80 meters. MQK has 136 countries worked and 123 confirmed, while KKK has 133 worked and 126 confirmed. MRAC officers are MDG, pres.; NLY and EKU, vice-pres.; VBZ, secy.; JPS, treas.; ONY board chairman; and RH, SNK, LSK, CUW, DR, and MOT, directors. New certificates (WPN) were issued to BCY, CFO, FZC, HBE, NYS, OVO, and YNO. YOX is mobile on 28 Mc. WN9FHT and WN9FJW are on 144 Mc. YRO uses a 75A-2 and a 32V-2. YOS keeps working 'em with 30 watts. The Point Radio Amateurs furnished an aided mobile unit for the police on New Year's Eve with BCC, NNS, CFO, GHJ, and NIT participating. RKP worked FG7, PA9, and DL1 on 3.5 Mc. Results of the Dec. 12th Wisconsin Section QSO Party: 'Phone and c.w., 1st VBZ, 2nd RQM, 3rd NYS; 'phone only, 1st OVO, 2nd QNT, 3rd NUH; c.w. only, 1st RKP, 2nd WZL, 3rd YOS; mobile, 1st ONY, 2nd TKY, 3rd LUC. WN9FJW's new jr. operator was the first baby born in 1955 in Kenosha. LEE has resumed transmission of Official Bulletins on 144.12 Mc. at 1955 West and 2000 SE. OVO has a new Heath antenna impedance meter. IUU is chief at WHKW. PBB entered military service. FXA moved to Milwaukee. Traffic: (Dec.) W9VBZ 2053, WWJ 686, CXY 362, SZR 154, IXA 118, UNJ 102, CCO 68, FXA 53, UIM 45, RTP 36, GMY 30, RQK 28, IQW 27, AEM 22, SAA 20, RQM 18, YLE 16, OVO 6, IUU 3, VKR 2. (Nov.) W9WWJ 189, CXY 45, YLE 12.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Earl Kirkeby, W0HNV — DAO has a new HT-20. PHH has a complete new station and is planning to change QTH. The Red River Valley Amateur Radio Club at Fargo had a "Worked All Members" Contest recently. It sounds like a very good idea. Activities like that help a lot to keep a club active. PMZ has a new 75A-3. HNR drove to Watertown Jan. 9th. He had four other hams with him which added up to half a ton of hams! Traffic: W6FVG 78, EXO 56, UXO 24, HNV 12, BFM 5, CAQ 4, EBA 3.

SOUTH DAKOTA — SCM, J. W. Sikorski, W0RRN —

(Continued on page 82)

SELECTABLE SIDE BAND RECEIVERS

NORGAARD* and McLaughlin** each have developed practical methods of switchable side band selection for receivers. Norgaard's is the phasing type and McLaughlin's employs the principle of side band selection by changing the frequency of the conversion oscillator.

SINCE both of these methods have certain electrical merits, we at Hallcrafters have spent many engineering man hours carefully evaluating the two systems for incorporation of the better features of each into our products.

WITH a receiver having poor selectance ratio in the i.f. system, i.e. poor nose to skirt ratio, the phasing scheme has some merit as it can be easily attached as an outboard device. It may improve unwanted side band rejection by as much as 35 db; but this value is hard to hold in production and from a more practical standpoint 20 to 25 db. is realistic.

IF the two systems are compared on a cost basis for incorporation in a new receiver, the phasing method does not appear attractive as better side band rejection can be obtained at less cost with good tuned circuits.

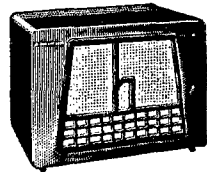
MODERN receivers of better design from \$250.00 up are dual conversion primarily to reduce image responses. Dual conversion also makes practical 50 kc. i.f. systems with excellent selectance ratio that can further be readily adjusted for various degrees of bandwidth***. It has been known for many years that the choice of conversion oscillator frequency will invert the side bands at the i.f. frequencies. However, McLaughlin was the first to apply this principle for side band selection when using an i.f. system adjusted to pass only one side band.

WITH a highly selective dual conversion receiver like the SX-96 wherein the i.f. pass band can be reduced to pass only one side band, it becomes very simple to add effective side band selection by choice of dual conversion frequencies. As the first i.f. is 1650 kc. and the second 50 kc., the second conversion oscillator may be either 1700 kc. or 1600 kc. Thus, if we switch in the 1600 kc. we pass the lower side band, and if we switch to 1700 kc. we pass the upper side band.

BY the addition of only a quartz crystal, some switch contacts and half of a dual triode, Hallicrafters is able to provide you with good, effective, selectable side band feature at a nominal cost.

Bill McLaughlin, Jr.

W. J. Halligan W9AC



for **hallicrafters**

* QST, July, 1948

** QST, October, 1947 and
April, 1948

*** QST, June, 1954. SX-88
(Recent Equipment)

75A-4 RECEIVER

The 75A-4 offers passband tuning, AVC for Single Sideband reception, a bridged T rejection notch filter, a crystal calibrator circuit, separate

detectors for double or single sideband signals, a new noise limiter circuit that works equally well on SSB, AM or CW, and mounting provision for three separate Mechanical Filters. Retained are the time-proven features of the earlier 75A series — double-conversion, crystal-controlled first injection oscillator for high stability and good image rejection; permeability tuned, sealed master oscillator with accurate dial calibration and long-term stability, and Mechanical Filters in the IF circuits for maximum selectivity.

32W-1 EXCITER

Designed to meet the requirements of the most discriminating Amateur whether he operates SSB, AM or CW, the 32W-1 Exciter has sufficient output power to drive a high-level power amplifier stage, and together with the 75A-4 Receiver provides the basic needs for a completely engineered Amateur radio installation.

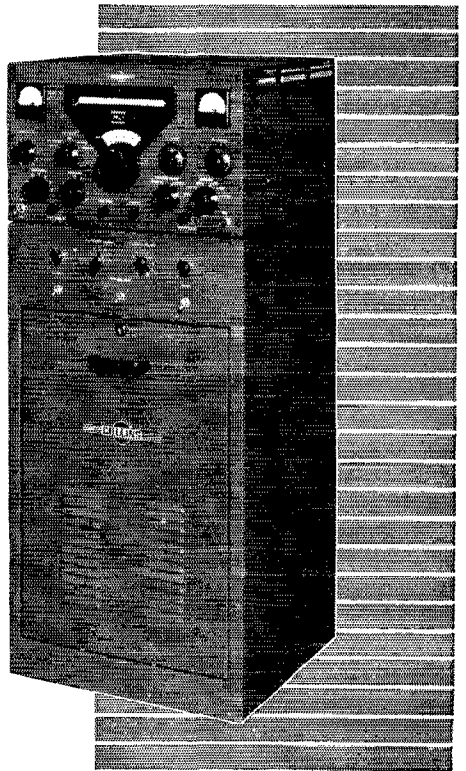
Special features of the 32W-1 are dual conversion, a permeability tuned, hermetically sealed VFO, a Single Sideband generator using the Collins Mechanical Filter to provide optimum rejection of the unwanted sideband, RF feedback to assist in reduction of distortion products, selectable sidebands, bandswitching operation on all amateur bands from 3.5 to 30 mc, VOX or push-to-talk operation, AM operation with full carrier and one sideband being transmitted, CW operation with wave shaping for minimum key clicks and transients, FSK operation by using an external audio FSK oscillator, Automatic Load Control (ALC), and unitized construction.

Collins PROUDLY ANNOUNCES a **NEW STANDARD** in **AM, CW and SSB OPERATION**

It took Collins to produce the first really new Amateur communication system, designed expressly for Single Sideband as well as AM and CW operation. Collins new 75A-4 Receiver/32W-1 Exciter or 75A-4 Receiver/KWS-1 Transmitter combinations are designed for the most exacting Amateur. Engineering-wise, the equipment meets the high standards Collins has set for military and commercial equipment. Price-wise, the Amateur will get more for his money than ever before. See your nearest Collins distributor for your brochure.

KWS-1 **TRANSMITTER**

Collins engineering plus extensive on-the-air tests account for the KWS-1 Transmitter's reliability and optimum performance in SSB, AM and CW operation. The exciter and RF power amplifier are housed in a single receiver size cabinet. The Collins 367A-1 linear RF power amplifier uses two 4X150A's in class AB operation. RF feedback is employed to improve the linearity characteristics of the power amplifier. The KWS-1 incorporates circuit application and components which have been proved in preceding Collins equipment; to note a few, the 70E VFO, the Pi-L output network, extremely accurate VFO dial and the Collins Mechanical Filters. To meet the Amateur's future desire for power increase, Collins 32W-1 Exciter can be modified to a KWS-1 at the factory.



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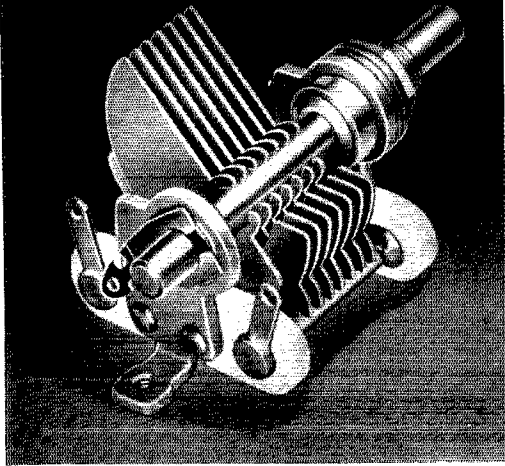
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Collins Radio Company of Canada Ltd.

74 Sparks Street, OTTAWA, ONTARIO

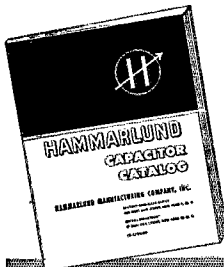


"MC" CAPACITOR . . .



Offers Wide Choice of Characteristics!

The "MC" is a versatile single-section tuning capacitor designed to give a choice of mountings, connections and capacity characteristics. The threaded brass front-bearing and tapped aluminum end-brackets permit panel or base mounting. A rotor stop permits 180° clockwise rotation for increasing capacity. For optimum performance all Hammarlund "MC" capacitors have silver-plated beryllium copper wiping contact, silicone-treated steatite insulation, soldered nickel-plated brass rotors and stators. The rotor shaft is supported on bearings at both front and rear of capacitor. "MC's" are available with capacities ranging from 5.5 mmf. to 320 mmf.



The Hammarlund Capacitor Catalog lists the complete line of standard capacitors sold by responsible dealers from coast to coast. For your free copy, write to The Hammarlund Manufacturing Co., Inc., 460 West 34th Street, New York 1, New York. Ask for Bulletin C-3.

HAMMARLUND

(Continued from page 78)

Asst. SCMs: Earl Shirley, 8YQR, and Martha Shirley, 0ZWL. SEC: GCP. RM: SMV. PAMS: BNA, GDE, PRL, and NEO. OOL and SDP have dropped the "N." A new Novice at Redfield is UYA. SIH is on the air from Onida. PRL and UVL have moved to new homes. RSP visited in Indiana during the holidays. NEO reports a new Elmac and Morrow FTR. The SFARC is conducting a 40-meter WAS Contest. While working on a new home, YQR fell, breaking his right arm. Bob Mitchell, ex-1SWX, and operator at K0FAL/FCR, now is F7EH and gives his QTH as Sac Zebra, SHAPE, APO 55, New York. LBS, collecting maritime mobiles on 15 meters, is up to 20. Net operations for December: 160-net, QNI, 876, 31 sessions, traffic "about 80;" c.w.-net, QNI, 90 in 14 sessions, with traffic 54; NJQ-net, QNI 520 in 18 sessions, traffic 130; evening 75-net averages QNI 34, traffic 15. SCT added 2-meter converter and Q5-er to his shack. ZIQ has a new tax deduction — a YL Silent Key: PYP, Rapid City. Traffic: (Dec.) W0MPQ 168, SCT 106, GDE 89, NEO 63, ZWL 59, SMV 50, BNA 27, YQR 26, AYD 15, QKV 14, BQS 10, LBS 8, GWS 3. (Nov.) W0SCT 89.

MINNESOTA — SCM, Charles M. Bove, W0MXC — Asst. SCM: Vince Smythe, 0GGQ. SEC: GTX. RMs: KLG, DQL, and OMC. PAMS: JIE and UCV. Net time and frequencies are: Minn. Junior Net at 1800 on 3690 kc., Minn. Section Net, 1830 on 3595 kc.; Minn. Phone Nets at 1200 and 1800 on 3820 kc.; 160-Meter Net at 1830 on 1815 kc. Your SEC is to be commended for his excellent organizing of our State Emergency Corps. George's figures to date are 43 Coordinators with a count of 227 members and 182 supporting members. Join now by dropping a card to George Lord, W0GTX, P.O. Box 8, Alexandria, Minn. Looks as if this is a ladies' world. The following are active on the air: IRD, 1KJ, IRJ, IXR, JAI, JMI, KFN, KJZ, KMP, KZD, LPS, PYC, NNO, NQQ, OPX, OVN, RHI, TQQ, QFA, QFX, QZS, NZT, ETV, BQE, and UMK. The Minnesota Section Net gang at KJZ's house rated Becky's (ZDA) plum pudding "tops." In the last Frequency Measuring Test HKF had an average error of 2 parts per million on the 3.5- and 7-Mc. bands. On the 3.5-Mc. band he was off only .6 of a cycle. GGQ and TKX each have a new World Radio Globe King 500-watt rig. VBD has applied for a General Class ticket. OJH, trustee of the Mankato Radio Club, has applied for a station license for the Club's EC station. K6EA is now back in Sunny California. Army is trying to sell us the *Pacific Area Net* paper which is printed for net news. He is trying to have its editor include the MSN in it. GBW and HIN are in a traffic race. CGK is wiring a new Viking Adventurer. The Runestone Radio Club is printing a club album. TUS has traded his 400-watt 813 for TBS's Viking. MQA, from Grand Forks, visited in the Cities. The following are active on 220 Mc. MVP, PYC, HPS, OFY, OFZ, OTY, OST, and PHZ. They meet at 7:00 P.M. daily. BGY is the proud father of a baby girl. Traffic: W0WMA 444, KLG 485, DQL 307, QNY 264, KNR 198, KJZ 165, K6EA 148, W0HUX 117, IRJ 103, UCV 80, QBW 76, OJH 70, QDP 62, JST 54, LUX 52, RVO 49, ABA 39, GTX 35, GGQ 32, TKX 28, EYW 26, BUO 24, NTV 23, IRD 22, MBD 22, BZG 21, OFA 21, TQQ 21, HIN 20, HNV 20, QZK 20, TUS 20, CID 17, MXG 16, FIT 15, QGD 13, PUO 10, TOK 8, K0WAA 8, W0PBI 6.

DELTA DIVISION

ARKANSAS — Owen Mahaffey, W5FME — We are sorry to hear about CAF losing part of his home by fire and more damage by water and smoke just before Christmas. VQD is the proud possessor of a new Collins receiver. A new ham in Fayetteville is WN5ED with a Globe Scout and an S-38C. He has worked 20 states. LUX lost a modulation transformer and will be off phone temporarily. The new RM is MSH, operating all bands with a new Lyco 600 and SX-96 receiver. He reports that RWJ is busy with his radio business days and works as a railroad telegrapher nights, which is why he is off the air. We need more slow operators on the OZK Net. See you there. Traffic: W5SXM 73, FME 29.

LOUISIANA — SCM, Thomas J. Morgavi, W5FMO — FYZ, Minden EC, has a home-built phasing exciter driving an 813 s.s.b. on 75 meters. SQL spent 15 days visiting Mexico. NG, Route Manager, reports a visit by 4PL, NCS of the Hit and Bounce Net and dean of traffic men. SAY now is SWL in Venezuela. ONM finally got his antenna coupler working. He is OBS and sends bulletins Tue. at 1700 on 3870 kc., Thurs. at 1700 on 3747 kc., and Sun. at 0730 on 3905 kc. and at 0900 on 3805 kc. DUS made General Class and WQX has Extra Class license now. FMO now is operating from his new ham shack but only because of the efforts of SPZ, MXQ, PJJ, and a neighbor. They carried all the heavy equipment, swung the antennas over to the new shack and reconnected the equipment. FMO's right hand was in a plaster cast at the time. BPL was made by NDV. The Greater New Orleans Amateur Radio Club members are sporting license tags on the front of their cards with their call letters and the club name. Our heartfelt sympathy to the family of Theodore G. Deiler, who passed away Jan. 5th. As engineer-in-charge of the FCC 8th District in New Orleans, he gave many of us exams for

(Continued on page 84)

THE HQ-140-X...



"A Ham's Dream" —says W4VPU

After trying out his new Hammarlund HQ-140-X receiver, Harry H. Harris, Jr., of Charlottesville, Va., W4VPU commented, "This is truly a Ham's dream."

Creating 'dream' equipment for hams is the Hammarlund goal. How well this goal has been achieved is proven by the enthusiastic comments received from satisfied Hams. They appreciate the little extras in design, circuitry and construction built into every Hammarlund product.

For example, the HQ-140-X—the amateur receiver built to professional standards—is rated XFB by Hams everywhere because of its—

FREQUENCY STABILITY — less than .01% frequency drift after warmup anywhere from 540 Kc. to 31 Mc.

EXTREME SELECTIVITY — sharp signal separation even in the most crowded bands.

LOW NOISE LEVEL — a noise limiter that really works.

RUGGED CONSTRUCTION — built for easy use for many years.

The HQ-140-X is available either as a cabinet model or for rack mounting. For complete details, write to The Hammarlund Manufacturing Co., Inc., 460 West 34th Street, New York 1, New York. Ask for Bulletin R-3.



HAMMARLUND

SINCE 1910

Heathkit GRID DIP METER KIT



MODEL GD-1B

\$19.50 Ship. Wt.
4 lbs.

with additional blank dials for individual calibration. You'll like the ready convenience and smart appearance of this kit with its baked enamel panel and crackle finish cabinet.

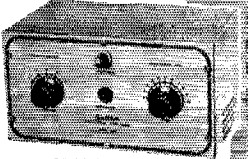
The invaluable instrument for all Hams. Numerous applications such as retuning, neutralization, locating parasites, correcting TVI, adjusting antennas, design procedures, etc. Receiver applications include measuring C, L and Q of components—determining RF circuit resonant frequencies.

Covers 80, 40, 20, 11, 10, 6, 2, and 1 1/2 meter Ham bands. Complete frequency coverage from 2—250 Mc, using ready-wound plug-in coils provided with the kit. Accessory coil kit, Part 341-A at \$3.00 extends low frequency range to 350 Kc. Dial correlation curves furnished.

Compact construction, one hand operation, AC transformer operated, variable sensitivity control, thumb wheel drive, and direct reading calibrations. Precalibrated dial

Heathkit ANTENNA COUPLER KIT

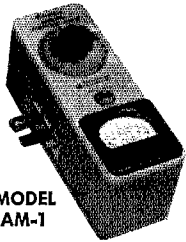
The new Heathkit Antenna Coupler Model AC-1 was specifically designed to operate with the Heathkit Amateur Transmitter and will operate with any transmitter not exceeding 75 watts RF input power. Rugged design has resulted in a sturdy, well shielded unit featuring a copper plated chassis and shield compartment. Coaxial 52 ohm receptacle on the rear of the chassis connects to a three section Pi-type low pass filter with a cut-off frequency of 36 Mc. Tuning network consists of a variable capacitance and tapped inductance in an impedance matching unit. Capacity coupled neon lamp serves as a tuning indicator and will also provide a rough indication of power output.



MODEL AC-1

\$14.50 Ship. Wt.
4 lbs.

Heathkit IMPEDANCE METER KIT



MODEL
AM-1

\$14.50 Ship. Wt.
2 lbs.

tive null indicator. Shielded aluminum light weight cabinet. Strong self supporting antenna terminals.

The Heathkit Antenna Impedance Meter is basically a resistance type standing wave ratio bridge, with one arm a variable resistance. In this manner it is possible to measure radiation resistance and resonant frequency and antenna transmission line impedance; approximate SWR and optimum receiver input. Use it also as a monitor or as a field strength meter where high sensitivity is not required. Frequency range of the AM-1 is 0-150 Mc and range of impedance measurements 0-600 ohms. The circuit uses a 100 microampere Simpson meter as a sensitive null indicator. Shielded aluminum light weight cabinet. Strong self supporting antenna terminals.

HEATH COMPANY
BENTON HARBOR 9, MICHIGAN

amateur and commercial tickets. Traffic: (Dec.) W5NDV 493, MXQ 252, NG 140, KRX 112, EA 49, VIC 35, ONM 2, SQI 2. (Oct.) W5KRX 80.

MISSISSIPPI — SCM, Dr. A. R. Cortese, W5OTD — SEC: KHB, RM: WZ, PAM: JHS. The Hurricane Net meets every night at 6 P.M. on 3935 kc. The Magnolia Net meets Sun. at 1:30 P.M. on 3870 kc. IHP is the new NCS. The Interstates Relay Net meets every morning except Sun. at 10 A.M. on 3870 kc. PFC is president of the Jackson Amateur Radio Club and OAE is secretary. The teen-age hams of Jackson have formed a c.w. net on 3734.5 kc. which meets on Sun. at 2 P.M. The Bailey Jr. High School Radio Club has been reorganized with DGL as president. MARS has reorganized the Mississippi State C.W. Net which meets daily Mon. through Fri. on 4025 kc. at 1800Z-1900Z. CSH has dropped the "N." TIR has two new 75-ft. pre-fab antenna masts. JHS still is monitoring 29.6 Mc. for mobiles. Traffic: W5VME 343, EWE 274, TIR 139.

TENNESSEE — SCM, Harry C. Simpson, W4SCF — SEC: RRV, PAM: PFP, RM: WQW. The Memphis Club elected CRP, pres.; GQQ, vice-pres.; STL, secy.; WTJ, treas.; VI, AFB, DCH, HHK, BAQ, and SCF, directors. ZJY is back on 'phone. The Tennessee Valley 10-meter Emergency Net now is an ARL affiliate, as is the Clarksville Club. New ECs are BBD and TYU. TYU got a CAN certificate. A new OPS is UWA. FLW reports the Weakley County RACE Net meets Mon. at 2130 on 50353 Mc. The Tennessee C.W. Net handled 395 QTC during December. OGG reports traffic at an all-time high on RN5. Friends will be sorry to hear of the passing of HK. While on a 7-week vacation trip to Texas and Old Mexico, PL visited W5 IGW, MN, and NG. BMT is NCS of the new c.w. practice net, Tue. and Fri., 3635 kc., at 2100 CST. Flowers to PL, OGG, TJJ, UWA, and ZJY for making this our best BPL month. RRV has a wonderful new idea for a Novice Emergency Net. Details when available. The Tennessee 'Phone Net averaged 32 QNI per session. High-speed c.w. handled 54 messages in a 40-minute session. Under "special stunts" WQW reports he "flew a Ford into a pole!" BBD reports 15 new AREC members. GUE has a new YL jr. operator. New Cookeville Club officers are BER, pres.; ZJY, vice-pres.; and UWA, secy-treas. Traffic: (Dec.) W4PL 1994, OGG 1556, TJJ 527, UWA 381, TYU 297, K4FET 280, W4HHH 271, SON 229, IIB 171, TZZ 139, ZJY 135, SCF 117, WQW 112, PFP 89, CXY 71, BQG 60, OEQ 52, IV 46, RRV 43, PQP 41, UOA 41, PHQ 35, VJ 33, AQN 26, UVS 26, WJZ 26, RHK 17, YMB 16, PAH 15, BAQ 12, BBD 8, RM 8, PVD 6, DCH 4, PLW 4, NPS 1. (Nov.) W4PFP 80, SGI 1, ZJY 1.

GREAT LAKES DIVISION

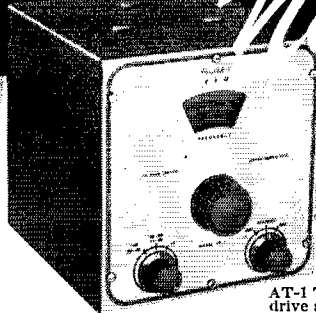
KENTUCKY — SCM, Robert E. Fields, W4SBI — A salute to our new SEC, CDA. He relieves NBY, who has been doing an FB job as SEC but has found it necessary to give it up to further his studies in Christian work. He is starting on a World Study Tour soon. URF/1 is currently stationed at Fort Devens, Mass. HSI, ex-6FOJ, is a new ham in Kentucky and is doing an FB job with appointments as OPS and ORS. WNH is a new OES. KKW is really keeping the KYN rolling along. BAZ reports that too many errors in overseas traffic is resulting from QSP via 'phone stations. NIZ and RPF are doing some leg work in organizing some new 'phone nets for better coverage in the State. K4FBW is going strong on 2 meters with 522 transmitter and a BC-639 receiver using four-element beams stacked. YOK has bought a 500-watt rig from 9JLL and is looking for some 812As. WXL handles a lot of traffic while pursuing his studies at college. JPV again is handling long-haul traffic. SBI reports that this is the best activity report in quite a while. NIZ has been reporting station activity faithfully for some time, but for some unknown reason has been omitted from QST. I am really sorry about that for it might have been our fault. I do have a deadline to meet so, fellows, won't you please mail your reports to reach me not later than the 7th of each month. The Amateur Radio Transmitting Society (ARTS) has elected the following officers: KQI, pres.; TLU, vice-pres.; CDO, secy-treas. Traffic: K4FBW 414, W4PXX 294, BAZ 272, KKW 235, WXL 209, SBI 160, ZLK 131, MWR 82, CDA 75, HSI 71, RPF 48, ZDB 40, WNH 37, GFG 32, JCN 32, NIZ 32, KRC 24, SZB 16, BAM 12, ZDA 11, HJQ 10, YOK 10, JUL 8, URF/1 4, PAM 3.

MICHIGAN — SCM, Fabian T. McAllister, W8HKT — Asst. SCMs: ('phone) Bob Cooper, 8AQ4; (c.w.) Joe Beljan, 8SCW. SEC: GJH, EMD is now OO Class III and IV. Many thanks for all of the holiday greetings received from the gang. BPL cards went to QAH, NUL, NOH, SWG, and WXO for December traffic. SWG says it was the best month in his entire ham career, and RTN is enjoying his best traffic season. Our congratulations to the QOs, whose new 8th harmonic was heard overmodulating on all bands Dec. 31st. Doc says the feedline now has a standing wave ratio of three to five, in favor of the girls! New officers of the Edison Amateur Radio Assn. are PKA, pres.; WEL, vice-pres.; CYJ, act. mgr.; ILP, secy-treas. HSG spent the holidays traveling through the South, and had a three-day visit with 4PL. "There," says Cos, "is a

(Continued on page 90)

New

Heathkit VFO KIT



MODEL VF-1

\$1950

Ship. Wt. 7 lbs.

- Smooth acting illuminated and precalibrated dial.
- 6AU6 electron coupled Clapp oscillator and OA2 voltage regulator.
- 10 Volt average output on fundamental frequencies.
- 7 Band calibration, 160 through 10 meters, from 3 basic oscillator frequencies.

Open layout—easy to build—simplified wiring.

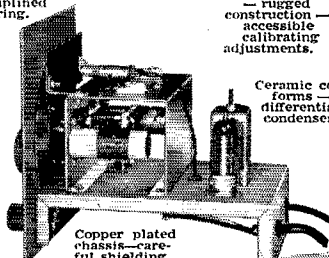
Smooth acting illuminated dial drive.

Clean appearance—rugged construction—accessible calibrating adjustments.

Here is the new Heathkit VFO you have been waiting for. The perfect companion to the Heathkit Model AT-1 Transmitter. It has sufficient output to drive any multi-stage transmitter of modern design. A terrific combination of outstanding features at a low kit price. Good mechanical

and electrical design insures operating stability. Coils are wound on heavy duty ceramic forms, using Litz or double cellulose wire coated with polystyrene cement. Variable capacitor is of differential type construction, especially designed for maximum bandspread and features ceramic insulation and double bearings.

This kit is furnished with a carefully precalibrated dial which provides well over two feet of calibrated dial scale. Smooth acting vernier reduction drive insures easy tuning and zero beating. Power requirements 6.3 volts AC at .45 amperes and 250 volts DC at 15 mills. Just plug it into the power receptacle provided on the rear of the AT-1 Transmitter Kit. The VFO coaxial output cable terminates in plastic plug to fit standard 1/4" crystal holder. Construction is simple and wiring is easy.



Ceramic coil forms—differential condenser.

Copper plated chassis—careful shielding.

Heathkit AMATEUR TRANSMITTER KIT



MODEL AT-1

\$2950

Ship. Wt. 16 lbs.

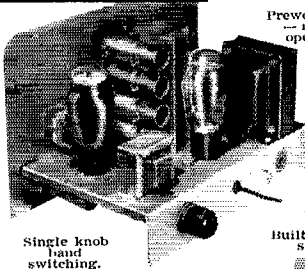
SPECIFICATIONS:

Range 80, 40, 20, 15, 11, 10 meters.
 6AG7 Oscillator-multiplier.
 6BE6 Amplifier-doubler.
 5U4G Rectifier.
 105-125 Volt A.C. 50-60 cycles 100 watts. Size: 9 1/2 inch high x 13 1/8 inch wide x 7 inch deep.

Crystal or VFO excitation.

Here is a major Heathkit addition to the Ham radio field, the AT-1 Transmitter Kit, incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, A. C. line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual.

Rugged, clean construction.



Prewound coils—metered operation.

52 ohm coaxial output.

Single knob band switching.

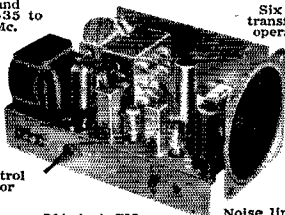
Built-in power supply.

Heathkit COMMUNICATIONS RECEIVER KIT

Four band operation 535 to 35 Mc.

Stable BFO oscillator circuit.

RF gain control with AVC or MVC.



Six tube transformer operation.

Electrical bandspread and scale.

5 1/2 inch PM Speaker-Headphone Jack.

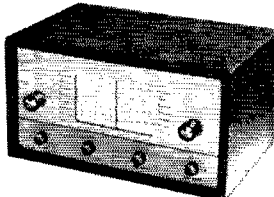
Noise limiter—standby switch.

SPECIFICATIONS:

Range.....535 Kc to 35 Mc
 12BE6 Mixer-oscillator
 12BA6 I. F. Amplifier
 12AV6 Detector—AVC—audio
 12SA6 B. F. O. oscillator
 12A6 Beam power output
 5Y3GT Rectifier
 105-125 volt, A. C. 50-60 cycles, 45 watts.

A new Heathkit AR-2 communications receiver. The ideal companion piece for the AT-1 Transmitter. Electrical bandspread scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio.

Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.



MODEL AR-2

\$2550

Ship. Wt. 12 lbs.

CABINET:

Pyrolox impregnated fabric covered plywood cabinet. Ship. weight 5 lbs. Number 91-10, \$4.50.

HEATH COMPANY
 BENTON HARBOR 9, MICHIGAN

NOW

a BROAD-BAND LINEAR

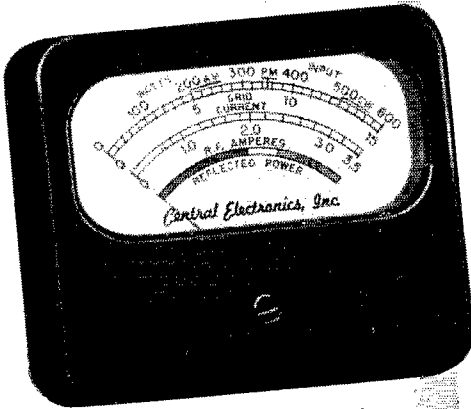
**MULTIPHASE
600 L
NO TUNING
CONTROLS**

**SINGLE KNOB
BAND-SWITCHING
10-160**

FOR USE ON
SSB, AM, PM & CW



WIRED, WITH TUBES AND
BUILT-IN POWER SUPPLY **\$349.50**



Another C.E. First!

**METER FEATURES NEVER BEFORE
FOUND IN A TRANSMITTER**

- Reads power input directly in watts
- Reads grid current
- Instantly reads output in RF amperes — no lagging thermocouple
- Indicates reflected power caused by mismatched load
- Calibrated input levels for AM, PM and CW. . . . and switch the meter to any position while transmitting!

*PATENT PENDING

WRITE FOR LITERATURE

a new concept in linears

CENTRAL ELECTRONICS takes pride in presenting a product of intensive research — the new Multiphase 600L Broadband* Linear. "It is destined to change the entire concept of RF amplifier design in the military, commercial and amateur fields." There are no tuning controls, servos or moving parts other than band-switch.

- Single 813 in Class AB₂.
- New band-pass couplers provide high linear efficiency: 60 to 65%.
- Designed for 50 — 70 ohm co-axial input and output.
- Easy to drive — Approx. 2 watts effective or 4 watts peak drive power required for 500 watts DC input.
- Built-in power supply — bias and screen regulation, 45 mfd. oil filled paper output capacitor. Excellent static and dynamic regulation.
- Extremely low intermodulation distortion.
- Automatic relay protects 813 and RF couplers.
- Excellent stability — complete freedom from parasitics.
- Effectively TVI suppressed — RF compartments thoroughly shielded and Hypassed.
- Choice of grey table model, grey or black wrinkle finish rack model.
- Table model cabinet size — 14 $\frac{5}{8}$ " W, 8 $\frac{3}{4}$ " H, 13" D.

MULTIPHASE

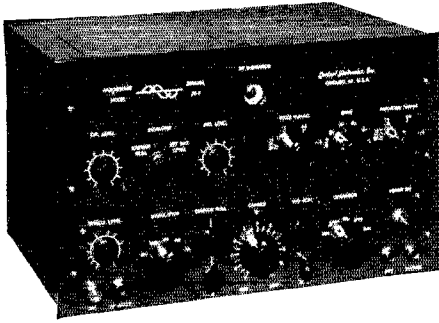
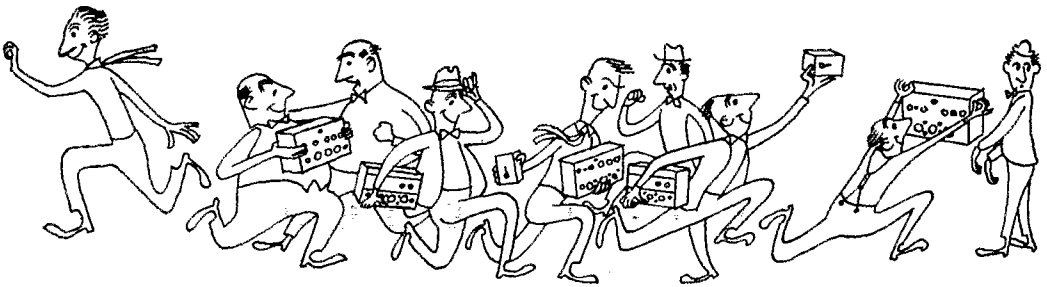
EQUIPMENT

Central Electronics, Inc.

1247 W. Belmont Ave.

Chicago 13, Illinois

Watch for early announcement of other new CENTRAL ELECTRONICS equipment.



MODEL 20A

MULTIPHASE EQUIPMENT is the overwhelming choice of SSB OPS everywhere. Ask any ham who uses it! Listen to it perform on SSB, AM, PM or CW!

MODEL 20A

- 20 Watts Peak Power Output SSB, AM, PM and CW
 - Completely Bandswitched 160 thru 10 Meters
 - Magic Eye Carrier Null and Peak Modulation Indicator
- Choice of grey table model, grey or black wrinkle finish rack model.
 Wired and tested.....\$249.50
 Complete kit.....\$199.50



**SIDE BAND SLICER
MODEL A
IMPROVES ANY
RECEIVER**

Upper or lower sideband reception of SSB, AM, PM and CW at the flip of a switch. Cuts QRM in half. Exalted carrier method eliminates distortion caused by selective fading. Easily connected into any receiver having 450-500 KC IF. Built-in power supply. Reduces or eliminates interference from 15 KC TV receiver sweep harmonics.
 Wired and tested.....\$74.50
 Complete kit.....\$49.50

Check These Features
NOW IN BOTH MODELS

- **Perfectd Voice-Controlled Break-in** on SSB, AM, PM.
- **Upper or Lower Sideband** at the flip of a switch.
- **New Carrier Level Control.** Insert any amount of carrier without disturbing carrier suppression adjustments.
- **New Calibrate Circuit.** Simply talk yourself exactly on frequency as you set your VFO. Calibrate signal level adjustable from zero to full output.
- **New AF Input Jack.** For oscillator or phone patch.
- **CW Break-in Operation.**
- **New Gold Contact Voice Control Relay.** Extra contacts for muting receiver, operating relays, etc.
- **Accessory Power Socket.** Furnishes blocking bias for linear amplifier and voltage for optional VFO (Modified BC458 makes an excellent multiband VFO.)
- **40 DB or More Suppression** of unwanted sideband.



**MODEL 10B
SUCCESSOR TO THE POPULAR
MODEL 10A**

- 10 Watts Peak Power Output SSB, AM, PM and CW
 - **Multiband Operation** using plug-in coils.
- Choice of grey table model, grey or black wrinkle finish rack model. With coils for one band.
 Wired and tested.....\$179.50
 Complete kit.....\$129.50

QT-1 ANTI-TRIP UNIT

Perfectd Voice Operated Break-in with loudspeaker. Prevents loud signals, heterodynes and static from tripping the voice break-in circuit. All electronic — no relays. Plugs into socket inside 20A or 10B Exciter.
 Wired and tested, with tube....\$12.50

AP-1 ADAPTER

Plug-in IF stage — used with Slicer, allows receiver to be switched back to normal.
 Wired and tested, with tube.....\$8.50

NEW AP-2 ADAPTER

Combined AP-1 and xtal mixer. Allows Slicer to be used with receivers having 50, 85, 100, 915 KC and other IF systems. One xtal suffices for most receivers. \$17.50

WRITE FOR LITERATURE



Central Electronics, Inc.

1247 W. Belmont Ave.

Chicago 13, Illinois

Watch For Early Announcement Of The New DeLuxe MULTIPHASE VFO.

**March
21-24**



**See!
Hear!**

**IRE
National Convention**

7 out of **704***

**good reasons why
you should attend**

**the Radio
Engineering Show**

 **Hear...**

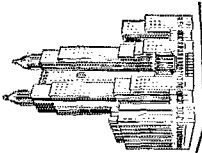
vital research and engineering papers on computers, transistors, color TV, etc., subject-organized in 55 sessions.

 **Watch...**

a computer balance a cane, making 20 corrective moves a second—at the IRE Show.

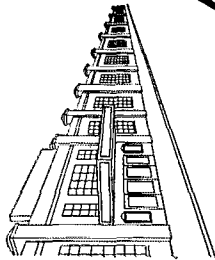
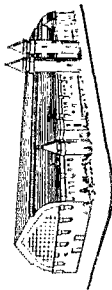
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the exhibits of 69 components vital to successful Automation. Or compare 21 different types of Transistors—and other subminiature components.



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Radio Engineering Show



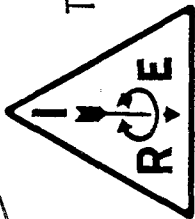
At both the Waldorf-Astoria (convention headquarters) and Kingsbridge Armory, you'll attend what actually amounts to 22 conventions fused into one. Hundreds of scientific and engineering papers will be presented during the many technical sessions, a large number of which are organized by IRE professional groups. You'll meet with the industry's leaders—enjoy the finest meeting and recreational facilities in New York.

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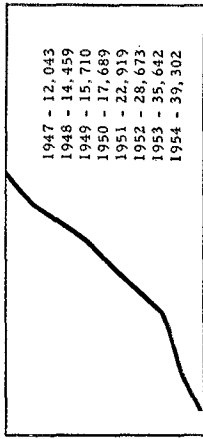
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HUDSON DIVISION

(Continued from page 84)

great guy and a grand gentleman." He has three rigs (kw. each) which he usually runs at 160 to 350 watts, has been on the air for 25 years, and has never worked a minute of 'phone. ITP's nineteen-year-old daughter was taken to the hospital for an emergency operation on Christmas Day but is now OK. JJK is buying a new house and the moving and reinstallation work may keep him off the air for a couple of months. WJO operated his station in a booth at a Crafts Exhibition and ran up some nice traffic totals. MLR sold the HT-20 and Matchbox and now runs 650 watts 'phone and 850 watts c.w. to a BC-610E. NEJ finally moved into the new quarters at the Game Refuge and now boasts of a 3 1/2-wave antenna on 75 meters hitched to the top of a 100-ft. fire tower. DAP wants information on the Great Lakes Net. Anyone got it? NDG is a newcomer to both QMN and THN and says he enjoys both. By the way, any of you fellows who are home at noon are missing out on lots of traffic on THN, 3663 kc. every day at noon, if you haven't checked in. The first official meeting of the new Holland Area Radio Club was held Dec. 9th in the Red Cross Office at Holland. Officers elected were GCW, pres.; and NYA, secy.-treas. Traffic: (Dec.) W8QAH 512, NUL 509, NOH 463, LLP 306, SWG 250, RTN 236, JKK 160, ZLK 144, WVL 139, WLO 122, QIX 109, URM 102, PHA 91, FX 79, DSE 76, MLR 69, INF 47, AUD 43, NEK 40, IV 38, DAP 30, NDG 25, OQH 24, OT 23, DLZ 18, PHM 15, HKT 14, TBP 12, MEX 8, ZHB 8, EGI 6. (Nov.) W8RTN 208, PHA 94, QOQ 34, NEJ 26, TBP 21, PDF 12, PHM 2.

OHIO — SCM, John E. Siringer, W8AJW — Asst. SCMs: J. C. Erickson, 8DAE; W. B. Davis, 8JNF; and O. V. Bonnet, 8OVG. SEC: UPB. RMs: DAF and FYO. PAMs: EQN and HUX. BPLs were plentiful for December as ARO, FYO and RO each qualified for the third and last leg of their BPL medallion awards. HNP and QHW each made his first BPL award. New appointees are SOL as EC, IVE as OBS, and VTF as ORS. A regrettable typographical error appeared in January QST. It was GL who passed away and not DL. New West Park Radiop officers are ZEU, pres.; OPX, secy.-treas.; PKB and AGA, trustees. AJH reports that ILZ has been the standout mobile in the Cleveland Area transmitter hunts. GZ claims 105 countries on s.s.b.c. SPU has worked about 200 mobile stations. OSD is working portable in Delaware, Ohio. WE's XYL, OTK, has received her General Class license and is trying for her last eight states for WAS. ROX made 407 FD contacts with 30 watts and an indoor antenna. ZAU is operating portable in New Mexico during February. GDQ worked LU3EL, YV5DE, and VP4JZ on 160 meters, along with a couple of Gs and a VO. DSX, mgr. of 8RN, reports Ohio was represented 40 times during December. An additional December appointment was QES for KQY. HFF, Acting EC for Lucas County, reports that NBD was the winning mobile in the December 160-meter hidden transmitter hunt. Novices H8J and RTA are twin brothers in Canal Winchester. W8R0CG took his General Class exam in December. TPM is ex-8ASE. The Dayton *RP Carrier* reports that new DARA officers are GQ, pres.; RCA, vice-pres.; MDK, secy.; DHJ, treas.; OVG and ZOF, board members. The DARA Christmas Party was held Dec. 18th at the Albatross Club. PPH handles the Monday C.D. Net and the Patterson High Radio Club has elected KQY as president. The GCARA *Mike and Key* tells us beginners' code classes are held on Tue. at 7:30 p.m. and theory classes follow at 8:30. Cincy's OVARA *Elmer* Wares states that the Club SS score hit pretty close to 1,800,000 points. Springfield's Q-5 reports that new officers are WXG, pres.; KQW, vice-pres.; DCJ, secy.; OKB, treas.; and ENS, editor. The FHARA *News Bulletin* mentions that new amateurs in the area are PNZ and QJH; the IUVs have acquired a brand-new baby daughter, and IZT has taken over as Hamilton's leading DX man. The Columbus *Carascope* informs us that RHY lost his one and only appendix; MRC and OMY are knocking off a bit of rare DX; and the Club's Christmas Party produced a husky and happy turnout. Toledo's *Shack Gossip*, edited by those lovely ladies HUX and HWX, relates that YAZ and VQP have moved to 2 meters, NBO and PXO have started on 160 meters, 9YEL was the first W9 to receive the WTO Award, JOR has a new 44-ft. vertical, ABE has returned to c.w., and ERH has become reactivated. Eastern Ohio *Ham* *Flashes* reports that NYZ has moved to California; TTQ and TTX are new Novices in Hubbard; EK is Radio Officer for Area 3 Control Center, while DUX is his assistant; NDB is president of Warren Harding High's radio club; NXX has procured a Viking II; and GST has moved from Youngstown to Canfield. Those Dayton F.M.T. wizards, HB, YCP, CUJ, and GQ, again topped the Ohio section. Traffic: (Dec.) W8FYO 994, ARO 926, QHW 562, DAE 381, FPZ 238, LHV 224, RO 221, HNP 217, IFX 151, AMH 144, MQQ 141, DG 83, AL 78, SRF 58, LMB 43, GDQ 38, LZE 37, AJW 36, GZ 34, HFF 24, BEW 22, QIE 20, TLW 20, ROX 19, KTH 16, EQN 13, AJH 12, WAE 12, HUX 10, WE 10, CRA 8, NQQ 8, AEU 7, MGC 7, DL 6, ET 6, HFE 6, PBX 6, BLS 5, CSN 5, DMD 5, HFR 4, IAY 4, OQP 4, WJB 4, TJD 3, AYR 2, HPP 2, KDY 2, KXN 2, LER 2, LVW 2, WYL 2, BZD 1, PM 1. (Nov.) W8EQN 20, WE 14, ZAU 13, ROX 7, SPU 2. (Oct.) W8ZAU 4.

EASTERN NEW YORK — SCM, Stephen J. Neason, W2ILI — SEC: RTE. RM: FYC, PAMs: GDD and IIG. It gives me pleasure to announce the appointment of LEL as Asst. SEC. Don is well qualified for the post and will be of much help to RTE, our very busy SEC. QJV has a converted AP-13 going on 430 Mc. Newly-elected officers of the SARA are YIV, pres.; ZBY, vice-pres.; GRI, secy.; K2HON, treas.; NZE, K2AXY, and K2CKS, directors. GFH and BKW are on the sick list. We hope for a speedy recovery. APF and family are touring Europe by air. K2BKU has an 813 final going on 3.5 and 7 Mc. WVK is the new EC for Schenectady County. Frank also is NCS for the Schenectady AREC Net each Sun. at 1400 on 3925 kc. K2BSD handled stacks of Christmas traffic. GYV moved to a new QTH in the Town of Colonie with enough room for stacked rhombics, he says. YIK moved to Syracuse recently. RMM has the s.s.b. fever. He is testing a newly designed s.s.b. exciter. KN2JTY, manager of the MHT Net, urges all Novices to be sure and call in on 3716 kc. Net, at 1300. If you don't have a crystal, drop Pete a line. K2ANL has 120 watts on 29 Mc. mobile. K2EOM is Acting RO for Peekskill. KN2HQW has a new sixteen-element beam on 144 Mc. ILL is the new RO for Dutchess County. K2EHI was awarded a Section Net certificate for activity on NYSEPN. K2GCH works DX on 144 Mc. with the family TV antenna. The IBM Club Christmas Party was an FB affair with many visitors present, including 20 from Peekskill. Gifts were exchanged, prizes were awarded, and refreshments topped off the evening. Please check your appointment expiration date now. Traffic: (Dec.) K2EQO 41, EHI 26. (Nov.) K2BJS 24, EQQ 32, BE 30, W2GDD 27, K2EHI 26, W2LRW 26.

NEW YORK CITY AND LONG ISLAND — Carleton L. Coleman, W2YBT — Asst. SCM: Harry J. Dannels, 2TUK. SEC: ZAI. PAM: JZX. RMs: VNJ and LPJ. ZAI reports AREC activity at its peak with successful drills held by the Staten Island and Brooklyn groups. Nassau EC, FI, lists more than 56 stations reporting weekly on the Mon. evening 144-Mc. net, with an additional 28 stations active on Thurs. evening on 40 meters. A busy December was had by the section's traffic gang with a record total of 10 BPL winners. Note KEB's total of 2097, followed by OM, KFV, and LPJ's fine total, and JOA's one-week BPL effort while enjoying college holidays. K2CQP is the new manager of TAN. VNJ's son now is KN2KLC. BO now is using a two-element beam on a 40-ft. pole for 14-Mc. overseas traffic. ABE, with three traffic-handlers, made BPL. K2ABW and his Dad, IHE, finished the 250-wattter which was Army's Christmas present. K2HID is building a radio-controlled airplane. D8C has a Collins Auto-tune KW. New officers of the Lake Success RC are GWD, pres.; DLO, vice-pres.; and QAN, secy. BMK received WAS and is planning 75-meter operation. A certification of the Tuboro Club still is awarding a certificate to any station working 5 members. New Tuboro Club officers are AZY, pres.; END, vice-pres.; LCK, secy.; MES, treas.; and IAG, financial secy. K2IBET is mobile with Stancor and broad-band converter. JBP returned from Guam and then left to work in W6-Land. K2s HVK and JEB are new ORS. Officers of the Levittown RC for the new year are AEV, pres.; K2GXL, vice-pres.; JUN, secy.; and K2CFB, treas. The North Shore RC plans an s.s.b. net for the high end of 20 meters. GDJ is on s.s.b. with 10A and 807s. K2AMP now is handling traffic with the NLI Net. K2GXL and his XYL, KN2IBI, are active on 144 Mc. JZX now is an honorary member of the Broadhollow RC. K2KIX, formerly the Republic Aviation RC. New officers of the L. I. unit of the YLRL are KN2EBU, pres.; KAE, vice-pres.; K2CFF, secy.; JZX, treas.; and UXAI and KN2JHQ, trustee. The Fordham RC is giving classes in radio theory at 7 p.m. on the 1st and 3rd Fri. The Northern Nassau RC has elected the following officers for '55: CJY, pres.; CNN, vice-pres.; YML, rec. secy.; DUO, corr. secy.; and ADO, treas. YHP increased 144-Mc. power from 1 to 15 watts in preparation for the V.H.F. Sweepstakes. K2HYK is increasing power on 80 meters to 45 watts. EEN has been active in all contests since returning to the air. K2AAM is building 144-Mc. receivers. The Hudson Division Convention, under the sponsorship of the FLIRC, is scheduled for June at Long Beach with K2EF acting as chairman. Wantagh RC officers are UGO, pres.; ELK, vice-pres.; and K2DRD, secy. GYL has added a new SX-88 for DX hunting. RB has a Johnson Viking II and VFO. GG is planning some aero-mobile operation for summer. K2HML has moved to New York City. On Nov. 27th meetings of the ACARC and the College Net were held in New York City. Twelve different colleges were represented at the College Net meeting. This Net meets on 3895 kc. Thurs. at 1600 and Fri. at 1515. Please continue mailing reports to TUK. Traffic: (Dec.) W2KEB 2097, KFV 1608, LPJ 1025, VNJ 912, BO 828, K2CQP 775, W2JXA 706, AEE 466, MUM 276, JGV 223, K2ABW 151, W2JZX 139, K2AMP 112, W2IHE 84, K2CRII 69, W2IVS 48, OME 46, K2HID 32, W2DSC 31, GP 31, IN 20, K2UMV 20, W2LKG 14, PF 14, OBU 13, TUK 5, K2AEL 4, HYK 4, W2OKU 3, MDM 1, K2GZE 1. (Nov.) W2AEE 86, K2AED 9, W2BAM 6, MDM 1. (Oct.) W2MUM 121.

(Continued on page 92)

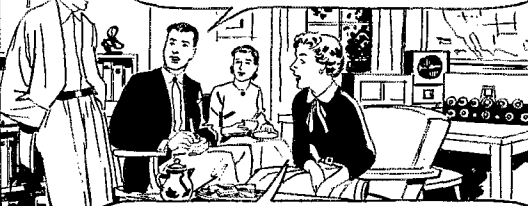
Thanks for that 5 by 9 plus, Algiers! WE'RE USING A VIKING II HERE!



THIS IS A SWELL LAYOUT, PETE. WISH I COULD MOVE MY SHACK OUT OF THE BASEMENT.



GEORGE, WHY DON'T YOU UNSCRAMBLE YOURSELF FROM THAT "HAYWIRE" AND BUILD UP A PROFESSIONAL LOOKING VIKING II LIKE MINE? I REALLY SHOULD. THAT VIKING HAS EVERYTHING I WANT. ITS BANDSWITCHING WITH PLENTY OF POWER, TOO!



YOU COULD PUT A NEAT LOOKING STATION LIKE THIS IN OUR DEN, TOO!



THIS IS THE WORLD FAMOUS VIKING II...THE CHOICE OF JUST ABOUT ONE OUT OF EVERY FOUR AMATEURS.

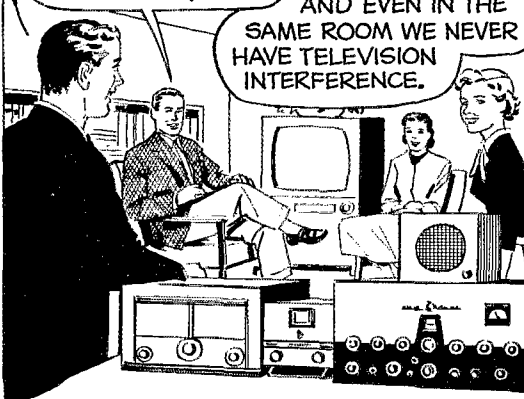
BOY! THIS KIT IS SURE COMPLETE! IT INCLUDES EVERYTHING FROM THE WIRING HARNESS TO THE PUNCHED CHASSIS...AND THOSE STEP-BY-STEP INSTRUCTION PICTURES...AND IT CERTAINLY WAS ECONOMICAL, TOO!! MAKE IT A CINCH TO WIRE.



THAT'S WHAT I WANT. IT'S PROFESSIONAL IN APPEARANCE AND DESIGN AND IT'S PACKED WITH FEATURES.

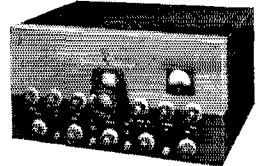
LIKE? I'M REALLY SOLD ON THE VIKING'S PERFORMANCE! GEORGE, IT'S GREAT!! I SEE YOU TOOK MY ADVICE AND GOT A VIKING VFO, ALSO.

AND EVEN IN THE SAME ROOM WE NEVER HAVE TELEVISION INTERFERENCE.



VIKING II TRANSMITTER KIT

- 10 Thru 160 Meters
- 180 Watts CW Input
- 150 Watts Phone Input



Available wired and tested, with tubes . . . or as a complete kit, the Viking II is today's most popular amateur transmitter.

Cat. No. 240-102. Complete with tubes, less crystals, key and mike. **\$279.50**
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Please send me a copy of Catalog No. 714, containing a complete written and pictorial description of the Viking II.

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Model DKC



Special connector protects your receiver from R.F. during transmission (Optional).

Silent AC magnet prevents hum modulation of carrier—AC types guaranteed as quiet as DC.

Transmit contact-pressure over 75 grams, making the 1000 w. rating very conservative. Causes negligible change in SWR up to 100 Mc.

1000 WATTS
Length 4 1/2",
width 3 7/8"

DKF2 rigid adapter for external chassis mounting, \$1.85



AC types (All volt.) Amateur net.....\$10.50
DC types (All volt.) Amateur net..... 9.50

See your distributor. If he has not yet stocked Dow Co-axial relays, order from factory. Send check or money order or will ship COD. Prices net FOB Warren, Minn. Shipping Weight 9 oz. Dealers' inquiries invited. Literature on request.

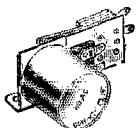
Add \$1 for external switch (Optional)

Add \$1 for special receiver protecting connector (Optional)

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MIDGET ALL-PURPOSE POWER RELAYS BY DOW



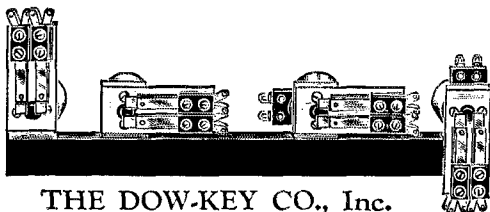
Model DKP

... a new class of relay
for Radio and Industry

DKP

This new midget power relay combines features of midget open type relays and the rugged power types, ideal for small space.

Silent as a DC relay, rated at 25 amps non-inductive load at 110 V... mounts easily under a 1 1/2" chassis... carefully engineered for control circuits, motor starting... quiet, rugged... linkage and lost motion eliminated by direct magnet thrust... this versatile relay solves mounting problems; easily changed mounting foot allows combinations for chassis, bank or rack mountings... heavy leaf springs and 3/16" coin silver contacts with operate time of 2 to 5 milliseconds put the DOW Midget All-Purpose Power Relay in class by itself.



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NORTHERN NEW JERSEY — SCM, Lloyd H. Manamon, W2VQR — Asst. SCM: Charles Teeters, K2DHE, SEC: IIN, PAM: CCS, RMs: EAS, CGG, and NKD, CFB is building a pulse transmitter for the 3500-Mc. band. The Irvington Radio Amateur Club is conducting code and theory classes the 2nd and 4th Mon. of the month for Novice and General Class tickets. Classes are under the direction of WFK. Prospective hams in the area are invited to attend these classes at the club rooms in the Irvington Community Bldg. HXP is working on RACES projects. K2CHI is experimenting on new antennas. K2BWQ has received his second MARS citation for exceptional participation for the month of November. His daughter Barbara, K2CLC (AA2CLC), age 16, became the youngest MARS member in the U. S. on her birthday Dec. 9th. Barbara and her dad now become the first father/daughter team to be registered in MARS work. EAS has been away from the home QTH for the past two months in connection with his work with United Air Lines in the communications field. NIY has received BERTA certificate. HXU is having his troubles with TVI. VYB was home on leave over the holidays. KBO has been laid up in the hospital for some time. We all wish you a speedy recovery. OMI, K2GBP is building a new base station now that the mobile transmitter is in good shape. K2EKO and GRU are busy chasing DX. BRC is on low power on 20 meters while the new rig is being built. The Windblowers VHF Society held a hobby party at the home of NUL. K2EDQ is a new OO. K2DSV is temporarily QRL because of attending school at RCA. However, during the holidays he had a few minutes spare time and ran up a traffic total of 411. K2GAS is a new ORS. K2EUN made BPL for the first time. KN2JOM has moved to North Brunswick. K2BAY confesses he never should have monkeyed with his sky wire. As a result his heaters have not been warm since Nov. 17th. K2BWQ has added a new tape recorder to his station. The Livingston Amateur Radio Club is sponsoring a building program on s.s.b. excitors. Much credit to the promotion of s.s.b. activity within the club is due 4CCU (ex-2NJR) and 2ICA. The s.s.b. group shortly will conduct an on-the-air net on 75 meters. Currently active on s.s.b. are BWN, CCF, COT, GBT, ICA, IID, NRQ, and ORX. Annie, the YL operator at K2ICE, has acquired the name of "Hurricane Annie." Thus stemmed the new Hurricane Net in Monmouth County, which meets nightly, with Annie at the helm, on 144 Mc. K2HNA is heard on the air from K2DHE's QTH. ENM is the proud possessor of a new 4-250A all-band final. NIE has a unique omni-directional 144-Mc. beam. This all happened when the brake failed on the Gordon Rotator. We think the beam still is spinning atop the 100-ft. tower. FC is heard regularly on 144 Mc. with his new Gonset. OUS is mobile on 144 Mc. all over the county. Tune in any time and you will hear him on the road combining business with a little hamming. K2CTL is building a new mini-beam for 14 Mc. Traffic: (Dec.) K2EUN 602, DSU 411, W2CQB 331, K2GAS 329, W2EAS 171, K2GFX 118, W2EPM 56, K2BWQ 41, W2CJX 14, K2CHI 6, GER 6, KN2JOM 6, W2NIY 6, HXP 5, CVW 1 (Nov.) W2EAS 123, K2CHI 4, W2CFB 4.

MIDWEST DIVISION

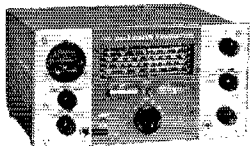
IOWA — SCM, William G. Davis, W0PFP — Iowa ended 1954 with the most reports to the SCM and, I believe, the biggest traffic total since I have been SCM. SCA earns his 48th BPL with his biggest month. Doc has been disabled from a fall while fixing his antenna. I must award 4 BPLs this month and a near miss by CZ. QVA reports: YBK has rejoined TLCN. UTD is a new member of the Net. DDV is our new SEC, succeeding VRA. HMM climaxed his class by giving the exams to 9 students, ranging in age from 10 to 60 years. QVA gave the Novice Class test to a 13-year-old Burlington lad. VYH has gone to I.S.C. for the spring term. Section Net certificates were awarded to KVJ and LGG, the latter a YL. LJJ reports for the Muscatine Club: BGN is on 2 meters. VRD worked 16 states on 2 meters with 5 watts. LIG has returned from TV school in Chicago. LJW is reporting from Davenport. HMM's radio class is doing very well. CGY continues his DX on 80-meter e.w., including Midway I. RKT and PIE are going great guns on mobile. LJW reports December was his best month for traffic. He's using a vertical antenna. Santa brought BLH a new Johnson Match Box which he intends to use on a 40-meter vertical. The Waterloo Club threw a Christmas Party for the XYLS. BBZ was home on leave but is back on the USS Rochester. It is now time to think of your nominations for SCM. Please consider carefully and get your nominations in. I will not be able to accept again because of a change in my work status. Traffic: W0SCA 3271, BDR 3156, PVO 931, LCX 766, CZ 419, LJW 224, QVA 86, BLH 78, KJZ 67, NGS 34, RMG 26, HWU 13, DDV 12, NYX 12.

KANSAS — SCM, Earl N. Johnston, W0ICV — SEC: PAH, RM: KXL/NIY, PAM: FNS. A new club known as the Wheat Belt Radio Club, with headquarters at Herndon, Kans., was formed Dec. 12th with 19 licensed amateurs; 20 XYLS, jr. operators; etc.; and 3 SWLs attending. Officers are UOL, pres.; QHE, vice-pres.; FVD, secy.; KDW, treas.; UTO, activities and entertainment. The KVCRC of Topeka

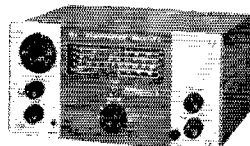
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System Engineering

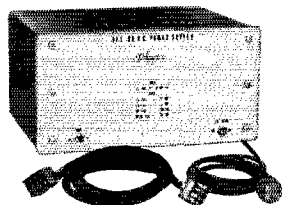
IN *Harvey*-WELLS EQUIPMENT



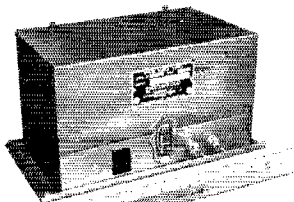
T-90 Bandmaster Transmitter



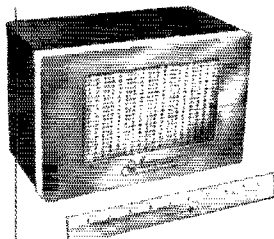
R-9 Bandmaster Receiver



APS-90 Power Supply
(115 V. A.C.)



VPS-T90
Mobile Power Supply



Speaker for
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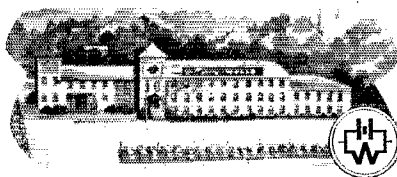
Here at Harvey-Wells, we make communications systems for military and commercial applications, and we believe that Hams too, want their stations complete in every respect. That's the basic thinking behind this new equipment we are introducing. The tremendous success of our TBS-50 Bandmaster has been due in part to the fact that it can be put on the air quickly and efficiently because it is a complete "package" with no additional equipment necessary.

Our new T-90 Bandmaster Transmitter is also a complete "package". It can be on the air five minutes after you bring it home if you so desire, just plug in the power supply and connect the antenna. Our new R-9 Bandmaster Receiver, in its matching case, becomes an integral part by simply connecting the antenna to the T-90.

For fixed station operation, we offer the APS-90 A.C. Power Supply in a cabinet to match. (Just connect to 115V A.C., plug the output cable in the rear of the T-90 and you are ready to go.) The R-9 Bandmaster Receiver has a built-in A.C. supply. For mobile operation we have two vibrator power supplies, the VPS-T90 for the transmitter, and the VPS-R9 for the receiver. Both are convertible for 6 or 12 V operation.

Speakers for either fixed or mobile operation are matched electrically and physically to the R-9 Bandmaster Receiver to complete the system. This new Bandmaster Series is a complete system, engineered for fixed, mobile or portable operation — a system which has beauty as well as efficiency. It's well worth waiting for.

P.S. We are still making the world-famous TBS-50 too!



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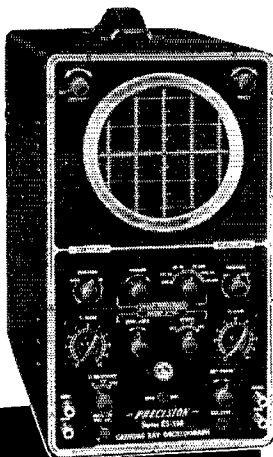
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PRECISION-Engineered in response to the demand for a low cost, FACTORY-wired FACTORY-calibrated and FACTORY-guaranteed 'scope . . . the new ES-520 fills an important need for every well-equipped ham shack.

SPECIFICATIONS INCLUDE :

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- ★ 3-Step, frequency-compensated, vertical input attenuator
- ★ Vertical freq. response 20 cycles to 500 KC within 2 DB.
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SERIES ES-520: In black ripple finished steel cabinet 8¼ x 14½ x 16½". Complete with all tubes, including 5U1 CR tube. Comprehensive instruction manual.

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held its annual banquet and election of officers Jan. 7th at Lake Linge, choosing KKF, pres.; JLY, vice-pres. and treas.; and UPU, secy. WN6YPK and his XYL, YPL, new in Colby, have a Viking Adventurer and an NC-88. FSE has a new Eldico electronic key to help with his traffic-handling. NFX has time for DX as well as traffic-handling. UWV and GDH, of KCK, have new Viking Rangers, as does GTU and ICV, of Topeka. GDH has been QSOing friends he visited in the Caribbean last year. MOX has completed 150-watt final for 6 and 2 meters. SIK, of Topeka, is a newcomer on 2 meters with 15 watts to a 2E26. YUH, of KCK, now in Lawrence, is a new 2-meter station there. The KVRCS debut on W1BW-TV brought in lots of fan mail and requests for additional shows on amateur radio, which will be given about every six weeks on different phases of our hobby. YJU is YFE's week-day station in Ottawa. BLL, NIY and SIG made BPL Traffic: W0BLL 1320, NIY 480, SIG 223, UAT 172, MXG 163, FSE 151, EOT 97, BET 96, TOL-90, ABJ 78, UNV 58, SVE 53, WXT 41, VZM 40, PBU 39, FDJ 30, KSY 30, ECD 27, TNA 27, NFX 26, LBJ 22, REP 18, LOW 17, ONF 17, VBQ 17, YJU 17, KAJ 13, SBL 10, LIX 9, SAF 8, DEL 6, QMU 6, YFE 6, ICV 4, LQX 4, MLG 2, RXM 2, VGE 2.

MISSOURI — SCM, Clarence L. Arundale, W0GBJ — SEC: VRF. PAM: BVL. RMs: OUD and QXO. New officers of the Ferguson High School Radio Club are RUK, pres.; TGD, vice-pres.; PWN, secy.; PWO, trustee. SMARC elected NHO, pres.; FGS, vice-pres.; PLR, secy.; BPD, treas.; and QWS, act. mgr. The HARC elected the following officers: NDS, pres.; HJC, vice-pres.; RDI, secy.; and TLV, treas. 9CXI has retired from the Army and is located in Springfield. FLN has installed a 10-20-meter beam, and is conducting code and theory classes for prospective hams. SAK has acquired an NC-173. TGC has a new 10-meter beam. TCF modified his TBS-50D to work all bands with a Heathkit VFO. TWL is installing a new beam and building a 250-watt final. OIV has a new Heathkit VFO. HUI has earned the 2500 Traffickers Club certificate. QMF reports a 2-meter emergency net is being formed to connect with St. Louis. CPI has earned his 27th consecutive BPL certificate. WN8UVH has worked 25 states in the past five months. SUV's automobile accident kept him from being very active during December. WAP is giving A-3 a try with low power. BVL reports EBTN handled over 1200 messages during December. QXO reports KOMU recently carried a very fine ham program. HUI is building a new modulator for his final. BPL certificates were earned by BVL, CPI, FLN, GAR, GBJ, IJS, and KA. Traffic: (Dec.) W0CPI 2402, GAR 1030, BVL 567, CFL 448, IJS 420, KA 325, GBJ 306, FLN 216, ETW 119, OMM 114, OUD 106, CKQ 95, TCF 86, HUI 77, BZK 73, SAK 63, WAP 53, VPQ 42, EBE 41, KIK 32, ECE 27, BUL 25, RTW 21, SUV 20, TSZ 17, RTO 16, TWL 12, SOZ 11, MPB 10, QMF 10, TGC 10, VFP 10, NHO 7, OIV 7, DFK 5, LMK 5, QXO 4, VTF 2. (Nov.) W0QXO 252, IJS 90, TWL 5, TCF 1. (Aug.) W0ETW 4.

NEBRASKA — SCM, Floyd B. Campbell, W0CBH — Asst. SCM: Tom Boydston, 0VYX. SEC: JDJ, NCS RM; HTA. PAM: EUT. DQN has a two-element beam on 15 meters. GDZ is EC for Sidney and DQN is Asst. EC for Potter. K0AIR's total traffic for 1954 was 25,834. K6HIA (ex-W0IXL) has been QNI Nebr. C.W. Net regularly. RNH is on the ball for traffic-handling. The following are alternate NCS for Nebr. C.W. Net: Sun. — RNH, Mon. — ZJF, Tue. — KDW, Wed. — FTQ, Thurs. — FQB, Fri. — RDN, Sat. — JDJ. The Net meets daily on 3525 kc. at 1845. New members are welcome regardless of code speed. LJO and NZ are regular reporters for the net with FTQ and RNH as new additions. RHL is having trouble finding a suitable antenna for his Nebraska kw. transmitter. TQD would rather work mobile than fixed. CDL has a signal slicer. New officers of the Ak-Sar-Ben Club for '55 are QMD, pres.; Dick Eilers, vice-pres.; NMN, secy.; NRS, treas. FQB is learning to dip with his Christmas grid-dipper. With 20 hours of operation in the 1954 SS, EHF QSOed all 73 ARRL sections, all 48 states and D. C., all Canadian districts, Hawaii, West Indies, Alaska, and the Canal Zone. ATU is on s.s.b. with 304-TL final and Lakeshore Exciter. Traffic: (Dec.) W0TQD 2348, K0AIR 2279, W0RDN 451, ZJF 343, FQB 217, AFM, 164, HTA 153, BUR 82, KDW 74, RNH 70, FTQ 59, MAO 59, FMV 37, JHJ 32, VYX 32, ERM 29, EGQ 28, QHG 19, FXH 16, PDJ 16, BEA 14, K6FBD 14, W0DQJ 13, QJH 12, QMZ 12, HXH 11, HQN 10, OFL 9, DDP 8, DJU 8, SQA 8, CBH 7, KFY 6, NIS 6, OCU 6, PQP 6, GVA 5, NGQ 5, CII 4, OOX 4, RMO 3, IRW 2, KLB 2, LWK 2, PPT 2, PZH 2, QVV 2, THX 2, VAS 2. (Nov.) W0RDN 249, VYX 33, DQN 4.

NEW ENGLAND DIVISION

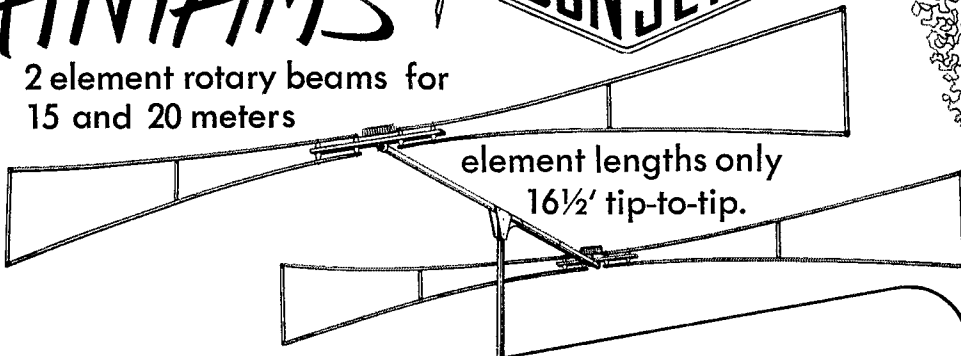
CONNECTICUT — SCM, Milton E. Chaffee, W1FFW — SEC: LKF. PAM: LWW. RM: KYQ. MCN and CN 3640 kc., CPN 3880 kc., CTN 3640 kc., CEN 29,580 kc. A report from KYQ shows CN handled a total of 339 in 26 sessions averaging 13 per session, with KYQ, RGB, and LV on the QNI Honor Roll. MCN pushed 249, averaging 9.6 per session, with QNI honors to RGB having perfect attendance and YYM and LV following closely. MCN and

(Continued on page 96)

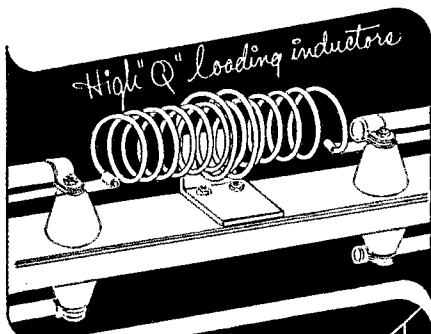
BANTAMS *by*



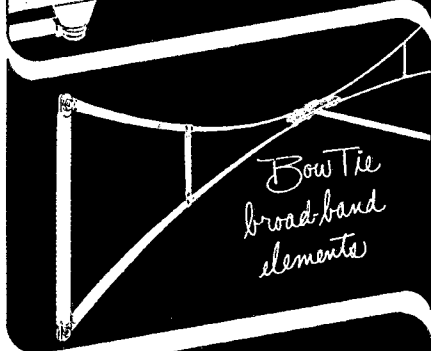
2 element rotary beams for
15 and 20 meters



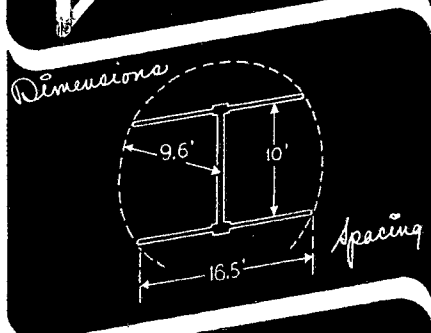
element lengths only
16½' tip-to-tip.



High "Q" loading inductors

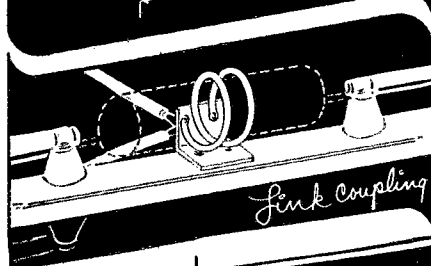


Bow Tie broad-band elements



Dimensions

Spacing



Link Coupling

Designing and producing an effective shortened beam, such as the GONSET Bantam, requires skillful engineering and adequate measuring equipment...not intuition

There are certain "Musts". The wholly outstanding performance of the great many Bantams in use today is attributable to many things:

- (1) The very high "Q" coils used in parasitic and driven elements. Silver plated, copper tubing, self-supporting. . .secured only at the ends with highest grade ceramic insulators. Observe that these coils are of ample diameter, that no phenolic or ceramic form is used. For this reason the GONSET Bantam is unaffected by weather. COMPARE these inductors.
- (2) The Bow-tie elements which provide additional antenna surface area, semi-broadbanding. VSWR therefore remains at reasonable limits within a given phone or C.W. band. . .does not immediately soar as you move frequency. COMPARE these elements.
- (3) The effective link-coupled line-to-antenna system permitting use of 52 ohm coax line. . .providing excellent line match and low SWR. . .symmetry in the form of a balanced antenna pattern. The link is "stuffed" for reactance cancellation.
- (4) GONSET does not publish gain figures on the Bantam since these are meaningless unless the reference is clearly and cleanly tied down so that everyone is talking about the same thing. Hundreds of tests conducted under carefully controlled conditions do indicate that the losses in the Bantam have been reduced to a point where performance, including gain and F.B.R. approaches that of a full-length beam. . . IN ALL KINDS OF WEATHER!

These are sound reasons, theoretically correct, readily verified. They are the reasons why you should select a GONSET Bantam for 15 and/or 20 if lack of space. . .and a desire for DX. . .is your problem.

20 METER BANTAM BEAM net 59.50

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ON HAND for his service needs in the Triplet Model 666R pocket size VOM

TRAVELING LIGHT, too, on expense

Model 666R is only \$26.50 net

Enclosed selector switch of molded construction keeps dirt out. Retains contact alignment permanently. A Triplet design representing the culmination of a quarter-century of switch making experience. Unit construction—All resistors, shunts, rectifier and batteries housed in a molded base integral with the switch. Eliminates chance for shorts. Direct connections. No cabling.

Precision film or wire-wound resistors mounted in their own separate compartment—assures greater accuracy. Four connectors at top of case, control knobs and instrument are all flush mounted with the panel.

3 1/2" 0-200 Microammeter, RED • DOT Lifetime guaranteed. Red and black dial markings on white. Easy to read scale.

Pre-calibrated rectifier unit. Batteries—self-contained, snap-in types, easily replaced.

RANGES
D.C. VOLTS: 0-10-50-250-1000-5000, at 1000 Ohms/Volt.

A.C. VOLTS: 0-10-50-250-1000-5000, at 1000 Ohms/Volt.

D.C. MA: 0-10-100, at 250 M.V.

D.C. AMP.: 0-1, at 250 M.V.

OHMS: 0-3000-300,000 (20-2000 center scale).

MEG OHMS: 0-3 (20,000 Ohms center scale).

(Compensated Ohmmeter circuit.)

Also available—Model 666-HH Pocket VOM, Net \$24.50.

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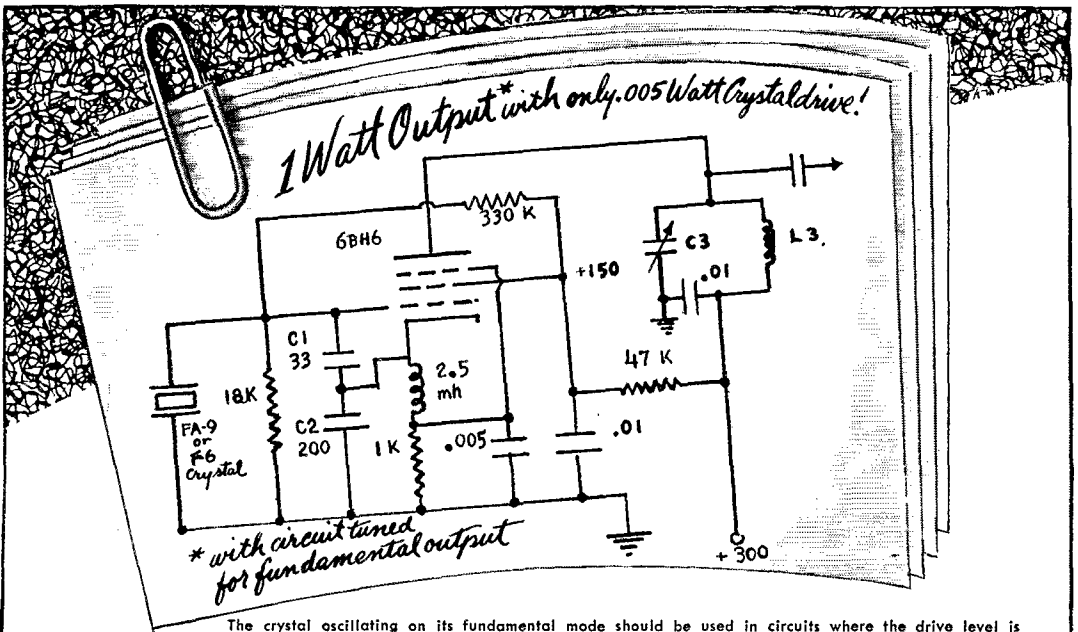


CN provide both morning and evening sessions for ORS to justify their appointments. UIZ furnished the only OES report, telling of 144-Mc. activity and schedules. EDA is active and looking for Alaskan contacts. FJH is the new EC for Bridgeport. EOB reports heavy traffic as he returns from Florida. WNH expects to resume activity when the kinks are out of the equipment. BGP came up with news from the Bridgeport Area: BSE received his General Class license, CRX is a new Novice, SARA has given 11 license exams and conducts code class Tue. nights, MFT showed slides of his recent visit to an SARA meeting. WAV is off to Florida. ADW is busy with c.d. activity but is back on 80 meters as well. GVJ is a new resident of Oakdale and wants OPS appointment. He is teaching at New London High School. RAN managed some time for the SS during a vacation from W.P.I. TD has a new antenna and is working on the big rig while his Official Bulletin schedule is maintained on 146 Mc. CUH has a new 813 final completed and is working on power supply and filter for expected TVI. BDI still is active on RTTY and resuming work on the new final. BFS got all December traffic from the West Haven Veterans' Hospital, where his wife is a volunteer helper. JW reports all his activity is in the v.h.f. region and mostly with c.d. WEE is having trouble getting out with his short antenna but is trying. Thanks to BVB and GIX for OO reports this month. RLN and EJH are new ECs, while RRE and JW renewed appointments. EDA is a new ORS, with renewals by BFS, WPR, ADW, and ZL. Traffic (Dec.) W1YBH 349, KYQ 259, AW 205, CUH 189, BDI 165, YYM 155, LIG 133, RGB 108, LV 100, EFW 99, BVB 76, HYF 58, QJM 51, RFJ 42, KV 28, NEK 26, BFS 19, UED 17, EDA 12. (Nov.) W1CUE 160, TSZ 100, EDA 23.

MAINE—SCM, Bernard Seamon, W1AFT—SEC: BYK, PAM; WRZ, RM; OHT. The Pine Tree Net meets Mon., Wed., and Fri. on 3596 kc. at 1900 hours. The Sea Gull Net meets Mon. through Fri. on 3940 kc. at 1700 hours. The Barnyard Net meets Mon. through Sat. on 3960 kc. at 0730 hours. Flash! BTY made the *Portland Press Herald* with a fine picture and a well-written story concerning his valued service to ham radio. ZMO has enlisted in the Air Force and is attending OCS at Wichita Falls, Tex. 6MSH, at Loring AFB, sends an FB letter reporting on activities at K1FCF. With two rigs, a 32V-2 and a BC-610E, and two receivers, a 75A-2 and a BC-342N, Dick and Alan, CEJ, have worked 30 countries. There are a number of other stations active at Loring, also. All the little PTLs were home for Christmas. RWB, formerly of Richmond, now is on 75 meters from his new QTH in Groton, Conn. Three new OBS appointees in Maine this month are JIS, TBZ, and WTG. Your SCM lost his sky hook because of a tired guy wire. VV is on the air from his trailer home in Bingham. The SCM ran into CV in Portland recently. Joe is planning to get back on 75 meters soon. The new EC for the Kennebec Area is UOY. Traffic: K1FCF 284, W1WTF 282, LKP 127, YVW 84, UDD 80, UZR 68, VJE 28, WRZ 25, EFR 18, BX 13, AFT 9, RJJ 8, TWR 8, ED 4, KBZ 4, NXX 4.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALB. New appointments: WVD Norton, KEK Lynnfield as ECs; CLF as OBS and OO. Appointments endorsed: MD Hingham, RSE Whitman, MAN Marblehead, MME Hull, KWD Weymouth. ELM, member of Region 5 Comm. RFE Middleton, SH Dedham, FWS Milton, HRY Walsley. PYT Ipswich, as ECs; AAR, NBS, BE, and LM as ORS; AAR, GOU, MME, BB, and RP as OPS; AAR, GOU, VMD, and BHD as OBSs; CUC as OES; RQZ as OO. 6JUT, ex-IDVC, writes from San Diego that he is on 20-75-meter phone with 1 kw. s.s.b. BW, BGW, PXE, BGH, BE, MKW, and AVG took part in the November F.M.T. Radio Amateur Open House had Nelson Bragg for an entertainer and TWG gave a talk on TVI. ALP spoke at the Braintree Radio Club. New officers of the South Eastern Mass. ARA are KHV, pres.; ZPE, vice-pres.; LAZ, secy.-treas.; TZU and CNT, directors. AQL writes from 4LEV, Camp Lejeune, N. C. WCI reports that the c.d. group was called out for a bad break in a water main. LLY says that the Arlington 6-meter Net is on Wed. at 9 P.M. on 53.4 Mc. UKO received his BPL Medallion. WPW will have a Viking II. New ham section: BJX, BNZ, CNW, AJH, Novices in Waltham; CZG, CZS, DDN, D1L, DFY, and DJJ. New Tech. Class licensees: COL, CZM, and CWH. Heard on 2 meters: TYZ, ZGO, EAB, QA, ZXH, YBN, WHC, WTK, TON, ARO, ZOC, AMK, AQR, EJE, DGY, CRV, OOD, RTZ, NCO, IKK, SIV, YVB, DJA, LSR, ZHG, WIM, and BYB. QA is working at National Co. WN1AAD is on 80-meter c.w. ARG has a TBS-50D. Heard on 10 meters: HSN, 3WAT/M/M, and RKU. JIQ has a Viking II. DFS is now our State Radio Officer and BL is Alternate State Radio Officer. We are very sorry to have to announce the death of PZ, of Lynnfield. ATU is on 40-80 meters with an ARC-5. New officers of the Bedford Radio Club are KJO, pres.; SPL, vice-pres.; YFP, secy.; NAD, treas. The Club has a net on 3600 kc. Thurs. at 1815 kc. with QJB as N.C. The 10-meter Net meets on Wed. on 29,120 kc. at 1900 with DTA and NDI as NCs. KJO gave a talk on transistors. TCG lectured on instruments as used in ham radio. Meeting date is the 3rd Thurs. The Falmouth Amateur Radio Assn. elected TJW, pres.; UXG, vice-pres.; DVS, secy.-treas. TJW has a new 80-meter

(Continued on page 98)



The crystal oscillating on its fundamental mode should be used in circuits where the drive level is limited to 10 milliwatts below 10,000 KC and to five milliwatts between 10,000 KC and 15,000 KC. A circuit meeting these requirements is shown above. The circuit will operate from 2,000 KC to 15,000 KC and limit the drive level to 5 milliwatts. By making capacitor C1 variable the crystal may be adjusted to exact frequency.

The correct load capacitance of the oscillator is extremely important in operation of the crystal, if the frequency of oscillation is to be within tolerance for which the crystal was manufactured.

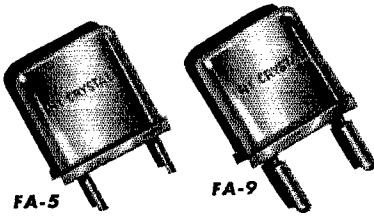
To reproduce 32 mmf precisely, lead lengths and position must be taken into account. Capacitors C1 and C2, together with tube and wiring capacitance determine the frequency. Tuned circuit C3—L3 may be tuned to the fundamental or a harmonic.

ONE-DAY PROCESSING

Spot Frequencies 2000 KC to 54 MC

Orders for less than five crystals will be processed and shipped in **one day**. Orders received on Monday through Thursday will be shipped the day following receipt of the order. Orders received on Friday will be shipped the following Monday.

.01% TOLERANCE—Crystals are all of the plated, hermetically sealed type and calibrated to .01% or better of the specified frequency when operated into a 32 mmf load capacitance.



FA-5

FA-9

PRICES

FA-9* (Pin Diameter .093) *
FA-5 (Pin Diameter .050)

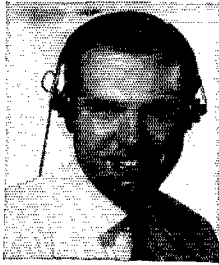
Pin Spacing .486 (*FA-9 fits same socket as FT-243)

RANGE	TOLERANCE	PRICE
Fundamental Crystals		FA-9 FA-5
2000-9999 KC	.01%	\$2.80 \$2.70
10000-15000 KC	.01%	\$3.90 \$3.80
Overtone Crystals		
(for 3rd overtone operation)		
15 MC—29.99 MC	.01%	\$2.80 \$2.70
30 MC—54 MC	.01%	\$3.90 \$3.80

HOW TO ORDER—in order to give the fastest possible service, crystals are sold direct. However, crystals are also available by special order through your local jobber. Where cash accompanies the order, International will prepay the Airmail postage; otherwise shipment will be made C.O.D. Specify your exact frequency and the crystal will be calibrated to .01% or better of this frequency with the unit operating into a 32 mmf load capacitance.

International/CRYSTAL Mfg. Co., Inc. 18 N. Lee Phone FO 5-1165
OKLAHOMA CITY, OKLA.

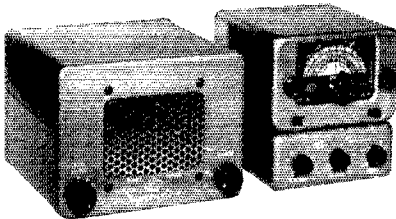
IT'S SPRING—TIME TO HIT THE ROAD!



by Bill Cummings, WTRMG

The first zephyr of spring gives us the tingles to get on wheels and shift into high gear. Naturally, we take our fellow hams along with us via a honey of a mobile rig just installed in our car. If you're planning an active mobile season, stop by and see our vehicle with a new outfit that has some features you'll find interesting. All you need is the car—we have everything else: dynamotors, filters, receivers, converters, noise clippers, squelches, mounts, loading coils, relays, cable and mikes. While we like the Gonset job featured below, we have lots of other rigs to suit your own ideas on mobile radio.

GONSET SUPER-CEIVER \$119.95



- | | |
|--------------------------------|-----------------|
| GONSET SUPER-6 | \$ 52.50 |
| ELMAC AF-67 TRANSMITTER | 177.00 |
| ELMAC PMR-6A RECEIVER | 134.50 |

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"Mini" beam. QLT has a new 60-watt VFO rig. YTA has a Heathkit VFO. The South Shore Club had a talk on transistors by A. Whitum. CLF handled traffic for many of the gang from 6ZZ during the holidays. CUC says he will be more active on v.h.f. this year. AAR has a B. & W. 5100. ZVC is C.D. Director for Norton and Asst. EC to WVD. HRY has a Viking II and Meissner 150B. RP has a Lyco 600S VFO. VJM, ex-2YAN, of Ipswich, has a Collins 32V-2, AR88, Elmac, Gonset, Tri-Band mobile. VIN, Carlisle EC, says they have 2 walkie-talkies, one mobile, 2 fixed, and 3 portable transmitters. The Wellesley Radio Club meets on the 1st Wed. of each month and has 14 stations on the 2-meter net and 3 mobile rigs. BB reports that they have their 20th crystal unit completed. ATP had a Gonset Communicator while at the hospital. LEM is on 2 meters. ZSS has his General Class ticket. The Area 1 Radio Comm. held a meeting in Cambridge with BL, CQ, QQL, ALP, OTK, IPA, and TQP present. ZYX is the new chairman; KTG is secy. HIL is on 10 and 75 meters with Elmac AF-67 mobile 'phone. New Novice calls in the New Bedford Area are DIY, DIR, and DIV. IPZ and RCJ had their EC certificates endorsed. CAM is a new ORS. Traffic: (Dec.) K1WAB 1329, W1EMG 656, IBE 606, UKO 530, LYL 270, EPE 231, AVY 97, LM 69, TY 67, UE 56, CLF 28, QLT 19, NUP 14, WPW 10, YTA 9, BY 8, HIL 2, UTH 2. (Nov.) W1QLT 9.

WESTERN MASSACHUSETTS—SCM, Arthur Zavarrella. W1MNG—SEC: CJK, RM; BVR, PAM; QWJ, WM C.W. Net meets on 3560 kc. Mon. through Sat. at 1900 EST; WM 'Phone Net on 3870 kc. Mon., Wed., and Fri. at 1900 EST with representation into C.W. Net for through traffic. New ECs are M5N, Russell, and WDK, Bernardston. SPF, Radio Officer and EC for Worcester, has a new QTH in Rochdale with able assistants AAP and JNA. RO gave a convincing demonstration of s.s.b. to GRM-ridden a.m. operators on the Sunday Morning N.E. Net (3870-0900 EST). SRM was elected a director of HCRA, Inc., and not PGQ as previously reported. UKR continues her traffic trek with BPL again this month, complete with medallion. The team of WCV and WDK are keeping KIWAV in the BP "League." HNE is back on WMN after a vacation on 20-meter 'phone. Santa and Dame Fortune presented 20As to AVK and VBG, 75A-3 to ARA, SX-88 to BKG. BYH has a new Globe Scout and MARS call. NPL recently received a QSL from Hungary dated 1951. ICY and family were featured in *Sickles Digest*. IIT and KFV are working 40-meter c.w. QXV is back on 2 meters. Also active on 2 meters are TAY, ZWL, TDS, and OY. F.M.T. results show MUN leading RLG, QGO, and JYH with an average error of only .01 p.p.m. AAM, MND, and ZEL are helping to keep WMN on top from Worcester County. LJQ is doing likewise for Hampshire. MJD, MKD, and ZEO are toying with s.s.b. and will be welcome in the WM 'Phone Net. BH and MNG got "Slicer" kits. BVR checked into the WM 'Phone Net with traffic! RAD and SRM are collaborating with veteran news hawks PIU and RRX in Zero-Beat production for HCRA, Inc. Club-sponsored license examiners are BVR, NY, RRX, VNE, IIRV, MOK, RLV, WLE, MNG, and SRM. Old-timers CND and KJB re-appeared on 10 meters. Traffic: W1UKR 652, WCG 240, K1WAV 162, W1WCC 144, BVR 107, SRM 78, MNG 62, WEF 36, TX 34, REX 31, WDK 31, DVW 19, WDW 17, BYH 14, BKG 9, UVI 6, JAH 4, ABB 3, BH 3, QWJ 2, ZEO 1, ZIO 1.

NEW HAMPSHIRE—SCM, Harold J. Preble, W1HS—SEC: BXU, RM; CRW, PAM; AXL, LVG was presented with twin-girl tax exemptions for Christmas. Concord Brasspounder officers for 1955 are SSK, pres.; RVQ, vice-pres.; HS, secy. We welcome the following New Hampshire Novices to radio: BYS, BQK, BQM, BQO, BXM, CAZ, COE, CCQ, CJE, CKE, CLY, CMV, and CFL. RCEN has openings for stations in Exeter and Hampton. ARR recently worked VP7NM on 80-meter c.w.; he also received a certificate as New Hampshire high scorer in the WVE Contest. GMH now has sky wires for all bands 80 through 10 meters. COC reports good activity and coverage on the New Hampshire Slow-speed Net, including Coos County. TBS is attending Massachusetts Radio School. Look for him on YS. POK received a new mike from Santa. CDX is trying out the Heathkit transmitter and has 5 continents so far. VES is Acting NCS of the New Hampshire Slow-speed Net Tue. New ORS appointees are ARR and VZS. TNO/1 puts out an PB signal on 10-meter 'phone on the summit of Mt. Washington and is worked regularly by stations all over New England. He has a 2-meter rig also. Traffic: (Dec.) W1GMH 217, COC 118, CDX 57, WUU 57, HS 18, VZS 12, ARR 9, FZ 8, CCE 6. (Nov.) W1CDX 302, POK 11, FZ 7.

RHODE ISLAND—SCM, Walter B. Hanson, jr., W1KKR—SEC: TQW, RM; BTY, PAM; VXC. All nets did a great job in handling the usual flood of Christmas traffic. BIS has a new Viking. BIL put up new beams with cold hands to get ready for the Sweepstakes. YKQ built and is using a cavity resonator for TVI elimination on 2 meters and reports sensational results. 4CVO/1 measured 26 parts per million in Frequency Measurement Tests. ZPH has built several 2-meter mobile transmitters and receivers as
(Continued on page 100)

FOR "40"

2 Element, 40 Meter MOSLEY VEST POCKET BEAM

- ★ Pretuned to 3 frequencies in 7 Mc. band!
- ★ 5 Db., or more, forward gain over reference dipole!
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- ★ Factory made coils wound on ceramic forms with weather-proof covers will handle full KW!
- ★ Link inductance matches 52 ohm co-ax line!

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- Element Sections and Element Supports pre-cut, pre-drilled for fast assembly.
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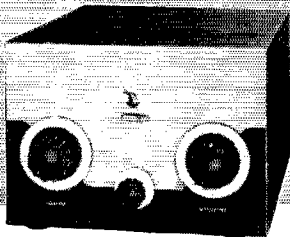
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Nominal input impedance is 52 ohms—may be used with any transmitter having 250 watts maximum power input, and a PA plate voltage not exceeding 1000 volts. Tuning and loading is easily accomplished with two convenient front panel controls—all connectors located at the rear of the unit.

Attractively finished in maroon and grey—supplied as an assembled, wired, and pre-tested unit. Complete operating instructions included. Dimensions: 9 7/8" wide, 10 1/2" deep, 7" high. Weight approximately .6 pounds.

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shown in April 1954 *QST*, and all reports are terrific. ZPG is heard on all bands with his new B. & W. New ORSs are ZXA and YAO. The PRA has been issued the new call of OP and the gang is rebuilding transmitters for installation at the new headquarters, if and when. Contact VXC for OPS appointment and TQW for EC. Your SCM could use more reports on station activities or club functions. The silence from SKT is deafening. Election results of the PRA are SGA, pres.; KKR, vice-pres.; KKE, treas.; YZP, secy.; TQW, corr. secy. Traffic: WICDV 101, BTV 100, UTA 67, VXC 67, YKQ 29, ZXA 22.

VERMONT — SCM, Robert L. Scott, W1RNA — SEC: SIO. PAM: RPR. RM: OAK. Vermont nets operate on 3860 and 3520 kc. Those interested in AREC, please contact your local EC or Andy, SIO. BRG is working hard on getting the necessary information and machinery in motion to have license tags acted on. Word as to what you can do to help will be passed along as soon as things have reached that stage. KJG hopes to have new GG final on shortly. ETE has recovered from a bout with pneumonia. Traffic: (Dec.) W1OAK 196, RNA 173, AVP 90, BJP 53, IT 38, TEW 37, BNV 32, FPS 21, TAN 17, JLZ 10, KJG 3. (Nov.) W1KJG 7.

NORTHWESTERN DIVISION

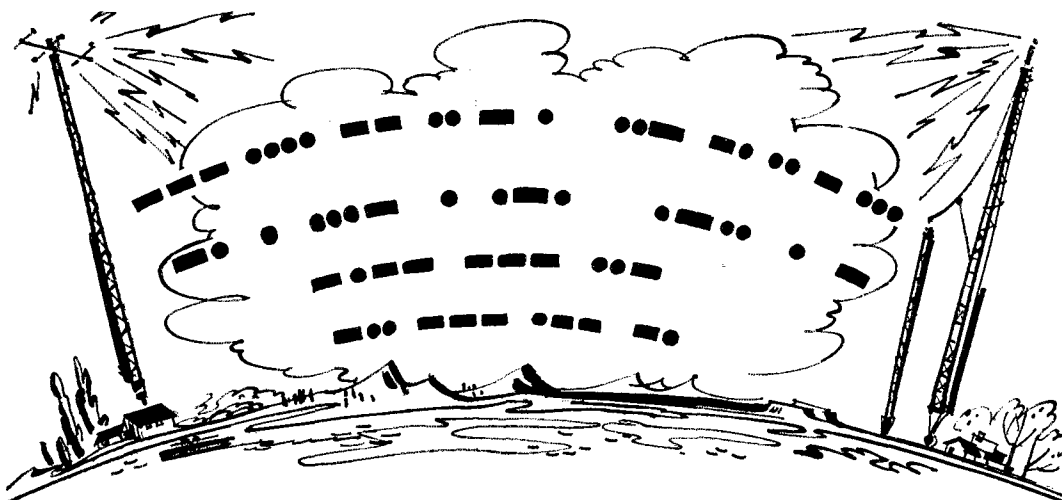
ALASKA — SCM, Dave A. Fulton, KL7AGU — The Anchorage Amateur Radio Club held a Christmas Party for all the hams in the Anchorage Area. There was a very good turnout with about eighty-two attending. We have received a few inquiries in regard to reactivating the Sourdough Net on 75 meters. Anyone interested in seeing this net run as a traffic outlet and in a business-like manner, please drop us a line and we will see what can be done. We have heard a rumor from a pretty reliable source that there will be a KL7 certificate out soon. This certificate will be awarded to anyone working ten KL7s in the various parts of KL7-Land. It will be sponsored by the Anchorage Amateur Radio Club and as soon as we can we will have full details. BK is in Fairbanks getting KTVF on the air. TVI here we come! It's not too bad, fellows, so far no TVI problems here in Anchorage.

IDAHO — SCM, Alan K. Ross, W7IWU — Lewiston; IDZ reports on the local gang. New officers of the Lewiston-Clarkston Amateur Radio Club are GMC, pres.; UJA, vice-pres.; TLW, secy.-treas.; and NOG, reporting secy. V1O has a Heathkit VFO, while IDZ assembled a Viking Adventurer. OWG is driving a new Ford. WN7YBV is running 16 watts to a 40-meter vertical. Caldwell: EYR has a new Viking II and antennas for 75, 40, and 20 meters. Kellogg: RQG has to let up on ham radio because of travel and extra work. RSQ is giving s.s.b. a lot of thought. Bonners Ferry: VMF, the 13-year-old son of QC, worked Norway for 32 countries. Boise: NVO is trying to tame the ARC-4 front end. AXY and BMF still are on s.s.b. OZJ and YAD are on 75 meters a lot. Two meters is very active. MWP, on Deer Point, 7000 feet up, can work Twin Falls on 2 meters. This band is to be encouraged for local c.d. work, and also gives a good chance for DX through MWF. Traffic: W7YB 39, NVO 4, EYR 2.

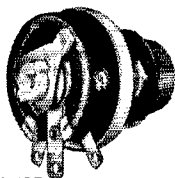
MONTANA — SCM, Leslie E. Crouter, W7CT — Long-skip conditions have prevented both the Montana Phone Net and the Montana State Net (c.w.) from having any contacts after the late afternoon during the past month. FUB has substituted as NCS a few times for the South Dakota Net. BSU was located at the new QTH in time for the November SS Contest. SFK is operating from a new ham shack (studio A). Ray is using s.s.b. with 20A exciter. EWR reports 14 charter members in the new Hi-Line Radio Club at Havre. NZJ and KUH have started a series of local on-the-air chess games. MM has been working hard to get Montana aligned for ham call letters on auto license plates. NPV reports the following new hams in Harlowton: YFH, YHB, and YHC. WDE is a new ham in Winifred. WSE, ex-0PJM, from Valley City, No. Dak., now lives in Lewiston. JRG is doing considerable experimenting on 132 Mc. Ken has a new balanced modulator for 3.9 and 50.4 Mc. using 832A. Your SCM has been promoted and will be located in the capital city of Helena by the time this goes to press. Traffic: (Dec.) W4SPK 75, MQL 15, CT 13, FUB 11. (Nov.) W7MM 105, EWR 3, NZJ 3.

OREGON — SCM, John M. Carroll, W7BUS — Officers of the Rogue Valley Radio Club are ISP, pres.; VCQ, vice-pres.; EZR, secy.; LNG, treas.; TZP, technical advisor. SBT is active on 2 and 6 meters. QMK is Asst. EC in the Medford Area. ISP is net control on the 29.5-Mc. Net. KTL is putting up an all-band vertical. APF renewed his membership in ARRL. The *OARS News Letter* is a fine letter and should be subscribed to by all the Portland bunch. QBT is building a new QTH. AHZ has moved to Denver. SY has an office in the State Office Building. MNS is working on RTTY gear. The Tillamook gang has a club room in the basement of the City Hall. RQN beat THX out on the DX recently. QKX is on 2 meters. VLJ and YFK have registered with AREC. KTF has purchased an old school house up in the mountains for a summer QTH and is taking applications for his PTA. BUS has ordered an s.s.b. rig. Traffic: (Dec.) W7APF 1679, JHA 668, QKU 418, VIL 128,

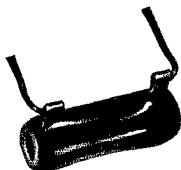
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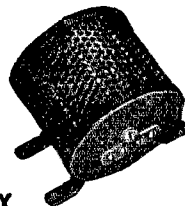
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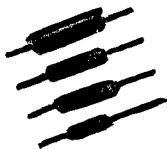
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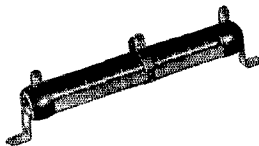
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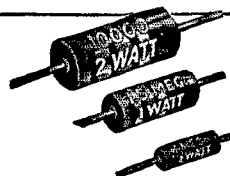
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D103T • DeLuxe 10m 3-El. T match, \$25.95. 1—8' Boom, 1" Alum. Tubing; 3—6' Center Elements, 1" Alum. Tubing; 6—6' End Inserts, 3/4" Alum. Tubing; 1—T Match (4'), Polystyrene Tubing; 1—Beam Mount.

S104T • Std. 10m 4-El. T match, \$24.95. 1—12' Boom, 1" Alum. Tubing; 4—6' Center Elements, 3/4" Alum. Tubing; 8—6' End Inserts, 3/4" Alum. Tubing; 1—T Match (4'), Polystyrene Tubing; 1—Beam Mount.

D104T • DeLuxe 10m 4-El. T match, \$30.95. 1—12' Boom, 1" Alum. Tubing; 4—6' Center Elements, 1" Alum. Tubing; 8—6' End Inserts, 3/4" Alum. Tubing; 1—T Match (4'), Polystyrene Tubing; 1—Beam Mount.

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D153T • DeLuxe 15m 3-El. T match, \$39.95. 1—12' Boom, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 2—5' End Inserts, 3/4" Alum. Tubing; 2—6' End Inserts, 3/4" Alum. Tubing; 2—7' End Inserts, 3/4" Alum. Tubing; 1—T Match (6'), Polystyrene Tubing; 1—Beam Mount.

20 M. BEAMS

S202N • Std. 20m 2-El. (No T), \$31.95. 1—12' Boom, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 3/4" Alum. Tubing; 1—Beam Mount.

S202T • Std. 20m 2-El. T match, \$24.95. 1—12' Boom, 1" Alum. Tubing; 2—12' Center Elements, 1 1/2" Alum. Tubing; 4—12' End Inserts, 3/4" Alum. Tubing; 1—T Match (8'), Polystyrene Tubing; 1—Beam Mount.

D202N • DeLuxe 20m 2-El. (No T), \$31.95. 2—12' Booms, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 3/4" Alum. Tubing; 1—Beam Crosspiece, 1" Alum. Tubing; 1—Beam Mount.

D202T • DeLuxe 20m 2-El. T match, \$34.95. 2—12' Booms, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 3/4" Alum. Tubing; 1—T Match (8'), Polystyrene Tubing; 1—Beam Crosspiece, 1" Alum. Tubing; 1—Beam Mount.

S203N • Std. 20m 3-El. (No T), \$34.95. 1—12' Boom, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 3/4" Alum. Tubing; 1—Beam Mount.

S203T • Std. 20m 3-El. T match, \$37.95. 1—12' Boom, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 3/4" Alum. Tubing; 1—T Match (8'), Polystyrene Tubing; 1—Beam Mount.

D203N • DeLuxe 20m 3-El. (No T), \$46.95. 2—12' Booms, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 3/4" Alum. Tubing; 1—Beam Crosspiece, 1" Alum. Tubing; 1—Beam Mount.

D203T • DeLuxe 20m 3-El. T match, \$49.95. 2—12' Booms, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 3/4" Alum. Tubing; 1—T Match (8'), Polystyrene Tubing; 1—Beam Crosspiece, 1" Alum. Tubing; 1—Beam Mount.

QEI 58, THX 50, OMO 47, AJN 34, PRA 22, KTL 3, (Nov.) W7VIL 35, QEI 28, ESJ 27.

WASHINGTON—SCM, Victor S. Gish, W7FIX—ATTENTION ALL WASHINGTON SECTION CLUBS: This section is in need of a Section Emergency Coordinator and more active ECs. Each club not now having an active EC, please nominate one and send his name and QTH to your SCM so that appointments can be made. At the Dec. 9th meeting of the North Seattle Radio Club FRU was presented with the Cliff Cavanaugh Award for the award 1954—a de luxe Vibroplex presented annually to the WSNET operator who contributes most to c.w. operating in the section. FRU brought over some clippings from his old home town paper with reprints from the year 1900, showing his name as a member of the high school class who built and demonstrated a "wireless set." This should get George membership in the "Old Old Old Timers Club." The NSARC is installing a 2-meter beam on the club station for c.d. use. KZ is trying 40-meter DX for a change. AIB insists that conditions are the worst he has ever seen. #50Q/7 reports from Everett. AMC got the XYL a TV set for Christmas! OE reports from Dalesport, Wash.; next stop is Bellingham. AVM (Aberdeen) is working BTW (Olympia) consistently with converted 522 on 2 meters. PRZ was home on Christmas vacation from Cornell U. to visit the OM, ZU. K6BDF/7 says conditions are so bad in Washington that he can't hear QRM. BMK reports better results by replacing the Windom antenna with a half-wave doublet. UJK worked 66 YLs in 19 states in the YLRL Party. UJK is working 20-meter DX. AVM is RACES Radio Officer for Aberdeen. OUK is with c.d. in Whatcom County. OEB still is working shifts—tough on traffic. ELO, DEF, and OZG are going for kw. rigs. 6PZG/7, now in Seattle, is working 80-meter traffic. UQV reports new Richland barns are 340 (ex-#NKC) and NIZ. TCS now operates club station KLTALZ on Adak and is going to try to hook up with RN7 on 3575 kc. with 450 watts. LVB reports his OM (6HFN) is sending him components for a half-gallon c.w. rig. TGO has a 66-ft. vertical for 80 meters. GAT burned out his power transformer. Traffic: (Dec.) W7BA 2303, PGY 1945, K7FAE 729, W7VAZ 508, FIX 178, KC 182, EIII 127, W8SOQ/7 98, W7RXH 81, USO 75, RXH 82, APS 50, AIB 41, JEV 37, UZB 24, AHC 23, VCF 21, WEV 18, FWD 16, OE 14, TGO 10, AVM 8, ZU 8, EWW 6, K6BDF/7 4, W7BMK 4, GAT 4, ULK 3, TIQ 2. (Nov.) W7FRU 879, KT 52, AVM 1.

PACIFIC DIVISION

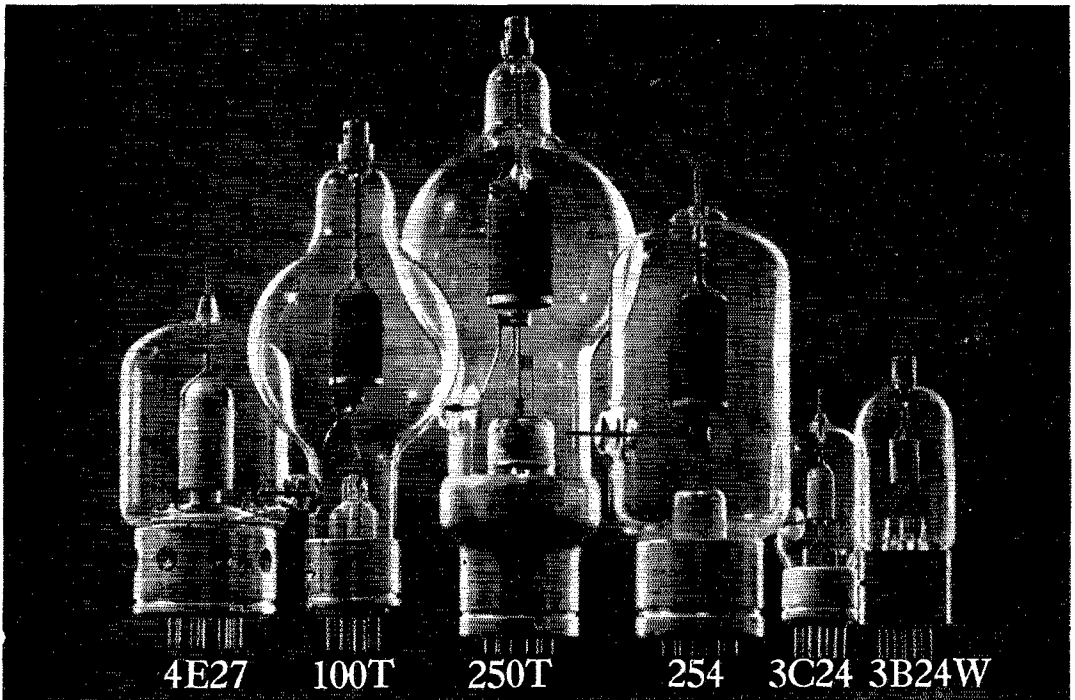
NEVADA—SCM, Ray T. Warner, W7JU—ECs: PEW, PRM, TVE, TIJ, and ZT. OPSs: JUO and UPS. ORRS: MYP, PEW, and VIU. OBS: BVZ. Nevada State Frequencies: Phone—3880 and 7268 kc.; c.w.—3660 and 7110 kc. PRM is now EC for Boulder City. TVE is EC for Las Vegas. How about backing these fellows with an increase in AREC activities? More and more of the gang are showing on the above chosen Nevada frequencies. The demand for Nevada QSLs appears to be heavier than ever! TVE now has 50 Nevada QSLs! The Southern Nevada Amateur Radio Club (NSARC) now has 42 paid-up members. VIU thinks a lot of his Viking II since working ZK1BG on 80-meter c.w. JUO fabricated a beautiful copy of the Gonset Commander. Traffic: W7VDC 43, VIU 35, JU 16, HJ 9, SNP 9.

SANTA CLARA VALLEY—SCM, R. Paul Tibbs, W6WGO—MKM, San Mateo, sends in the following report. The San Mateo Radio Club elected the following new officers: INN, pres.; K6DMM, secy.; ABE, treas.; and MKM, board member. TFZ is installing a 144-Mc. antenna trying for DX on v.h.f. K6DMM is active on 7 Mc. using a vertical for transmitting. There have been no new cases of TVI reported to the TVI committee in San Mateo from the FCC office for the past three months. INN has a kw. on the air now. FON again is a grandpa on the birth of a girl to KN6RGL, the XYL of VZT. Oh, yes, the uncle is AVJ. WLI, very active as an OZ, was elected secretary of the SARO at its December meeting. K6BBD has been appointed OBS. Dick would like skeds with stations in Maine, Delaware, Vermont, and North Carolina. NOG decided that two could work 144 Mc. as cheaply as one and acquired an XYL in December. YHM is using an HQ-140X now. RN6 and PAN still can use operators, so any of you who have just lost your Novice call and now have a General Class license, get in touch with HC in San Jose. Harry will start you on the road to some pleasant hours operating with some very swell amateurs, some new and some old. Anyone who happens to be in the vicinity of San Mateo the 2nd Wed. of each month, drop into the Fiesta Building, attend the club meeting, and meet all the San Mateo gang. Traffic: W4YIP/6 1615, W6YHM 652, KC 472, UTV 200, AIT 85, K6BAM 57, BBD 11, W6WLI 10.

EAST BAY—SCM, Guy Black, W6RLB—Asst. SCMs: Oliver Nelson, 6MXQ, for v.h.f.; and Harry Cameron, 6RVC, for TVL. RMs: IPW and JOH. PAM: LL. ECs: CAN, CX, FLT, QDE, TCU, ZZF, and K6ERR. Once again the many radio clubs in the East Bay section report having highly successful Christmas Parties. The Mt.

(Continued on page 104)

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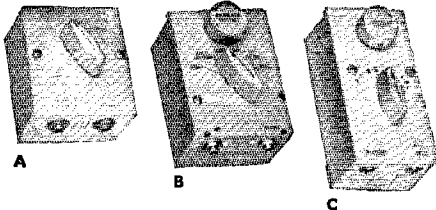


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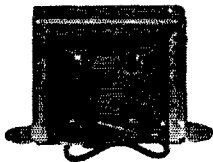
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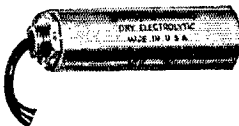
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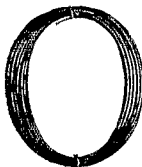


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Diablo Club's Party was outstanding and unusual in that it was an affair for the kids, but there was nothing wrong with the other parties either. The Skyriders Net came to the rescue of three persons trapped in a wrecked car in an isolated area of San Mateo County on Jan. 5th. DEG's new QTH is Memphis, Tenn. When the weather turns cold think of JIG, whose QTH is 5064th Cold Weather Material Testing Squadron, APO 731, Seattle. The Napa County CD has some Gonset Communicators and is obtaining crystals on 147.11 Mc. CAN's appointment as Emergency Coördinator for the Napa AREC has been renewed. Wayne reports a Napa AREC Net at 9 A.M. Sun. on 3885 kc. 9QOM now is organizing K6FDJ at Parks AFB and is getting additional equipment. BAO and BAT are now 432-Mc. mobile. VSV wants to try pulse modulation on 1215 Mc. — as soon as it's legal. EE has retired as head of Oakland Civil Defense. A real amateur himself, Shell believed strongly that civil defense should rely heavily on amateur participation and he put his belief into words. His civil defense communication system was a pace-setter for the Bay Area. Hope you enjoy relaxing, Shell. The Official Observers of the East Bay section are PSL, JZ, HBF, CTL, RLB, EY, YDP, WOC, CBF, NGC, ITH, BEZ, and LTI. HBF reports he has his BC-459 going on 40-meter c.w. JHV now is high power on the low frequencies. VS reports being QRL lately. Your SCM was treated royally by the ARRL Headquarters gang when he dropped in on the West Hartford office during the Christmas season. It would be a thrilling experience for any ham. Traffic: (Dec.) K6FDG 1294, W6QPY 807, K6GK 449, W6IPW 118, EFD 80, LL 44, ASJ 36, HBF 25, EJA 24, VSV 4. (Nov.) K6GK 119, W6EFD 62, JOH 60, ASJ 36, ITH 31, HBF 19, K6CCQ 1.

SAN FRANCISCO — SCM, Walter A. Buckley, W6GGC — The San Francisco Radio Club held its annual Christmas Party the 3rd Fri. in December. A good time was had by all. The HAMS Club has changed its regular meeting night to the 1st Fri. of each month so that the boys also can attend the Oakland Club meetings which are held the 2nd Fri. The San Francisco Naval Shipyard had its Christmas Dinner at Grotto 9, Fisherman's Wharf, with a good show of hams. The Tamalpais Radio Club now holds its monthly meetings at Novato. The Marin County Radio Club had a large group show up for the season's dinner held at El Verano. The Young Ladies Radio Club of SF prepared and served the food for the SF Radio Club Party. The 29ers lost another of its group, K6ALF, to Uncle Sam's Navy. The Humboldt Radio Club members were all on the alert during the big shake. K6FKI was in town mobile when it happened and contacted GL, in Crescent City, who was first to give the news to the Crescent City broadcasting station. Both Eureka stations were off because of power shortage. K6DVV, W6CNG, and BME all gave reports to VRG, in Oakland, to give to the *Oakland Tribune*. CNG and ULF held a circuit for a time for emergency railroad traffic but none was required. However, many messages were handled because of overcrowded telephone lines. The Club held its Christmas Party in lieu of its regular meeting and reports a fine time was had by the group. AEY let the stove in his ham shack get overheated so now he has a hole through the roof. OPL received lots of help erecting his V-37 antenna on Dec. 5th. ATO, BON, GGV, GQA, GTY, HST, OCZ, OST, TLN, TMF, and K6CVS all helped and report the best antenna-raising feed ever held. ZYI and PW died within a few days of each other during the holiday season. CBE reports that he is going low power and is building a 40-watt rig. YC has been handling traffic from Japan, usually on Sun. SWP has been having trouble, high noise level is wrecking his reception. Congratulations to QMO on the BPL total for December. ACN reports that the Bill for the ham license plates renewal was introduced on the legislature floor the first day of the new session at Sacramento. GHII is new representative for the HAMS at the Central California Council meetings. PHT has a new TV and radio store in San Francisco. Lots of luck and success in your new venture — "CYN's TV & Radio Shop." A local amateur made the headlines in the San Francisco newspapers and radio broadcasts on Dec. 5th. He was driving on a very lonely road down the country shortly after a car went into the ditch and trapped three people. By means of his mobile rig he was able to bring help to them very quickly. WD, Arthur Hart, certainly let the people know of the good deeds amateurs can do. Local papers gave Arthur a real nice write-up. Traffic: W6QMO 710, PHT 668, SWP 226, GGC 82, YC 14, GQA 3.

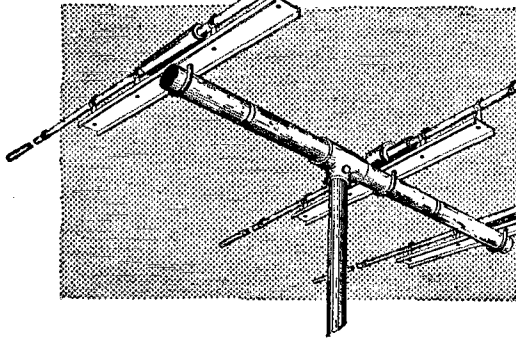
SACRAMENTO VALLEY — SCM, Harold L. Lucero, W6JDN — Fellows, let's build this section to one of the best during 1955. It can be done with the help of all of you. The Annual Christmas Party of the Sacramento Amateur Radio Club proved to be a big success. ILZ acted as master of ceremonies. The following served on various committees: DIE, GHE, HGW, IOY, JEQ, QKJ, RNR, VKT, ASI, LLR, VBU, and BTY. Six Heathkits were awarded as prizes and the main prize, a Globe Scout, was won by AK. ASI is constructing a Linear. OPY is active on traffic nets. MIW is active on 144 Mc. LLR has a BC-610 and is on 75 and 40 meters. ILZ completed the kw. final. JEQ, c.d. coördinator, announces the Sacramento Communications Plan is on its way to FCDA and FCC. K6CNA is active

(Continued on page 106)

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15 Meter, 2 Element Shortbeam

6 ft. boom. Forward gain 4.4 db over full size reference dipole. Front to back ratio 15 db. Tuned 21,350 Kc. Approximate wt. 15 lbs. Longest element 13 feet.

MODEL R.S. 2-15
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15 Meter, 3 Element Shortbeam

12 ft. boom. Forward gain 4.8 db over full size reference dipole. Front to back ratio 20 db. Tuned 21,350 Kc. Weight approximately 20 lbs. Longest element 13 feet.

MODEL R.S. 3-15
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40 Meter, 2 Element Shortbeam

12 ft. boom. Forward gain 4.4 db over full size reference dipole. Front to back ratio 15 db. Tuned 7250 Kc. Weight approximately 30 lbs. Longest element 33 feet.

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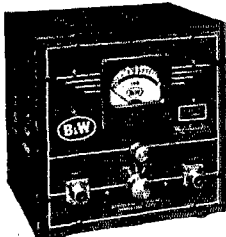
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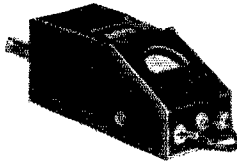
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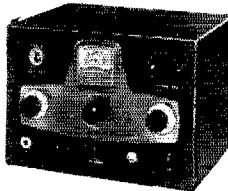


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with a Globe Scout on 75 and 40 meters. CMA has duels as excitor-frequency standard. K6FR is on mobile. RNR is having trouble in the 4-250A final. KKI has a new portable unit. QDT is going back to s.s.b. QKJ is experimenting with indoor antennas. MARS officers at McClellan AFB are HIR, pres.; ESZ, vice-pres.; LLR, secy. AK has a new Twin Yagi on 144 Mc. QYQ is active on 75-meter mobile. AD is active on 75 meters. PNS is sporting a new car and mobile set-up. OPY is on 'phone at times with a Viking. TYC is doing nicely with the PAM job. SBH, of Red Bluff, really puts out the Official Bulletins. BII reports that SM60B is operator aboard the *Silver Gate*, running between Europe and W6-Land to VE6-Land, 5QDF/6 made BPL. Traffic: W5QDF/6 1464, W6OPY 82, MWR 56, JDN 10, TYC 3.

SAN JOAQUIN VALLEY — SCM, Edward L. Bewley, W6GIW — SEC: EBL, RM: K6BGM. PAMS: ZRJ and WJF. As in the past, the holiday season brought a heavy load to the traffic nets, and this section carried its share of the load. BPL awards were issued to K6FAE, W6ZRJ and W6FEA. BRAT awards went to K6EVM, K6BGM and W6ZRJ. EXH was awarded a Meritorious Medal Award by the Ground Observer Corps in recognition of his work with the 2-meter group in San Joaquin County. The Trowel Club held its Third Annual Winter Hamfest in Fresno, and it was a big success. Newly-elected officers of the Stockton Club are HQY, pres.; K6CZO, vice-pres.; W6PJJ, secy.; DBH, treas.; RRN, sgt. at arms. KN6HWT, the blind boy sponsored by the Stockton Club, is now on 2 meters. DVI qualified as Class I Observer in the last Frequency Measuring Test. RLG has been selected as EC for San Joaquin County. ADB is on s.s.b. with a 10B exciter driving a pair of 837s in grounded grid amplifier at 300 watts. Traffic: (Dec.) K6FAE 2206, W6ZRJ 514, GRO 265, FEA 207, ADB 136, K6EVM 88, BGM 60, W6SJJ 24, EBL 23, TXM 4, WJF 4. (Nov.) K6FAE 638.

ROANOKE DIVISION

NORTH CAROLINA — Charles H. Brydges, W4WXZ — CVX is still working DX on 20 meters. The best so far for Tom is VK4. ONM reports that 2-meter activity is lively in Greensboro. The gang in Greensboro now has an emergency generator. SGD has been busy with nets. Katherine recently completed YL-WAS and is waiting for her certificate. ZKE has a B&W transmitter. A new Novice in Wadesboro is KN4BED, using a Globe Scout and HQ-140X. Others in Wadesboro are 5JYB/5 and W4CSH, who are with Air National Guard. DLX is about to get his basement finished. ZMG was NCS of the Tarheel Net for the month of January. FUS did a swell job during the hot month of December. BUD has a new Viking and is working out FB. Some of you should get on 2 meters. There is a very good net in Winston; also a good net over the State. SOD is signing up AREC members in Lumberton and also in the adjoining counties of Bladen and Hoke. You fellows who are not signed up, get in touch with SOD. Ex-4SIY now is VP7NW and is looking for Winston-Salem stations. YBQ reports RACES is being organized in the Statesville Area. How about more reports from you ECs? Many thanks to all for sending those great monthly reports. They sure do make the job much easier. Traffic: W4WXZ 612, RRH 90, BTZ 52, BDU 34, CVX 8, YPY 6, BUA 4, 8GD 4, YBQ 2.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — PED is back on the air on 80-meter c.w. NJG has installed an Elmec mobile transmitter. LXX is ORS and reports that FGX is working DX on 20 meters. ERG is EC for Bamberg. AKC has an A-1 Operator certificate and reports the following reporting into the C.W. Net: AKC, ANK, CHD, HMG, LHH, KTL, KYN, MVX, RPV, TDJ, THH, UFP, UWA, WJH, WP, WXZ, YAA, ZLZ, ZJY, ZKU, and K4AQQ. The S.C. C.W. Net meets at 7 p.m. Mon. through Fri. on 3525 kc. A joint meeting was held between the Columbia and Charleston Clubs with NJG, president of the Greenville Club, TTG, EC for Orangeburg, and groups from other parts of the State in Columbia on Jan. 6th. Organization of clubs in South Carolina and the value of ARRL membership was discussed. The feature of the meeting was presentation of the Corn Cob trophy to the Columbia Club by the Charleston group as a consolation prize for making low score in the '54 Field Day. The Charleston group had received the Corn Cob as a result of losing the 1954 transmitter hunt. It was mounted on an engraved walnut placard with an ancient key and Marconi antenna. ZRH is transmitting code practice and Official Bulletins on 3700 kc. at 7 p.m. nightly using tape-keyed 800-watt transmitter. Traffic: W4AKC 334, K4AQQ 144, W4ZIZ 126, ANK 79, RPV 18, MVX 7, EDQ 4, SOY 4, TTG 4, HMG 1.

VIRGINIA — SCM, John Carl Morgan, W4KX — Santa seems to have done well by the gang. IA reports he and jr. operator TFX now have new Viking II and 75A-3 to play with. CGE has new BW-5100 and 876. Others found various hunks of swell gear in their socks. YE and No. 1 jr. operator YZC are building all-band, half-bucketful rig with separate finals for each band. YE's 11-year-old passed his Novice Class exam and is awaiting his call. KFC says he worked countries No. 98 and 99 on 80 meters. Vic also reports visits from W4KVM/YO6 and KH6YL. 3WDP, who

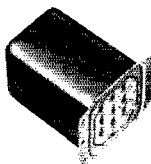
(Continued on page 108)

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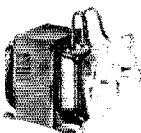
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600/750	250	325	P-67	R-63	R-103
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D.C. Volts	DCMA CCS	ICAS	Plate Transformer	Choke No. 1	Choke No. 2
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3000/3500/4000	600	800	P-4353	R-67	R-67



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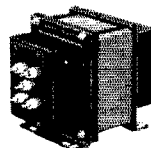
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1000	225	280	PT-8311	C-1412
1000	325	405	PT-8312	C-1414
1500	225	280	PT-8314	C-1412
1750	200	250	PT-8315	C-1646

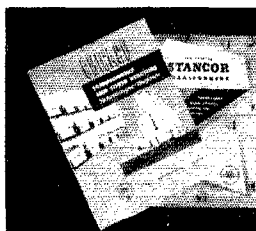
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1250/1500	500	625	P-8029	C-1405	C-1415
1750/2000	500	625	P-8033	C-1405	C-1415
2000/2500	500	575	P-8035	C-1405	C-1415



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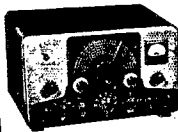
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Elmac PWR6A	134.50	National NC 183D	399.50
Elmac AF57	177.00	National HRO-60	339.50
E-Z Way Towers	(in stock)	RME-MC55 Converter	69.50
Gonset Super 6	52.50	RME-DB23A Preselector	49.50
Hallcrafters S38D	49.95	Short Beams (complete stock)	49.50
Hallcrafters S53A	89.95	Telex Beams (in stock)	
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has kept K4MC hot, has overseas orders. 3LEZ reports he operated from Front Royal during the SS. ZFV is too busy at school for hamming, and his "Hazelized" antenna at home still is just junk wire. SVG made BPL on originations as a result of promoting traffic at the Service Men's Club. 3QQE continues busier than a bee in a tarbucket at PFC as his 2247 traffic total for December will testify. LW reports activity on VON is booming, with 16 different stations QNI in December. If conditions continue on 80 as they have been, we'll all have to move up there to 160 meters, Dick, or resort to smoke signals. BLR says OM BVB built 'em a new 813 rig. OWV reports duty at W5VA-TV's mountaintop transmitter cuts into hamming. WBC reports MARS Net No. 3 staked out mobiles at shopping centers in the Arlington Area to promote traffic for overseas servicemen and 75 messages were handled via K4AF, EBH, now in a new wig-wam, still has no antenna, but has been so busy running ground radials he has more copper in the ground than Anaconda. The SVARC should be in its new club building by the time this appears. Traffic: W4PFC 2247, SVG 216, OWV 121, YKB 100, KX 82, YZC 70, DWP 46, DBE 43, CFV 35, RJW 32, KFC 29, BLR 25, BVZ 18, TYC 16, LW 14, CGE 10, JAU 10, TFX 10, WBC 10, IA 9.

WEST VIRGINIA — SCM, Albert H. Hix, W8PQQ — WN8SNG is doing very well toward his WAS with 15 watts on 80 meters. BOK was active in the last 'phone CD Party. PZT and JWX visited HZA, PQQ, and the Princeton group in December. I am sorry to report the passing away of ex-MZD, of Clarksburg. HZA is putting up a real long wire for 80 meters. He has been working good European DX on this band. QHG is coming right along on his new 500-watt rig. IXG handled lots of traffic from the Morgantown Hobby Show. ETF is on 6 meters along with HI. VCT is back from Texas and is active now. EOJ will have his kw. s.s.b. rig going soon. ZJS skeds ex-1MEF, who is now in Florida. NLT is getting ready to put up a 15- and 20-meter three-element beam system. LS is doing a good job mobile. CLX has a Ranger and is doing a good job on 15-meter 'phone with it. RKV is quite active now. The Tri City Club has been meeting lately at the South Charleston Naval Reserve Armory. Guests are certainly welcome. Your SCM would appreciate receiving more information for this section. GEP is very active on the various nets and does a bang-up job. Traffic: (Dec.) W8GEP 137, JWX 126, HZA 69, NYH 44, ETF 36, KDQ 21, DFC 18, IXG 18, PQQ 6. (Nov.) W8DFC 25.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Karl Brueggeman, W0CDX — SEC: MMT, RMs: KQD and KHQ, PAM: IUF. The state-wide drill was a success, with stations from all over the State reporting to net control with members of the legislature in attendance. ABE handled the net control, assisted by WLR and MMT. Our bill has been introduced and has been turned over to the transportation committee for action. We must now contact the members of that group in order to keep them reminded of our needs. Also all must write their legislators so that they won't forget us when it comes time to vote on the bill. If you need more copies of the bill, contact IC and he will send them to you. IUF made BFL with 102 originations. EKQ reports that the CSSN is doing find and a new ham in Littleton is WN6WNJ. The Hi-Noon Net handled 437 pieces of traffic in 21 sessions. HOP has a new rig running 500 watts on c.w. Congratulations to the Trout Route Mike and Key Club on its affiliation with ARRL. New officers are MMP, pres.; Muriel Schwarz, vice-pres.; Ray Wilhelm, secy. We all want to give the MARS stations in the State a vote of thanks for the fine way that they are working with our amateur groups. They have brought our traffic totals up to a very respectable figure and can always be counted upon to help us whenever we need it. Traffic: K0FDX 4821, WBB 2529, W0KQD 1334, YGB 782, IUF 200, PGN 93, YQ 83, BWJ 52, LNH 48, EKQ 46, TVI 41, IC 35, WGB 31, IA 23, SWK 19, HOP 9, TVB 6.

UTAH — SCM, Floyd L. Hinshaw, W7UTM — TVL is busy looking for a new QTH, hoping for room for a new ham shack. 9VZQ is a regular visitor to W7-Land, flying United planes from Chicago to Salt Lake. QDM is now being pushed into a rebuilding program since receiving a new 6-ft. rack for Christmas. BLE still is commuting from Salt Lake to Denver, but says slick roads and mobile operation do not fit together too well. SP has nearly forsaken low-frequency contacts for 2 meters — not nearly as much QRM on 2 meters! MWR has a potent signal with new 500-ft. skywire. Traffic: W7PIM 111, UTM 35.

WYOMING — SCM, Wallace J. Ritter, W7PKX — NVX, president of the Casper Club, reports the club house is nearly completed, with console operating position and Viking Ranger two-thirds installed. JSS visited IWF and LLP while in Sheridan. NVX visited PKX to arrange for relay of bowling scores. QNR recently hooked his 65th country. PJX has plans for a 813 final. ILL, recently-appointed OBS, starts schedules following the Pony Express Net. PAV's stolen 10-meter mobile was found in unusable condition. The Sheridan Club will go 2-meter mobile in the near future with rigs designed and engineered by LVU. QPP and LLP are "prospeting" on 2 meters. PKX holds

(Continued on page 110)

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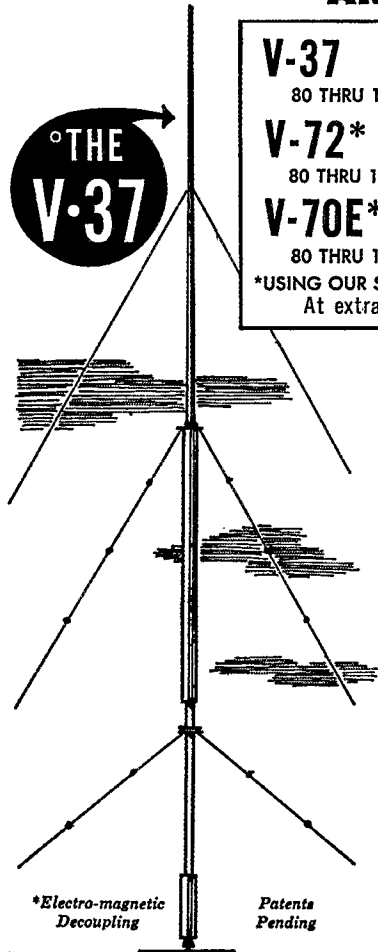
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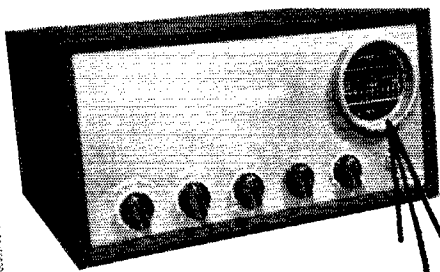
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SOUTHEASTERN DIVISION

ALABAMA — SCM, Joe A. Shannon, W4MI — SEC: TKL, RM: KIX, PAM: RNX. Welcome to the Valley Amateur Radio Club in Lanett! Officers of the new club are PHY, pres.; KPI, vice-pres.; CHO, secy.; FL, treas.; VUO, act. mgr. The Club presently is working on a training program and organization of an emergency net for the area. The Birmingham Club has a new slate of officers headed by WJX, the Club's first XYL president, YYJ (also an XYL), 1st vice-pres.; ZSQ, 2nd vice-pres.; KNV, secy.-treas.; YEG, rec. secy. CRY has moved to Cullman and is back on the air after a short stretch of strictly mobile operation. YAI now meets a total of six nets. We welcome the following newcomers to the Florence Area: KN4s ARD, AUP, AVA, KAAEN, W4FVJ, and KN4BEQ, jr. operator of TXO and now working on General Class. TKL now is mobile on 2 meters — 145.35 Mc. — and is waiting for others to join in. ZSQ has s.s.b. going and has revamped the operating position. OAO is on with Viking I in Anniston. Traffic: (Dec.) K4FDY 1897, W4UHA 950, WOG 780, COU 646, KIX 189, YNG 139, YAI 101, DXB 73, K4ACO 62, W4YRO 59, TXO 39, TKL 22, ZSQ 19, BRE 14, MI 14, VYI 11, ZSH 11, OAO 10, BFM 9, RNX 8, W5ONL/4 6, W4DDP 4, HYI 4, PWS 4, (Nov.) W4UHA 363 (correction), W5ONL/4 18, W4CAH 15, WHW 12.

EASTERN FLORIDA — SCM, John W. Hollister, jr., W4FWZ — Sorry, gang, but a double-barrelled shot of the flu got me. The December report will be confined mostly to traffic reports. AQJ and OLA have new 20-meter beams. Club notes — Jacksonville: JARS officers are UHE, WEO, TRN, AGT, and NKC. Ft. Lauderdale: BARC officers are JZB, LRM, PM, EUV, and CQP. Traffic: W4PJU 916, DVR 699, BMY 606, WEO 196, TJU 140, WS 135, LAP 118, K4ANJ 101, W4AWY 94, HCQ 79, LMT 76, DSC 58, IM 47, ZIR 44, RWM 43, TRN 41, FSS 39, TKE 39, IYT 33, YOX 32, QCP 27, ELS 24, DES 8, FJE 5, FWZ 5, PBS 5, WEM 3, DRT 2, YNM 2, YW 2.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS/W4RE — SEC: PLE, ECs: HIZ and MFY. JPD has the new B.&W. 5100 going. AIA keeps Marianna represented on 75 meters. BGO is on s.s.b. MS has the 250THs going s.s.b. BFD is interested in ham-TV. BCG is working DX on 21 Mc. KN4AEP has a new receiver. GMS had BCI from over a hundred a.c.-d.c. sets in the dormitory. ZFL is a DX hunter. The Pensy Amateur Club had a wonderful Christmas Party. DAO/DEF has a new NC-183. QK has a pair of 813s on 75 meters. HQQ is using cathode modulation on 75 meters. UUF still is working 144 Mc. UYS is after 144 Mc. PAA has a new 32V-3. W'HQ and VR keep true to 7-Mc. c.w. RZV is kingpin of the Dagwood Net. KN4AGM raises too many stations on her CQs. NOX/NYZ keep traffic rolling out Bohemia way. SOQ is thinking s.s.b. 9CPI/4 wants s.s.b. for his 5100. GMS wants kw. final for the Ranger. Traffic: KN4AGM 5, W4AXP 3.

GEORGIA — SCM, George W. Parker, W4NS — SEC: OPE, PAMs: ACH and LXE, RM: MTS and OCG. Nets: Georgia Cracker Emergency Net meets on 3995 kc. Sun. at 0830, Tue. and Thurs. at 1830 EST; Georgia State Net (GSN) meets on 3590 kc. Mon., Wed., and Fri. at 1900 EST. Georgia Traffic Net meets on 3920 kc. at 0745 EST, daily except Sun. New appointments: FYC as EC for Lamar, Pike, and Monroe Counties; TGM as OO Class IV, K4FEP as OPS and ORS. EMR is new in St. Simons and is mobile with an Elmec. The Warner Robbins Club took part in the collection of toys for underprivileged children. New officers of the Club are ØRV, pres.; 5RDP, vice-pres.; K4AYT, secy.; K4ASP, treas. New hams in Moultrie are KN4ANZ and KN4ACP. FGH is building a new kw. final. HYW has new kw. finals on all bands and has BERTA, WAA, 101, and CAA DX awards. FZO has a new VFO. DYR is new in Temple. DDY, in Lincolnton, is active on 75 and 80 meters. OCG reports some traffic handled on the GSN but still needs outlets in the south and central parts of the State. BYJ is active on 20- and 40-meter c.w. in Savannah. PFF reports a new club being formed in Dublin. The Atlanta Club Christmas Party was a big success. The principal guest and speaker was 1BUD. The Atlanta Hamfest will be held on May 28-29 this year with all the usual attractions. Traffic: (Dec.) K4WAR 831, W4OCG 341, BVE 218, IMQ 158, BWD 139, DDY 92, ZWT 72, CFJ 66, MTS 30, NS 28, ZD 10, DYR 6, FZO 4. (Nov.) W4YRX 114, MTS 40, HYW 16.

WEST INDIES — SCM, William Werner, KP4DJ — SEC: HZ, WR transmits Official Bulletins Mon., Wed., and Fri. at 7:30 p.m. AST on 3925 kc. DV transmits Official Bulletins on 1810.4 kc. Mon., Wed., and Fri. at 7:15 p.m.

(Continued on page 112)

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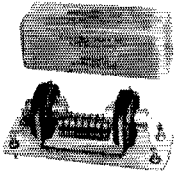
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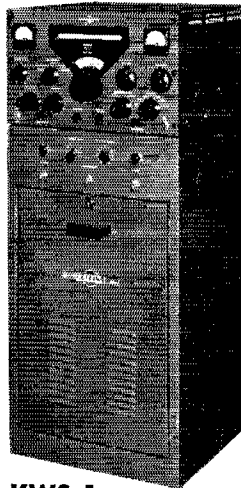
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75A-4



KWS-1

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Dimensions: 10½" h x 15½" d x 17¼" w.

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Features Include: Double conversion . . . Permeability-tuned, hermetically sealed VFO . . . Crystal controlled first injection oscillator . . . Mechanical filter in IF strip . . . Fast attack, slow release AVC . . . Separate detectors for SSB and AM . . . Band-pass tuning . . . New noise limiter circuit . . . Bridged-T rejection notch filter . . . Built-in crystal calibrator . . . Fixed 455 kc IF . . . Low frequency converter stage with VFO . . . Provision for 3 Collins plug-in mechanical filters.

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See Control/Speaker 312A-1

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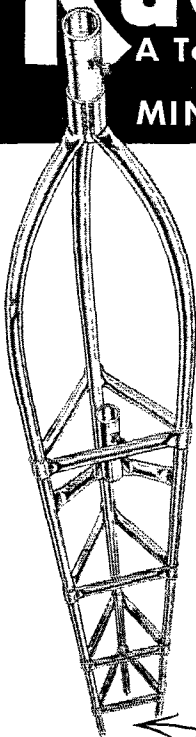
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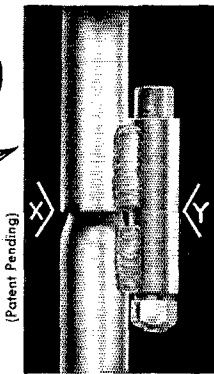
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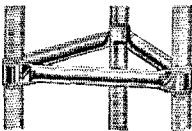
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AST. AAB uses Millen 75-watt transmitter on 144 Mc. AAA spends most of his time on 7 Mc. ABA, ABD, and ABI are on 3.7 Mc. AZ overhauled the HRO-5. DJ put up a 40-ft. all-band vertical. AAC interviewed Capt. Kurt Carlson of the *Flying Enterprise II* on WAPA-TV. KD worked E19J, G5RI, G5JU, T12BX, YV5DE, and LU3EL on 160 meters. DV, CC, and TF also are on 160 meters. W2AOX, of the *New York Herald Tribune*, is in San Juan writing a story. Senator Bauza, who backed the license plate bill, now is WP4AAS. VC's son is WP4AAT. MP is on with a kw. The first call at Polytechnic Institute is WP4ABJ. US is using cathode modulation and new antennas on 75 meters. DP is on 20-meter 'phone with new kw. and 75A-3. WD is working DX since he erected Telrex 20-meter beam. OS is giving code classes at home. WT, Dona Maria, has a new antenna on 75 meters and is heard S9 in San Juan. HZ built a 2-meter transmitter. RK received his WAC certificate. CZ operates c.w. on 3.7-Mc. mobile. Officers of the Borinquen RC, renamed the Ramey ARC, are ABE, pres.; WW, vice-pres.; ZW, secy-treas. Theory classes are held Tue. at 7:30 p.m., code classes Thurs. 7:30 p.m. AAZ, Base Commander of Ramey APB, operates aeronautical mobile. ZD has a new 75A-3. ZA, ZQ, and ABE have Viking Rangers. ABS has a TBS-50. Traffic: (Dec.) KP4ZW 14, AAC 6. (Nov.) KP4ZW 5.

CANAL ZONE — SCM, Roger M. Howe, KZ5RM — NM has been appointed OPS and OO (Class III). BR and KA have their maritime mobile certificates. BE has new 813 rig and HRO-60. JJ has 10-over-15-over-20 array up. The SS *Rampitola*, bound for England, produced visitors on its last trip through the big ditch in the persons of Roy, ZLIAKL (also G3AYL), and his very charming XYL, Christine. They were met at the dock by GF, PL, ML, DG, GD, RV, KA, and RM. The party went from the dock to the home of KA and RM, where they enjoyed some very nice refreshments provided by KA and DG. Later in the evening RV took the party on a motor tour of the Pacific side of the Canal Zone and returned the visitors to their ship about midnight. Mil, GF's XYL; Virginia, RV's XYL, and Dorothy, DG's sister, also were in the group. WA reports working double 'phone patch with W4KAH on 14 Mc. using s.s.b. on the W4 end with very good results. Traffic: KZ5WA 115, KA 38, DG 25, BE 13.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Howard C. Bellman, W6YVJ — QJW, our SEC, calls to our attention the fact that more than 1400 have signed up in AREC in the section but that this figure should be near 5000 to handle emergencies properly. Howard points out that we need top c.w. and 'phone operators to man the control centers. HKD, Asst. SEC and IC for San Bernardino (also Radio Officer for Region 8 RACES), reports that the Hq. is set up under the call JBT, auspices of the Citrus Belt Club. The Fish Net, with "Kingfish" TDW presiding, held its annual Christmas affair. CMN, RM of SCN, informs us that 83 different stations handled 407 messages during December. Check in SCN some night at 1900 on 3.6 Mc. This is our official section net. The Frequency Measuring Test held in November brought three Class I qualifications: CBC, CK, and YVJ. Qualification twice a year in this manner is necessary to hold Class I and II Official Observer certificates. K6DGW is 14 years old and is a sophomore at South Gate High School. He runs 50 watts on c.w. on 80 and 40 meters. K6COP, also 14, has a rig on all bands and is a new OO. EBK conducted a Novice Class examination and now we have WN6ISX in our midst. The examiner, Johnny, loans a complete station to Novices until they receive their General Class licenses. KN6GKW has been given a taste of traffic-handling via QR and GYH. Your writer received several non-standard letters this month, including one from Scotland. R. S. Bruce, formerly of Glendale, is returning here in March or April of this year after operating GM3GVI. ORS comes through with a report. NRY is on 428 Mc. with a BC-78S. The "First Annual Report" of the United Trunk Lines, West Division, has arrived from ELQ. It talks about the first year of operation and lists its members: 1 in Arizona, 10 in California, 3 in Washington, 1 in B. C., and 2 in Alaska. ELQ, the Manager, shows message totals from Nov., 1953, to Oct., 1954, which add up to 15,207. For point-to-point traffic Ed invites one and all to drop down to 3570 kc. 1915 to 2115 nightly. MLZ is acting as liaison between UTL and RN6. GYH reports that KP4ZW, ex-W6PWZ, sends 73 to the RN6 and SCN gang. Reporting from Minnesota is K6EA, who brags of having two SCMs. ZDO has finished his 1215-Mc. receiver and antenna. Carl has started test transmissions on 431.5 Mc. at 8 p.m. nightly. CFL still wants a buddy on the 2400-Mc. band. Traffic: (Dec.) K6FCZ 2245, FCY 1043, W6LYG 740, CMN 560, USY 356, BHG 212, NCP 192, K6EA/Ø 148, W6GYH 104, GJP 88, K6PQA 78, W6FMG 70, MBW 51, MLZ 46, YAS 46, ORS 32, CK 30, HKD 29, K8BEQ 26, W6FAI 24, KN6GKW 12, K6COP 10, W6CBO 9, AM 3. (Nov.) GJP 26, W6TRF 23, PZN 5. (Oct.) W6G3P 19.

ARIZONA — SCM, Albert H. Steinbrecher, W7LVR — Asst. SCMs: Kenneth P. Cole, 7QZH; Dr. John A. Stewart, (Continued on page 114)

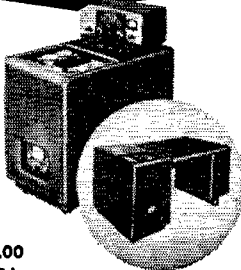


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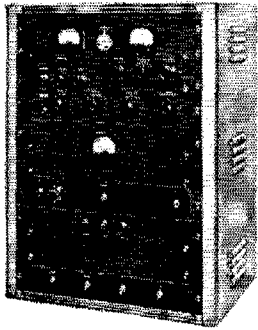
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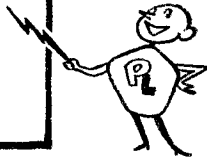
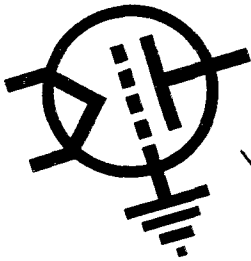
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78X, SEC: VRB, PAM; KOY, Arizona 'Phone Net; Tue. and Thurs., 7 P.M., 3865 kc. Arizona C.W. Net; Tue. and Thurs., 8 P.M., 3690 kc. This report is a combination of November and December activities. The 14th Mobileer Hamfest was held in Casa Grande, but because of poor weather conditions only RYS, UDI, USX, and QZX were present. The OPRC had fine programs by NYT on "Mobile Installations," and Bob Dobinsky, of Minneapolis Honeywell, on "Controlled Circuits." It is rumored that Douglas Area is setting up a "Local Net" on approximately 3914 kc. The OPRC hidden transmitter hunt was won by QHD and QHT. RG is back on 75 meters. SUI has moved to Ohio. QZX has been appointed Asst. SEC. MES has a new Elmec transmitter and receiver in the car. IRX has moved to San Francisco. QZH has been elected to the board of directors and is president of the AARC. 6SKC has moved to Glendale. PEY is back on the air with Viking Ranger, 183 receiver, and 10 and 15 beams. New call: YGZ and YCU. Last minute scoops: Call letter license plates are now being issued to those who made application last June. The Montezuma Well Hamfest will be held May 21 and 22. Contact GYK or OAS for tickets and information. Traffic: W7LVR 18.

SAN DIEGO — SCM, Don Stansifer, W6LRU — Asst. SCMs: Tom Wells, 6EWU; Shelley Trotter, 6BAM; Dick Huddleston, 6DLN. SEC: VFT. ECs: BAO, BZC, DLN, HFQ, HIL, HRI, IBS, KSI, KUU, and WYA. RM: ELQ. Our thanks to Roy Maxson, DEY, who has done such a good job as EC for Orange County, and has now resigned. His place has been taken by Bob Swenson, HIL. Congrats to the operators of IAB who handled 8593 messages during December, also BSD with 3227 and YDK with 3226 — a total of 15,046 for these three stations. New officers of the Silvergate Club are K6CTQ, pres.; KN6GSF, vice-pres.; KN6ITB, secy.-treas. KN6IIR got an HQ-140 and an Elmec transmitter from Santa. SYA is now on 144 Mc. with a Communicator. The Coronado Club made 119,062 points in the SS Contest with 7 stations participating. OGY will complete the term of K6AZW as corr. secy. of the Coronado Club. The San Diego Club is now incorporated. The Conivar Club has completed its classes and many KN6 calls are evidence of its fine work. A night school class at Hoover High is starting, with K6RO as instructor. K6CTQ now has a Ranger, thanks to Santa. We note the passing of Buddy Ascher, QZH, after a long illness. He was active on 28-Mc. 'phone for many years. K6IWS and IWU are new Novices in the Silvergate Club. CAE is building a new final pi-net, all bands, 4-250A final. QCA and K6R were home for Christmas. K6AAJ is heard working DX on all bands. Traffic: W6LAB 8593, BSD 3227, YDK 3226, IZG 788, ELQ 626, KVB 50, K6DBG 42, HZO 38, W6CHV 5, CRT 3.

SANTA BARBARA — SCM, Vincent J. Haggerty, W6IOX — K6NBI (Mac, DBY, operator) reported traffic via radiogram which was delivered to the SCM by JPP. QIW, reporting from the Ventura Area, says ERU is getting out fine with a new skyhook. MWA has 100 watts going on 2 meters. REF is moving to Oxnard. FYW reports the Paso Robles Club purchased a Viking I kit which MSG and MSW are assembling. THA also has a Viking I kit. NET submitted an OO report. W3RNY/6, operator at K6CST in Pt. Mugu, received ORS appointment. OQX reports a new a.s.b. rig in operation. New Santa Amateur Radio Club officers are K6ATX, pres.; W6JQC, vice-pres.; K6EAO, rec. secy.; W6AET, corr. secy.; W6ULS, treas.; K6BVZ, sgt. at arms; K6CJR, W6OQX, and W6SNI board of directors. Traffic: K6NBI 141, W6QIW 33, FYW 3.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, T. Bruce Craig, W5JQD — SEC: RRM, PAMs: PAK and IWQ. RMs: PCN and QHI. Santa brought LGY a Jr. Weller Soldering gun and a Heathkit VFO. WN5FBE's father died Dec. 2nd. ATG is Mayor of Dodd City. WXY is NCS for the new YL Net on Thurs. at 1:00 P.M. on 3885 kc. BDB and OM are back in Dallas for keeps. KRZ has been working Guam, Japan, and the Philippines on 15 and 20 meters. MQW is NCS and UXY ANCS for No. Tex. Emerg. Net., which meets on 3930 kc. 8 A.M. Sun. AAO will have his kilowatt on the air soon. CDN has moved from Lubbock to San Angelo. The Abilene Amateur Radio Club assisted in a Crippled Children's Fund Drive in cooperation with the Kiwanis Club and TV station. Mobile units picked up the funds. CIP, BJL, and EOY are active with mobile units, reports TGW. CZW is looking for contacts on 144 Mc. DTA is operating portable in the Fort Worth Area. WN5FBY is working c.w. mobile on 40 meters. TJP has a new Viking II. The Texas YL Net meets each Thurs. morning on 3880 kc. at 9:30. The Dallas Amateur Radio Club's new officers are SDG, pres.; UHF, vice-pres.; and TMZ, secy.-treas. KZC and VMB, formerly of Roswell and Wichita Falls, are now being heard in Lubbock. YPI is rebuilding to a 500-watt rig and is running 5 watts on 75-meter 'phone. ZTB set up a portable rig at a Scout camp over the holidays, assisted by EFJ, FIE, and FIP. TVA is out of the hospital. UUR received an ARC-9 transmitter/receiver from MARS for

(Continued on page 116)

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Christmas. Blue Ridge (160 meter) Net is up with 92 per cent attendance. Traffic: K5FFB 1094, W5BKH 514, UBW 447, YPI 350, AHC 338, ACK 179, PAK 159, DTA/5 131, CF 72, ASA 53, RRM 38, OCV 33, YKE 29, TFP 12, LGY 5.

OKLAHOMA — SCM, Dr. Will G. Crandall, W5RST — Asst. SCM: Ewing Canady, 5G1Q. SEC: KY, RM: GVS. PAMs: PML, SVR, and ROZ. Message traffic has been much increased by the holidays as shown by this month's traffic report. Sincere regret is felt at the passing of Old-Timer EZK at Enid who did much to promote amateur radio. The position of call letters in the alphabet is no longer any indication of the age of the license since the necessity of reissuance. The ACARC has issued a manual of procedure for c.w. operators which is available on request and is well worth while. CXM had a nice write-up and picture in the *Enid Morning News* as the State's only YL EC. About half of the 77 counties in the State now have ECs but KY is asking for eligible applicants for the others. The Enid Annual Dinner and Hamfest had 103 registrations, 74 of them licensed. Among those present were the SCM, SEC, RM, two PAMs, and the local c.d. director. GIQ was MC. The North Fork Amateur Radio Club has set the date for its annual affair as May 21-22. Many thanks to those sending in traffic reports and news items. News must be of general interest to be included in this column. Traffic: (Dec.) W5GVS 451, AIRK 216, MQI 107, SVR 97, ZKK 90, PML 77, TFX 74, TC/IXM 68, ADC 65, QAC 62, KY 58, RST 43, MFX 42, REC 32, FEC 32, IIF 30, SWJ 30, WSM 27, CYQ 25, TNW 21, FEC 19, PNG 17, EHC 12, CBV 9, UTC 4, WPA 2.

SOUTHERN TEXAS — SCM, Dr. Charles Fermaglich, W5RIF — The Galveston County ARC participated in a recent c.d. alert. Everything in communications went off as expected. The club house was the center of communications activities. The following participated: VUS, KXA, DJD, AUN, DJC, PBY, and BPH. The GCARC is going ahead with plans to give amateur radio good publicity. DeVaney, Boles, and White gave a talk and demonstration to the Kiwanis Club. DJC now has a General Class license. DJD has a 4-watt mobile. Larry Gateley already has worked 14 states and hopes to get WAS before he gets his General Class license. EIF has been doing very nicely with a new kw. John Henry Kerby, III, has passed the Novice Class exam and soon will be on the air, portable in Arizona. WN5BTP is grinding crystals like mad; he now is Technician Class. URU has a new 813 rig on the air. CE is rebuilding and has a 75A-3. LSE is doing all the work around his house lately. The reason will be announced as soon as we know if it is male or female. Buddy Jarvis is soon to plunge into the sea of matrimony. Good luck. FEK is working hard on *HARC News* and 2 meters. SDA has a new ham shack. The HARC is progressing with its plans for a club house. Traffic: W5MN 2326.

NEW MEXICO — SCM, G. Merton Sayre, W5ZU — SEC: KCW, PAM: BIW, V.H.F. PAM: FPB, RM: JZT. The NMEPN meets on 3838 kc. Tue. and Thurs. at 1800, Sun. at 0730; the NM Breakfast Club every morning except Sun. 0700-0900 on 3838 kc.; NM C.W. Net daily on 3633 kc. at 1900. In operation "Ready" Dec. 6th, the following stations were active: ADX, AHQ, AK, AWR, BIW, BLO, BTB, BXP, CEE, CMI, DAD, DRA, DZB, EDN, FAG, FIE, FVY, GEM, GXU, GYN, HJF, LEF, KCW, KWR, NSN, NUN, OAF, PGJ, PIZ, THA, UCX, UDM, UWA, VDY, VNZ, WBG, WBJ, WPA, YFN, YIK, YPC, YWG, YWU, ZCV, ZET, ZU, and ZUV. CEE did a nice job in getting word to Canal Zone and Honduras on 21 Mc. to notify a person of his mother's passing. CIN had a lot of mobile QSOs en route to and from Michigan. FJE and NSJ are active on 430 Mc. WNL, ECS, EEM, and UEO, in Albuquerque, recently got on 144 Mc. FPB reports that over 40 hams in Albuquerque have 144-Mc. gear. ZU got a Communicator I for Christmas while in San Diego. AKR worked all states but Delaware in '54 with 8 watts on 7042 kc. SUP reports that the Hobbs Radio Amateur Club has discussed call license plates. RES puts in a nice signal. BAQ is back with 813s. CEE and LII visited the radio club at Portales. BHF has been on 40 meters and has a new SX-88. Ex-WN5DUB has a Viking II. Traffic: W5QR 73, ACQ 64, JZT 53, CMI 34, HJF 25, ARD 17, AK 16, WBC 16, CEE 14, ZU 10, AWR 6, BZA 2, BZB 2, BXP 1.

CANADIAN DIVISION

MARITIME — SCM, Douglas C. Johnson, VE1OM — Asst. SCM: Fritz A. Webb, 1DB. SEC: RR, RMS: VE1HJ, VO6X. PAMs: VE1OC, VO2AW, VO6N. ECs: VE1AA, VE1DQ, VO2G, VO6U. New appointee: VO1D as EC for St. John's Area. Congrats to OO VE1BN on his showing in the November F.M.T. Les had an average error of 12.8 parts per million for four measurements! AV is doing well with new Class B modulator on 75 meters. Ex-VE1MZ now is W9IVP. 1D has a new B.&W. transmitter. DQ, EC for Nova Scotia, reports the need for OPS volunteers at the provincial c.d. station. VO1Y put through his annual DX call to Santa on Christmas Eve to the delight of many VO

(Continued on page 118)

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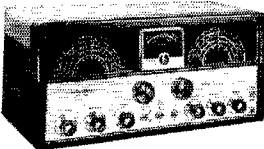
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ONTARIO — SCM, G. Eric Farquhar, VE3IA — BXX and AGB sport new rigs and report excellent results. ANY moved to Detroit. Good luck to you, OM. AOE endeavors to get the bugs out of the 2-meter rig. AUU is convinced that there is a Santa Clause. He received a communications receiver via that route. Welcome to Kapuskasing's latest ham, VWL. AVS completed his Clapp oscillator. NN enjoyed a Florida sojourn. The Quinte Club loses its valued ex-president, Doc Bruels, recently appointed to Scarborough's Medical Center. Congratulations and good luck, OM. BSW is working on a 'scope kit. BQP has added photography to his list of hobbies and admires the results of his recent Mexican trip. To the household of VZ we extend congratulations upon the arrival of a jr. operator. It's a boy and cigars were enjoyed during the HARC meeting. Band conditions still are grim and traffic-handlers experienced difficulty moving the large volume of Christmas messages. Traffic: VE3BUR 249, AJR 180, TM 148, NO 124, DQX 56, VZ 55, AVS 47, ATR 46, EAM 34, AUU 31, PH 28, CP 23, IA 17, AOK 14.

QUEBEC — SCM, Gordon A. Lynn, VE2GL — All the VE2 gang join the rest of the Canadian amateurs in extending to VE2BE congratulations on his 25th anniversary as Canadian Division Director and wish him well for the coming years. AJE is ex-VE2ACG and has converted ARB receiver with Globe Scout 40 transmitter. AEM, KJ, APP, AOB, and EC continue the c.w. net at 0830 and 1300 daily on 3645 kc. ADU, VA, and AGI are located at Seminary of Trois Rivieres. ANK is engrossed in mastering his 813. TIU operates a Viking Ranger. ATA, AOL, AUA, UB, and UZ are reported newcomers. QJ has had his call changed to AT, which was held by his father for many years. FL reports organization of the AREC in his district is proceeding apace, with the Northland Net operating on 3755 kc. at 1915 EST Wed. AGI spent three weeks in VE8-Land. DR has a new Viking Ranger. AGI is active on 75-meter n.t.m. with 400 watts. BK has ordered a 20A s.s.b. exciter. CA reports December was a busy month with traffic, also Europeans and Africans were coming in. Radio Club de Quebec (city) has ALV as president and AFC as secretary. The Club station, VE2CQ, will transmit ARRL Official Bulletins on 3740-ke. 'phone twice daily at 12:30 and 6:00 p.m. in both French and English. Traffic: (Dec.) VE2DR 145, EC 50, CP 31, FL 21, GL 17, CA 11, LO 7, BK 2, LM 2. (Nov.) VE2CA 98, EC 18, FL 7.

ALBERTA — SCM, Sydney T. Jones, VE6MJ — It is with sincere regret that we have to report the accidental death of E.L. of Camrose. Don was a good operator, a brilliant technician, and will be sadly missed by all who knew him. Our deepest sympathy is extended to his wife and family, and particularly to his dad, LL. WC reports reduced activity because of other commitments. I.Q. has an 813 rig in the blueprint stage. HL has an 813 rig on 7-Mc. c.w. and is getting FB reports. Any amateur station in Northern Alberta is invited to check into the new C.D. Net which meets on 3765 kc. at 0900 hours Sun. NX has a new rig going and is working out well on 14 Mc. CE is checking into the B.C. Net nightly. ZR is chasing the DX. FF, IZ, MO, ON, KP, PS, and EG are active on the new C.D. Net. HM, ZR, and MJ did reasonably well in the last Frequency Measuring Test. GW is active on 14-Mc. 'phone and sports a new beam. AL has a new jr. operator and is an active ORS. XG is QRL temporarily with TVI troubles. Traffic: VE6HM 144, OD 32, MJ 10, WC 9, AL 6.

BRITISH COLUMBIA — SCM, Peter McIntyre, VE7JT — Last month there was no column because of the press of business and the season activities. Thanks to the two who took the time to write after reading the last published column, namely 6MJ and 7AKD, who both touched on the lack of old-time ham spirit. US was the guest speaker at the VARC meeting where he gave an excellent talk on s.s.b. which was well received. Will reports that VE7s ABU, AKA, AKN, ALW, BV, TV, and YY are either on or getting on with s.s.b. and that there are 10 phase shift networks and 5 slicers floating around the Province ready for operation. The AREC has been having a rough time with band conditions very poor, QRM from VE4s, 5s, 6s and other sorts of sundry unmodulated carriers. There are some ECs throughout the Province who forget that reports to DH are necessary, so start reporting, fellows, or at least tell DH you are no longer interested. The AREC Net covers a large amount

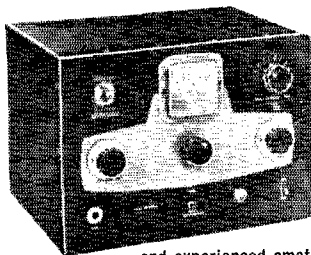
(Continued on page 180)



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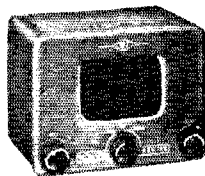
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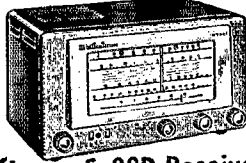
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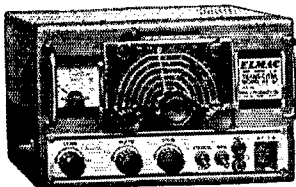


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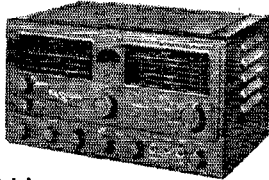
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of territory now, with check-ins from the Yukon, N.W.T., and Alberta on a regular roll call. Hope you all enjoyed the festive season and are on the road to a good 1955. Yours truly wants to know when the next hidden transmitter hunt will be. Not where, but when. Traffic: (Dec.) VE7QC 48, XY 35, DH 20. (Nov.) VE7QC 55, DH 32, KL 27, ZV 19.

SASKATCHEWAN — SCM, Harold R. Horn, VE5HR — DR attended the "Communications Planning Course" held at Arnprior, Ontario, Civil Defense College, and reports that much information was gained and many ideas were exchanged on ways to put communications to good use during an emergency. A good number of amateurs attended. CX reports that EB was married on Dec. 7th, with JG, BO, RU, EB, and their XYs in attendance. RU worked 45 countries the past summer with his 80 watts and a two-element vertical on his trailer. Ex-5JS now is 7IW at Kelowna. PW works 21 Mc. and likes that band. BG has a new Viking Ranger. RG is back on 75 meters after being QRT for a long time. MX is heard on 14 and 3.5 Mc. with his Viking. LM is now located at Saskatoon and BC at Swift Current. AT was the only VE west of Ontario to report during the B.E.R.U. Contest. BZ is a new OBS and can be heard on 3740 kc. at 1800 hours MST Tue., Thurs., and Sat. Because of poor band conditions the 'phone net has been practically extinct but it is hoped that members will be on the watch for any traffic when the band is open. Traffic: VE5GX 4.

Frequency Marker

(Continued from page 15)

controlling oscillator by factors of more than 10. Suitable low-frequency crystals, including those operating at 450 kc., and which should be as useful as those already mentioned, are available as surplus material for \$2.00 or less each.

A crystal-controlled frequency marker such as is described here can be built for from \$15 to \$20 if all parts, including the crystal, must be purchased new. Of course, if the receiver is provided with suitable power-supply terminals, filament and plate power could be taken from the receiver, in which case the cost can be still further reduced by omitting the filament transformer and rectifier-filter system.

The high precision and small size of this self-contained unit make it an especially useful piece of equipment for the radio amateur.

Overtone Crystals

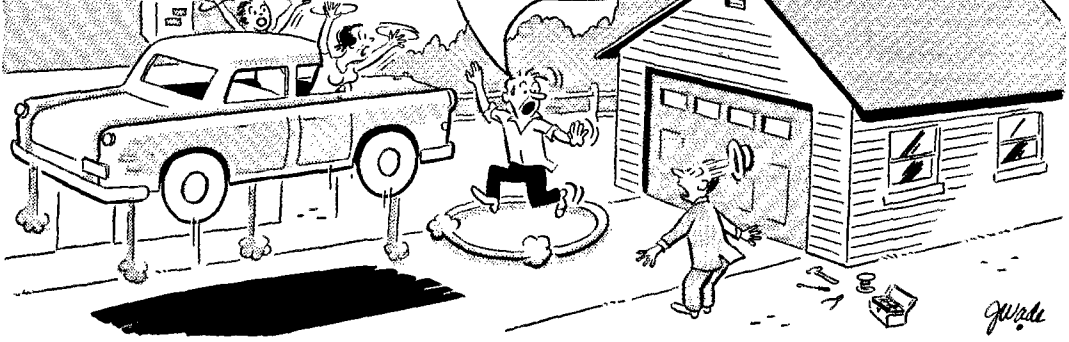
(Continued from page 17)

more capacitor than the circuit of Fig. 2A, and it will usually work well with crystals of either the overtone or fundamental variety interchangeably. We've used it repeatedly for 3rd-overtone work with crystals in the 6- to 9-Mc. range, and have had no trouble getting 5th-overtone oscillation with 3.5-Mc. crystals.

In some applications it may be desirable to have the crystal oscillator as high in frequency as possible. This is particularly true of crystal-controlled converters, where energy at frequencies other than the desired one may cause birdies and spurious responses. For converter use the circuit of Fig. 2C may have merit. This was suggested to the writer by Clare Reynolds, W9MBI, of the James Knights Crystal Co., Sandwich, Ill. He uses it in v.h.f. converters, and has also had direct control of an oscillator at 144 Mc. in a low-powered 2-meter transmitter. He

(Continued on page 122)

"Don't get excited, Fred! I probably wired the transmitter wrong. It's the garage door that's supposed to go up."



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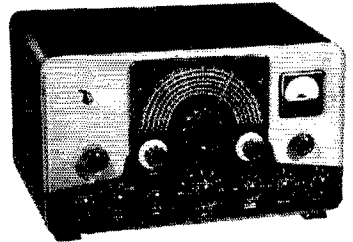
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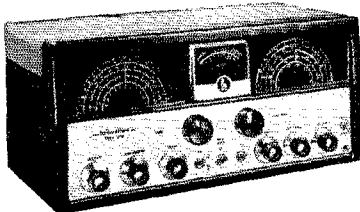
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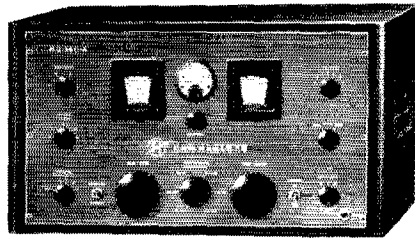
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reports that frequencies as high as 216 Mc. have been obtained with direct control, involving overtones as high as the 11th, with this circuit.

The critical element here is the value of the two resistors on either side of the crystal. Increasing them causes more feed-back, encouraging the tendency to self-oscillation and "squeezing." Dropping their value much below that specified cuts out oscillation altogether. We checked many types of fundamental crystals in this circuit in the Headquarters lab, with the usual result: In going through dozens of crystals in the range between 6 and 9 Mc., we found only two that could be made to oscillate on overtones higher than the 5th, and very few would even go this high, though all worked well on the 3rd. However, when we checked about 20 overtone crystals, higher overtones were found with ease. With any 3rd-mode crystal, the 5th and 7th modes were found in every case, and in most instances the 9th was usable. Third-overtone crystals around 12 to 15 Mc. (fundamental 4 to 5 Mc.) could be operated on their 9th, 11th and even higher overtones in some instances. Several v.h.f. crystals from the International Crystal Co., Oklahoma City, for frequencies between 40 and 50 Mc. were made to oscillate as high as 150 Mc. These were 3rd-overtone crystals in CR7-type holders.

Precautions with Overtone Crystals

Too many hams regard the frequency marked on a crystal holder as a fixed value, to be relied upon regardless of how the crystal is used. It should be borne in mind that even when the crystal is used at the fundamental frequency, the value marked on the holder applies only to the conditions under which the crystal was checked by the manufacturer. Changing the load capacitance into which the crystal works, using it in different circuits, or running it hotter than the manufacturer specifies, can make the frequency something quite different. Exact calibration may not be important unless you are planning to work close to band edges, but staying within the recommended operating conditions as to crystal current is important, if you want stability.

Most overtone crystals, being of the plated variety, are incapable of dissipating much heat. This means that the crystal oscillator must be operated at low power level, and with no more feed-back than is necessary to maintain good starting characteristics under load. The crystal oscillator should never be thought of as a power-generating device, and this is particularly true of overtone oscillators. The oscillator should generate a stable signal; stepping up the power should be left to succeeding stages.

When fundamental crystals are used on overtones, the frequency of oscillation may not be an exact multiple of the marked frequency. And the frequency will be different for series or parallel resonance. Moral: When working anywhere near band edges, have some accurate means of checking frequency; a crystal marking is no guarantee that you will be inside the band.

(Continued on page 124)

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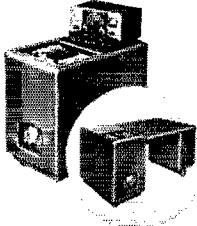
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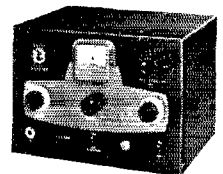
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1. What antenna popular during the 10-meter opening in the '40s has been revived as a 20-meter beam?
2. An average car antenna is just the right length for which amateur band?
3. Use of the grounded grid amplifier eliminates what troublesome problem?
4. The League recently filed comment on FCC Docket 11157. What does this docket propose?
5. What contests were held by ARRL during January?

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Answers

1. *The Cubical Quad (A Cubical Quad for 20 Meters, page 21)* 2. *Six Meters (A Simple Rig for Six-Meter Mobile, page 28)* 3. *The need for neutralization (Grounded-Grid and the 304-TH, page 33)* 4. *Expansion of Technician privileges to six and two meters (Happenings of the Month, page 48)* 5. *The Novice Round-up and the VHF Sweepstakes (pages 59 and 53, respectively)*

*QRK—*QST* Reading Knowledge. It is also the International Q-Signal meaning "Your readability is . . .". You'll find *QST* always QRK 5—Perfectly Readable.

The common test for self-oscillation, pulling out the crystal to see if oscillation stops, is not applicable to most overtone circuits. The capacitance of the crystal and its holder is a part of the feed-back circuit. If there is self-oscillation present, it will almost invariably stop when the crystal is removed.

In trying for high-order overtones, it may be necessary to bring feed-back up to the point where self-oscillation develops when the tuned circuits are resonated at frequencies away from the desired overtone. If a receiver covering the range is available, the self-oscillation frequency may be checked as the circuits are varied. When the desired overtone is approached there will usually be a sudden jump in frequency to that overtone, whereupon the signal (with b.f.o. on) will become stable and musical in tone, instead of raspy and subject to frequency shift during even slight mechanical vibration. Adjustment of such circuits is critical, and it usually will not be right for more than one crystal.

The tuning of circuits associated with overtone crystals affects the frequency of oscillation appreciably. There may be shifts of 50 kc. or more in the 144-Mc. band when tuning overtone circuits. Thus it can be seen that they are unsuited to shaving the band edges.

To Use or Not To Use?

From what we have said here it can be seen that the ability to work with direct crystal control in the v.h.f. range is not an unalloyed blessing. There are applications, however, where overtone techniques have much to recommend them. They are almost a must in crystal-controlled converters, for instance. Here you want freedom from birdies in the form of crystal harmonics, and you also want the energy you inject into the mixer to be as free as possible from frequencies other than the desired one. If you can get direct control at the injection frequency in your crystal-controlled converter, by all means do it. The power output required is, of course, very low, so you can achieve high stability in your converter readily. And you're not going to change injection frequencies, so critical adjustment is not an important deterrent. You're going to have to do the job only once.

Third-overtone operation of cheap and plentiful surplus crystals in the 8-Mc. range is often a convenient and economical way of controlling the frequency of v.h.f. transmitters. If circuit simplicity and low power drain are important considerations, along with low cost, overtone circuits are certainly attractive.

But suppose you're going to build an exciter that you hope to use on several bands. You want the oscillator to work with 3.5-, 6-, 7-, 8-, 12- or 14-Mc. crystals, so as to make use of a stock you have on hand. Quite likely, you'll want to have a VFO to work into the crystal-oscillator stage, too. Simplicity and low first cost are minor considerations in such a design, compared to the convenience of being able to use any type of crystal. Stability and more reliable frequency calibration

(Continued on page 126)

E. E. or PHYSICS

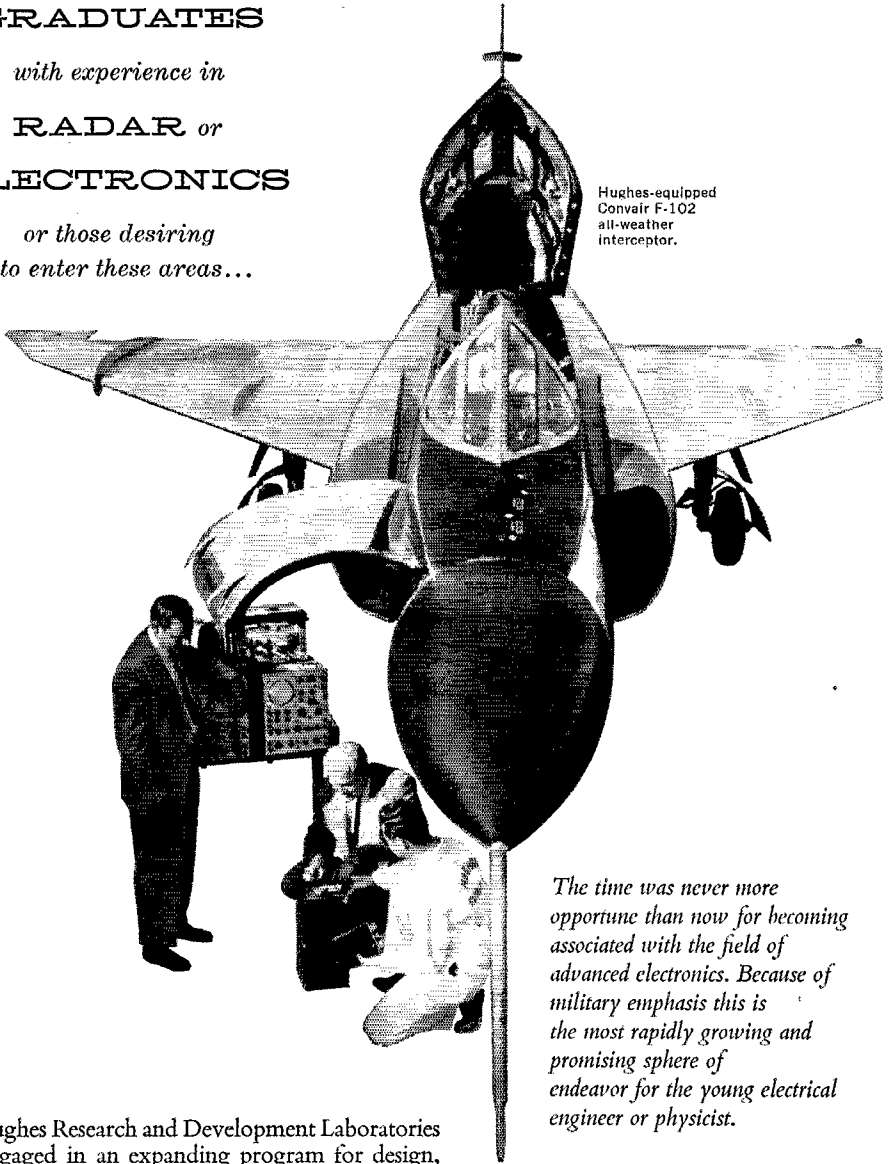
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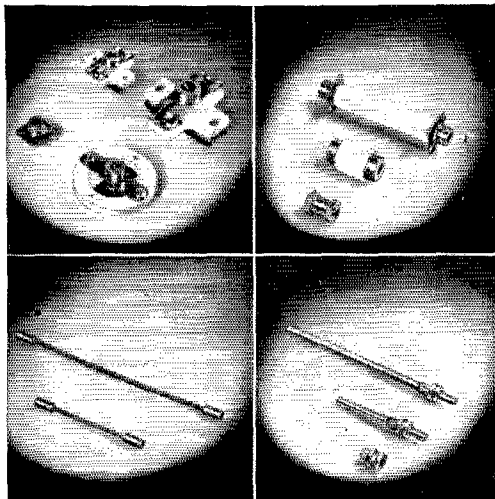
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are important here, too. Overtone circuits are out for such applications, obviously. You'll build this rig with all the customary TVI-prevention measures, anyway, so the possibility that unwanted multiples of the oscillator frequencies may appear in the output is of little importance. A careful consideration of all the design factors will enable you to make a wise choice as to whether overtone-oscillator techniques are attractive for the job you have in view.

Antenna Coupler

(Continued from page 19)

harmonic attenuation. Note the similarity of Fig. 3B to a low-pass filter section. It should be possible to match either 52- or 72-ohm coax without difficulty.

The nominal rating of the components used is 500 watts. The major operating precaution is not to operate the circuit switch S_1 with the power applied. These switches can carry quite a bit more current than they can break. The same precaution applies with somewhat lesser weight to S_2 and L_1 .

The L-C matching section may be used by itself for matching grounded antennas by bringing the antenna line in and tapping into the coupler at the point marked "X" in Fig. 1. No coil should be plugged in the jackbar, and switch S_1 must be in position 2 or 3. The only precaution is to observe the voltage ratings of the capacitors in the matching section.

If the same type of ceramic stand-offs are used as those in the photographs, be extremely careful when mounting them to the metal panel, as they break very easily. Fiber washers under the nuts and between the ceramic and the panel should help considerably.

HAMFEST CALENDAR

PUERTO RICO—The 1955 PRARC Hamfest will be conducted on Sunday, March 20th, on the Island of Puerto Rico, the exact location to be announced in the Club's bulletin, *Ground Wave*. There will be talks and demonstrations of TV, TVI and ITV. No changes in admissions from those of last year. U. S. and foreign amateurs desiring hotel accommodations should contact KP4DU for arrangements.

WASHINGTON—The Bremerton Amateur Radio Association will hold a hamfest on March 5th at the Elks Temple, 5th & Pacific, Bremerton. Registration will be at 1:00 P.M. The banquet starts at 7:00 P.M. A chicken dinner, country style, will be served. The price is \$4.00 per person. There will be a dance later in the evening. Fun for all. Tickets may be ordered in advance from Allen R. Nelson, W7GUS, Box 103, Port Orchard, Wash.

OHIO—Saturday, April 2nd, at the Dayton Biltmore. Dayton—the Dayton Amateur Radio Association will hold its annual Hamvention. Hamvention is the best treat in ham radio—ask anyone who has attended. The day-long program will feature outstanding speakers on all phases of amateur radio and a special program has been prepared for the ladies. The affair will wind up with a banquet at 7 P.M. in the hotel ballroom. Tickets are \$5.00 in advance or \$5.50 at the door. Reservations, more information and an attractive brochure may be obtained from D.A.R.A., P.O. Box 44, Dayton 1, Ohio.

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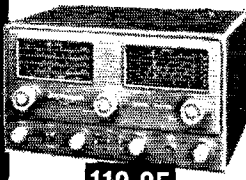
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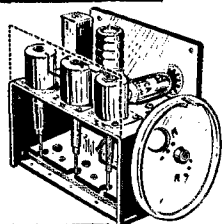
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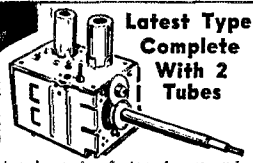


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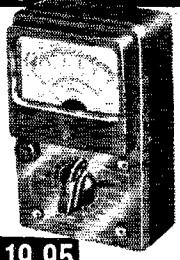


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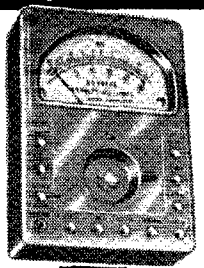
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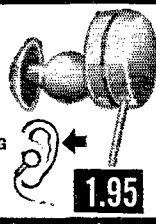
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Receiver Design

(Continued from page 21)

worked; however, instability, tracking difficulties, and oscillator pulling were quite bad above 7 Mc. This condition was attributed to insufficient frequency separation and the consequent reactance of the local oscillator circuit coupled into the cathode of the mixer, producing sufficient phase shift to cause oscillation in the mixer and pulling of the local oscillator frequency. Again, the 6C4 cathode follower provided a practical solution, by giving necessary isolation, resulting in a cool, smooth-running low-noise mixer. No further difficulty with tracking was encountered.

Circuitry

Fig. 1 shows our low-noise front-end circuit. No a.v.c. should be used on the first r.f. stage. It should be emphasized that in order to utilize the grounded-grid triode mixer it is imperative to use a separate h.f. oscillator. Although a converter circuit may appear complicated, a little study will reveal that it consists of simple triode-oscillator, signal-input and i.f. output circuits. Fig. 2 illustrates modification of two common types of single-tube converters to separate oscillator mixers for use in this low-noise front end. There is nothing tricky about making this modification. One precaution: connect all grounds to the cathode return of the stage being wired. The use of tube shields for all the 6C4s is recommended, especially if they are mounted below deck, as was the case in our receiver. Although major realignment will not be necessary, a touch-up of the trimmer capacitors at the high end of each band may be required. Readjust the oscillator trimmers first to bring the receiver back into calibration; then the r.f. and mixer trimmers for maximum gain.

Conclusion

Here is a circuit that for the first time makes practical the use of low-noise techniques in general-coverage receivers. It is easily applied to any receiver without introducing additional knobs or alterations to existing tuned circuits and, furthermore, works at the first try. The few extra wires and components are well worth the time and expense. Comparative listening tests were made on 14 Mc., between a receiver incorporating this circuit and three late-model stock commercial receivers in the \$100.00 class. Listening fatigue attributable to internal noise was considerably less, and twice as many DX stations were heard.



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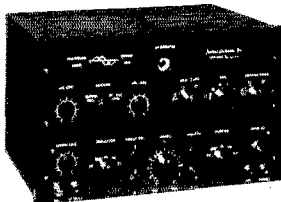
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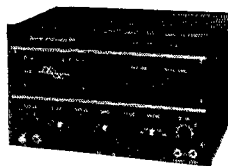
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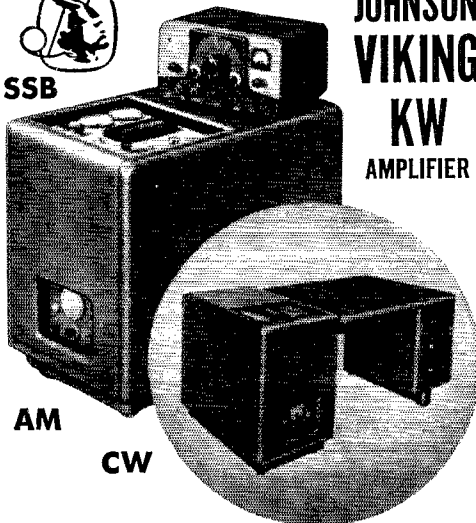
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Multimatch Antenna System

(Continued from page 23)

again, the capacitor is made up of concentric aluminum or dural tubing separated with polystyrene, and the coil is concentric. In each capacitor, the polystyrene insert (Fig. 4) should provide a tight fit to both sections of tubing, and the insert should be driven into the outer conductor to the shoulder. The inner conductor should be driven into the insert for a distance of $2\frac{3}{4}$ inches (thus protruding 2 inches inside the outer conductor). This gives a capacitance of approximately 25 μ f. The trap inductors are wound with No. 8 wire. The 10-meter inductors have 5 turns $2\frac{1}{2}$ inches in diameter, with the turns spaced approximately $\frac{1}{2}$ inch. The 21-Mc. inductors are similar, but have 7 turns. As with the wire-antenna traps, the inductors should be adjusted for resonance near the center of each band before they are installed. The ends of the inductors are wound around the element sections and fastened with clamps. The array is fed with a T match to 75-ohm Twin Lead.

Fig. 3 shows the element dimensions used by the author. Antennas of this type, in both wire and beam forms, have been installed by many amateurs, using traps constructed by the author. Without exception, all have been enthusiastic about the performance.

"Hidden Gem"

(Continued from page 24)

A Vari-Loopstick is used for L_1 , as suggested by W8E1Y. It is a commercial slug-tuned inductance which is widely used as a broadcast-receiver antenna. It sells for less than a dollar, and requires only a small hole for mounting. It comprises a very compact, adjustable tuned circuit consisting of its self-inductance and the distributed and stray capacitance of the circuit. It peaks very nicely on 75 meters using a transmitter or grid-dip meter as a signal source. Once the Vari-Loopstick is peaked at 75 meters, no further adjustment is ever necessary, since it is broad enough to cover the entire 75-meter band, and the increased radiation efficiencies on the higher-frequency bands more than compensate for the lack of a tuned circuit.

When it comes to the pick-up antenna, you can really let your imagination go to work. Only a short vertical probe from 4 to 8 inches in length is necessary if mounted on the rear gravel skirt or on the rear-window deck. An unused broadcast-receiver whip is efficient and inconspicuous. The antenna used here is a right front-fender guide which is insulated from the car body. This serves double duty because it works well as a pick-up antenna and helps the XYL in parking. Any insulated wire serves as a lead-in to the meter.

(Continued on page 132)

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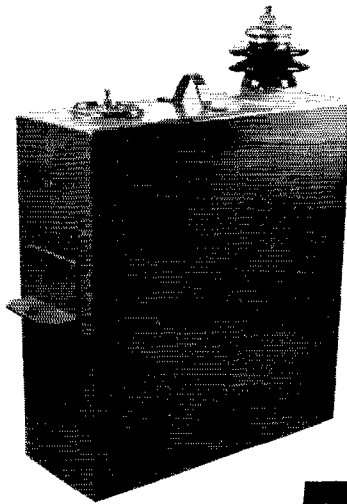
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Exclusive at Radio Shack! Sorry we can't tell you the famous make of this capacitor, rated at 50 mf at 3 KV (dc), but it's brand new — NOT gov't or other surplus — and fully guaranteed. Provides excellent dynamic regulation and optimum power output when filtering power supply for voice frequency, especially in low frequency syllabic loading, in suppressed carrier single side-band transmitter operation. Mild steel construction, finished gray. Size: 13½" wide, 5¼" deep, 14½" high. Insulator bushing and stud terminal 4" high. Mounting center 15⅝" for ⅜" bolts. Allow for 75 lb. ship. wt. NOTE: the quantity is very limited — first come, first served.

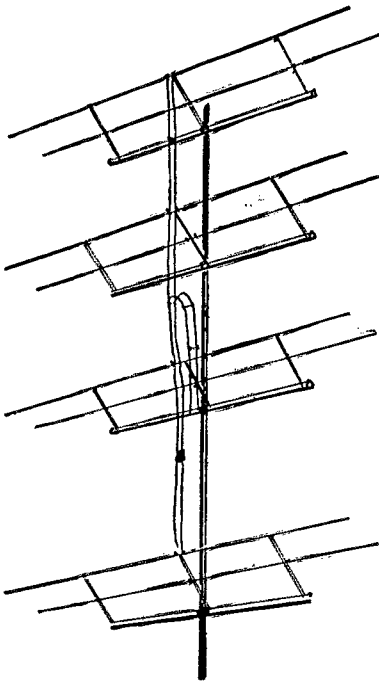
REFERENCE: See G-E "Ham News" of Jan.-Feb. and March-April 1954 for data on better dynamic regulation and power supply design. The value of this capacitor will then be even more fully appreciated.

RADIO SHACK CORPORATION



167 Washington Street, Boston 8, Massachusetts

230-234 Crown Street, New Haven 10, Connecticut



COLLINEAR ANTENNAS
for the TWO METER band

- 8 element beam..... \$12.50*
- 16 element beam..... \$21.50
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COLLINEAR antennas for the two-meter CD and CAP frequencies are also available.

If your local Distributor does not have our literature, write direct to the factory. All inquiries answered promptly.

U. H. F. RESONATOR CO.

224 7th Street Racine, Wisconsin

*All prices F.O.B. Racine, Wisc.

Using the F. S. Indicator

Once your field-strength indicator is installed, it may reveal some surprising facts about your transmitting system. For instance, you may find that maximum output does not occur at the plate-current dip but somewhere off to one side. You may find that output does not continue to increase with increased coupling, even if the plate current does go up and you still are able to get a plate dip. A point is sometimes reached where increased coupling merely heats your final amplifier and the transmission line, and actually decreases power output. If your grid drive is adjustable, you may find that there is an optimum setting for it, too. Too much drive may drop the output just as too little will. You will be able to find the exact frequency at which your antenna system radiates best and you will be able to prune your antenna to any desired frequency. The system followed here to QSY the antenna on 75 meters is to use capacity sprigs clipped on the antenna above the loading coil. The sprigs are short lengths of stiff copper wire and attached to small battery clips. If the antenna itself is tuned to the high end of the band, four sprigs of different lengths will enable you to cover most of the band with reasonable efficiency and will spot five frequencies for maximum output. If you are using one of the new continuously-variable loading coils, your field-strength indicator will help you to determine the correct tuning in a hurry.

And not the least value of this gadget is its ability to let you know that you're actually radiating. You won't have to tear the transmitter apart or run a special check when you fail to raise a station, if your meter is indicating normal output. You can just conclude that the other guy is deaf or has left the antenna off his receiver.

The sensitivity control should be turned all the way down when the indicator is not in use to protect the movement from overload if you should get too close to a strong commercial station. This also damps the meter against mechanical vibration.

The indicator can be constructed in a couple of hours, and attached to your car in even less time. About the only cost of any consequence is the meter movement, but almost everyone should have some meter available which can be used. Remember, the larger the pick-up antenna and the closer it is placed to the radiating antenna, the less sensitive the meter movement required. With fifty watts input, a 150- μ a. movement is more than ample when using the fender-guide pick-up.

No matter whether you're running a mobile kilowatt or only a half pint, whether you have a super high-Q antenna or just a piece of wire, a mobile field-strength indicator will at least result in the self-satisfaction of knowing when you are getting the maximum available output from your system. It will also let you know if changes in your system are of any benefit, and should result in more and better QSOs. You probably will discover other uses and applications yourself.

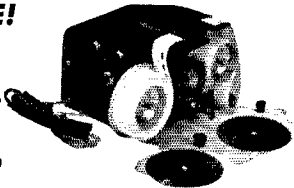
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SPEED UP Your RECEIVING with G.C.

Automatic Sender

Type S

\$28.00 Postpaid in U. S. A.



Housed in Aluminum Case Black Instrument Finished. Small—Compact—Quiet induction type motor. 110 Volts—60 Cycle A.C.

Adjustable speed control, maintains constant speed at any Setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50c per roll.

GARDINER & COMPANY

STRATFORD

NEW JERSEY

Let's call a ♠ a ♠!

Exaggerated allowances for old gear are pure and simple discounting and price-cutting. As a large scale Factory Authorized Distributor for every leading Equipment manufacturer, I pay them rock-bottom prices for all latest models, and can therefore give you the very best deal. For 30 years now — since 1925 — I have always been happy to match or beat any competition, so . . .

"I guarantee to top any trade-in deal — no matter how crazy!"

No need to go to the delay, expense, and risk of shipping your equipment all over the country. Just get the best offer, and bring or send it to me along with your old gear. You'll be glad you did! You don't need a ♣ to get the kind of service that will make ♣ your ♥ sing for joy!

Let's have the mutual pleasure of doing business together. It will be to your advantage!

Sincere 73,

Bill Harrison, W2AVA

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for all the best makes! Latest improved production of all current models in stock for immediate shipment. Place your order with HARRISON now for earliest delivery of new items.

Literature? — Just ask for it!



No need to the family ♠♠♠!
The Harrison Easy Pay Plan has terms to suite your budget! Ask for confidential acquaintance blank.

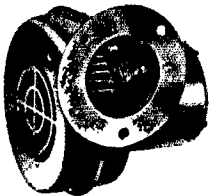


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for every Electronic Application

These dependable blowers pay for themselves immediately by up-rating tube and component capabilities to their higher forced ventilation limits. Lowered operating temperatures also reduce equipment failures, extending useful service life.

Standard production part with leading makers of transmitters, induction heaters, calculators, radar, etc., particularly to enable compacting more performance into smaller space.



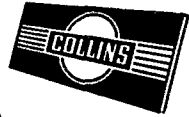
Model RO-50

Most popular WHISPER-QUIET small blower. Delivers 50 CFM (44 CFM at .25 inch static pressure). 115 Volt 60 cycle 2600 RPM shaded pole (brushless) motor creates no electrical interference. Draws only 40 watts. Over-size, self-aligning bearings for cool,

trouble-free performance. 5 3/4" high, 5 1/4" wide, projects 6-5/16" from mounting flange. 2 1/8" dia. discharge. Shipping weight 5 lbs. Immediate shipment from stock.

1-9	10-24	25-99
\$8.95	\$8.45	\$7.75

» Ask for literature on our other single and dual models 15 to 275 CFM. «



I do NOT sell on approval! That's your assurance that everything you get from Harrison is brand new, latest improved production. You are the first to use it! And it is guaranteed to be 100% perfect in every respect!

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FOR ALL MODELS OF THE FAMOUS

NEW! 3 BANDS ON ONE BOOM!

Telrex's answer for multi-band operation in limited beam space, using TV rotator!

Two full size 5.6 db gain elements on 10, two slightly condensed elements on 15 giving 4.9 db gain, and two Super Mini-Beam elements with broad banding end pieces on 20, giving 4.8 db power gain over a full size dipole — all on one 2" boom 22 feet long.

Each beam has the famous Perfect-Match Balun, to take 52 ohm coax cable.

Total weight 53 lbs., turning radius 16 ft. Harrison has it! For immediate delivery.

Model TBM-3

\$190.

Visit LONG ISLAND'S newest, largest center for Ham, Service, Hi Fi, and industrial Material.

Hillside Ave at 145th Street JAMAICA

REpublic 9-4102

TELREX PRE-TUNED BEAMS

Save up to \$100 with Harrison's sensational Beam — Prop Pitch Rotator — Tower Bargain Package! See previous ads, or ask.

HARRISON

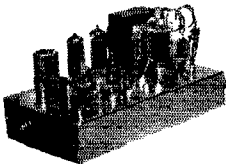
Ham Headquarters Since 1925
225 GREENWICH STREET
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TWO METER

TRANSMITTER • CONVERTER

Area of the Base is 58% of the size of this Page

Area of the Base is 68% of the size of this Ad.



LW-50—

Fixed or Mobile

- 15 Watt Transmitter
- Crystal controlled
- Speech for Crystal or Carbon Microphone
- Push-pull Modulators with Speech Clipping Pre-assembled Kit

LW-50K \$34.50

Wired and tested

LW-50 \$54.50

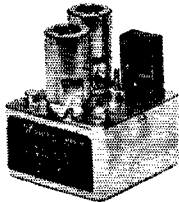
Crystals \$2.00

6 Tubes \$10.50

AC Power Supply

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- Crystal Controlled Converter
 - 7-11, 14-18 Mc or BC output
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 - Only 5 ma total B+ drain
- LW-61**
\$18.50
Postpaid
- Completely wired and tested with tubes, crystal and coax plugs.



See QST May '54, pp. 47-48 or write for literature.

ELECTRONIC LABORATORY
ROUTE 2, JACKSON, MICHIGAN

Transmitter Hunting

(Continued from page 27)

his call), the hidden transmitter, inviting all mobiles on 29 megacycles to participate in tonight's hidden-transmitter hunt. We are in the south sector (or north sector if he is in the north half of the city). We shall start the hunt with a roll call. All participating stations please identify themselves. This is W7QPR mobile, the bunny. By." During this transmission the participating stations take a bearing, determine the axis, and possibly the direction of the hidden transmitter, and start after him, announcing their calls for the roll call. After the initial transmission, the bunny may remain silent until he is called. When he is called, he transmits for fifteen or twenty seconds, allowing the pack to get a "fix" on him. The idea is to ask for as few transmissions as are necessary, because each time a participating station asks for a transmission, the whole group takes a bearing.

On a typical hunt, the first bearing was taken at point A, Fig. 3, and this indicated a northeast-

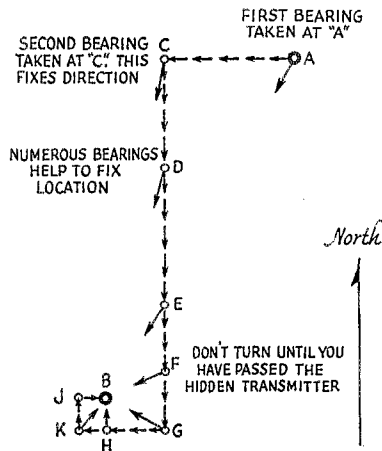


Fig. 3 — Diagram of a typical transmitter hunt following the "spiral" system described in the text.

to-southwest axis (A to B). The author drove about a mile westward to point C and called for a transmission. The bearing then appeared in a more north-to-south direction, indicating that the bunny was definitely to the south and a little west. Driving south (the streets run due north and south), bearings were taken at D, E, and F, as other mobiles called for transmissions. By this time, the author's XYL, who was the copilot, and the two junior ops in the back seat were calling for a turn to the west. At G, a transmission was asked for and it indicated that the author was south of the bunny's east-to-west axis. So, turning west, bearings were taken at points H and K. Position K showed that the author was west of the north-to-south axis of the hidden transmitter. The author then drove northward very slowly. At J, a bearing was taken which

(Continued on page 136)

USED IN ALL 48 STATES!

Self Supporting STEEL TOWERS

For Rotary Beams, FM, TV

Amateurs and commercial users alike — in every one of the 48 states and many foreign countries — have discovered why VESTO is the most famous name in towers! If you're not already a Vesto owner, write today for full information.

ATTRACTIVE — NO GUY WIRES!

- 4-Post Construction for Greater Strength!
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SMALL DOWN PMT.—EASY TERMS



Width of Base Equal to 1/5 Height

Vesto Towers are available in a wide range of sizes to meet requirements of amateurs and commercial users alike. Note the low prices for these quality lifetime towers: 22'—\$104, 28'—\$127, 33'—\$149, 39'—\$182, 44'—\$208, 50'—\$239, 61'—\$299, 100'—\$395.

Towers are shipped to your home knocked down, FOB Kansas City, Mo., 4th class freight. Prices subject to change... so order now! Send check or money order... or write for free information.

Cable address: "VESTO"

WRITE TODAY FOR COMPLETE FREE INFORMATION AND PHOTOGRAPHS

VESTO CO., Inc.
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Attention

OWNERS OF JOHNSON VIKING II TRANSMITTERS

NOW you too can have sparkling single sideband performance from this fine transmitter. Add the B&W 51SB Single Sideband Generator to your Viking II, and you'll enjoy all the operating characteristics you now get *plus* the superior effectiveness of SSB transmission. Here are just a few of the features of the B&W 51SB:

- Complete bandswitching from 80 to 10 meters • Operates with either crystal control or VFO of your Viking
- Voice control operation on SSB • Speaker deactivating circuit

The 51SB comes to you ready for hook-up to your Viking. Complete instructions and necessary modification kit are of course included.

Construction of the 51SB is completely unitized. The equipment can easily be removed in three major sub-assemblies: R-F Unit, Audio Unit, and Main Chassis Unit. It's entirely self-contained except for microphone.

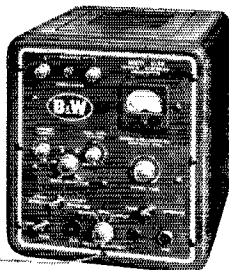
GET THE FACTS! Write B&W now for Bulletin 51SB, or see this new SSB generator at your distributors?.

B&W

BARKER & WILLIAMSON, INC.

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Upper Darby, Pennsylvania



PRICE: \$279.50

Amateur Net

Factory wired and tested. Complete with tubes, instructions, modification kit.

Watch for News

Information on application of 51SB to other communication transmitters will follow soon!

SEE US AT THE I. R. E. SHOW
202 INSTRUMENTS AVE.

ORIGINAL VAARO MOBILE PRODUCTS NOW MADE BY DAVIS ELECTRONICS

ORIGINAL VARIABLE SINGLE UNIT COIL

For 75-40-20-15-11 and 10 METER BANDS.

NOW IN THE 1955 DESIGN with the NEW, IMPROVED "DUAL CONTACT" between the coil windings to provide a greater, more positive, more efficient contact. Coil can be INSTANTLY TUNED to ANY DESIRED BAND or FREQUENCY by ingenious locking device. Factory pretuned. Continuous coverage from 3750 kcs. to 30,000 kcs. Highest "Q" available in an all-band coil. Fits all whips and bases.

MODEL V-102B—for 0 to 500 watts input

\$14.95

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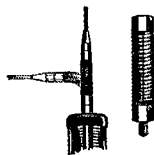
VAARO "WHIP CLAMP" — Securely fastens to roof water-drain of any car without damage to finish. Fastens whip securely down to car roof level for storage, low wooded areas, etc. Solid brass, chrome plated. Installed in 30 seconds. \$1.79



VAARO BUMPER MOUNT Eliminates cutting holes in your car. Fits any antenna and car bumper. BUMPER CURVATURE INSERT exactly fits your make and model of car. Socket dimensions: Standard 9/8" x 24 thread. Has .500 thick fibreglas disc of top dielectric material. MODEL V-105. Cast aluminum. Hammertone baked enamel, **\$13.95**

VAARO "WHIP FLEXOR" Guaranteed 5 years against corrosion and flaking. Cast bronze. Heavy chrome and copper under-plating, **\$25.95**

keeps whip perpendicular at high speeds—thus no change in loading or impairment of reception. Cuts down bad "QSB" action on receiving end. Whip can be brought into horizontal plane for car storage, etc. Has strong cadmium-plated square steel wire spring. Only **\$3.95**



The DAVIS-VAARO Line also includes: FIBREGLAS WHIPS—6' \$8.50, 7' \$8.75, and 8' \$8.95. Also BASE SECTIONS (Solid Hex); 12" \$3.75. 24" \$3.95. 36" \$4.95.

DAVIS ELECTRONICS

VAARO ELECTRONICS DIVISION

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BURBANK, CALIFORNIA

VAARO DIV., DAVIS ELECTRONICS Q-2
BOX 1247, Burbank, California
SIRS: RUSH INFORMATION TO ME AS CHECKED:
 Send CATALOG INFORMATION and DATA on VAARO MOBILE ANTENNA EQUIPMENT.
 Send Address of NEAREST AMATEUR JOBBER.

Name _____
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City _____ State _____

Tecraft

CASCADE CRYSTAL CONTROLLED CONVERTER

for 144 or 220 Mc.



Provides:

- HIGH SENSITIVITY — Sensitivity better than 1/10 microvolt. Gain approx. 30 db. Noise approx. 4 db.
- COMPLETELY STABLE. C.W. on 144 mc. NO mechanical modulation. Pure D.C. note. No drift.
- RUGGEDLY BUILT — Suitable for mobile application.
- USE WITH ANY COMMUNICATIONS RECEIVER — Availability with output at I.F. frequencies 6-10 mc., 8-12 mc., 10-14 mc., 12-16 mc., 14-18 mc. We recommend use at I.F. output 14-18 mc.
- COMPLETELY SHIELDED — In beautifully finished silver gray hammertone steel case.
- Available (SPECIAL ORDER) for other CD or industrial frequencies. Also available for Collins receiver.
- USES 6BZ7, 2 — 6CB6, 2 — 6J6 tubes. COMPLETE with plugs, tubes and crystal. \$42.50
- Kit Form. Complete. \$29.75

Ask your dealer or write us

THE EQUIPMENT CRAFTERS, INC.
523 Winne Ave. River Edge P.O., N. J.

indicated the bunny was due east. Turning east, the bunny was located. He had been hiding between two buildings on a school ground.

The author calls this the "spiral" technique. It cuts down the possibility of passing the bunny without realizing it, a condition that might easily occur if the hunter tried to drive directly to the bunny.

Well, that's how it is done in Seattle, to say nothing of the coffee and rag-chew at the favorite beanery after the hunt. So, bundle the XYL and the junior ops in the family chariot and really have some fun.

Mobile S.S.B. Receiver

(Continued from page 35)

The heaters are originally in series-parallel for 24-volt operation. They are easily rewired in parallel if the mounting screws holding the capacitors over each tube socket are removed and the capacitors carefully moved out of the way while making the necessary changes.

An additional stage of audio is necessary to obtain good speaker volume. A small sub-chassis was made from light-weight galvanized metal and soldered to two opposite capacitors, as shown in the photograph. A seven-pin miniature socket was mounted on this chassis to take the 6C4 audio tube.

The second detector was modified as shown in Fig. 2. The wiring for the a.v.c., a.n.l., and 6C4 audio stage is also shown here. The long leads going to the audio gain control should be shielded. Many of the components in Fig. 2 are already in the original set. Douglas R. Jordan's article, "New Life for the Q5-er," *QST*, February, 1951, will be helpful to the builder.

After these modifications, the BC-453-A is a high-performance mobile receiver. I believe it to be the only unit, easily obtainable, qualified for s.s.b. mobile reception.

THE NEW Master-Flex-'R

RELIEVES THE SHOCK OF THE WHIP ON LOADING COILS

Here is a must for all mobile hams! . . . The new heavy-duty Master-Flex-'R, designed to relieve the stress and strain and prevent damage that could be transmitted to the loading coil. The Master-Flex-'R protects the whip and prevents the loading coil from injury and detuning while driving at high speed, or from overhanging limbs and driving into garage. Permits whip to be fastened down to car on bumper mount installations of late model cars. Made of sturdy spring steel, yet flexible enough to absorb all the shock. Heavy cadmium finish to withstand the elements. Takes only a few minutes to attach to the coil.

Amateur Net

\$1.95

NEW! . . . Master "TENAHOOLD"

Stops Antenna Whipping

Screws on to rain molding of car. Protects antenna from low hanging limbs or driving into garage. Also when driving at high speeds. Hard cadmium plated finish.

Amateur Net

\$1.



AT LEADING RADIO JOBBERS EVERYWHERE

Master Mobile Mounts, Inc.

1306 BOND STREET LOS ANGELES 36 CALIFORNIA

Silent Keys

IT is with deep regret that we record the passing of these amateurs:

- W1CCF, Carroll W. Still, jr., Atkinson, N. H.
- W1JLM, Anthony J. Liard, Clinton, Mass.
- W1UT, Lester E. Gavitt, Brookfield, Mass.
- W1VD, William F. Coleman, West Hartford, Conn.
- KN2LXL, George Penney, Pine Bush, N. Y.
- W2M2S, Cornelius V. Hulse, Montclair, N. J.
- W3QKS, John A. Eva, Tamaqua, Pa.
- W4LLL, ex-W3EXI, J. W. Scrivener, Orlando, Fla.
- KN6TMA, John F. Walker, Whittier, Calif.
- W6OZH, Herman R. Ascher, San Diego, Calif.
- ex-W8M2D, Paul Lawman, Clarksburg, W. Va.
- W8OQX, James W. Quinn, Belleville, Mich.
- W0LDH, Reuben Sorenson, Keokuk, Ia.
- W0PYP, Harlan I. Trask, Rapid City, S. Dak.
- VE3OW, Romeo Vachon, Ottawa
- VE6EL, Eldon R. Langbell, Camrose
- HC2JR, John M. Reed, Guayaquil, Ecuador
- ZS1A, J. A. Twine, Capetown, S. Africa

You can take it with you!



LADIES:

take note of a charming couple... packed, ready...about to be on their way to an exciting, completely unique event.

The first **YLRL INTERNATIONAL CONVENTION**

MIRAMAR HOTEL
SANTA MONICA,
CALIFORNIA
JUNE 24 - 26

(See QST Feb. 1955, page 49 for program, chairmen, costs etc.)

The GONSET Company, makers of the well known 2 meter Communicator reminds you that... like the lovely lady in the photograph... "you can take it with you." At home...or on your travels...Communicator is a "friend maker" of well established reputation.

all possible success to the YLRL INTERNATIONAL CONVENTION.

GONSET CO.

801 South Main Street Burbank, Calif.



AN/APR-4 COMPONENTS WANTED

In any condition. NEW HIGH PRICES. Also top prices for: ARC-1, ARC-3, APR-1, APR-5A, etc.; TS-34 and other "TS-" and standard Lab Test equipment, especially for the MICROWAVE REGION; ART-13, BC-348, BC-221, LAE, LAF, LAG, and other quality Surplus equipment; also quantity Spares, tubes, plugs and cable.

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THE NATL. SOCIETY FOR CRIPPLED CHILDREN AND ADULTS, INC. 11 S. LASALLE STREET, CHICAGO 3, ILL.

In this top rated rig TVI is sealed in with

METEX Electronic Weatherstrip



Viking Ranger

This inexpensive product will do the same for your own rigs. Follow the lead of Johnson and other high placed manufacturers.

For sealing your own rigs or any consumer, industrial or military equipment against RF leakage METEX Electronic Weatherstrip is highly effective and is a simple operation. It's made of highly resilient compressed knitted wire which comes in several forms to meet all normal requirements even where closure is of an uneven nature. Type TVI 20-S is easily applied to most rigs in the home workshop. METEX Electronic Weatherstrip is the simplest and most inexpensive method for sealing in RF leakage yet devised. Try it. Results are amazing. Ham and industrial inquiries invited.



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KNITTERS OF WIRE MESH FOR MORE THAN A QUARTER CENTURY

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XMTRS FOR 160 TO 2 METERS

or Special Freq. 500 KC. to 160 MC.



LETTINE MODEL 240 TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. Air wound plug-in coils used for high efficiency. Takes any freq. from 1.6 to 30 mc. Ideal for General Class, Novice, CAP, CD, Industrial. Sold direct from our factory, ready to operate. 40 to 50 watts input, Phone-CW. Complete with 8 x 14 x 8 cabinet, 40 meter coils, xtal, tubes: 6V6 osc., 307 final, 5U4G rect., 6S17 xtal mike amp., 6N7 phase inv., 2-6I.6's PP mod. Wt. 30 lbs. \$79.95, 80, 20, 10 meter coils \$2.91 per band, 160 meter coils \$3.60. MODEL 130 FOR 120 TO 130 WATTS — \$199.50

MODEL 242 FOR 2 METERS — 45 WATTS INPUT — 6146 FINAL. Complete with mobile connections, A.C. power supply, tubes, xtal. Xtal mike input. Uses 8 mc. xtals. Swinging link matches 52 — 300 ohm antennas. Same cab. as 240. \$89.95. Also 6 meter model.

150 WATT ANT. TUNER matches any antenna. 8 x 10 x 8 cab. \$20.00. Coils extra: 100 — \$1.50, 80 — \$3.45, 40 — \$2.73, 20 — \$2.40, 10 — \$2.31.

VFO FOR ANY OF ABOVE TRANSMITTERS — \$49.95
Send full amount or \$25 with order — balance C.O.D.

LETTINE RADIO MFG. CO.

62 Berkeley St. Valley Stream, N. Y.

S.W.R. Bridge

(Continued from page 31)

C_1 is also tuned for minimum or a null. It may be necessary to readjust both C_1 and C_2 to get the best possible null. The taps on L_2 may have to be moved toward the center of the coil if a good null isn't obtained with the tap near the outside. However, though there may be more than one set of conditions that will give a good null, the best condition is with the taps as close to the ends as possible. When the best reading is obtained, the bridge can be removed from the coax line and the line connected directly to the transmitter. The transmitter can then be loaded to the proper operating input.

There are two points to be remembered. No matter what changes are made at the transmitter, they will have no effect on the match so long as the frequency is left the same as when matched. Point number two is that the controls, C_1 , C_2 , and the taps, should not be changed after the system is matched. Again, this holds true for a given frequency. Any loading adjustments should be made at the transmitter, not the coupler.

With the system matched, it will probably be noticed that it is possible to vary the operating frequency, without retuning the antenna coupler, over a wider range than was possible before. The actual range will depend upon the antenna system. The settings of C_1 , C_2 , and the taps can be noted for each particular point in the band and it then becomes a simple matter to change the controls to the correct setting whenever the operating frequency is changed.

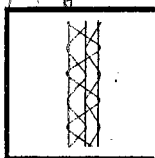
Coax-Fed Antennas

Another place the s.w.r. bridge does yeoman duty is in the case of a coax-fed beam, such as is used on the 20-, 15-, and 10-meter bands. Assuming that we are going to match a 15-meter beam fed with 72-ohm coax, the procedure is simple. The bridge is connected to the transmitter with a piece of 72-ohm coax and full-scale reading is obtained with the output side of the bridge disconnected. After full-scale reading is reached, the line to the antenna is connected to the bridge. The matching network at the antenna is then adjusted for the lowest possible reading on the milliammeter. When a reading of zero or close to it is obtained, one can be fairly sure that the antenna is acting as a 72-ohm load for the 72-ohm coax and the s.w.r. is very low. The bridge is removed from the line and the transmitter can be loaded up. You can then be pretty sure the r.f. is going to the antenna and not being used up as heat in the feed line.

If one is interested in making actual standing-wave-ratio measurements, the Measurements chapter of the *Handbook* describes an excellent bridge that can be used for this purpose. However, for making sure your antenna system is working properly, the unit described here is worth its weight in the 24-carat stuff.

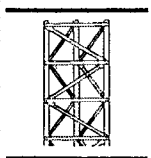


Amateur radio types • Guyed towers for FM-TV antennas • Vertical Radiators • Microwave towers • Commercial Communication towers • Transmission line supports, etc.

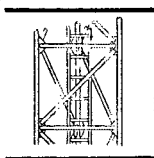


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Height to 80'
Width*—6.5"
10' section—
22 lbs.
Use—Mast for TV
Amateur, Port-
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* Between CG of Tower Legs



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Microwave
antennas



SERIES 6000
Height to 600'
Width*—60"
10' section—
653 lbs.
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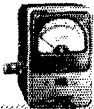
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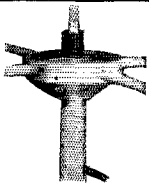
FTR

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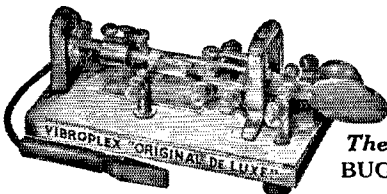
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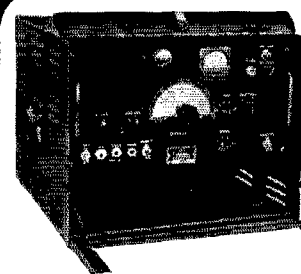
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Hints & Kinks

(Continued from page 56)

nally employed in the voltage amplifier and the modulator require no modification when the 12AT7 is replaced with the Type 6U8. Component designations — C_{10} , R_{10} , etc. — shown on the new schematic, refer to Fig. 1 of the article which appeared in 1952. — *Cal Hadlock, W1CTW*

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MANY hams would like to have a source of regulated voltage for experimental use, but do not care to tie up a transformer and the necessary filter components in a supply that will be employed only at irregular intervals. The late W5LS designed an *outboard regulator* that may be used with any small power supply capable of delivering up to 100 ma. at 350 to 400 volts.

The circuit diagram of the regulator is shown in Fig. 3. Tests of the circuit, made with the output

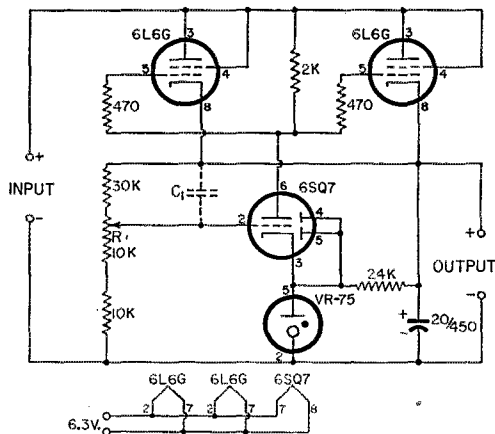


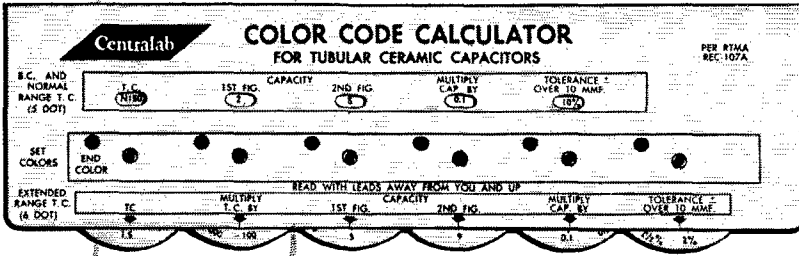
Fig. 3 — Circuit diagram of the voltage regulator. All resistors, except R_1 , 1-watt carbon.

C_1 — Optional ripple filter, 0.1 μ f., 600 volts.

R_1 — 10,000-ohm 3-watt wire-wound potentiometer (ClaroStat Series 58).

control, R_1 , adjusted for an output of 225 volts, showed no voltage drop at loads as high as 77 ma. When adjusted for an output of 250 volts, the regulation was constant up to loads of 60 ma. and a drop of no more than 5 volts was measured with the load increased to 77 ma. At 275 volts, the output remained steady with loads up to 54 ma. and fell to approximately 240 volts with the drain raised to 77 ma.

Variations in the design to meet special conditions are possible. In addition to the ripple filter shown, the connection of a 0.002- μ f. mica capacitor across the VR-75 will reduce the noise amplification, in which case the 20- μ f. capacitor can be eliminated. Of course, the filament voltage applied to the regulator tubes cannot be used for equipment powered by the regulator unit. — *E. P. Prass, W5AFL*



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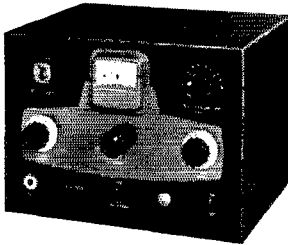
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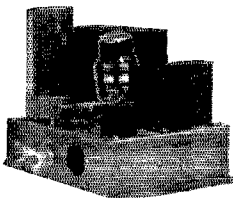
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Correspondence

(Continued from page 46)

signal, and seems to be conscious of the fact that they have to sell the thing in the proper light. A fellow with a bad signal finds out about it quickly. The vast majority of s.s.b. operators are convinced that with the proper operation of existing receiving equipment, not to mention the excellent supplementary units which improve the existing equipment, there is very little justification for the criticism that s.s.b. "hogs" the bands. As a group, and through experience, they feel that the opposite is true — and a close examination of the number of individual QSOs in, let's say, any range of 10 kc. in the top of the 75-meter band, should prove the point. Any reasonably good communications receiver, properly operated, can generally receive an a.m. signal much closer to a s.s.b. station than it could adjacent to another a.m. signal. Only experience can prove this, not opinions!

My most serious concern, however, is the nature of some of the severe criticism and remarks being made about the so-called deliberate interference, and also the attitudes of some of the a.m. operators that the s.s.b. boys are supposed to restrict their operation to a portion of the band and that the rest of the band is a.m. territory only. Admittedly, there are some rotten apples in the s.s.b. barrel, and some of the s.s.b. boys are not selling a thing but trouble, but as a whole, the group does not deserve the criticism that they are receiving by a minority group. It is my personal opinion that neither group owns any portion of the band, nor any particular frequencies therein. I believe that that is also recorded as a matter of law!

It is also my opinion that these remarks have progressed, or rather digressed, to the point where they are rapidly becoming a black eye to the ham fraternity in general. I believe it is meant that the ham bands can be used for free and intelligent discussion of these issues, but that they are not meant to be used by a minority group for the purpose of insulting the person, integrity, and character of anyone who does not believe as they, the minority, do. Furthermore, this group's only sensible argument to the issue is that they are not in the minority. They are, I am sure, in the majority in number, but most definitely in the minority in attitude. This group is, I believe, the product of the influence of a certain few individuals who are using the too-popular views. They contend that the FCC is "investigating the matter, so you s.s.b. boys better get the heck out of here." Personally, I would welcome an FCC investigation of the issue, and seeing in print what the results of such an investigation would disclose.

— Elton B. Miller, W8HKE

VIEWPOINT

Aeronautical Center Amateur
Radio Club
Box 1082
Oklahoma City 1, Okla.

Editor, *QST*:

As an amateur who built and operated "wireless" equipment long before the spark-tube hassle of the Twenties, I was amused at the rantings of W4WQT in his letter published in the December issue of *QST*.

While some of us have probably not done much to unite the amateurs, we are certainly not trying to divide them over the small issue of s.s.b. versus d.s.b. We feel that the caliber of remarks used in W4WQT's letter is entirely uncalled for and inexcusable and that *QST* has struck some kind of a new low in publishing it.

— C. E. Gardner, W5AGM
President

Brantford, Ont.

Editor, *QST*:

I have just finished reading the letter from W4WQT concerning single sideband. I quite agree with him. This is the new era and sideband is the coming thing. But at this time, I wish to say live and let live. Surely there is adequate space for all of us, no matter what our mode of operation. The amateur clan are supposed to be gentlemen; let us live up to this and try to get along in peace and harmony.

— R. Crandell, VE3AOT

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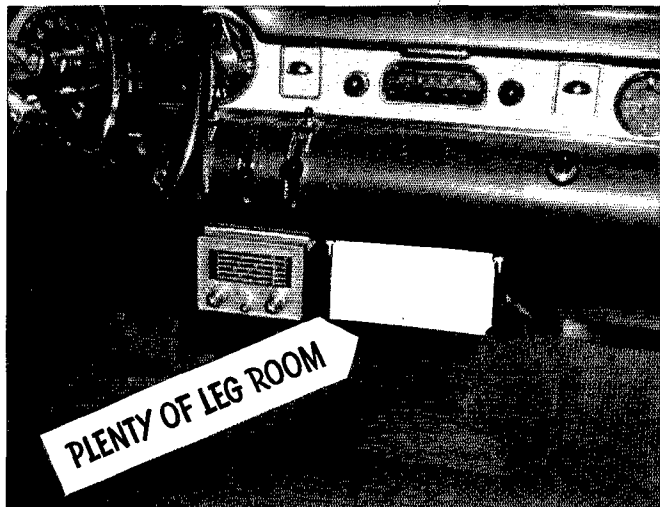
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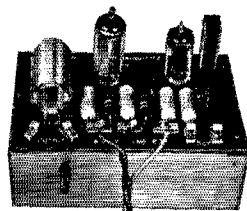
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Happenings

(Continued from page 47)

SECURITY RULES

QST has earlier reported (p. 46, August 1954) a proposal by FCC to amend our rules to exclude from eligibility for an amateur license any person who is a member of the Communist party, or Communist-front organization, or any group advocating the overthrow of the U. S. Government by force. Additionally it was proposed that only persons of good moral character would be eligible for amateur licenses; factors to be considered in this connection are former membership in above-mentioned organizations, and conviction of a felony. Because of the varied comments filed and "the legal questions which have been raised," FCC has designated the matter for oral argument to be held in Washington on March 7, 1955.

NOVICE EXPANSION PROPOSED

In late January FCC issued a Notice of Proposed Rule Making to expand the 40-meter Novice segment to read 7150-7200 kc. This action is based on a request of the League formulated at the 1954 meeting of the Board of Directors. Date for filing comment is April 15, 1955.

Readers may recall that when in early 1952 the Commission proposed 7175-7200 kc. for Novices, the League heartily endorsed the idea but asked that the segment be a full 50 kc. FCC decided not to grant ARRL's request at that time, believing that it would be better to wait until some Novice operation there provided some experience on which to base judgment concerning a possibly larger band. As stated, in 1954 the League reiterated its request, which has now taken the form of proposed rule-making.

World Above 50 Mc.

(Continued from page 56)

them first with a code oscillator, repeating the text on voice shortly after. This not only spreads the latest news of ARRL affairs, but also provides much-needed code practice for quite a few of the gang who do not get code experience in any other way.

W2TTU's summary in January *QST* (Fig. 5, page 13) and other long-term records show that auroral activity is not common in January, but two of the best aurora sessions in years came on consecutive nights, the 17th and 18th, of January, 1955. These did not follow the usual pattern as to time, either, both apparently getting under way around 2245 EST, and running for about two hours. This is about the time of night when auroras that have started earlier taper off. Activity in these was considerable, and reports of stations heard and worked have been received from as far east as W1BCN, out on the elbow of Cape Cod, and as far west as W7DYD and W7TMU in Washington, as well as from scores of stations in between.

For years the v.h.f. operators who take advantage of the fun and DX that only aurora sessions offer have been something of an exclusive club. You hear the same fellows in there every time. You also hear dozens of roaring completely unintelligible carriers of 'phone stations, some of them undoubtedly coming from fellows who would be amazed if they knew how far they were getting out at the time.

(Continued on page 148)

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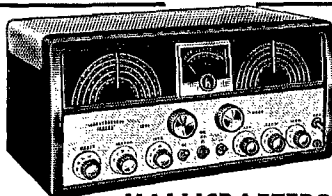
Build up your code speed quickly . . . easily. Just a few minutes a day spent with this practice set can boost you over that hump. Set includes a constant frequency buzzer and key mounted on a 4"x6" molded Bakelite base. May be used singly or in pairs for code practice.

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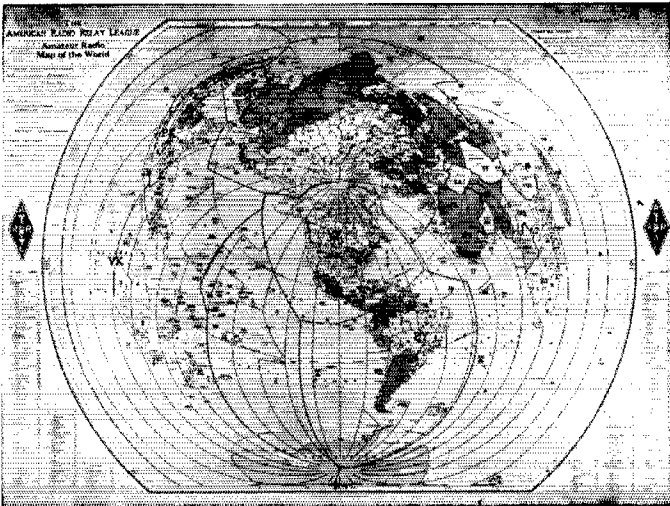
The time zones are plainly marked, too. Call areas of thirteen countries are shown. Principal cities are designated. There's a scale of miles, another of kilometers. Printed on heavy map paper measuring 40" wide x 30" high, in 8 colors that really stand out, this new ARRL World Map is easily read from your operating position.

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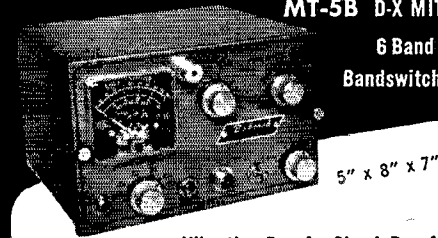
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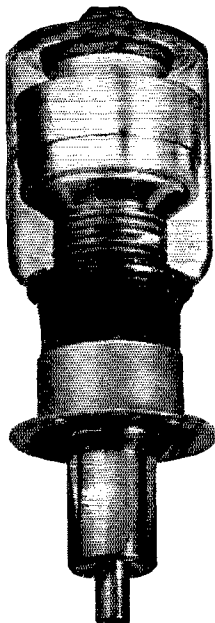
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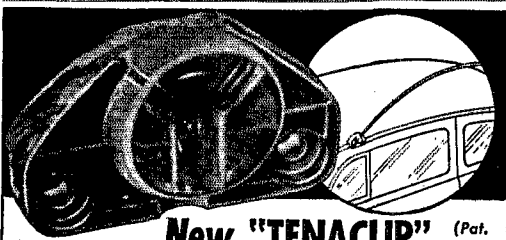


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OES Notes

W1UTZ, Salem, Conn. — Nightly skeds with W1WHC/1, Wellfleet, Mass., indicate that this 120-mile path can be covered regularly on 144 Mc. with readable voice signals. This is at 2130, and is followed at 2200 by a similar check with W1YQI, Marblehead, Mass. The latter circuit, about 100 miles, is also consistent. Planning gear for 1215 Mc.

W2ORA, Collingswood, N. J. — Round-table in Philadelphia area each Monday at 2030 is big help in keeping the 6-meter gang together. As many as 12 stations participate, and more are invited. Heavy antenna damage during fall hurricanes has now been largely repaired.

W3KLA, Baltimore, Md. — Equipment under construction: coaxial tank circuit for 4X150A, amplifier for 144 Mc., will also operate as doubler to 220. W3YQD now keeping nightly sked on 220 with W4UMF, Arlington, Va., at 2115.

W3OTC, Silver Spring, Md. — 50-Mc. activity holding up well during winter months, with good turnouts for Sunday-morning and Monday-night sessions. Extraordinary 50-Mc. reception during Sunday morning of V.H.F. SS. W1FZ, Farmington, N. H., answered CQ, but faded out before complete exchange could be made. W3OJU, Washington, D. C., also heard W1s briefly during same period. As no exceptional tropospheric signals were heard, this one period of 400-mile reception appears to have been an extra-long meteor burst, or some other form of short-duration reflection.

W3UQJ, York, Pa. — Would like to see QST box listing accomplishments of 220- and 420-Mc. stations, similar to 2-meter box. After several months of regular skeds on 220 Mc. with W4UMF, and contacts with Maryland, there now seems to be some probability of a Pennsylvania contact, as two 220-Mc. stations are being built by York-area hams.

W4HHK, Collierville, Tenn. — After more than a year of almost daily observation of meteor-burst signals on 144 Mc. there appears to be a lag of a day or so between the predicted peak of a meteor shower and the maximum results on the 2-meter schedules. Daily tests with W1HDQ and W2UK continue, working schedules permitting.

W5FPB, Albuquerque, N. Mex. — Though there are about 40 hams in the area who can get on 144 Mc., few show up regularly on net. C.d. group would like 2-meter mobiles for their communications plan.

W6ZDO, Canoga Park, Calif. — Nightly transmission on 431.5 Mc., 2000 PST. Receiver for 1215 Mc. completed, and work started on transmitter.

W7JHX, Port Orchard, Wash. — Completed new a.f.c. system for 10,000-Mc. gear. Seems extremely stable, holding over wide frequency range.

W7JRG, Billings, Mont. — Gear for 432 Mc. about completed, including 4X150A coaxial-tank tripler, 16-element array with plane reflector, and crystal-controlled converter with two lighthouse-tube r.f. stages. Also working on balanced modulator for s.s.b., 3.9 to 50.4 Mc.

W7NVO, Boise, Idaho — Working on 145.44 Mc. in Boise Valley 2-meter net.

W8LEE, Westboro, Wisc. — New power supply completed; now running 600 watts on voice. Continuing 0745 skeds with W8BN, but 2130 sked discontinued. OBS transmissions nightly, except Monday and Friday, as follows: west — 1955; southeast — 2000. Frequency — 144.12 Mc.

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376	397	419	483	504	526	444	464
377	398	420	484	505	527	445	465
379	401	422	485	506	529	446	466
380	402	423	486	507	530	447	468
381	403	424	487	508	531	448	469
383	404	425	488	509	533	450	470
384	405	426	490	511	534	451	472
385	406	427	491	512	536	452	473
386	407	429	492	513	537	453	474
387	408	430	493	514	538	454	475
388	409	431	494	515		455	476
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4397	5706	6275	6875	7650	7950
4490	5725	6300	6900	7673	7973
4495	5040	6325	6925	7675	7975
4535	5750	6350	6950	7700	8260
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4840	5780	6375	7450	7725	8275
4930	5806	6400	7473	7740	8300
4950	5840	6406	7475	7750	8325
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3980	6475	7073	7400	8340	8700
6000	6500	7075	7425	8355	8733
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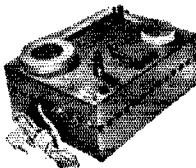
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YL News & Views

(Continued from page 64)

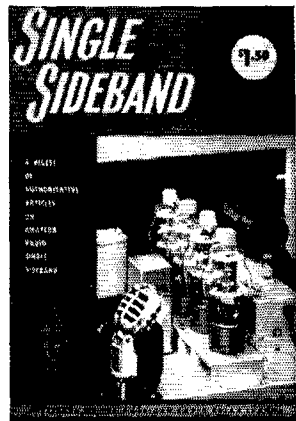
meeting, W6JZA, Elsa, accepted the post of "Hospitality Chairman" for the YLRL Convention in June with K6ANG, Billie, assisting her. . . . The Christmas day issue of the *Troy Record* featured an article on K2IRF, Pamela Proctor, of Watervliet, N. Y. . . . Chairman of the *YL Harmonics* cover contest W2EEO, Madeline, and committee K2AMZ, Alda, W2NAI, Marge, and KN2JHQ, Barbara, announce as first-prize winner W2JZX, Vi, and second-prize winner VE3AJR, Dell. . . . W8ERR, Ann, is working out well with a new single-sideband Slicer, Christmas present from her OM. . . . W1AHS, Ruth, of Providence, R. I., was formerly active as W4BPF and Lucile, ex-W4KZT, is now KP4ZV. . . . New harmonics were recently born to W4UTO, Mary Ann, WN4HML, Rosie, and W8KLZ, Betty. . . . YLRL chairman of the Fourth District, W4RLG, reports three new YLs in Alabama: K4BGH, Judy, Silverhill; KN4AIZ, Marie, Birmingham; and KN4APF, Ann, Adger. Frances also tells us that W4TVO, Lorraine, is manager of the Virginia 'Phone Net; W4WJX, Dean, is president of the Birmingham ARC, and W4WTJ, Betty, is treasurer of the Mid-South ARA. . . . W4DEE, Beulah, and W4YJD, Chris, invite interested YLs to join them on s.s.b. each Tuesday at 2:30 EST, 14,292 kc. . . . W1VXC, June, is the new PAM for Rhode Island. . . . W4UMI, Eleanor, is home after spending several months in a hospital. . . . W3s GYU HUX MBI SPU participated in the January V.H.F. Party on 2 meters. . . . The daughter of W8FPT, Wava, is now WN8UVV, Jeannie. . . . W1YPT, Louise, is Secy.-Treas. of the Cape Cod and Island Net on 75 'phone. . . . W1VOS, Margo, has her first endorsement for her YLCC certificate. . . . Using her OM's call W6MBD, W6QOG, Helene, now has 160 countries worked on 'phone. . . . W6WSV, Carol, gives the results of the recent officer's election of the San Francisco YLRC: W6QMO, Pres.; W6PCN, Secy.-Treas.; KN6GDC, KN6HIW, Board of Governors. . . . W6QMO, Jeri, made BPL again in December.



W8GJX, Helen Cloutier, gives credence to the conclusion drawn many times that a busy YL always finds time to do still more. Last November, Helen became the first YL to receive membership in the Quarter Century Wireless Assn., thus honoring her 25 years of amateur activity. From a start with a 15-watt Hartley rig and a Silver-Marshall receiver, W8GJX has progressed to a 400-watt TVI-suppressed transmitter and assorted fixed-station and mobile gear. Besides being an active operator, Helen is the mother of sons W8QFD and W8UED, a "variegated hobbyist," and a career woman. Author of several books, including *Sim Barton, Girl Radio Operator* (story of a young girl's determination to achieve success as a First Class ship's radio operator), Helen is pictured at the console of station WESK, NBC, Escanaba, Mich., where she is continuity director and supervisor of women's activities. W8GJX maintains that her many amateur experiences have directly stimulated her other pursuits and interests.

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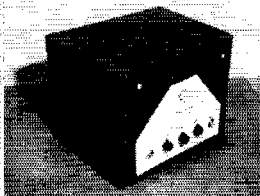
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Net Know-How

(Continued from page 65)

phrase and mentally repeat it two or three times before going on to the next phrase. Of course, if the receiving station is using a typewriter you can speak more rapidly. A number of voice operators have learned through experience how to prolong certain syllables and add certain "niceties" to make the words more intelligible. Proper enunciation of numbers is vital since they occur so frequently in texts of emergency traffic as well as in addresses and telephone numbers. Recommended phonetic substitutes used *only* when required can be of tremendous value.

Stick to Business

During net operations all communications should be limited to the serious business at hand; rag chewing and nonpertinent discussions should be eliminated. All transmissions must be aimed toward moving the traffic on to its destination.

The pamphlet "Operating an Amateur Radio Station," published by the ARRL, is required reading for every active ham. It's available on request and without charge to League members and to others for twenty-five cents. The chapters on Emergency Communications, Message Handling and Network Organization are especially pertinent to the present subject.

In conclusion:

LISTENING and a silent transmitter are often more important and more helpful than transmitting.

TRAINING and familiarity with standard procedures are basic requirements for helpful participation.

NET DISCIPLINE and compliance with orders from the established net control station are essential to best success of the amateur effort.

ACCURACY and exactness in both transmission and transcription of messages is more important than speed for speed's sake.

PARTICIPATION in an emergency net imposes responsibilities beyond reporting in with an offer to help and then leaving the net at will.

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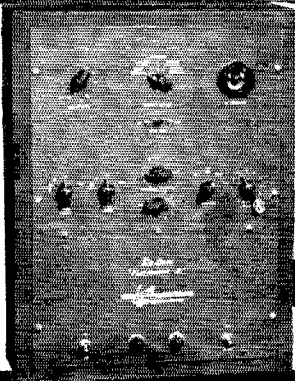
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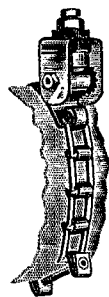
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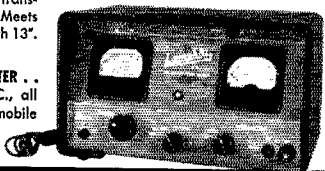
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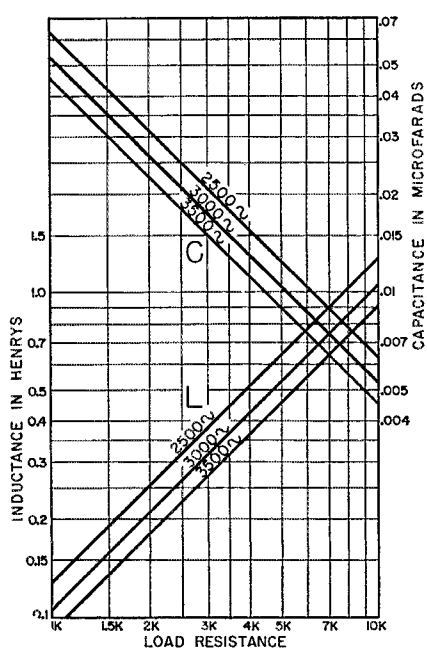
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FEED-BACK

In Turner, "A Steerable Array for 7 and 14 Mc." in the February issue, Fig. 1 should show L_1 , L_2 and L_3 as 7 turns instead of 8.

The splatter filter chart appearing as Fig. 3, page 19, December *QST*, in the article "120 Watts of Audio Without Driving Power," was incorrectly drawn. The accompanying version is the proper one.



Although values taken from the chart in December *QST* will not be theoretically correct, it is doubtful whether a design based on them will show a material improvement in actual performance if the values are corrected to conform with the accompanying chart. This is because there is wide latitude in the selection of a frequency in the first place, and because it is difficult to obtain the exact values of inductance and capacitance called for in the ideal case. In other words, use the chart herewith if you're starting out fresh, but don't worry about the performance of a filter already built from the December data.

In an editor's note in the correspondence column on page 138 of the January issue, reference was made to the ARRL Safety Code. The code was published in the issue for June, 1953, not 1952 as stated.

Re the circuit diagram of W6RET's crystal-controlled converter on page 34 of the December issue, the positive 175-volt supply should be connected at C_8 , rather than C_7 , so that the voltage to the 6J6 will be reduced.

For "top-man-on-the-frequency" results!

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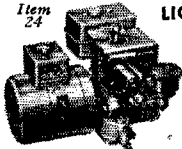
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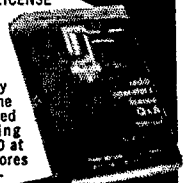
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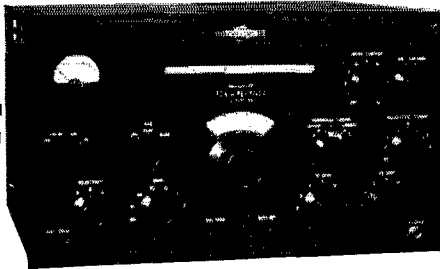
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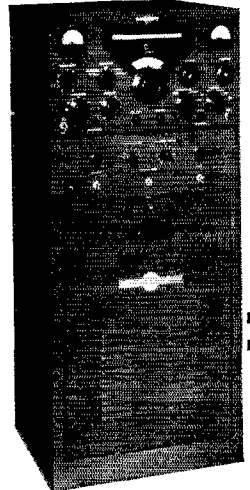
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HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(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.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. 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 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature, and is placed and signed by a member of the American Radio Relay League. 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, if by a member of the American Radio Relay League take the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ 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 signature and address be printed plainly. Typewritten copy preferred.

(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, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ.—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 248 Madison Ave., New York City 16.

MOTOROLA used communication equipment bought and sold. W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

SUBSCRIPTIONS. Radio publications. Latest Call Books, \$3.50. Mrs. Earl Mead, Huntley, Montana.

WANTED: Cash or trade, fixed frequency receivers 28/42 Mc. W9YIV, Troy, Ill.

WANTED: All types of aircraft radios, receivers and transmitters. Absolutely top prices. Dames, W2KOW, 308 Hickory St., Arlington, N. J.

WANTED: Early wireless gear, books, magazines and catalogs. Send description and prices. W6GH, 1010 Monte Drive, Sauta Barbara, Calif.

CODE slow? Try new method. Free particulars. Donald H. Rogers, Ivyland, Penna.

URGENTLY need AN/APR-4 items particularly tuning units for important defense contracts. New high prices. Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio.

DON'T Fail! Check yourself with a time-tested Surecheck Test. Novice, \$1.50; General, \$1.75; Amateur Extra, \$2. Amateur Radio Supply, 101 Seventh Avenue, Worthington, Minn.

MICHIGAN HAMS! Amateur supplies, standard brands. Store hours 0800 to 1800 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 605 Church St., Ann Arbor, Michigan. Tel. 8-8696, No. 8-8262.

WANTED: ART-13 transmitters. Write James S. Spivey, Inc., 4908 Hampden Lane, Washington 14, D. C.

CALL-SIGNS: Mobile, Shack, Lawn-stake, \$1.00 and up. Free literature. Kallsigns, 2029-A Bradley, Chicago 18, Illinois.

COMMUNICATIONS Engineers and Technicians! Excellent salaries, minimum requirements. Engineer: Graduate with 3 years experience. Technician: 2 years school in communications and 5 years experience. Require installation, adjustment, and maintenance experience with communication receivers and associate terminal equipment. Also, men with similar experience with high-powered transmitters, antennas, transmission lines. Must be willing to travel in United States and overseas. Write: Page Communications Engineers, Inc., 710 Fourteenth St., N.W., Washington 5, D. C.

OUTSTANDING ham list always. Our prices on trade-ins of all amateur brands are realistic and down to earth. We feature Johnson, National, Collins, Hallicrafters, Gonset, Elmac, Harvey-Wells, Morrow, Central Electronics and other leaders. We trade easy and offer our own time-payment plan tailored to fit you. All leading brands of new equipment always in stock. Write today for latest bulletin, Stan Burghardt, W0BIV, Burghardt Radio Supply, Inc., Box 41, Watertown, S. Dak.

ANTENNA for bandswitching transmitters up to 300 watts input, approx. 120 feet long, centered with 75-ohm line, 70 feet included, low SWR, tunes 80-40-20-10 meter bands. U. S. Patent 2,535,298. Let one tested for resonance on all bands. Send stamp for details. \$18.95 each. Lattin Radio Laboratories, 1431 Sweeney St., Owensboro, Ky.

NEED ART-13. R. Ritter, 4908 Hampden Lane, Bethesda, Maryland.

RECEIVERS repaired, aligned, Collins modifications by competent engineers, using factory-standard instruments. Prompt service. Our nineteenth year, Douglas Instrument Laboratory, 176 Norfolk Avenue, Boston 19, Mass.

JOHNSON Viking II (TVI), \$210.00; Johnson VFO, \$22.50; Johnson low pass filter, \$9.00; Balun coils (2), \$4.00; Vibropitch Bug, \$8.00; Post Governor, 400 East 52nd St., New York 22, N. Y. Tel. PLaza 9-2900 after 6 P.M.

QSLs? QSLs? State-map? Rainbow-map? Cartoons? Largest variety QSL samples, 25¢ (refunded). Rug Sakkers, W8DED, P.O. Box 218, Holland, Mich. Callbooks (Spring), \$3.60.

QSL-SWLS Meade W6KXL, 1507 Central Avenue, Kansas City, Kans.

QSL-SWLS, 100, \$2.85 and up. Samples 10¢. Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSL-SWLS, America's Finest!!! Samples 10¢. C. Fritz, 1213 Briar-gate Joliet, Ill.

QSL-S, SWLS. Fair prices for excellent quality cards. Eleven styles for you to choose from. Samples, 10¢. Almar Printing Service, 423 Barker Bldg., Omaha, Nebraska.

DELUXE QSL. Petty, W2HAZ, Box 27, Trenton, N. J. Samples, 10¢.

QSL-SWLS. Samples free. Bartinoski, Houlton, Me.

QSL-S. Samples free. Albertson, W4HUD, Box 322, High Point, N. C.

QSL-S. Two colors, \$2.00 hundred. Samples for stamp. Rosedale Press, Box 164, Asher Station, Little Rock, Ark.

QSL-S "Brownie," W3CJ1, 3110 Lehigh, Allentown, Penna. Samples 10¢; with catalogue, 25¢.

QSL-S! Taprint, Union, Mississippi.

QSL-SWL cards. Sensational offer, Bristol stock 500 1 color \$3.95, 2 color \$4.95, 3 color \$5.95. Super gloss \$1.25 extra. Rainbow cards, Samples. QSL Press, Box 71, Passaic, N. J.

QSL samples. Dime, refunded. Roy Gale, W1BD, Waterford, Conn. QSL-S. Postcard brings samples. Fred Leyden, WINZ1, 454 Proctor Ave., Revre 51, Mass.

QSL-SWLS, as low as \$1.50 per color. Samples dime. Stronberg, P.O. Box 151, Highland Station, Springfield, Mass.

QSL-SWLS, Samples 10¢. Malgo Press, 1937 Glendale Ave., Toledo 14, Ohio.

BEAUTIFUL QSL cards from World Printing. Samples free. 166 Barclay Ave., Clifton, N. J.

QSL, personalized. 150, \$2.00. Samples, 10¢. Bob Gatta, Lehighton, Penna.

QSL-SWLS, samples free. Backus, 5318 Walker Ave., Richmond, Va.

FLUORESCENT QSL-SWL cards. Samples 10¢. Kimball, 1545 Vine, Denver, Colorado.

QSL-S. Nice designs. Samples. Beseparis, W3QCC, 207 S. Balliet St., Frackville, Pa.

QSL-S. Samples-dime. Printer, Corwith, Iowa.

QSL-S! Exotic colors and designs; 2 days service. \$3.85 for 100. Satisfaction guaranteed. Be surprised! Constantine Press, Bladensburg, Md.

FINE quality QSLs, 100, \$2.75. Oscar Craig, Newark, Arkansas.

BEAUTIFUL QSL cards from World Printing. Samples free, 166 Barclay Ave., Clifton, N. J.

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QSLs, SWLS. High quality. Reasonable prices. Samples. Bob Teacout, W1FSV, 204 Adams St., Rutland, Vt.

QSL-S. New, Different. Samples, 10¢. Graphic Crafts, Rt. 12, Ft. Wayne, Ind.

QSL-SWLS. Samples free. Backus, 5318 Walker Ave., Richmond, Va.

PERSONALIZED QSLs, SWLS. Varicolored specials. Samples 10¢. Snyder, W9HIU, 113 Harrison, Jeffersonville, Ind.

QSL-S! Modern, better quality designs. Samples 10¢. Tooker Press, Lakehurst, N. J.

QSLs: 10% discount to back-logging eager beavers. 15 samples, "Super-Speed Specials", 10¢. Robinson, W9AYH, 12811 Sacramento, Blue Island, Ill.

QSL-SWLS. Rainbows, Cartoons, others. Reasonable. Samples 10¢ (refunded). Joe Harms, W2JME, 225 Maple Ave., No. Plainfield, N. J.

QSL-S. Distinctively different. Postpaid. Samples free. Dauphinee, K0JCN, Box 66009, Mar Vista 66, Calif.

FOR Sale: National One Ten receiver with power supply and speaker, Eldico Antennascope, 2-in. MM-2 oscilloscope. Best offer takes them. L. Ingalls, W6VOY, Tracy, Minn.

V8 Baby mobile antenna. Satisfied XYL mobile antenna problem. Beautifully chromed, only 4 ft. high. High Q, weatherproof plug-in loading coils. Changes bands instantly. Top section resonates antenna to operating frequency. Becomes regular car whip when coil is removed. Perfect for Gonset, Elmac, Viking, etc. Bandswitching transmitters. Tiny but effective on all bands. Replaces regular cowl or fender broadcast whip. Easily installed in a few minutes. Cards available. 15 thru 10 meters. With all mounting hardware and one coil, \$12.95 each. Specify band. Other coils \$2.75 each. W6VS, Bill Davis, 225 Cambridge Ave., Berkeley 8, Calif.

USED commercial FM communications equipment bought and sold. W2FOU, Allan M. Klein, 95-33 225th St., Bellerose, L. I., N. Y.

CASH Paid for BC-610-B xmitters; BC-614-E. Sp. amplifier, BC-939 or 729 ant. tuning units, also BC-221 freq. meters, TCs and others. Technical manuals wanted. We need Sig. Corp. Navy and Air Force stock catalogs; maintenance and instruction TM's for war surplus equipment. Amber Co., 393 Greengwich St., New York 13, N. Y.

REAL bargains: New and reconditioned Collins, National, Hallicrafters, Hammarlund, Johnson, Elmac, Barker & Williamson, Gonset, Morrow, Babcock, RME, Harvey-Wells, Millen, Meissner, Ivesco, Sonar, Central Electronics, all others. Reconditioned S40A \$69.00, S40B \$79.00, S76 \$129.00, S871 \$159.00, NC57 \$59.00, NC98 \$119.00, NC125 \$129.00, HRO5UT \$269.00, HRO60 \$389.00, SP400X \$259.00, HT20 \$299.00, 32V1 \$345.00, 32V2 \$445.00, 75A2, 75A3, Viking I, Viking II, H19, NC183D, many others cheap. Shipped on approval. Easy terms. Satisfaction guaranteed. Write for free list. Henry Radio, Butler, Missouri.

COLLINS 32V3: \$500; Collins 75A3: \$450; General Electronics S21 20" x 20" x \$200. All in original boxes, used very little. Hodgeman, W9BSG, Box 298, Odell, Ill.

WANTED: APR.4, ART-13, ARN-7, APR-5, CU-25, RA-34, ARC-1, ARC-3, TDQ, BC-22, TS-173 etc., BC-342, BC-312, BC-348, BC-610, BC-614, BC-939, APR.4, BC-610 tuning units, DV-12, DV-17, Boehme, Teletype. Technical Manuals, Supply Catalogs, APO-13. Amateur receivers, transmitters, 75A, 32V, Cash, or trade for new Viking, Ranger, National, Hallicrafters, Conset, Morrow, Barker Williamson, Elmac, Central Electronics, Telrex, Beam, etc. D. J. Rotundo, Jones Mercantile, National, etc. Write: Altronics, Box 19, Boston 1, Mass. Richmond 2-0048 (Tom Howard, WIAFN) New & Used Equipment at 44 Canal St., Boston, 60 Spring St., Newport, R. I.

BARGAINS: With new guarantee: R-9'er \$14.95; S-72 \$59.50; SW-54 \$35.00; S-38C \$35.00; S-40B \$79.00; Lyco 600S \$139.00; S-27 \$99.00; SX-43 \$129.00; S-76 \$149.00; SX-71 \$169.00; SX-75 Novice transceiver \$49.00; SX-42 \$189.00; HRO-50 \$275.00; HT-47 \$32.50; EX Shifter \$39.50; Globe Prot. Mic. \$49.50; Harvey, 110 S. \$69.00; deLuxe \$79.00; Viking I \$209.50; Viking II \$259.00; New SS-75 \$189.00; early HT-9 \$139.00; Globe King 400B \$359.00; 32V1 \$395.00; 32V2 \$450.00; 32V3 \$550.00. Free trial. Terms financed by Leo, W9CFQ. Write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

CONSET 3003 1.6-4 mcs \$29.95, 3008 two-meter \$24.95, 3028 Signal-Shoer \$19.95, 3030 Super-Six \$39.95, Hallicrafters S-16 \$69.95, S-38 \$34.95, S-38C \$39.95, S-40 \$69.95, S-72 \$59.95, S-81 \$34.95, SX-42 \$179.95, SX-43 \$129.95, SX-62 \$250.00; Howard 435 \$39.95; Lyco 133 \$19.95, 210 \$19.95; National HFS \$99.95; HRO-M \$125.00, NC-46 \$64.95, NC-181D \$299.95, SW-54 \$34.95; Pollicarum PR-7, PR-9 \$29.95; RME DB-20 \$29.95, HF 10/20 \$59.95, MB-3 \$4.95, VHF 2-1 \$99.95, VHF-152 \$49.95; Collins 32V2 \$475.00; Globe King 400B \$359.00; Harvey, 110 S. \$69.00; deLuxe \$79.00; Viking I \$209.50; Viking II \$259.00; New SS-75 \$189.00; early HT-9 \$139.00; Globe King 400B \$359.00; 32V1 \$395.00; 32V2 \$450.00; 32V3 \$550.00. Free trial. Terms financed by Leo, W9CFQ. Write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

FOR Sale: Complete station comprising Hallicrafters SX-71 receiver and TVI-proofed, 250W 813 phone transmitter, complete with power supplies - \$375.00 takes all. Equipment like new. E. M. Gilbert, W30WZ, 824 Millford Mill Road, Pikesville, Md.

FOR Sale: TBS-50 Harvey-Wells Bandmaster; PE-103; Mark II transmitter/revr. Will take best offer. Will consider trade for new NC-125. Bruce Marsh, W6NIV, 2603 W. 179th St., Torrance, Calif.

WEST Texas, Eastern New Mexico hams! We both lose unless you get our deal on all leading lines of ham equipment first. Let us quote and you will agree. Tom Conner, W5U1T, F & S Sales Company, 1100 N. Lynn Avenue, Lamesa, Texas. Tel. #4757.

FOR Sale: Sonar SRT 120P, latest 1954 model. Complete with power supply and VFO. Factory-wired, used only 1 month; \$200. Also: 1 G-E 5894 tube, brand new; \$14. J. Klein, K2GST, 235 Lyons Ave., Newark, N. J., Phone WA 3-3025.

FOR Sale: Meissner Signal Shifter. Late turret type. Used only a few hours building and testing a KW final. Looks new, \$50. SCR 511 Walkie-Talkie 75 meters. Complete and brand new, in original packing, instruction manual: \$20. W7CYP, 837 Park Hill Drive, Billings, Montana.

COLLINS 32V2, like new. Commercially modified to V3 Specs. Very low mileage. No time for use. Will accept reasonable offer. E. S. Grainger, W2NXZ, Box 186, Brightwaters, L. I., N. Y.

SELL: ATR inverter. Input: 110v. DC, output: 110v. 50-60 cycles, 250 w, intermittent, 150 w continuous. Best offer. A. Simon, W6TGP, 825 Idaho Ave., Santa Monica, Calif.

FOR Sale: NC-98, with speaker, practically brand new, less than ten hours time on it. \$100 takes it! Barton Krawetz, 26-40 211 St., Bayside, L. I., N. Y. Tel. BA 5-3647.

PROTECT QSRs permanently: clear laminated plastic, 10 for \$1.00. Sample your card, 15¢. Thomas Hark, 500 42nd St., Charleston, W. Va.

20 METER beams: end loaded; more effective, hi-Q; one-third the size! Build yourself and save half! Only \$2.00 for full plans and instructions! Ted Long, K2EU, 46-41 Hanford St., Douglaston, L. I., N. Y.

SELL: Millen 90810 HF transmitter with tubes, 10 and 6 meter coils, instruction book. Never used! Also: VHF 152-A, used about six hours. Best offer takes both. G. Cloer, Jr., W4SDW, 801 No. Main St., Salisbury, N. C.

WANTED: Lambda modulation 'Scope, Robert F. Haas, W4SDM, 49 Grandview Ave., Ft. Thomas, Ky.

VIKING II, like new, VFO. Matchbox, LP filter, SWR bridge, D104 mike, F.o.b. Wilmette, Ill. First \$300 takes it. W. Dee, W9JEL, 1341 Elmwood, Wilmette, Ill.

BACK Numbers of electronics magazines. Where to buy, sell. Lists 70 dealers, #1. Box 4946, Ft. Lauderdale, Fla.

SELL: Hallicrafters SX-71, in original carton, with instruction book. In excellent condx, \$195. Thomas Comport, W9RQN, 124 No. Orchard St., Madison, Wis.

FOR Sale: Collins 75A3, speaker, 3 Kc, 6 Kc fltrs, used about 20 hrs. No time, married! \$450 or best offer takes. M. Levy, W6WGG, 1111 No. La Cienega Blvd., L. A. 46, Calif.

NOVICES! Complete station: includes Heathkit AT-1, xmtr, SWR, revr, with 138 kc; almost new! Bargain at \$125. Molis, Jr., W9FJH, 3419 West 112th Place, Chicago, Ill. Phone: Hilltop 5-1164.

SELL: Lyco equipment, never used, model 382 mobile VFO, \$25; 4B129F mobile xmtr, 100 watts, \$26.00; 4B129F mobile coupler, \$11; #30 noise limiter \$8.00; #401 Clammaster, \$16 and #912 marine radiotelephone, \$160. W2BAY, P.O. Box 305, Haddonfield, N. J.

SELL: Tape recorder, 5 rolls 1200' tape, mike, Ekotape, Model 116, year old, excellent condx, \$100; generator, 1000 wts, continuous, 1800 starting. Cost: \$276; 115 A.C. Sell \$200. Gerard Moor, W10GY, 53 Garland Ave., Cranston, R. I.

BARKEB & Williamson S100 transmitter, D104 mike and stand; antenna matching coils, slightly used. All for \$385. Al Paris, K2DHO, 28 Graham St., Farmingdale, N. Y.

FOR Sale: Power supply 1460 volts at 350 Ma. W4WEL, Rocky Mount, N. C.

FOR Sale: General Electric CRO3A oscilloscope, \$50.00. AN/ARC-4, A 140-144 M; transmitter-receiver, new with manual, \$50. M. Schumacher, Lomira, Wis.

SELL: Gonset Communicator, used ten hours, \$150. WRL Globe Scout xmtr model 40A, \$55. Frank Schneider, K2EOA, 858 Kinsella St., New York, N. Y.

WANT Millen 90881 power amplifier with coils, less power supply. State condition and price prepared for shipment. John Diebold, W7SCU, 1944-8th Ave., West, Seattle 99, Washington.

FREE Bargain Bulletin. Visit score for thousands of unadvertised bargains. New BC610 tuning units, \$1.47. TU-43, TU-49, TU-50, TU-51, TU-52, \$5.95 each. Surplus RG-8/U cable, 100 ft., \$5.95; 250 ft., \$13.25, 500 ft., \$25.00. Selsyns, 110 volt size 5, \$12.95 pr. 1000 Kc standard crystals, \$2.95. Wanted: Surplus radio equipment, Navy synchros. Lectronic Research Laboratories, 719 Arch St., Philadelphia, Pa.

WANTED: Good ham transmitter, etc. Will buy, or will trade for it 4 5 Grader 4.5 lens, German Welta 120 2.8 lens and Balda 35 mm 2.9 lens; DeJur exposure meter; Solar 5 x 7 enlarger; 3.5 lens; dryer, flash, tanks, trays, lights, etc. Whatcha got? Don Cooley, 24 Dean St., Gainesville, Ga.

WHAT do you do when power fails? Wish you had a PE101-C dynamotor? Easily converted to 6VDC input 300VDC at 90 Ma. and 160VDC at 110 Ma. output. Conv. data with units or leave at 12VDC input 610VDC at 150 Ma., 325VDC at 125 Ma. output. Brand new in original boxes, \$6.10, 13 1/2 lbs. or wud you like a 6VDC 400VDC 100 Ma. Vibration pack, \$12.50, 8 lbs., 2-meter stals, 3150 Kc. FT-243 base .95. Gallagher's Service, John, W2VAQ, Voiceville, N. Y.

BC348-110AC, \$85; Heathkit GDO with BC coils, \$15; 522 xmtr w/tubes, no mod xfmr, \$10; BC221 w/1M, \$75; Gonset Noise Limiter, \$5; 100M ARC5 w/tubes, \$10; Electronic bug, \$10. No swaps. Leo Liebl, P.S.R., Medford, Wis.

BACK QSTs, 1935 thru 1945, complete run, \$8.00. Residence post-w. C.R.E.I. course, 25 vols. \$10. W3NHAA.

SALE: Viking II, \$225; SW with aprk, \$150; Viking VFO, \$30; Electro-Voice mike Model 950 with stand, \$19; ant. coupler w/2-2 5K ammeter and 20, 40, and 80 coils; KF relay, \$20; Drake 1P filter with 4 coax connectors \$9. All items in excellent condition. J. Sommer, W8KQD, 950 Irving Ave., Dayton 9, Ohio.

COLLINS 30K-1, w/310A driver; cannot be told from new, \$975. Will take 32V-1, V-2, B&W 5100, or Viking in trade. Would consider other small commercial gear in trade also. W4LEP, Dan Edwards, 208 Fremont Ave., Tampa, Fla.

DAYTON Hamvention is the best treat in ham radio. See Hamfest Calendar this issue.

WANT: CQ January 1946, QST 1922 and prior. Clifford Storch, 5 Winfield Terrace, Great Neck, L. I., N. Y.

HEATHKIT AT-1 transmitter, \$29; VFO, \$19; both used less than an hour, excellent wiring. W5SVB, Gifford, 1412 No. Manhattan, Amarillo, Texas.

REVERE Tape Recorder, Mod. T700 (keyboard type), with foot control, less than year old. Trade for Elmac AF67 and AC supply, or the equivalent. Henry Kauppe, W90KM, 1207 Oneida St., Joliet, Ill.

SELLING cheap: transmitters, tubes, meters, beams, Variacs. Send for list. E. L. Felder, Tylertown, Miss.

ATTENTION! Edico TR-75TV transmitter, AM-40 modulator, for sale or for trade. In excellent condition. Write to W1ZHE, Boston St., Middletown, Mass.

FOR Sale: QSTs 1932-1952, complete run, \$25. Also early call books. R. Van Wyckehuse, W2CR, 412 Humboldt St., Rochester, N. Y.

FOR Sale: Johnson Viking I, with TVI kit, VFO, Ant. relay, Excellent condx; \$240.00. Billy Horner, Sanford, N. C.

ANTENNA impedance bridge schematic with illustrations and discussion, \$1.00. Econo-Craft, Box 103, Oak Ridge, Tenn.

HRO-60 with four coils, in like-new condition, \$395 complete; Hallicrafters S-36A with matching speaker, excellent condx, \$100; Collins 75A2, late model, \$325; steel cased transformer 2500 volt c.t. 305 mils, \$15; cased 300 mil 4 Henry choke, \$3; 866 filament transformer, \$4; B&W converted, excellent, \$25; power supply for RG-3; 120V BC-45, \$10; BC-45B, \$10; BC-45C, \$5; BC-170A, as is, \$3; large surplus 2P2D switches, \$2; 1P2D, \$1. John Huey, W9AMU, 390 Hill Ave., Elmhurst, Ill.

ARRL Staff opening: A licensed amateur is desired for opening in the Communications Dept. Work comprises consolidation field contest, emergency and traffic reports; may involve administrative organizational matters. Salary commensurate with experience and functions. Get your application in without delay; when post is filled applications will be held for other possible openings. Long experience not required, preference single amateurs interested combining hobby and career. We'll send personnel form for data on age, license, and resume of experience. Inquiries welcomed and will be held confidential. Write Box A, ARRL HQ, West Hartford, Conn.

COLLINS 32V3, new condition with spare 4D32, \$535; HRO-60, like new, complete with xtal calibrator, \$389; F.o.b. Worcester, Mass. W1KC, 240 Moreland St., Worcester, Mass.

MOBILE Station, complete: Elmac, PE-103, Gonset Super-Six, Band-Spanner, etc. Will exchange for Hi-Fi unit or cash. G. G. Petersen, West Branch, Iowa.

FOR Sale: 15 watt VFO/exciter, \$50; 75-watt 829B xmtr, complete, \$70; 829B xtal calibrator, \$12; 829B tubes, \$15 pair; all items shipped. Robert Clough, W2PCF, 172 Boulevard, Pompton Plains, N. J.

COLLINS 310B-3, like new, no changes, little use by single owner. In original carton with manual, \$200. R. B. Parker, W1AJZ, 38 Ayer Lane, Harwichport, Mass.

SELL: Hallicrafters S-40A unused, like new, \$60. Also HRO60. Swap latest 3/4 x 4 1/4 Speed Graphic outfit complete, extras, case for clean HRO or 183D revr. R. Long, 933 E. Broadway, So. Boston, Mass.

SALE: Knight wire-recorder, in excellent condition. Has turntable for playing records. Complete with two reels of wire. \$25 F.o.b. Tucumcari, N.M. W5NUN, P.O. 818, Tucumcari, New Mexico.

FOR Sale or trade for receiver: Type 827R tube, never used. Cost over \$150. W9BYX, Vogel, 205 Evergreen, Elmhurst, Ill.

75A1, speaker, \$225; SX-43, speaker, \$119.50; 37" Panadapter, \$54. Hundreds of other items, list for 3¢ stamp. W9ERU, 2511 Burrmont Road, Rockford, Illinois.

SELL: Viking II with VFO, in original cartons: \$300. 7001.25 band-edge crystals, \$1.75. NC-173 receiver, \$140. Need 75A2 or 75A3. W2AEV, Jones, 14 Carol Rd., Bethpage, L. I., N. Y.

WANT: Johnson rotator. Self television receiver, \$30. W4API, 1420 South Randolph St., Arlington, Va.

CASH for your gear. We buy as well as sell. Write for cash offer or trade. We stock Elmac, Gonset, Hallicrafters, Hammarlund, Johnson, Lyco, Master Mobile, Morrow, National and other ham gear. H & H Electronic Supply, Inc. 506 Kishwaukee St., Rockford, Ill. WANTED: Mark II BC654 W2BXK.

SELL: Coast Guard receiver 15-650 kc, new, prop-pitch motor. BC906 freq. meter, Command transmitter 7-9 Mc, pair new surplus 805 tubes. Reasonable. Want 20 meter T-relax beam. W8MAS.

WILL donate dead 852, 211, and porcelain base 210 to bona fide collector for \$1.00 postage. Willard Monahan, 817 Pacific, Manhattan Beach, Calif.

ELMAC Transmitter, \$135. Morrow complete mobile rcvr includes 6 volt supply, \$150. Never installed, uses as fixed station for 2 mos. Orig. cartons and instrux books. W9MUB, 4100 W. Eddy, Chi., Ill.

W9CVU complete station for sale. Collins 3ZV3, 75A2A with factory installed mechanical filter, matching speaker, both 800 cycle and 3 K mechanical filters, 8B1 crystal calibrator, 148C-INBFM adapter installed. Equipment like new condx and factory tested. Hardly used at all. \$1432 value for only \$995. Complete F.o.b. Cedar Rapids, Iowa. Write or wire Chas. W. Boegel, Jr., 1500 Center Point Road, NE, Cedar Rapids, Iowa.

SWAP: Bell & Howell 16 mm sound projector for ham gear, or test equipment. W7TWH, Sunburst, Montana.

SWAP: Near-new 9er plus 7 coils and power supply for VHF152A. Local deal preferred. Samkofsky, 264 Division Ave., Brooklyn 11, N. Y.

FOR Sale or trade: Precise 300 oscilloscope, in perfect condx. Want #90, Collins 70E-8A or similar VFO, Panadapter or what have you? David Dillon, W81RX, 1253 Fenimore St., Fairmont, W. Va.

WOW. Wow: Best offer over \$40 takes complete kilowatt power supply and free complete KW amplifier. Also Viking II and VFO like new. Make offer. W6KPI, 2130 Williams, Palo Alto, Calif.

SELL: SP-600-JX10, BC-455, BC-457, BC-696. All in top condition. W2WVF, 255 Eastern Parkway, Brooklyn, N. Y. Tel: NE 8-5273.

FOR Sale: Collins 30-K transmitter, complete with exciter: \$1000. at Anthony, R. I. W1JND, Capwell, 474 Fairview Ave., Anthony, R. I.

WANTED: QST's 1920 and earlier. Top cash prices paid. A. F. Susen, 3600 Forbes St., Pittsburgh 13, Penna.

SELL: AN/ART-13 Driver, modulation transformer, pair of 811s, \$17; T-21/ARC-5, new, \$10; plate transformer 3600 volts, center-tapped, 450 Ma., \$30; new pair RCA 832A's, \$15; tubes, meters, capacitors, etc. Send for list. Seidman, W2GNZ, 1535 Longfellow Ave., Bronx, N. Y.

FOR Sale: Complete mobile rig. Elmac rcvr and xmtr, pwr supplies, etc. 33% off cost. Write for details. Box 206, Roxbury, N. Y.

GLOBE-KING, 400 watt pk; 450 c.w. Bud VFO, coils for all bands, extra pair TZ40s; BC342 rcvr, complete, \$395. F.o.b. Martinsville, Va., Webb, W4AAH, 103 Erwin St., Villa Hgts, Martinsville, Va.

SELLING: Transmitting equipment with gray Bud panels; heavy duty power supply, 750 volts, 300 Ma. plus bias, \$50; 500-watt antenna tuner, \$25; new parts for kilowatt final amplifier and variable voltage kilowatt power supply, 106 for photos and details plus list of mobile gear, test equipment, tubes and parts. Gray Bud cabinet, CR-177-35. Roy Gillett, W2PNC, 68 Hyde Boulevard, Ballston Spa, N. Y.

SOUTHEASTERN Hams! For a good deal in ham gear try Curle Radio Supply, 406 Meridan, Huntsville, Alabama, 439 Broad Street, Chattanooga, Tennessee.

SELL: R23/ARC 5, Q5'er unmodified, new w/dynamotor, \$20; BC348Q coil assemblies, new, RF #191, Det. #192, \$3 ea; PE101C, new, modified, \$3.95; DM32A, \$1 each; BC696 coil set, \$2.50; QST's 1937-1948, \$2 per yr, all plus shipping. Have cash for good receiver. M. J. Marshall, 455 Washington Ave., Dumont, N. J.

SELL: 450TH tubes, \$17.50 each, or two for \$30. Complete power supply, 1000 VDC at 300 Ma. or 2000 VDC at 300 Ma., plus filament and relay voltage divider. Best! Full commercial radio telephone transmitter, full kilowatt plus. In three slim six-ft. cabinets, power supply, modulator and RF units, uses 450TH modulator and output tubes. Original cost about \$7000. Asking \$595 or trade for Collins 75A3. All F.o.b. W7DI, Cheyenne, Wyoming. Box 2098, Cheyenne, Wyoming. Carl B. Hempel, W7DI.

FOR Sale: SX28A relay rack style receiver, less speaker. First check, cash, or money order for \$90 takes it. Will pack and ship. W8P8A, c/o Ithaca Radio Sales & Service, Ithaca, Michigan.

GOING Mobile or High Frequency? A complete Gonset outfit for sale for cash. Deluxe two meter Communicator II (quickch), Super-Six Converter, Super-Celver, Gonset Commander transmitter and V.F.O. All in a "like-new" condition. Take one, take all. W1KJT, R. T. Graham, P.O. Box 23, Stoneham, Mass. Tel. ST 6-1966.

HISTORICAL "The Story of the First Trans-Atlantic Short Wave Message" is illustrated with photographs, diagrams, reproductions of logs, news stories, magazine articles. Send \$1 to The Radio Club of America, 11 West 42nd St., New York City 36 and ask for the IBCG Issue of the Proceedings.

LOS ANGELES Hams! For sale: 1 K.W. linear amplifier, AM, FM, SSB, c.w. custom-built. Only needs 10 watts drive. \$600. Terms: Mr. W. E. Chan, Dunbar 3-6554.

FOR Sale: Lyco 600 transmitter, with 401 modulator. \$92; 1250 volt 300 Ma. power supply, \$20. Want: NC100 with PW dial. J. Phipps, W2CPO, Box 1004, Sparta, N. J. Lake Mohawk 8203.

WANTED: Plate transformer for FR-1 3600V CT, 200 Ma. Sell BC221AC with chart, excellent; SCR522, complete, brand new, never used. Best offer. W6FDG, Clark, 40 Ardmore Road, Berkeley 7, Calif.

WANTED: Good National, Collins, Hammarlund or Hallicrafters receiver, Matchbox. W6KDR, Stidham, 904 N. Dickel, Anaheim, Calif.

MUST sell complete mobile and fixed station including Gon-Set Triband, Hallicrafters SX24, two transmitters, power supplies, etc. Write for complete list of equipment and prices. Albert E. Linden, W3KVL, 306 Dogwood Drive, Levittown, Penna.

SSB20A, never used: \$210. Howard Dunlap, Box E, Beverly Farms, Mass.

VIKING II, like new, factory-wired: \$265. W2CFT, Box 483, Lake Ronkonkoma, L. I., N. Y.

RECORDISTS! Exchange talking and musical tapes internationally! Box 1404-B, San Francisco 1, Calif.

SELL: Heathkit AR-2 com. rcvr, gud condx, with cabinet; prefer local sale: \$25. Jerry, K2HNF, 579-84 St., Brooklyn, N. Y.

HY-LITE 3-el. 15 over 20 meter beam. Original carton. Never used. Small prop pitch motor completely converted transformer. \$125. \$125. Original cost \$163. Niagara low pass filter, \$5. Plate filament transformers, double-single button carbon microphones, tubes, relays, crystals, meters. Write for list. W2EQS, O'Brien, 48 Prospect Ave., Westwood, N. J.

SELL: B & W Baluns (for 32V and Viking). New Dow-Key coax relay. Melvin Gardner 134 S. Ferry, Ottumwa, Iowa.

SELL: New BC654A xmtr/rcvr with all tubes, PE104 power pack T17 mike, key, no conversions, \$50, with PE103, \$65, complete portable diathermy, good operating condx. \$25. Oliver F. Nash, 134 Ashman Circle, Midland, Michigan.

SELL: NC173 and speaker, in excellent condx, \$110; Harvey-Wells TB550 Deluxe, with companion power supply, and VFO, in like-new condx. \$140. Harvey-Wells dynamotor 6V input 450V, 250 Ma. output. Never used. Best cash offer. Ed Edwards, 7067 No. Ashland Blvd., Chicago 26, Ill. Ho. 5-7198.

SELL modern TVI-proofed 65-watt transmitter, 25 watt modulator, power supplies, antenna coils, etc. Constructed as per February 1952 QST. First \$100 takes all. Send for details. Don Franzmann, W9NFI, 647 Ripley Ave., Eau Claire, Wis.

SELL: Viking II, Viking VFO, Matchbox, Hallicrafters SX-88 with speaker, B&W low-pass, D-104 mike, Vibroplex Bug, Heathkit grid dipper, Millen Bridge, Baluns, Relays, 500 watt coils, antennas, coax, etc. Beautiful condition and functionally perfect. All since offered or inquired welcomed and acknowledged. Gordon Crowe, W6JPG, 303 Brush Creek, Kansas City, Mo. Phone LQgan 2426.

SELL: QST January 1928 thru December 1954, in excellent condition. \$75.00. Fred Coen, Neoga, Ill.

FOR Sale: Elmac PMR-6A mobile receiver; also PMR-6 and PMR-116 power supply. David Lauder, 1317 Blaine Blvd., Racine, Wis.

SELL/Swap: One complete mobile station. Elmac AF67 xmtr, Morrow 5BR converter with S/W Mobile-Center modified with outboard TNS. 8 ft. whip with Johnson whip-load 6 coil, extra strong base and heavy coil spring. Carter Gen-E-Motor 500w, at 200 Ma.; Leeco-Neville AC generator with mountings for Ford, complete, chest mike, bag, all instructions, books. Triplett 3256 absorption freq. meter, cost \$500. Want \$250 cash or excellent SP400 Super Pro or Collins 75A1. Andy Sallet, P.O. Box 103 Seward, Ill. F.o.b. Seward, Illinois

SELL: Fifty lesson CREI radio course, \$50 or trade for rcvr or xmtr. Warren Jarvis, W4SCY 139-28 230th Place, Laurelton, N. Y.

SELL: High-voltage dc generator 1060 volts, 425 amps: \$15. W40F, SX-71 Like-new condx, used 50 hours: \$175.00. Harold Greene, W1KO, West Hanover, Mass.

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COLLINS 32V1, in excellent condx, \$350. National HFS and pwr sup., \$90. Prices F.o.b. Glenside, Pa. Krewson, W3QQL, P.O. Box 175, Glenside, Pa.

QSTs: 280 issues - 1922-1950, \$100, with covers. Stamp for list. Bud Gentry, W5VIM, 428 Maple, Richardson, Texas.

FOR Sale: AR-88-D rcvr with manuals, best offer, new BC625A with tubes, in carton, \$17.50; two Millen R-9ers each with two coils, \$18.00 each; Millen high voltage power supply, typ. 90281 with manual, \$75.00; 6V rectifier, new, \$10.00. All f.o.b. Ipswich, Mass. Write to WITKC, P.O. Box 232, Ipswich, Mass.

COLLINS 32V3 xmtr, like new, \$590; National NC-183 rcvr with spkr, in gud condx, \$175; Instructograph with 11 tapes, less oscillator, \$20; PE103 dynamotor, like new, with spare brushes, \$25. Don DeShazo, Jr., W9BVC, 529 Blackstone Ave., LaGrange, Ill.

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BC-342 receiver, A-1 condition, \$90. W1CEG, 183 Daly Ave., New Britain, Conn.

SELL: Collins kilowatt modulation transformer, conservatively rated, \$40. W6WZD.

SELL: Viking II and VFO, like new, factory-wired, \$325 or best offer. Reason for selling: Going SSB! W0TGC, Mulholland, 1656 Liggett Ct., St. Louis 19, Mo.

SELL: Collins 32V1, \$375; HRO-60R, \$425; Collins 30-J with 310-C exciter, \$475; Bothe automatic keyer with 3-key tape perforator for Morse code, \$145; TS-34, \$145; Dumont #24, \$275; APT-9 with inverter, \$225; I-208 sig. gen., \$150; Want: BC-610, ARN-7, ARC-1, TS-173, TS-174, TS-175, BC-614, Collins 75A, 32V, Tech. manuals and supply catalogs. Tom Howard, W1AFN, 46 Mt. Vernon St., Boston 8, Mass. Tel. Richmond 2-0916.

FOR Sale: 1 new 2C43 tube, 2 new 2C39A tubes, 1 used 5G 60-cycle selsyn. Best offer to Genaille, W5RSN, 2122 E. Monroe Ave., Harlingen, Texas.

PASS amateur theory exams. Check yourself with sample FCC-type questions and Novice and General Class examinations. All for only 50¢. Ameco Electronics, 1203 Bryant Ave., New York 59, N. Y.

FOR Sale: Modified Hy-Lite 20-meter beam; 3-elements; spaced .15 director .2 reflector, "T" match, 50 pounds. Will crate and ship collector. Photographs on request. K2LXC, Fairchild, 23 Woodridge Lane, Sea Cliff, N. Y.

COMING Soon! 75-watt, 160-10 bandswitching CW transmitter. Kit, \$59.95. W6KJ, 25-watt kit, \$19.95. Details free. Hart Industries, 467 Park, Birmingham, Mich.

SELL: Collins 32V3, \$575. Cash and carry. W4KNW, 742 So. 78th St., Birmingham, Ala.

MOBILE transmitter 80-40 M. xtal with Carter dynamotor, 400v. at 300 Ma. ATR inverter RSB input 6v. output 110 AC; 85 w. intermittent, \$12.00 F.O.B. San Antonio 9, Texas. Johnston, Box 6703.

ANTENNA Wire #18 high strength Copperweld 1000 ft., \$4.60; 2500 ft., \$9.75 postage paid. R. J. Buchan Co., P.O. Box 9, Bricelwyn, Minn.

SELL: Elmac AF-67, 600 volt pwr supp, PMR 6-A w/pwr supply, Shure 505-C mike, Advance Elec. coax relay, speaker, all brackets, cables, manuals, etc. Excellent condx: \$285. Allan Murphey, W4JAG, Princeton, Kentucky.

A Stancord 10-meter xmtr. JBR narrow convy. Western Electric dyn. 5.8 v. in 425 v. 375 Ma. outp. All for \$75.00. Jeff Taylor, W9BRH, 714 N. Lockwood Ave., Chi. 44, Ill.

WANT Tape-Recorder. Write for list of gear offered in trade. VE5MS, LaFleche, Sask., Can.

FOR Sale: Hallicrafters SX-71 with matching speaker, in gud condx: \$140. W4ESD, 29 Morton St., Aiken, S. C.

FOR Sale: Eldico Universal antenna coupler; shielded cabinet for TBS-50; Wanted: G.D.O.; frequency meter; Pr. 4-250A; Pr. 810, power supply capable of output 2500 v. @ 400 Ma. W9PWV, 821 Waveland Rd., Lake Forest, Ill.

SELL: NC-200 receiver, \$100 f.o.b. Reason: drafted. W4UKO, 1001 Sedgfield Rd., Charlotte, N. C.

COLLINS 32V-3 with spare 4D32, in original carton, with manual. Spotless and guaranteed like new. Used very little. First check for \$595 takes it. Herb Green, W9ARI, 1227 West 17th St., Muncie, Ind.

FOR Sale: BC-610 transmitter, Factory converted for ten meters. Like new condx. New modulation transformer all new plastic condensers in speech equipment. Complete with BC614 speech amplifier, technical manuals and cable and ant. relay. Spare modulation deck spare 250TH and 100TH, \$450. Francis L. Sutton, 1018 Club Drive, Johnstown, Penna.

SELL IRE Proceedings 1950 through 1954 with directories, \$15 per year. ARC4, \$25 F.o.b. Ft. Lauderdale, Fla., W4CGS, 3102 SW 15th Ct., Ft. Lauderdale, Fla.

FOR Sale or trade: LS-84, CG-301, CG-104, PA-429, PA-109, all UTC. Rack mounted amplifier, 6V6's into LS-52, push-pull. Freed, 13600. Two 203A plus sockets. Will trade for good stamps. All replies answered. A. R. Ronzio, 1250 41st St., Los Alamos, N. Mexico.

LYSCO Model 600 transmitter, in gud condx, \$75. Roy Scherman, W9PHS, 4040 No. Kasson Ave., Chicago 30, Ill.

NOW! Power your surplus recvrs and transmitters from 115VAC line "Tabtron" B28V/5A for ARC5, BC312, 342, 348 at \$35; "Tabtron" B28V/24A for BC654 or BC375 at \$110. "Tabtron" B12V/50A for BC191 at \$110. "TAB", 111 Liberty St., N. Y. 6, N. Y.

HALLICRAFTERS HT20 AM-CW transmitter, used less than five hours. Prefer pickup here. Will sacrifice at \$300. Also Thordarson 11M77 multimatch 300 watt xmtr, \$20. W9GXB, Mitchell Wiseman, 5157 Clarendon Rd., Indianapolis, Ind. BR 9429.

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SELL: ART-13 Sp. amp. new w/tubes, \$15. Motorola dual Vibrator sup, 340v., 240 Ma., \$15; Master Mobile Mount 132XC, \$7; Master Mobile Ant. with 75 and 20 M coils, \$5; converter 75 M, \$10; Auto xfrmr 110V. 600 Va., \$6; dynamotor 5.8V, 425V, 375 Ma., \$10. Carbon mike taxcab type retractable cord, \$5; dynamotor start relay same as above. PE-107, \$150. Stamp and write for details. A. Brocato, 1534 Brown Marx Bldg., Birmingham, Ala.

RECEIVER wanted with xtal filter, noise-limiter, and S meter: \$100 maximum. P. H. Silbert, 44 Seaview Ave., Marblehead, Mass.

MO Hams or others, if between age twenty and thirty-two, high school graduate, some typing ability, copy code twenty WPM, and interested in permanent position in police communications write: Director, Radio Division, Missouri Highway Patrol, Jefferson City, Missouri.

QST: Need February 1920. Pay your price. Also govt. call books 1923-25 and Wm. B. Duck catalog, W5NW, Box 586, Odessa, Texas.

2-METER Beams; 6 element, horizontal or vertical, all seamless aluminum. \$6.95 prepaid. Wholesale Supply Co., Lunenburg, Mass.

SELL VHF transmitter using Millen 90810 RF unit, 1625s Class B modulators with S-9 driver, three power supplies, in 30-in. relay rack. Photos available, several spare 829Bs, three AX3 crystals, coils for 2, 6 and 10. BC-44 with PE-104A, various Command transmitters and receivers. Dismantling 500 watt AM transmitter, all parts for sale. Send for list. W9GWL.

FOR Sale: Gonset 2-meter converter, \$28; McMurdo-Silver 2-meter xmtr including crystal, \$30; both in brand new condx; RCA 45 RPM with ampl. in portable case, new crystal, \$18. Wanted: National One Ten, also Gonset Communicator. H. I. Griffiths, W2OQR, 39-82 65 Place, Woodside 77, L. I., N. Y.

FOR Sale: BC610-E transmitter de-TV'd, with 614-E speech amplifier, 2 spare 250THs, 4 spare 100THs, coax antenna relay. All for \$350 f.o.b. Denton, Texas. With delivery within 100 miles. Also SX-43 receiver with R24 speaker, both \$99.50. Call or write W5CC, H. V. Shepard, phone Central 4144. Write P. O. Box 609, Denton, Texas.

SELL: R-4/ARR-2 receiver, 11-tube, UHF for operation on 1 1/2 meter band. With tubes, schematic, less dyn., \$7.95 MD-7 Modulator, provides plate and screen mod. for any xmtr of the AN/ARC-5 equipment. With 4 tubes. In excellent condx: \$7.95; MP-28 modulation and power supply for TA-12 xmtr. In new condx, with dynamotor, \$4.95. IDA/A-PNA indicator scope, in gud condx. With 27 tubes, xtal and schematic, \$19.95. C. J. Casey, 7460 Varna Ave., N. Hollywood, Calif.



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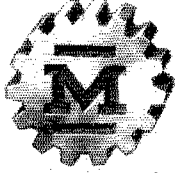
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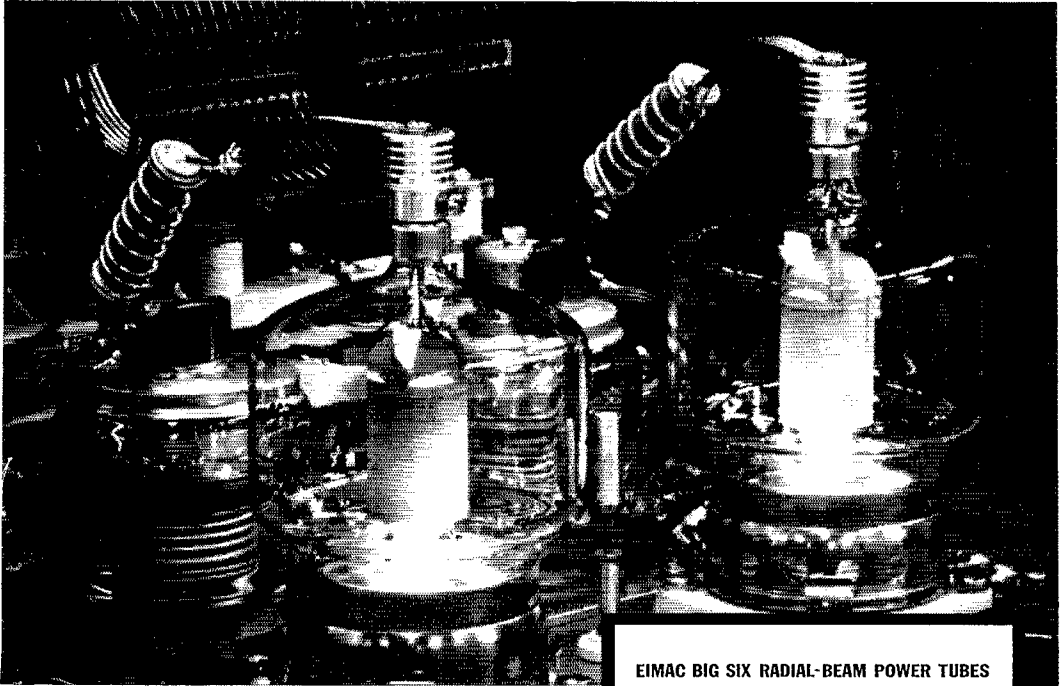
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How to select a tube for single sideband



To realize the advantages of Single Sideband operation, there are two important points to keep in mind when selecting a final amplifier tube. First, since there is no continuously running carrier, high peak powers may be reached when a signal is put on the air. And second, because it is easier to produce an SSB signal at a low power level, it takes more than an ordinary tube to build this valuable low power signal from the modulator to high power in a single amplifier stage. Eimac tubes offer these extras. Their reserve supply of filament emission, lack of internal insulators and widely recognized ability to handle high peak power has been proved over the years. And high power gain is inherent in all Eimac multi-grid tubes. When planning or building an SSB rig, remember these two important points and consider the Big Six of Amateur Radio—Eimac 4-65A, 4-125A, 4-250A, 4-400A and 4X150A radial-beam power tetrodes and the 4E27A radial-beam power pentode.

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Typical Two Tone Performance*

	DC Plate Voltage	DC Screen Voltage	Peak Sig RF Grid Driving Voltage	Peak Sig Plate Power Input
4-65A	2000	450	100	195
4-125A	2500	555	100	300
4-250A	3000	600	110	630
4-400A	3000	810	140	900
4X150A	1250	375	60	350
4E27A	2500	600	110	325

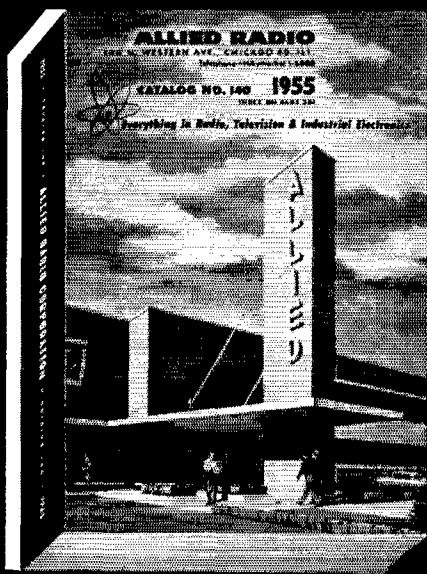
*Permitting safe adjustment and conservative operation.

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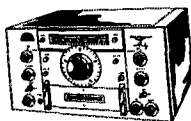
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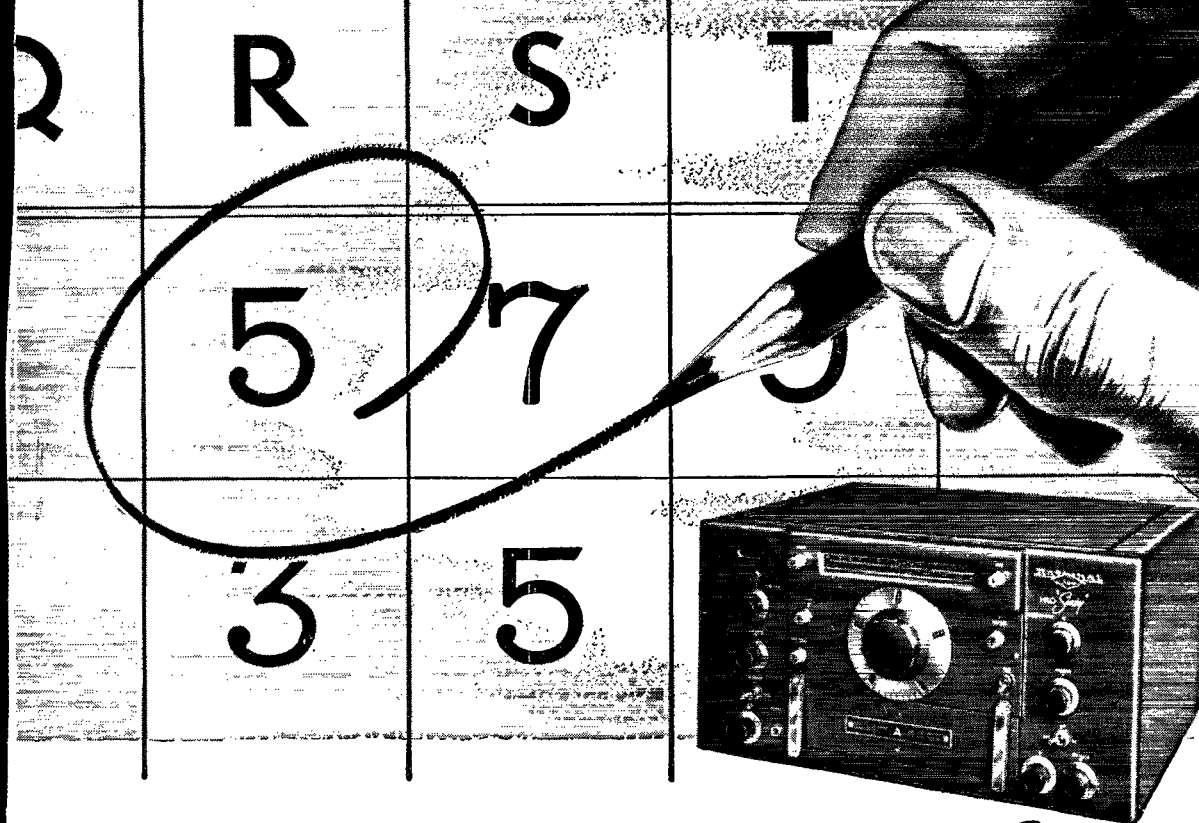
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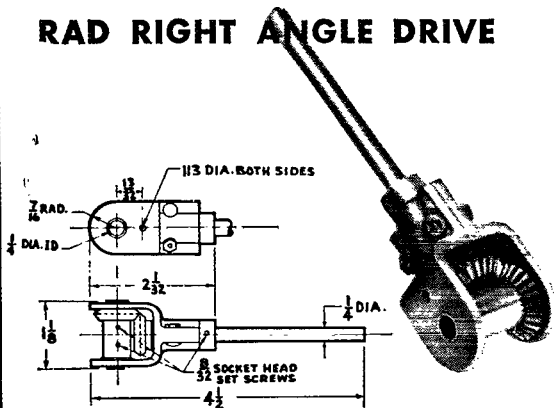
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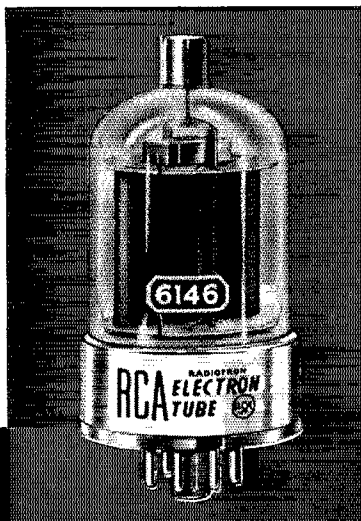
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Close-up view of the RCA-6146's in parallel—in the final amplifier of the Johnson Viking II.



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