

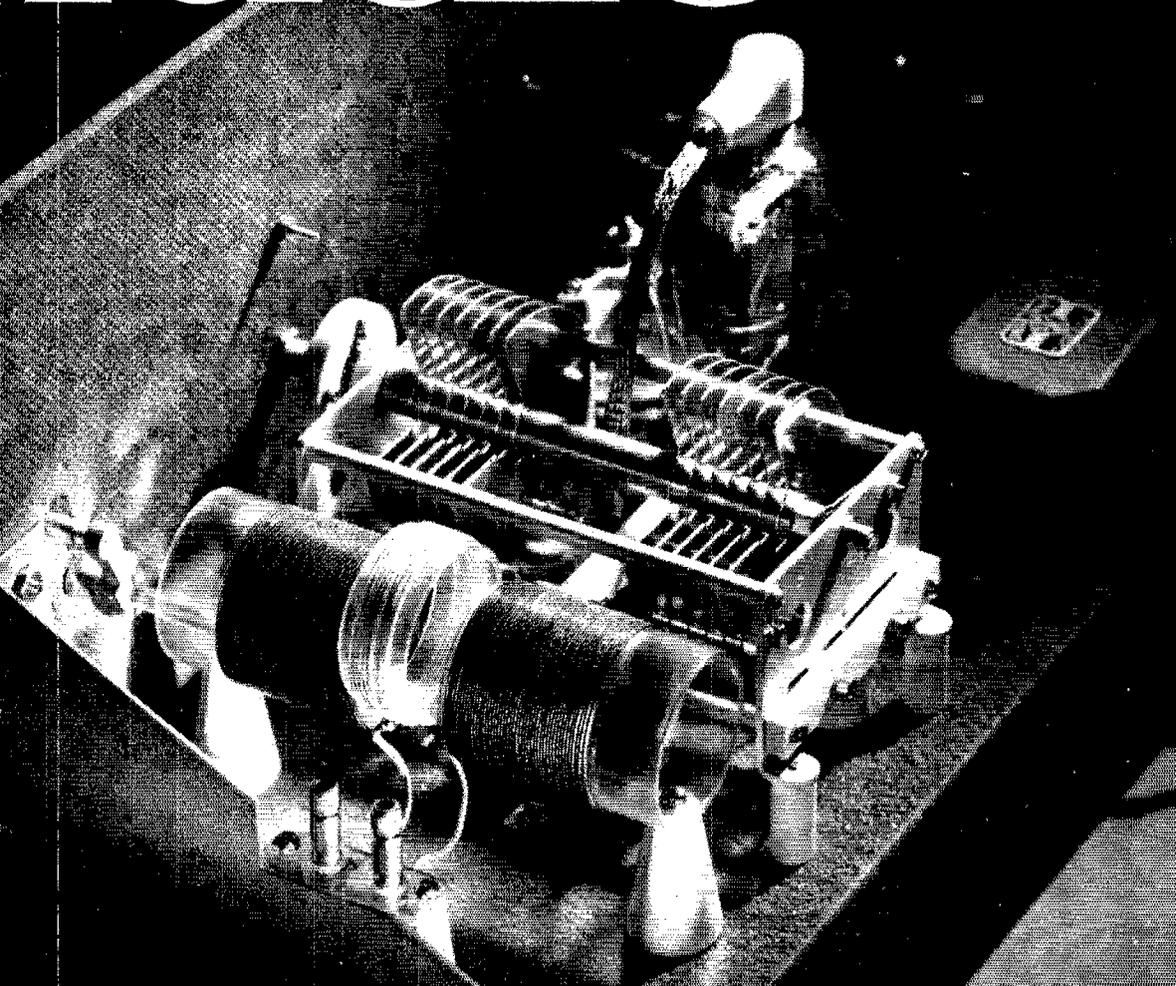
April, 1949

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# amateur radio



# A wide range of units for every application

U.T.C. Commercial Grade components employ rugged, drawn steel cases for units from 1" diameter to 300 VA rating . . . vertical mounting, permanent mold, aluminum castings for power components up to 15 KVA. Units are conservatively designed . . . vacuum impregnated . . . sealed with special sealing compound to insure dependability under continuous commercial service.

A few of the large number of standard C.G. units are described below. In addition to catalogued units, special C.G. units are supplied to customer's specifications.

## CG VARIMATCH MODULATION UNITS

Will match any modulator tubes to any RF load.

Primary Impedances from 500 to 20,000 ohms

Secondary Impedances from 30,000 to 300 ohms

Type No.	Max. Audio Watts	Max. Class C Input	Typical Modulator Tubes	List Price
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CVM-1	30	60	6V6, 6H5, 2A3, 42, 48, 6L6, 210	14.00
CVM-2	60	125	80L, 6L8, 809, 4-48, T-20, 1608	20.50
CVM-3	125	250	800, 807, 845, TZ-20, RK-30, 35-T	30.00
CVM-4	300	600	50-T, 203A, 805, 838, T-55, ZB-120	50.00
CVM-5	600	1200	805, HP-300, 204A, RK-334, 250TH	115.00

## INPUT, INTERSTAGE, MIXING AND LOW LEVEL OUTPUT TRANSFORMERS

(200 ohm windings are balanced and can be used for 250 ohms)

CG Type No.	Application	Primary Impedance Ohms	Secondary Impedance Ohms	List Price
131	1 plate to 1 grid	15,000	135,000 3:1 ratio	\$ 9.50
132	1 plate to 2 grids	15,000	135,000 centertapped 3:1 ratio overall	10.00
133	2 plates to 2 grids	30,000 P to P	80,000 overall 1.6:1 ratio overall	12.50
134	Line to 1 grid hum-bucking	50, 200, 500	80,000	12.50
135	Line to 2 grids hum-bucking	50, 200, 500	120,000 overall	13.50
235	Line to 1 or 2 grids, hum-bucking; multiple alloy shielded for low hum pickup	50, 200, 500 ohms	80,000 overall	17.50
136	Single plate and low impedance mike or line to 1 or 2 grids Hum-bucking	15,000, 50, 200	80,000 overall	13.50
233	PP 6C5, 56, similar triodes to AB 45's, 2A3's, 6L6's, etc.	30,000 P to P	25,000 overall 3:1 ratio overall	11.00
333	PP 6C5, 56, similar triodes to fixed bias 6L6's	30,000 P to P	7,500 overall 5:1 ratio overall	11.00
433	PP 45, 2A3, similar tubes to fixed bias 2 or 1 6L6's	5,000 P to P	1,250 overall 5:1 ratio overall	12.00
137	Mixing	50, 200, 500	50, 200, 500	10.00
140	Triode plate to line	15,000	50, 200, 500	12.00
141	P-P triode plates to line	15,000	50, 200, 500	13.50

*United Transformer Co.*

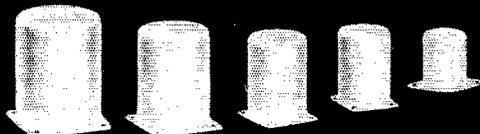
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"ONE, TWO, THREE, TEST..."



Why should the 6L6-G in your audio amplifier be a Ken-Rad tube?



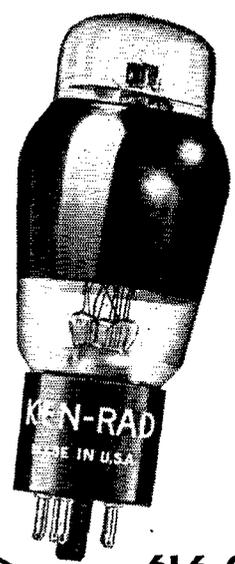
**BECAUSE PRECISION MANUFACTURE GIVES GREATER BEAM POWER EFFICIENCY!**

How Ken-Rad tubes are built, is the "why" of their fine performance. Beam power tubes like the 6L6-G go up in efficiency, in ratio to the care with which they're made. The electrons are focused, or beamed, to avoid the screen-grid structure while passing through it. Excellence of this focusing action depends on accurate alignment of the control and screen grids—i. e., painstaking assembly. Here Ken-Rad standards never slacken!

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Type 6L6-G accents the usefulness of the individual Ken-Rad tube when full advantage is taken of its capabilities. Though one of the first beam power tubes designed, the 6L6-G still is alone in its power class for use in a-f circuits for ham and public-address work. One tube in Class A will put out 10.8 w. A pair in Class AB<sub>2</sub> will put out 47 w. This is enough power, on the one hand, to modulate a 100-w transmitter—audio-wise, to handle a number of speakers covering a large hall, should such volume be needed!

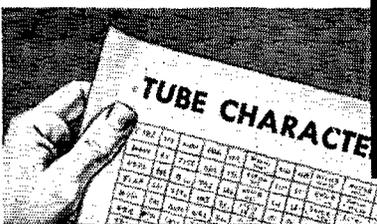
Visit your Ken-Rad distributor or dealer today. Listen to the three-way tube message he has for you: quality—performance—value!



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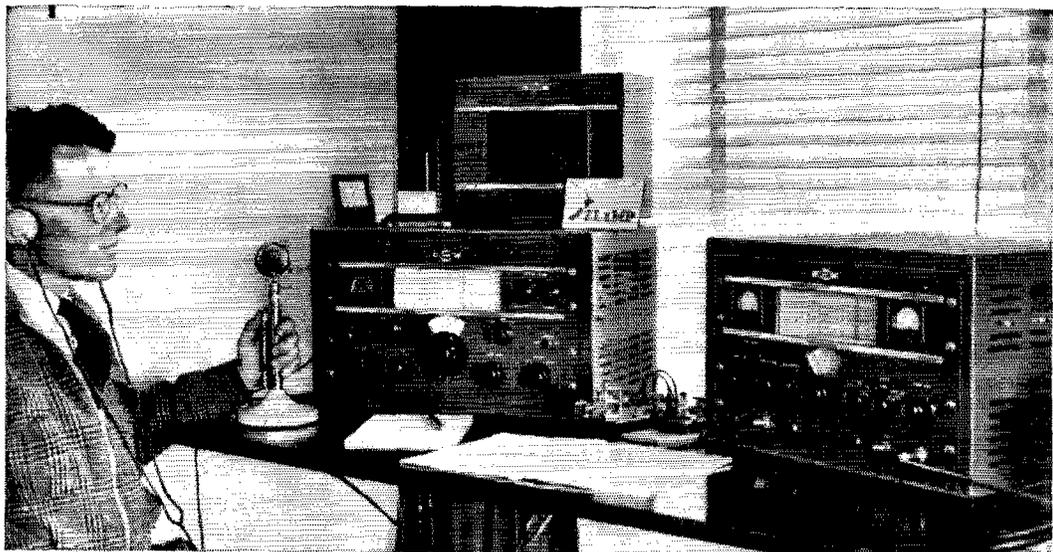
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## “... very delighted,” says ZL1MP

ZL1MP (David S. Mitchell, above) has written us about the performance of his Collins amateur equipment:

“I enclose registration card in respect of my 32V transmitter,” he says, “and in doing so I would like to say how very delighted I am with it.

“I have been an amateur operator for 18 years (G2II 1931-1936, and GW6AA 1936-1948), and during all this time I have never possessed any piece of equipment which has given me more delight than my Collins 32V, with the possible exception of my 75A receiver.

“Within three days of receiving my New Zealand license I had worked all continents

with the 32V, with reports varying from S7 to S9.

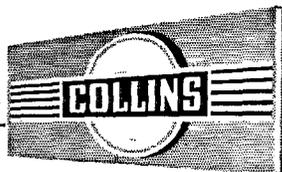
“The first call brought a reply from DK7AQ 11,000 miles away, and since then the 32V has proved to be a splendid link with many of my old ham friends back in England.

“The 75A is also a joy to operate and has enabled me to work G stations using powers as low as 8 watts—some of these fellows have told me that they have never had reports from New Zealand before.

“Best wishes to you, and may you continue to produce the superb equipment which is serving hams so excellently all over the world.”

NOTE to amateurs who make their living in radio broadcasting or communications: The advanced engineering and high performance typical of Collins ham gear are also characteristic of Collins AM and FM broadcast station equipment and Collins airborne and ground station radio communication and navigation equipment.

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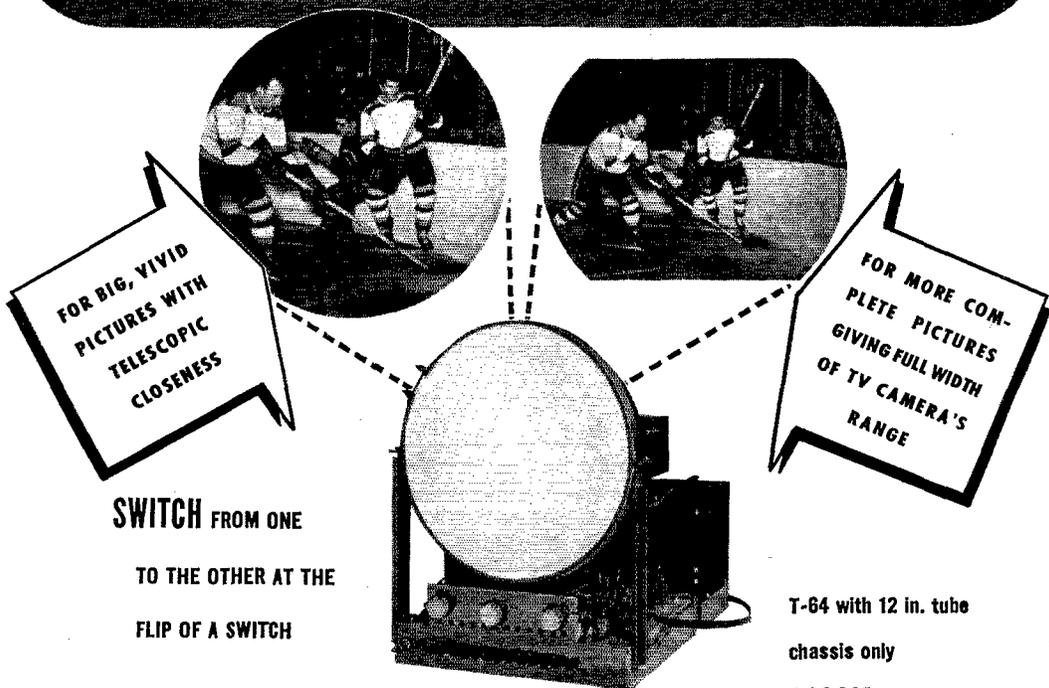
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# DUAL FOCUS Steals The Show with TWO Pictures Instead of ONE



## WHY YOU NEED BOTH PICTURES

For complete enjoyment of circular-picture television, you need both the circular picture and the rectangular picture. The larger picture is truly a joy to behold, *but*—it clips off the sides of the normal picture. It works like a telescope; it concentrates on a smaller area and magnifies it. You see *less*, but what you do see appears *bigger* and *closer*. However, if reading material is flashed on the screen, the circular view may not cover the full width of the lines. Then, of course, with Hallicrafters, you merely flip the switch back to the rectangular picture.

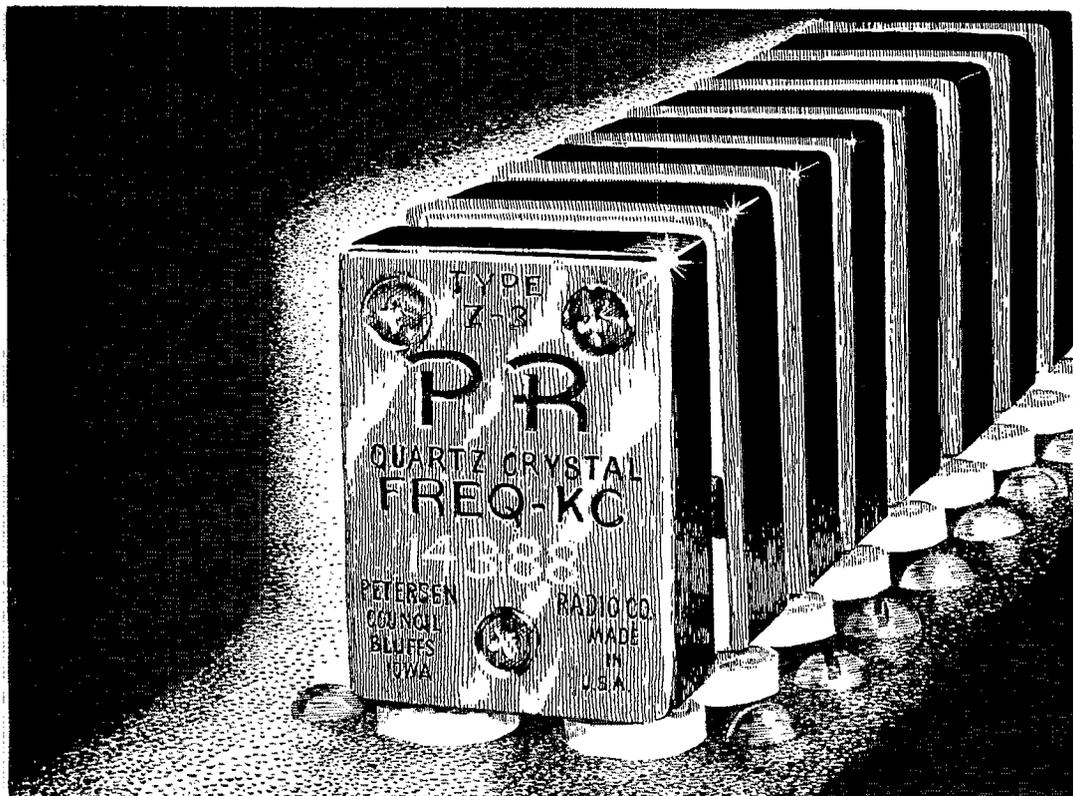
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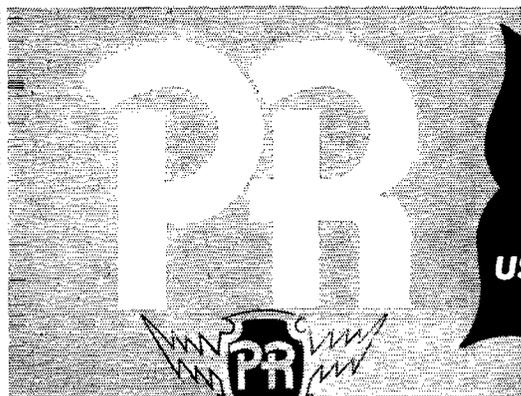
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SINCE 1934

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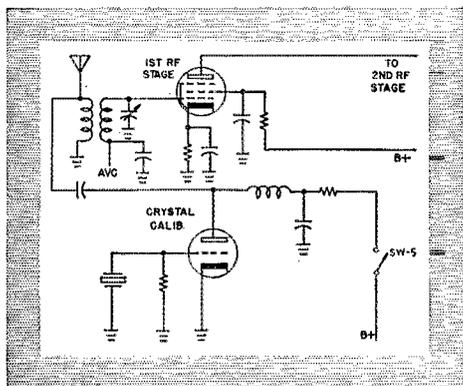
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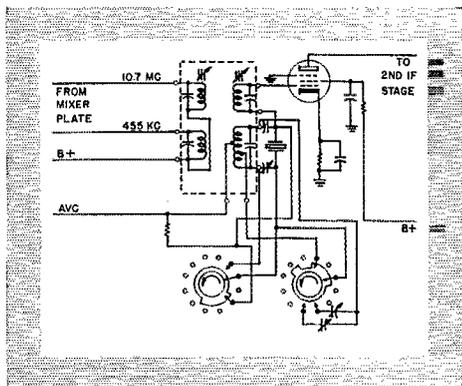
**Reports Invited.** All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in QST. All ARRL Field Organization appointments are now available to League members. These include ORS, OES, OPS, OO and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, *all amateurs* are invited to join the ARRL Emergency Corps (ask for Form 7).

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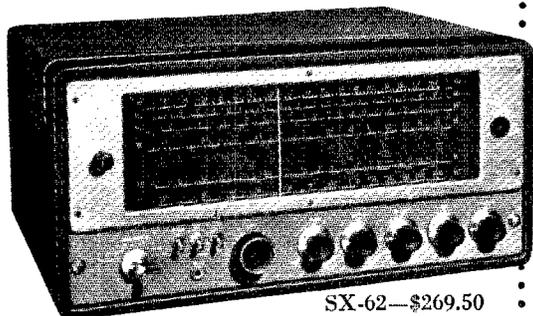
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## the hallicrafters co.

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MANUFACTURERS OF PRECISION RADIO & TELEVISION EQUIPMENT

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

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

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

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

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### New England Division

PERCY C. NOBLE . . . . . W1BVR  
37 Broad St., Westfield, Mass.  
Alternate: Clayton C. Gordon . . . . . W1HRC  
70 Columbia Ave., Providence 5, R. I.

### Northwestern Division

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Alternate: Allan D. Gunston . . . . . W7GP  
7209 Wright Ave., Seattle 6, Wash.

### Pacific Division

WILLIAM A. LADLEY . . . . . W6RBQ  
200 Naylor St., San Francisco 12, Calif.  
Alternate: Kenneth E. Hughes . . . . . W6CIS  
810 W. Orange Ave., So. San Francisco, Calif.

### Roanoke Division

EVERETT L. BATTEY . . . . . W4IA  
2008 N. Cleveland St., Arlington, Va.  
Alternate: J. Frank Key . . . . . W4ZA  
Box 707, Buena Vista, Va.

### Rocky Mountain Division

FRANKLIN K. MATEJKA . . . . . W0DD  
P. O. Box 212, Estes Park, Colo.  
Alternate: William R. White . . . . . W0PDA  
1263 Pearl St., Denver 3, Colo.

### Southeastern Division

WILLIAM C. SHELTON . . . . . W4AFR  
527 Revilo Blvd., Daytona Beach, Fla.  
Alternate: William P. Slides . . . . . W4AUP  
Fiemling Road, Montgomery, Ala.

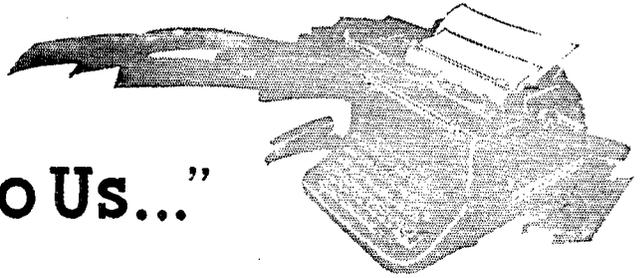
### Southwestern Division

JOHN R. GRIGGS . . . . . W6KW  
3212 Grape St., San Diego 2, Calif.  
Alternate: John E. Bickel . . . . . W6NY  
1834 Whittier Blvd., Whittier, Calif.

### West Gulf Division

WAYLAND M. GROVES . . . . . W5NW  
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W5NW at Humble Pipe Line Camp, Odessa  
Alternate: David H. Calk . . . . . W5BHO  
7730 Joplin St., Houston 17, Texas

# "It Seems to Us..."



## MEMBERSHIP DUES

Recently we mailed a special letter-questionnaire to several hundred hams who didn't renew their League membership in 1948. We've always had some turnover in our membership, just as there is a constant turnover in amateur ranks, and we know some of the reasons from past experience — but we wanted to find out exactly why. You'll probably be as interested as we were in the tabulation of the 207 questionnaires returned:

The largest group to give a single reason, 57, were no longer interested or were not able currently to be active in ham radio (23 of these fellows said they were too occupied with school or college; 13 more gave marriage or business as the reason; the rest gave no special reason). Another large group, 39, said they were renewing soon, hadn't got around to it; 9 of these proved their intention by enclosing renewals. Thirty-eight others said they simply couldn't afford membership now, much as they'd like to; the cold fact of the matter was that ham radio was in competition with the butcher and the landlord. Four questionnaires came back from parents or wives; the addressee had joined Silent Keys. Eleven didn't agree with ARRL policies. Eleven more had a gripe about *QST* (3 thought it was too technical, one said it wasn't technical enough; several wanted more v.h.f. articles, and several more said we had too many v.h.f. articles); 5 thought there were better magazines than *QST*. Two quit ham radio because of TVI. Seven gave miscellaneous reasons. Thirty-three said the price was too high, and some said it was especially true "in comparison with other radio magazines."

With one exception, the major reasons were about in the proportion expected: we know that school hampers a lot of hams' activities and consequently their interest in and ability to join ARRL; we've known that marriage or business occasionally affects the level of individual amateur interest, and that a certain percentage of fellows drop out for other reasons; we've known (having been told so by various amateurs over the years, in addition to having found ourselves in the same position

more than once) that it is sometimes difficult to scrape up the dues all at one time — with limited funds, a new tube or other gadget looks more inviting, and we let membership renewal slide for a few months. The one thing we didn't bargain for was that group who said that *QST*'s price was too high "in comparison with other radio magazines." And that's something we'd like to talk about.

There's one thing we must put down as fundamental. *QST* is not a magazine published on the same basis as "other radio magazines." It is the official organ of ARRL. It is only one of the things you buy with your membership dues. If ARRL were simply a commercial publishing house to produce *QST*, we could eliminate at least a third of the Headquarters staff and operations and set *QST* subscription prices at about \$3.

Okay, let's suppose for a minute that happened.

Then, of course, there would be no League. There would be no organized amateur control of amateur affairs. There would be no Board of Directors to collect amateur opinion and to represent you in League policy. You wouldn't be able to select your amateur representatives — there wouldn't be any.

There would be no experienced amateur representatives working with FCC on amateur regulatory matters, no united amateur voice at world conferences such as Atlantic City in 1947. No ARRL staff members would be currently meeting with planning groups in Washington in advance of the forthcoming Inter-American Telecommunications Conference to keep watch on amateur interests. There would be no special legal counsel to protect amateur rights in regulatory matters.

There would be no International DX Competition, no Sweepstakes, no DX Century Club, WAS, or RCC, as we know them. There would be no SCMs or ORSs or other field appointees, no traffic systems, no emergency-preparedness planning, and no Field Day test. There would be no Training Aids, no special bulletins to clubs and appointees. There would be no WIAW official bulletins, code practice, or general operation.

There would be no central amateur agency to provide answers to membership questions on licensing and regulatory matters, technical information service, etc. There would be no reliable system of bulk handling of QSL cards from foreign countries, no official amateur conventions, no special publicity efforts to promote amateur radio before the public—at least not as we know these activities today.

There would be none of these things.

You'd get *QST* for \$3, sure. But nothing else.

You as an amateur would have no voice in amateur affairs. There would be 80,000 amateurs, 80,000 different opinions, and no amateur organization to collect those opinions and integrate them into a decision for the greatest good to the greatest number. And there would be no united amateur voice at Washington and in international conferences.

True, these aren't things you can see and feel, like *QST*, but they're vitally important nevertheless, and they cost money. You will be interested in some example expenditures for just one year. The figures below are for 1948, and are close estimates, our books at this writing not being finally closed:

For amateur administrative control of the League: elections, director travel and expenses, Board meeting expenses, Board committee expenses. . .	\$15,500
For representation of the amateur service in national, international and municipal matters: Washington contact, travel, general counsel, legal expenses, etc. . . . .	21,000
For organized operating activities: Communications Department, W1AW, bulletins, contests, awards, SCM-SEC travel, etc. . . . .	58,000
For additional membership services: Technical Information Service, membership correspondence, general publicity, handling QSLs, visits to affiliated clubs and conventions, etc. . . . .	19,000
Just these few items total. . . . .	\$113,500

Now, when you apply that to more than 60,000 League members, it figures an expenditure of nearly \$2 per person on just those strictly organizational matters mentioned, entirely separate from *QST*.

That's an example of why ARRL membership dues can't be compared to subscription prices for "other radio magazines."

Remember, your ARRL is a noncommercial, nonprofit organization, whose only purpose is to promote and advance the welfare of amateur radio. Sure, an outfit that publishes a radio magazine as a commercial venture can afford to sponsor an occasional contest, an occasional award. But if such a venture expects to make

money (profits) for its owners, it cannot afford to sponsor very many projects which do not pay their own way. The members of the ARRL are its owners. They do not expect to receive monetary dividends. The dividends which you, as an ARRL member, receive from the operations of the ARRL are in the form of the multitude of services mentioned earlier and in the form of an unceasing effort to improve the status of amateur radio in all its many aspects.

At its 1948 meeting the Board of Directors found that with rising costs of all goods and services, current revenue would not permit continuance of these many membership benefits. The Board had two alternatives: it could leave membership dues at \$3 and cut out many services to amateurs and amateur radio; or it could raise the dues so that these services would continue. The Board felt these services were vital to amateur radio's future well-being, and therefore decided to continue them by raising membership dues.

Wouldn't you have voted the same way?

— J. H.

### WRITE YOUR DIRECTOR

The annual meeting of the ARRL Board of Directors is scheduled for May 27th this year, later than usual because of the inter-American radio conference in Washington which begins in April and probably will run well into May. At sessions of the Board the director of your division—the man you elected to represent you—is your voice in ARRL policy. He wants to hear from you in advance of the meeting as to how you feel about various matters of the day. At this writing there are no specific items on the agenda, but you know from experience that many matters will be brought up, largely sparkplugged by individual amateurs and groups in various League divisions as the meeting draws nigh. Perhaps you or your club has discussed a subject which will also be before the Board. In any event, the thing to do is let your director know about it. See the list on page 8, and write your director today!

### Strays

#### Drama from the Ham Bands

*W3NBK*: Sri, OM, can't keep our sked tonite.

Hv a date with the YL.

*W3QPB*: Can't u use ur mobile rig?

*W3NBK*: Naw. Every time I pull up to a gud location and park, the YL cuddles up close and holds out her hand.

*W3QPB*: Yeah? . . . Wat fer?

*W3NBK*: The XTAL!

[The End]

— W3KPO

# Getting Back on "160"

## *A Few Suggestions, and a 200-Watt Rig Designed Expressly for 160-Meter Operation*

BY RICHARD M. SMITH,\* W1FTX

FOR several days after we heard the good news that we were once again to be permitted to operate in the 160-meter band, the talk during lunch hours ran something like this: "Well, I dug up an old 250- $\mu$ fd. variable that I can use for the plate condenser, but I don't know what I'm going to do for a coil. Tried the stores, but they haven't got any yet, and I don't relish the thought of winding all those turns with No. 14 enameled. Wish my present rig would work there, but the tank condenser is only 50  $\mu$ fd. per section, and 'The Book' says it's no go with much less than 100 per." One or two fortunate souls were all set, having packed their old 160-meter prewar rigs away, along with their pet crystals, but the majority were faced with the necessity of either remodeling their present low-frequency transmitters to make them go still lower, or else building an entirely new one. The 10-meter gang was really stumped. It's almost impossible to make a 10-meter rig work on "160" too without some really drastic changes, and when you've got a set that behaves itself on 10, you're not inclined to start ripping into it even if 160 does give you another Class B 'phone band to use.

### **How To Go About It**

Getting on 160 should be a cinch for you fellows who have rigs that you use in the 75-meter 'phone band. You've had the experience necessary and the know-how that it takes, so we won't take up space telling you what you've probably figured out already. For the 10-meter man, however, the problem is tougher.

In the first place, the tank condenser used in the usual 10-meter rig is far too small to give you the  $L/C$  ratio you need for proper operation at 1800 kc. It becomes mighty hard to load a circuit that is all  $L$  and very little  $C$ , which is what you wind up with if you try to put a 10-meter final on 160. Another problem — not so obvious — con-

\* Technical Assistant, QST.

• If you're wondering how to get on the "new" 160-meter band, here are a few suggestions, plus a single-control 200-watt rig that should fill the bill. We don't think you'll want to tear your present 10-meter rig apart to try to make it work on 160, but you can keep the cost down by building a rig that can utilize your present power supplies and modulator.

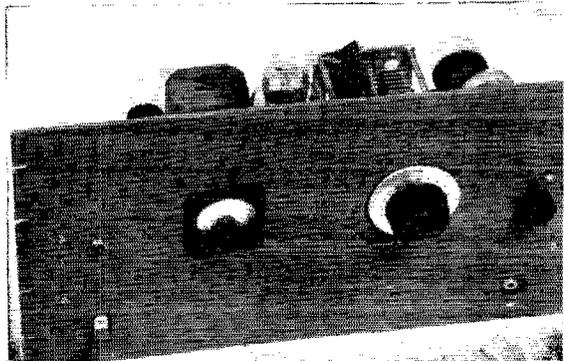
cerns by-pass condensers. While 28-Mc. r.f. doesn't encounter much trouble in finding its way through a few micromicrofarads, it takes a pretty good-sized capacity to by-pass 1800 kc. You would probably have to replace most of your by-pass condensers to make the transmitter work right. No, it just doesn't look practical to take a 10-meter rig and change it over for 160, especially if you want it to remain usable on 10.

About the best thing to do, if you're in that position, is to build up a transmitter that you can use with your present power supply and your present modulator. The regulations forbid the use of more than 500 watts during daylight hours, and this figure is reduced to 200 watts after dark. Because most of us will probably want to continue using 10 meters during daylight hours, and will use 160 for increased nighttime range, 200 watts seems to be the logical choice.

In the transmitter shown here, a 6AG7 crystal oscillator is used to drive a 6L6 buffer, which in turn drives a 5514 final amplifier. If desired, an 812, V-70-D, T-40 or T-55 could be used (with suitable filament-transformer changes) in place of the 5514. We chose the 5514 because it can be operated without fixed bias at 1250 volts, whereas the others mentioned require some fixed bias for protection against excitation failure.

The circuits themselves are straightforward, with standard components used in most cases. We chose a 100- $\mu$ fd.-per-section tank condenser

◆  
Front view of a 200-watt 'phone-c.w. transmitter for the 160-meter band. Only one tuning control is needed, plus a small knob used to adjust the setting of the swinging link on the output coil.  
◆



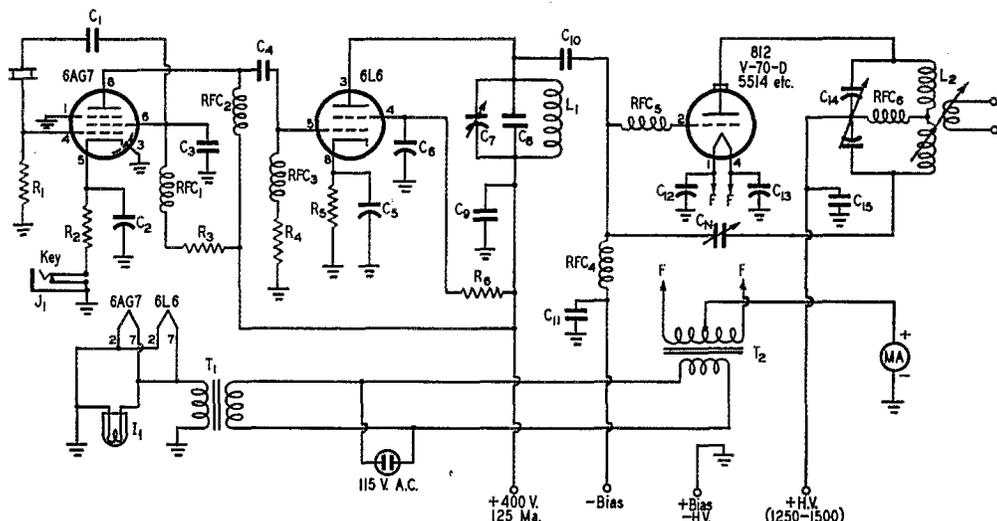


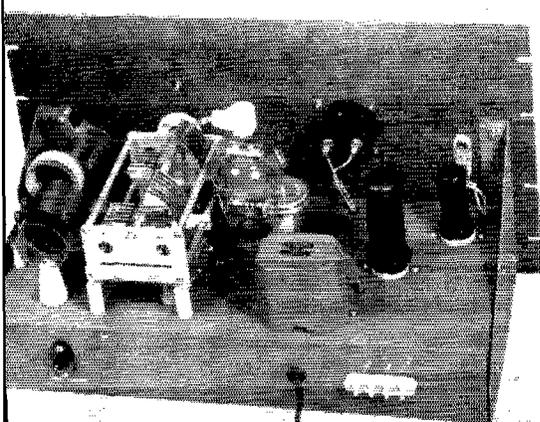
Fig. 1 — Schematic diagram of a single-control 200-watt transmitter for the 160-meter band.

- C<sub>1</sub> — 0.001- $\mu$ fd. mica, 400 volts.
- C<sub>2</sub>, C<sub>5</sub>, C<sub>6</sub>, C<sub>12</sub>, C<sub>13</sub> — 0.01- $\mu$ fd. 600-volt paper.
- C<sub>8</sub> — 10- $\mu$ fd. mica. See text.
- C<sub>4</sub>, C<sub>8</sub> — 100- $\mu$ fd. mica.
- C<sub>7</sub> — 50- $\mu$ fd. variable (National PSR-50).
- C<sub>9</sub>, C<sub>11</sub> — 0.006- $\mu$ fd. mica, 500 volts.
- C<sub>10</sub> — 220- $\mu$ fd. mica, 600 volts.
- C<sub>14</sub> — 100- $\mu$ fd.-per-section dual transmitting variable, 0.070 air gap (3000 volts peak). (National TMC-100-D.)
- C<sub>15</sub> — 0.0035- $\mu$ fd. mica, 5000 volts.
- CN — Neutralizing condenser, 0.8-10  $\mu$ fd. (NC-800-A).
- R<sub>1</sub> — 15,000 ohms,  $\frac{1}{2}$  watt.
- R<sub>2</sub> — 330 ohms, 1 watt.
- R<sub>3</sub> — 39,000 ohms, 1 watt.
- R<sub>4</sub> — 22,000 ohms,  $\frac{1}{2}$  watt.
- R<sub>5</sub> — 600 ohms, 2 watts (two 1200-ohm 1-watt units in parallel).
- R<sub>6</sub> — 10,000 ohms, 5 watts.

for the final amplifier primarily because that size is readily available. With the plate-volts-to-plate-milliamperere ratio encountered with most of the tubes that are usable with this transmitter, 100  $\mu$ fd.-per-section comes very close to being the minimum C that is usable without falling seriously below the "Q-of-12" requirements shown in the *Handbook* charts. Some care should be taken, therefore, to be sure that almost all the available capacity is used to resonate the coil at

- L<sub>1</sub> — 46 turns No. 26 d.s.c. close-wound on  $\frac{1}{4}$ -inch diam. form.
- L<sub>2</sub> — Each half consists of 46 turns No. 20 d.s.c. close-wound on a  $\frac{1}{8}$ -inch diam. form (Millen 44000). The two halves are mounted so that there is  $1\frac{1}{2}$  inch between windings to permit passage of the link coil. Link: 8 turns No. 18 d.c.c. close-wound on  $1\frac{1}{8}$ -inch diam. form made of same material as the main coil form.
- I<sub>1</sub> — 6.3-volt panel lamp.
- J<sub>1</sub> — Closed-circuit jack.
- MA — 0-300 ma. d.c. meter.
- RFC<sub>1</sub> through RFC<sub>4</sub> — 2.5-mh. r.f. choke (National R-100-S).
- RFC<sub>5</sub> — 21 turns No. 26 d.s.c. close-wound on  $\frac{1}{4}$ -inch diam. form (a 1-watt resistor of any high value may be used as the form).
- RFC<sub>6</sub> — Transmitting r.f. choke (Millen 34140).
- T<sub>1</sub> — 6.3-volt 3-amp. filament transformer (Stancor P-6014).
- T<sub>2</sub> — 7.5-volt 4-amp. filament transformer (UTC S-56).

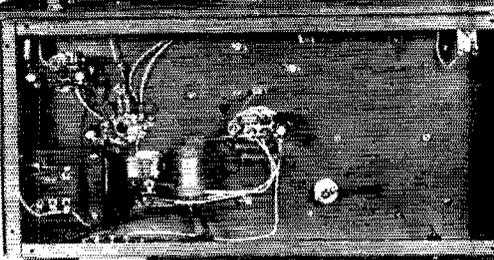
the low-frequency end of the band. The coil problem was solved by winding our own. A couple of Millen type 44000 polystyrene forms were cut down to a  $2\frac{1}{2}$ -inch length, separate halves of the plate coil L<sub>2</sub> were wound with No. 20 wire, and the windings were then covered with coil dope. One end of each section of the coil is supported by a  $1\frac{1}{2}$ -inch ceramic stand-off insulator, and the centers are left floating. A bit of rigidity is added by the soldered leads that run from the



Rear view of the transmitter. The construction of the amplifier plate coil and its swinging link is shown at the left. The plate r.f. choke and the plate by-pass condenser are mounted underneath the main tuning condenser, which is supported by 1-inch stand-off insulators. An insulated coupling is used between the rotor shaft of the condenser and the panel control. The neutralizing condenser is visible behind the amplifier tube.

**QST** for

Bottom view of the transmitter. The oscillator tube socket and its related parts are in the upper left corner. The 6L6 and the 5514 are mounted in a line through the center of the chassis, with the plate coil for the 6L6 supported on a bracket between the two stages. The parasitic-suppressing choke is mounted between the grid terminal of the amplifier socket and a ceramic stand-off insulator.



center-tap wires to the r.f. choke, and the whole unit then becomes quite rugged. A swinging link was made up from one of the leftover pieces of the polystyrene form. A length of polystyrene rod was cemented to the inside surface of the form, and then extended through one half of the plate coil to the panel, through a  $\frac{1}{4}$ -inch bushing to the panel knob. Eight turns of No. 18 d.c.c. wire proved to be enough to permit full loading of the final with the link almost fully "in." A National type RSL rotor-shaft lock bolted to the rear of the panel provides an adjustable friction bearing to make the link stay put at a given setting. Small flexible shield braid is used to connect the link winding to the output posts.

The low-power stages consist of an untuned crystal oscillator and a fixed-tuned buffer. If you live in the East, you tune the 6L6 stage to about 1850 kc. and it will operate very nicely in either the 1800- to 1825-kc. segment or the 1875- to 1900-kc. portion of the band without retuning. In the West, tune it to 1950 kc. and a similar "lazy man's" set-up is obtained for the frequencies available there. When changing frequency it is only necessary to adjust the tuning of the final amplifier to resonate at whatever crystal frequency you decide to use.

With the 5514 tube we used in the final, v.h.f. parasitics were killed off easily with a simple choke, *RFC*s, installed right at the grid terminal of the tube. We used only one of the two grid pins instead of tying them both together as the tube manufacturer suggests. After all, a couple of extra inches of grid lead doesn't mean much at these frequencies, and the tube was not unruly (once we remembered that a *big* plate by-pass condenser is needed at 160). If other tubes are used, the grid-choke idea may not work out. In this case, you can use a plate trap of the dimensions shown in most triode-amplifier circuits in the *Handbook*. The trap should do the job in cases where the choke doesn't.

### Adjustment

In first tuning up, you'll probably have to vary the value of the oscillator feed-back condenser, *C*<sub>3</sub>, a little to get the optimum conditions. We were looking for good keying characteristics as well as just plain oscillation when we built the one described here. The value shown worked out best with the particular crystal we had (it was the only one in town!) but you may find it necessary to use something a bit larger, smaller, or even

none at all. You may even find that the oscillator works best with the condenser connected from *grid* to ground instead of from screen to ground, depending on how much feed-back the crystal needs.

The oscillator should produce about 5 ma. grid current in the 6L6 stage. This can be measured as grid voltage across the grid leak, *R*<sub>4</sub>. It isn't particularly critical, but the bias voltage read at this point should be about 100 to 110 volts. Connect a 0-200 ma. meter in the 400-volt B+ lead and resonate the plate circuit of the 6L6 by tuning *C*<sub>7</sub>, the little screwdriver-adjusted trimmer. There won't be much of a dip noticeable in plate current, because the plate circuit is loaded down by the final grid, but a dip should be there, and the current reading on the meter should be 100-120 ma. Remember that the meter connected in this way reads the total plate and screen currents of both the 6AG7 and the 6L6 stages. About 30 ma. of the total reading is taken by the 6AG7.

Cathode bias is used on the 6L6 to protect it against excitation failure. If the crystal stops oscillating, the 6L6 will draw about 50 ma., and will be dissipating 20 watts, which is almost full rating. The bias is sufficient for use in case oscillator keying is desired for c.w. operation. Coincident with resonance in the 6L6 circuit, the panel meter, which reads the total cathode current of the final amplifier, should show that grid current is flowing in that tube. With the 5514, and with a grid-bias resistor of 1500 ohms, grid current should be 90 to 100 ma. with no plate voltage applied to the tube. This should fall somewhat when plate voltage is applied and the plate circuit is loaded to 160 ma. but should not go below 60 ma. You can measure the bias voltage by connecting the voltmeter across the grid leak in the usual manner. If a 5514 tube is used the bias, when plate voltage is 1250 volts, should be about -84 volts. The proper bias for other tubes can be found from the tube data sheets or the tables in the *Handbook*.

The final amplifier is neutralized in the usual fashion. Checks for v.h.f. parasitics should be made with a sensitive wavemeter.<sup>1</sup> With the choke specified in the grid of the 5514, you probably won't have parasitic troubles, but it is

(Continued on page 104)

<sup>1</sup>Neutralizing methods and means for detecting and curing parasitic oscillations are covered in detail in the *Handbook*, so need not be repeated here.

# Pointers in Harmonic Reduction

BY GEORGE GRAMMER,\* W1DF

THE general principles of reducing harmonic radiation have been laid down in a series of articles in *QST* over the past few years,<sup>1</sup> and by now enough experience has been gained to show that it is possible to reduce harmonics to the point where they will not cause objectionable interference to TV reception — provided a standard television receiver, with the type of simple antenna normally used within the nominal service area of the television transmitter, will produce a picture of entertainment quality. This should not be interpreted to imply that harmonics will not be seen if the receiver has to have a booster or two, plus a multielement array, in order to bring in a picture at all — particularly when the amateur transmitter is next door. Nor do we mean to intimate that reduction of harmonics to a satisfactory degree will guarantee freedom from TVI. There are far too many TV receivers that will get interference even when the amateur signal is pure fundamental. Over this we have no control at our transmitters, since it is a feature of receiver design.

The purpose of this article is less to review the methods of harmonic reduction than to treat a few aspects that have not had much attention in print. Nevertheless, some review is in order — for the simple reason that far too many fellows are staying off the air when they could be hamming as usual. The reason is either an unwillingness to do something about it (and this apparently is a very real element in the picture) or just simple bewilderment. The former can be cured only by a change of attitude, but the latter will disappear in time as the principles become more familiar from reiteration. So let's spend a little time going over the ground.

There are two general lines of attack, one of which might be called the "brute-force" method and the other the "selective" method (not having anything to do with selectivity, as we ordinarily think of the word). The "brute-force" method includes such things as shielding, lead filtering, transmitter design for minimum harmonic generation, and the use of circuits that are selective to the operating frequency. In other words, it aims at an over-all reduction of harmonics generally,

by straightforward design methods. It has the advantage that, if it gives a sufficient degree of harmonic reduction, harmonic radiation does not depend critically on any adjustments in the transmitter. The "selective" method makes use of circuits such as traps and filters that are designed for suppressing a *particular* harmonic. While this method usually gives good results it is also usually rather critical with respect to the operating frequency, and readjustment becomes necessary when the frequency is changed over more than a small range. It has the advantage that it frequently makes the application of "brute-force" methods a good deal easier, since it usually reduces the amplitude of the harmonic at its source.

Either method alone often will eliminate harmonic TVI in areas where the TV signals are strong, but in weak-signal areas a combination of both generally is necessary, particularly on the higher-frequency bands.

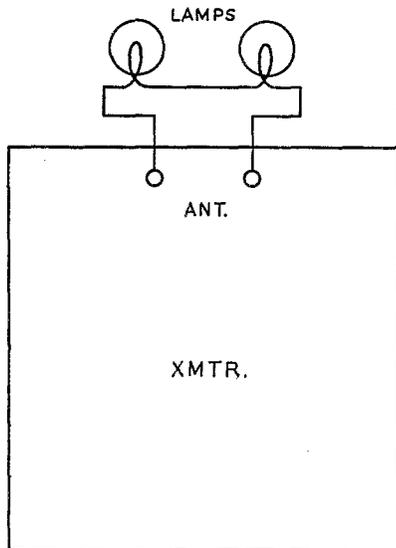


Fig. 1 — Use a dummy antenna to check for radiation from the transmitter itself. If you use a "flat" line, some combination of lamps can be chosen to give an approximate match. The approximate resistances of common lamp sizes, at full brilliance, are as follows:

25-watt — 600 ohms	100-watt — 150 ohms
40-watt — 350 ohms	150-watt — 100 ohms
60-watt — 250 ohms	300-watt — 50 ohms

Use a lamp combination that will match the transmitter power output as closely as possible. For example, if the output is 200 watts into 75-ohm line, use two 100-watt lamps in parallel; for 400 watts into 600-ohm line, use four 100-watt lamps in series, etc.

\* Technical Director, ARRL.

<sup>1</sup> Grammer, "Keeping Your Harmonics at Home," *QST*, November, 1946; Seybold, "Curing Interference to Television Reception," *QST*, August, 1947; Grammer, "Interference with Television Broadcasting," *QST*, September, 1947; Rand, "TVI Can be Reduced," *QST*, May, 1948; Rand, "More on TVI Elimination," *QST*, December, 1948; Rand, "The 'Little Slugger'," *QST*, February, 1949; Gemmill, "Harmonic Suppression in Class C Amplifiers," *QST*, February, 1949 (see also p. 34 this issue).

### Isolating the Harmonics

First and foremost, the whole problem is divided into two parts: (1) radiation from the transmitter and wiring; (2) radiation from the transmission line and antenna. This has been said many times and is worth repeating once more: It will do no good to try this and that remedy on the antenna system if the radiation from the transmitter itself is causing TVI. You must settle this point right at the start.

It's very easy to do, fortunately. Simply disconnect the transmission line at the transmitter and substitute a dummy antenna — which need be nothing more elaborate than one or two incandescent lamps big enough to handle the output power. Connect them in place of the feed-line (Fig. 1) and readjust the coupling, if necessary, to make the final amplifier load up to its normal input. Then check for TVI. If it is gone — and it very well may disappear if you live in an area where the TV signals are strong — your problem is one of keeping harmonics from getting into the transmission line and antenna. If the interference is still there, you need to tackle the transmitter itself before worrying about the antenna system.

### Reducing Transmitter Radiation

Experience has shown that most of the harmonic radiation from transmitters takes place from circuits and leads that, in theory, are not supposed to be carrying r.f. of any kind. A tank circuit, of course, will radiate somewhat, but if it is reasonably compact it will cause less trouble than the filament and d.c. supply leads, particularly those going to the final amplifier. Radiation of harmonics from r.f. circuits can be prevented only by shielding, but it is surprising how simple the shielding can be once the d.c. and a.c. supply leads have been cleaned up.

For example, we have found it possible to operate a 250-watt ten-meter transmitter within 50 feet of a television receiver without causing detectable interference in a picture of such low strength as to be decidedly unsatisfactory in quality — this with only partial shielding of the r.f. circuits and with an unshielded dummy antenna. No harmonic traps were used in the transmitter. Supply-lead filtering did the trick. At a distance of less than 10 feet it was necessary to complete the shielding about the r.f. circuits in order to be free of interference, the shielding consisting of an ordinary metal box with reasonably good connections at the joints.

There is an important point here. Shielding, as such, seems to be essential only when the transmitter and receiver are literally within a few feet of each other. The supply leads, not the tank circuits, are the principal cause of harmonic radiation. Some shielding is desirable (it's a good thing to have for many reasons besides harmonic

radiation) because the supply leads usually are pretty close to the tank circuit and can pick up some harmonic energy from the tank after leaving the chassis. Simple shielding prevents this and also, with suitable precautions, prevents similar pick-up by the antenna leads.

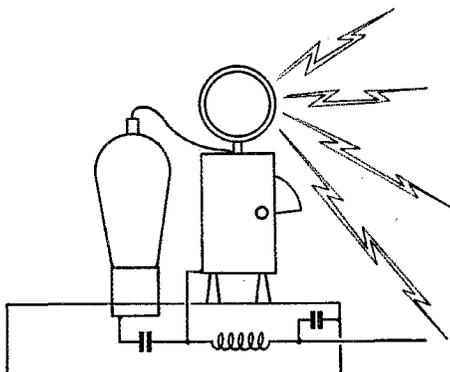


Fig. 2 — Don't expect filters to do a good job if the leads can pick up r.f. after they leave the chassis. The field around a tank circuit is pretty intense within a couple of feet, but can be cut down to the negligible point by simple shielding. The material used in the shield is less important than getting a continuous connection at the joints.

In other words, you shield the r.f. circuits not so much because they are the direct cause of interference, but principally because by doing so you prevent pick-up on transmitter wiring that is necessarily within a couple of feet of the tank circuits. If there is such pick-up you can spend lots of time filtering and trapping with little or no results. Your efforts along those lines are simply being by-passed without your realizing it.

So give yourself a break and do a bit of shielding. Avoid the situation shown in Fig. 2. An ordinary metal cabinet may be enough — but always remember that an exposed lead *inside* such a cabinet can pick up harmonic energy and carry it out. Although the cabinet may be quite adequate as a shield, you're by-passing it again if you have the set-up shown in Fig. 3. There are three ways to get around this one. First, the tank circuit itself can be shielded. Second, the leads can be filtered again where they leave the cabinet; in this case the preferable method is to put the filters inside a shield box of their own, built right against the cabinet wall, so the filters themselves are not exposed to r.f. Third, all leads leaving the chassis can be carried out in shielding. This last won't do any good at all unless the shielding is carefully bonded to the cabinet where the leads go out into the open. The outside of shield braid is just as good a harmonic conductor as the lead itself; no shield is any good if the r.f. is on the *outside*.

For filtering the leads you will need patience, a crystal-detector wavemeter, a handful of by-

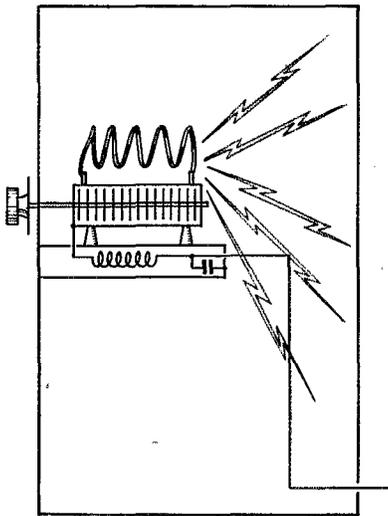


Fig. 3 — A metal cabinet can be an adequate shield, but there will still be radiation if the leads inside can pick up r.f. from the transmitting circuits.

pass condensers, and a few chokes. Not the least of these ingredients is patience. However, if you keep in mind the possibilities of stray pick-up mentioned above, the job will be made much easier. If there is one thing that stands out in this business of reducing harmonic radiation, it is that corrective measures can work only when they aren't nullified by coupling through some stray path that isn't obvious at first glance. If nothing happens when you try a remedy that has been recommended, don't condemn the method out of hand. Give the layout a critical looking-over and try to determine what path the harmonic is using to sneak past you. When you keep it within known channels you can operate on it with every probability of success.

### Filters and Wavemeters

The technique of using filters already has been covered in detail in *QST* and so will not be repeated here. There are only one or two additional points that need emphasis. Filtering at the source — right at the tube and tank circuit — is excellent because it reduces the amplitude of harmonic currents on leads inside the chassis. But so long as those leads are inside the chassis there is always the possibility of stray pick-up, so if "source filtering" does not clean up the external leads it will be necessary to filter again where the leads leave the chassis. Alternatively, use shielded leads inside the chassis, grounding the shields at least at both ends and running the shielding right up to the filter at one end and to the connection block at the other. Coax cable can be used for high-voltage leads. Shielded leads act like a continuous by-pass, an arrangement that

often is more effective than an ordinary by-pass condenser. It doesn't do any harm, either, to use shielded wire with a dielectric having the worst possible r.f. losses. It will attenuate v.h.f. harmonics just that much more.

To give yourself the most signal to work with, it is advisable to do the lead filtering before making use of harmonic traps in the r.f. circuits. The crystal-detector wavemeter is the handiest device for checking. It has one fault; it may register a considerable amount of fundamental, along with the harmonic, particularly when used near a tank circuit.

When this happens there is a more or less constant reading on the meter regardless of the setting of the tuning control. The cause usually is pick-up in the loop formed by the crystal, meter by-pass condenser, and the turns across which the crystal is tapped, in the case where the crystal is tapped across part of the tuning coil to obtain maximum sensitivity. The same thing happens when the crystal is connected to a separate coupling link. This loop is, in effect, an untuned pick-up and will give a response on any reasonably strong field, independently of the wavemeter tuning. Connecting the crystal across the whole coil is not a good answer since it reduces the sensitivity and, by putting an additional load on the tuned circuit, cuts the selectivity as well.

A remedy that has been found to be quite effective is to use link coupling between the wavemeter and the point where the signal is being picked up, as shown in Fig. 4. This reduces the coupling at all frequencies except that to which the wavemeter is tuned, because untuned links do not transfer much energy unless at least one of them is coupled to a high-*Q* circuit. The wavemeter circuit is high-*Q* only at the frequency to which it is tuned. We have found it possible to put the link at the transmitter end right between the turns of a 10-meter tank, with around 100 watts of fundamental present, and get no indication of fundamental at all when the

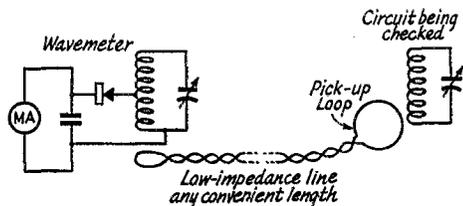
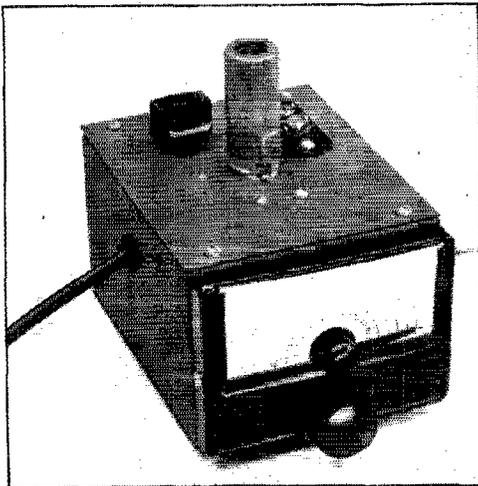


Fig. 4 — Using a pick-up link with a crystal-detector wavemeter. A single-turn link at both ends is adequate. The "probe" link can be about 2 inches in diameter and should be made of stiff wire covered with insulating tubing. The link at the wavemeter circuit should be the same diameter as the wavemeter coil. Adjustable coupling at this end will provide for obtaining maximum sensitivity. Receiving-type 75-ohm Twin-Lead makes a good connecting line. Three or four feet will be adequate in most cases.

meter is tuned to the second and higher harmonics. Under these conditions the harmonics stand out as they should. Link coupling has the additional advantage that the meter itself can be placed where you want and the link used as a probe. If it is covered with insulating tubing it can be used around the high-voltage circuits without danger either to the operator or the wavemeter.

Experimenting with filters in the supply leads should be done with the transmitter working into a dummy antenna, and loaded just as it would be with a regular antenna. This helps prevent the fundamental from setting up a strong field in the operating room by radiation from the regular antenna — a thing which can, in some cases, still cause trouble from fundamental pick-up on the wavemeter despite the link coupling. Shielding the wavemeter will reduce stray pick-up of this type, but is largely unnecessary if a dummy antenna is used. In any event, it is impossible to work very effectively when antenna effects are mixed up with the radiation from the transmitter itself; they can be separated only by using a dummy antenna.

It is not too difficult to filter the leads so that the wavemeter will give no indication, although it is sometimes a bit trying to find that cleaning up one lead makes the harmonics stronger in another! The critical ones usually are the filament or heater leads and the final-amplifier high-voltage lead, but once they begin to come under control the job is in its last stages. You may also find that a filter that works on one harmonic may boost the strength of another.



Simple converter covering the range 54-88 Mc. for checking harmonics in the lower group of television channels. This is only one of many possible arrangements. Such a converter is useful when there is no television receiver handy for testing, or for use when there are no TV signals on the air.

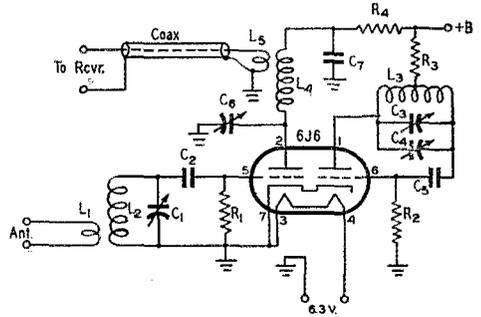


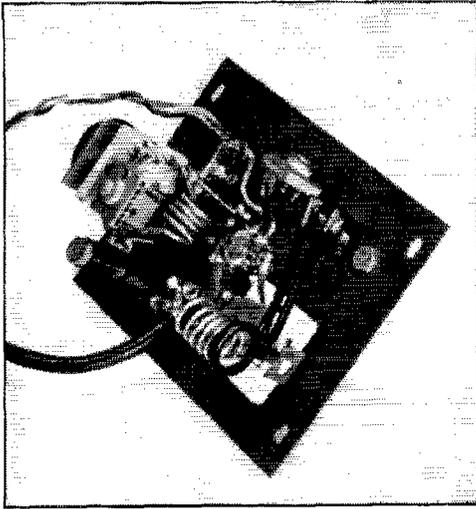
Fig. 5 — Circuit diagram of a simple converter covering the 54-88 Mc. range for checking TV signals and transmitter harmonics. The output frequency is 17 Mc.

- C<sub>1</sub> — 35- $\mu$ fd. variable.
- C<sub>2</sub> — 100- $\mu$ fd. mica.
- C<sub>3</sub> — 25- $\mu$ fd. variable.
- C<sub>4</sub>, C<sub>6</sub> — 3-30  $\mu$ fd. trimmer.
- C<sub>5</sub> — 47- $\mu$ fd. mica.
- C<sub>7</sub> — 470- $\mu$ fd. mica.
- R<sub>1</sub> — 0.47 megohm,  $\frac{1}{2}$  watt.
- R<sub>2</sub>, R<sub>3</sub> — 2200 ohms,  $\frac{1}{2}$  watt.
- R<sub>4</sub> — 10,000 ohms,  $\frac{1}{2}$  watt.
- L<sub>1</sub> — 1 turn,  $\frac{1}{2}$ -inch diameter.
- L<sub>2</sub> — 5 turns No. 14, diameter  $\frac{1}{2}$  inch, length  $\frac{3}{4}$  inch.
- L<sub>3</sub> — 4 turns No. 14, diameter  $\frac{3}{8}$  inch, length  $\frac{1}{2}$  inch, tapped at center.
- L<sub>4</sub> — 26 turns No. 24 enam., close-wound on  $\frac{3}{8}$ -inch diameter form.
- L<sub>5</sub> — 5 turns same as L<sub>4</sub> on same form,  $\frac{1}{8}$  inch from ground end of L<sub>4</sub>.

NOTE: C<sub>3</sub> and C<sub>4</sub> must be insulated from chassis. Plate supply should be 150-200 volts.

Whether or not this is a handicap depends on the particular TV channels assigned in your locality. Generally speaking, it is well to try to arrive at filter combinations that do the best possible job over the whole range. This means trying different values of by-pass condensers and different sizes of chokes. The latter can be wound on high-resistance 1-watt carbon resistors as a matter of convenience.

The set radiation is usually cleaned up to a satisfactory degree, for areas where the TV signal is of reasonable strength, if a fairly sensitive wavemeter will show no indication when coupled as closely as possible to all leads and to the transmitter itself. A 0-1 milliammeter is sufficiently sensitive, provided the coupling between the crystal circuit and the wavemeter coil has been adjusted for maximum sensitivity. However, there is a limit to what any indicator of this type will show, and the harmonic reduction can be carried still further by using a more sensitive type of indicator. Of course, a television receiver is the final judge, but a communications receiver will do just as well. Some of the current receivers cover the lower group of TV channels (54 to 88 Mc.) where TVI is most acute, but lacking such a receiver a simple converter can be used with an ordinary communications receiver. Fig. 5 shows a suitable circuit. The converter will give



Inside view of the converter. All parts are mounted on one plate of the  $3 \times 4 \times 5$ -inch box. In this view the mixer tuned circuit is at the lower right and the i.f. output transformer is at the lower left. The i.f. tuning condenser,  $C_6$ , is at the top center and is screwdriver-adjusted through a hole in the side of the box. The oscillator tuned circuit, at the left, is mounted on a metal bracket (but insulated from it) and the tuning condenser is connected to the dial by means of an insulated coupling, after assembly.

you a check on the strength of the television picture carrier, and when the radiation from the transmitter is 3 to 6 S points below the TV carrier strength (depending on the part of the TV channel in which the harmonic falls) it will be down to where it will not interfere even in your own house.

### The Antenna Circuit

Eventually, of course, the r.f. has to come out of the transmitter shield. At this point you hope that whatever comes out will be mostly fundamental and very little harmonic. Unfortunately, even though the harmonics may be well enough confined inside the shield to avoid TVI when the transmitter is on a dummy antenna, they will try to get outside on the same path used by the fundamental. The problem here is to offer every encouragement to the fundamental and every possible discouragement to the harmonics.

A good deal of the answer is supplied by an antenna tuner. Like any selective circuit, it will help suppress frequencies to which it is not resonant. Equally important, if the  $Q$  of the coupling circuit is reasonably high it will be possible to use loose coupling between the links at the final tank and the antenna tank and thereby reduce the capacitive coupling that permits harmonics to sneak through. If you don't have one already, an antenna tuner will pay off in better performance at the funda-

mental, in addition to helping suppress off-frequency radiations of all types. For best results, it should be coupled to the transmitter through a section of coaxial cable, as shown in Fig. 6. Although the antenna tank does not itself require shielding, a shield of some sort is necessary to provide a termination for the shield on the coax. Without it, any harmonic currents in the cable will simply flow out the end and back over the cable and the transmitter, as shown at A in Fig. 6. This we can't afford to allow, since it is the same sort of condition that exists when harmonic currents flow on d.c. leads. Actually, an ordinary metal chassis seems to serve just about as well as a complete shield. Apparently a reasonable amount of metal in the general shape of a box, even an open box, confuses the r.f. enough so that it is content to stay inside and makes no special attempt to get on the outer surface where it can do harm. A type of construction that has worked well is shown in Fig. 7.

It is not easy to make measurements of real significance in the v.h.f. region, and the measurement of harmonic output introduces difficulties of its own. An attempt was made to evaluate the effectiveness of an antenna tuner by first setting up the system for optimum fundamental power transfer into a dummy antenna, to obtain the values of coupling at the links that would be used in practice. The antenna post of a receiver was then connected directly to the "hot" side of the link at the antenna tuner, and readings obtained on the 56- and 84-Mc. harmonics leaking through from a buffer stage, with the final off. The receiver antenna connection was then shifted to one of the taps to which the dummy antenna was connected, the difference between the readings being taken as the amount of harmonic suppression offered by the tuner. On both harmonics considered it averaged about 25 to 30 db.

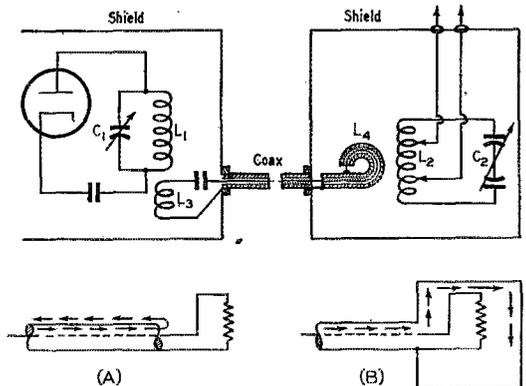


Fig. 6—Recommended type of antenna coupler for reducing harmonic radiation. A ground on the rotor of  $C_2$  may help in some cases; in others it may increase harmonic radiation. It should be tried both ways to see which gives the best results.

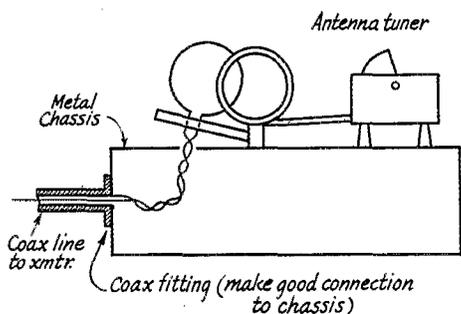


Fig. 7—Terminating the coax link line in an ordinary chassis is frequently sufficient to prevent harmonics from flowing back over the coax shield. The antenna coupling circuit itself seldom requires shielding.

This was with unshielded links at both ends, but with the circuit  $Q$ s high enough so that the coupling was reasonably loose. Substituting a shielded link at the antenna-tuner end reduced the 56-Mc. harmonic transfer by another 6 db., but did not affect the 84-Mc. harmonic. This was taken to indicate that at least some of the coupling at the second harmonic was by capacitive means, but that inductive coupling was largely responsible for the third-harmonic transfer.

#### Link-Line Filters

So much for the "brute-force" methods that can be applied to existing transmitters. If the steps outlined above are not enough (they are not as formidable in practice as they may seem in the reading) it is usually necessary to resort to the "selective" methods, principally represented by tuned traps of various kinds.<sup>2</sup>

One definite advantage of the coax-coupled antenna tuner is that it offers a good place to put either a harmonic trap or low-pass filter. Attempts to use such filters (including "linear" traps) are frequently unsuccessful, and the reason is not that a filter is no good, but that the r.f. is bypassing it so that it never gets a chance to work. In a set-up such as is shown in Fig. 6—assuming that the necessary preliminary work has been done to reduce the lead radiation to the point where it does not cause TVI when the transmitter is working into a dummy antenna—the output of the transmitter, harmonics and all, has to flow *inside* the coax link between the transmitter and antenna coupler. Furthermore, it has to flow as a transmission-line current and not as a "parallel" or "antenna" current.<sup>3</sup> Under

<sup>2</sup> See, in particular, the second, fourth and fifth references under footnote 1. Tank-circuit traps have shown, in practice, some interesting peculiarities, and it is hoped that a study now under way will provide some useful data that can be reported in the next issue. This study covers both plate-lead traps and the inductively-coupled traps described by J. L. Reinartz in the Nov.-Dec., 1948, and Jan.-Feb., 1949, issues of *RCA Ham Tips*.

<sup>3</sup> Paddon, "Parallel Standing Waves," *QST*, January, 1948.

these conditions a wavetraps will really get down to business. A low-pass filter is preferable to a simple trap, because it permits operating the coax line without standing waves at the fundamental. Also, if the cut-off frequency is above 30 Mc. the filter can be left in the line all the time and will not affect the transmitter operation on any band from 28 Mc. on down. The circuit diagram of such a filter is shown in Fig. 8, and the photograph shows a typical one suitable for powers of the order of a few hundred watts. It is essential that the filter be mounted in a metal box; leaving it in the open is simply an invitation to the harmonic currents to get on the outside of the cable, in which event the filter might just as well not be there.

The measured performance of the filter shown in the photograph is given by the curves of Fig. 9. These curves were taken with a signal generator, using a receiver connected across the terminating resistor on the coax line as an indicator. For comparison, a curve was run on a simple "L"-section filter (no tuned trap). As shown by curve *C*, the attenuation is according to expectations up to about 60 Mc. At that point it flattens off, probably indicating leakage in the measuring system. If so, the attenuations obtained with the tuned traps, curves *A* and *B*, are probably pessimistic. When installed in the coax cable between the transmitter and antenna tuner the actual performance was about as indicated by the measured curves. On either the second or third harmonic the attenuation was such that the harmonic signal was brought right down to the level of the radiation from the transmitter itself, the trans-

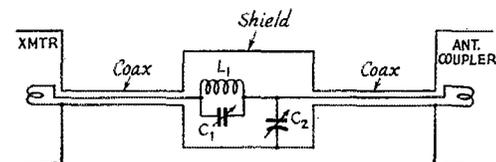


Fig. 8—Simple type of low-pass filter for use in coax line between transmitter and antenna tuner. Constants may be found from the following formulas:

$$\text{For 50-ohm line—} C_1 = \frac{2120}{f}$$

$$C_2 = \frac{4770}{f}$$

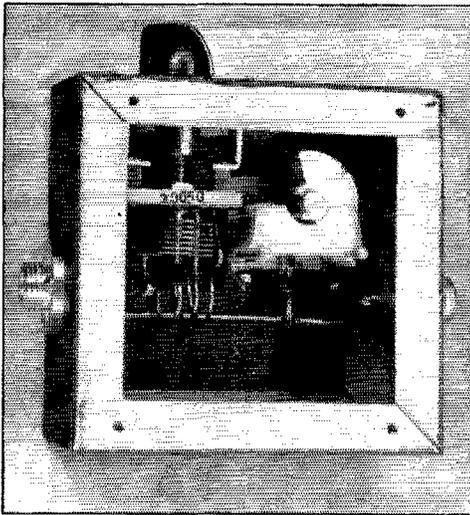
$$L_1 = \frac{12}{f}$$

$$\text{For 75-ohm line—} C_1 = \frac{1420}{f}$$

$$C_2 = \frac{3180}{f}$$

$$L_1 = \frac{18}{f}$$

$C_1$  and  $C_2$  in  $\mu\text{fd.}$ ,  $L_1$  in  $\mu\text{h.}$  Coils can be wound of No. 14 wire to be self-supporting; number of turns will vary from about 3 to 10,  $\frac{1}{2}$ -inch diameter, depending on inductance required. Adjust the inductance so that the harmonic is rejected when  $C_1$  is set to approximately the capacitance given by the formulas above.



Harmonic filter for use in coaxial line. This unit is mounted in a 2 × 2 × 4-inch box, with coaxial fittings on each end. The receiving-type condensers shown are good for about 500 watts, provided the s.w.r. on the line is close to 1.

mitter and receiver being within arm's reach of each other when the check was made.

It is important to note that in actual use the line would not be terminated in its characteristic impedance at the harmonic frequencies, even though perfectly matched at the fundamental. For this reason the length of coax between the filter and the antenna tuner can have a pronounced effect on the performance of the filter. The most desirable condition is that which makes the input end of the line look like a low capacitive reactance at the harmonic to be suppressed. The line should, therefore, be between  $\frac{1}{4}$  and  $\frac{1}{2}$  wave long, electrically, at the harmonic. This is modified somewhat by the fact that the termination for the line is the link coil in the antenna tuner; the link tends to make the line act as though it were longer. The best line length can be found by starting with about a half wavelength and clipping off a few inches at a time while checking the harmonic strength in a near-by receiver. Another useful scheme is to start with the same length, connect it to the antenna-tuner link but not to the filter, and check the resonant frequency with a grid-dip meter. The open end of

the line can then be clipped a bit at a time until the resonant frequency is a little more than half the frequency of the harmonic to be trapped out. For example, if the harmonic is on 58 Mc. the line should be cut so that it resonates (including the link) at around 35 Mc. or so.

With the optimum line length, the attenuation of a given harmonic can be considerably greater than is shown by the curves of Fig. 9. In fact, we have obtained attenuations in excess of 60 db., in cases where the termination was deliberately mismatched at the harmonic to provide more favorable operation. A simple trap is just as good as a filter for suppressing a particular harmonic. However, the filter will partly suppress all harmonics above the cut-off frequency, while the trap alone is good for only one frequency.

Our tests have shown that a simple filter of the type shown in Fig. 8 is at least equally effective, and possibly a bit better, than a tuned trap in the plate circuit of the amplifier, once the preliminary work of getting rid of radiation from the transmitter and its leads has been accomplished. Theoretically, it ought to be better for two reasons. First, assuming equally-good trap  $Q$ s, proper selection of line length between the filter and antenna tuner will result in a lower impedance for the trap to work into; this increases its effectiveness. Second, the trap catches all the harmonic output coming from the transmitter, whereas it is readily possible for stray coupling to exist between the transmitter link and some part of the final tank circuit — in effect, by-passing the plate trap. Both the plate trap and the filter can be used, of course, and two harmonics can readily be suppressed by tuning the plate trap to one and the filter to the other.

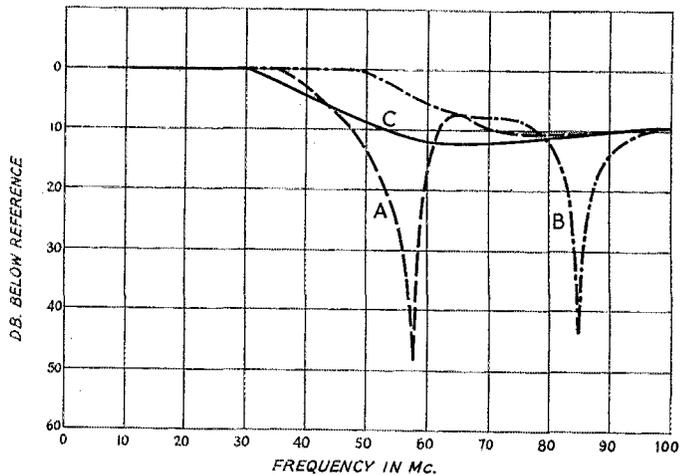


Fig. 9 — Measured performance of a filter of the type shown in Fig. 8, constructed for use with 75-ohm line. Curve A, filter constants adjusted for rejection at 57 Mc.; curve B, constants adjusted for rejection at 85 Mc.; curve C, fundamental "L" section, without resonant trap. The line was terminated in its characteristic impedance, approximately, at all frequencies shown.

### Parasitics

It goes without saying that parasitics ought to be eliminated in any amplifier, and that certainly they cannot be permitted to exist in any of the television bands. A further requirement is that whatever means is used to eliminate them should not interfere with measures to be taken for harmonic suppression. In particular, trap circuits need to be reserved for harmonic suppression and not for killing parasitics; the tuning condition that accomplishes the latter may bring the amplitude of a particular harmonic up to an intolerable level.

In this respect, the popular 807 probably tops the list of chronic offenders. The usual method of getting rid of parasitics includes small chokes in the grid lead, 50- to 100-ohm resistors in the screen-grid leads, and sometimes a tuned trap in the plate circuit. The grid chokes may either help or hinder, from the harmonic standpoint. The screen-grid resistors are definitely bad, since they tend to make the screen somewhat "hot" for r.f. of any frequency; they are frequently the cause of self-oscillation at the fundamental and without any question make the harmonic situation worse, because it is a hard problem to get the screen down to ground at v.h.f. even without the resistors. The plate trap is undesirable for the reason mentioned above; it is better to reserve it for harmonic suppression.

A great deal depends on the amplifier layout when 807s are used. We have found, for example, that in some cases parasitics can be killed simply by connecting a 10- $\mu\text{fd.}$  ceramic condenser between control grid and cathode, laying it across the socket so that there are practically no leads. In other cases it is necessary to use a grid choke in addition to the shunt condenser, the number of turns on the choke being adjusted so that with the condenser it forms a simple sort of low-pass filter. In this case the choke inductance should be the largest value that will permit the tube to be driven properly at 28 Mc., and is adjusted by checking the grid current while the number of turns is varied. When the grid current starts to drop off, as compared with the value without the choke, the choke is large enough. This test can be made, of course, without either plate or screen voltage on the tube. This type of circuit is helpful from the harmonic standpoint, since it helps reduce the amount of harmonic voltage applied to the grid.

It has also been found helpful to connect a good r.f. condenser directly between the plate and cathode. This has been suggested by WIDBM as an aid to harmonic reduction,<sup>4</sup> but appears to be highly advantageous from the parasitic standpoint as well. For moderate-power set-ups a satisfactory condenser can be made as shown in Fig. 10. It should be mounted on the chassis as

close as possible to the cathode, and can serve as a mounting pillar for the plate connection to the tube. The bottom should be open, and should be placed over a hole in the chassis so the high-frequency currents can flow back to the cathode over the shortest possible path. Although condensers of this type have relatively low capacitance—10 to 15  $\mu\text{fd.}$ , depending on the length and spacing—they make an effective r.f. connection between the plate and cathode at v.h.f. They can be looked upon, in fact, as being a short section of low-impedance transmission line at such frequencies.

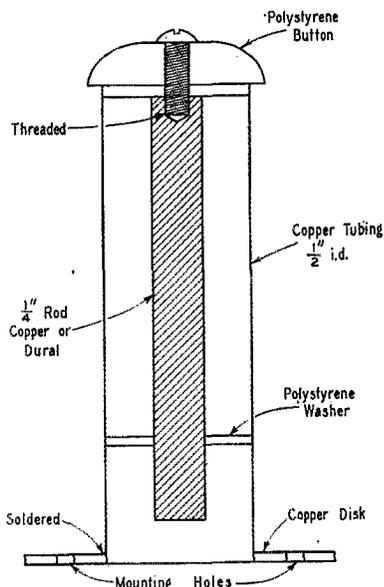


Fig. 10 — Tubular condenser for providing short r.f. path between plate and cathode, for tubes having the plate connection at the top. The bottom of the larger tube should be left open and should be mounted over a hole in the chassis near the grounded connection from the tube cathode. The electrode spacing suggested in this drawing is good for a peak voltage of about 2500. A condenser 4 inches long has a capacitance in the vicinity of 10  $\mu\text{fd.}$

In one amplifier using two 807s in parallel, the combination of grid chokes, shunt grid condensers, and the shunt plate condenser did not quite kill off parasitic oscillations. The trouble was that the screen grids were hot, it being impossible to by-pass them effectively with ordinary mica by-pass condensers. The amplifier was finally stabilized by using short lengths (about 8 inches) of RG-59/U cable as a by-pass on each screen, in effect detuning the screen circuit at v.h.f. The main screen by-pass condenser was installed on the supply-side of the cable, as shown in Fig. 11; at the operating frequency, the cable simply acts like an additional small capacitance. This type of by-pass seems to be quite effective,

<sup>4</sup> See fifth article listed under footnote 1.

not only inherently but because, being shielded, it prevents radiation of such harmonics as may exist on the screen leads.

Although it was necessary to take four separate measures to kill parasitics in the circuit shown in Fig. 11, it should be observed that each one of them is also helpful in reducing harmonics. This is important. In addition, the plate lead is left free for the installation of a harmonic trap. In this connection, it is possible to series-resonate the screen circuit to eliminate a particular harmonic in that circuit. Regardless of the fact that the screen may be by-passed by a high-capacitance mica condenser, connecting a small variable (the 45- $\mu\text{mf}$ . ceramics are about the right size) from screen to chassis through a few inches of wire will permit tuning the screen circuit to frequencies

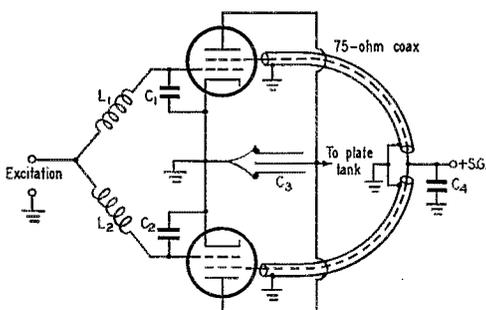


Fig. 11 — Measures for suppressing parasitics without using plate traps or resistance in the screen circuits. The amplifier in which this circuit was used had two beam tubes in parallel, a combination that is extremely prone to parasitic oscillation. Although not so shown in the drawing, the connection between the two plates was as short as the size of the tube envelopes would allow.

$C_1, C_2$  — 10- $\mu\text{mf}$ . ceramic, laid on tube socket.

$C_3$  — Tubular condenser as shown in Fig. 10.

$C_4$  — Normal screen by-pass condenser.

Approximately 8 inches of RG-59/U was used to connect each screen to  $C_4$ .

between 60 and at least 150 Mc. If the wave-meter shows harmonic voltage to be present, tuning the condenser will carry it right through a minimum. Like all trap circuits, however, it may result in a higher voltage at some other harmonic. This same stunt, incidentally, is often effective in killing a parasitic oscillation — although too frequently the parasitic is killed only at the expense of increased output on some harmonic frequency. We definitely need tubes that are less anxious to “take off” in the v.h.f. region. The problem of harmonic suppression is sizable enough in itself, without adding to it the often conflicting requirements of parasitic suppression.

#### Other Methods

We have not touched here on the many other aspects of harmonic reduction, nor on a number

of the finer points that have been uncovered in the course of such work on the problem as time permitted during the past year. It should be obvious, for example, that any measures that reduce harmonics at their source will in turn simplify the procedure for preventing their radiation either by the transmitter itself or by the antenna system. Past issues of *QST* have had a lot of information — so much, perhaps, that there is good reason for that helpless feeling that goes with not knowing where to start work. This, as we said at the beginning, is bound to dissipate itself as the ideas become part of our regular technical equipment.

### Silent Keys

IT is with deep regret that we record the passing of these amateurs:

W1AZ, George U. Readio, Springfield, Mass.

W1BKF, Elmer G. Maki, Worcester, Mass.

Ex-W1DND, CRM Anthony G. Machansky, USCG, South Boston, Mass.

W1KTE, Albert S. Olsen, West Roxbury, Mass.

W1RIB, V. Joseph Altieri, Watertown, Mass.

W2PNM, Charles J. Holstein, New York City

W2TOX, William M. Verkler, jr., Mayfield, N. Y.

W3HKQ, Charles F. Heckman, Reading, Penna.

W4MIT, Houston H. Cleveland, Coral Gables, Fla.

W5JFK, H. Ray Hollifield, San Antonio, Texas

Ex-W5WA, Porter Holland, jr., Dallas, Texas

Ex-W6KMZ, Forrest E. Westerlund

W6MFK, John L. Sprecht, Lancaster, Calif.

W6ONO, Deron D. Terzian, Modesto, Calif.

W8ZDE, Russell Johns, Laurium, Mich.

Ex-W9CKF, Frank Colclough, Philip, S. D.

W9EQJ, Charles E. Riecken, jr., River Grove, Ill.

W9GPH, Victor J. Volz, Cannon Falls, Minn.

OK3CJL, Josef Laslo, Bratislava

VE3AI, James R. Tuck, Port Colborne, Ont.

VE7AA, Richard E. Plewman, Rossland, B. C.

# Better Results with the 522

*Some Hints on Improving Performance Based on Practical Experience*

BY ROBERT E. FAIRBROTHER,\* WIPYO

**T**HOUGH the SCR-522 was the principal factor in promoting stabilization of the 2-meter band, with resulting tremendous improvement in coverage for the average station, it didn't take progressive operators long to discover that the unit in its original or slightly-modified forms left quite a bit to be desired. There was a vast difference in the results obtained, from one station to the next. Some of the transmitters sounded far from good on the air, and the receivers developed a reputation for missing all but the loud ones when the band was open.

It was such a simple matter to get on the 2-meter band with the 522 rigs that most of the early users jumped in after having done the minimum of work required to make the transmitter transmit and the receiver receive. The standard conversions published in several radio magazines made this process simple, indeed. Soon, however, almost everyone had his pet conversion process, and ideas for improving the 522 were the subjects of endless nightly discussions.

Literally thousands of 522s have been sold and even today, more than two years after their appearance on the surplus market, there is still a lot of interest in ways by which their performance may be improved. Here is a conversion process, outlined in step-by-step fashion, which should help 522 owners to get more out of their equipment, both transmitting and receiving.

## Stepping Up the Receiver Sensitivity

A considerable improvement in receiver sensitivity can be achieved by substituting 6AK5s for the 9003s used in the r.f. and mixer stages. Other changes, of a purely mechanical nature, make for easier tuning. The 522 was designed to cover a wide range of frequencies, and to provide non-critical operation on various spot frequencies from 90 to 150 Mc. This service is far different from the weak-signal performance in a narrow band of frequencies which the 2-meter man expects of his receiver.

Stepping up the r.f. gain introduces complications, however. The 6AK5s show marked tendencies toward self-oscillation, correction of which required extensive experimentation with grounds and by-passes. It is often not appreciated that high S-meter readings and lots of receiver noise do not necessarily mean high sensitivity. In the case of the much-converted 522s worked on here, we found that each of the steps enumerated be-

low tended to "cool down" the receiver, reducing the noise, but improving the signal-to-noise ratio. The improvement was such that signals which are completely inaudible on a 522 in its original form are copied solidly with the converted jobs. Their performance has compared very favorably, in side-by-side checks, with a highly-regarded commercial converter ahead of an HRO-7.

Insofar as possible, the part numbers used in the service manual are used in the conversion process detailed herewith, and the parts to be changed are also described in sufficient detail to permit following the process even if no schematic diagram is available. First, remove the r.f. and harmonic-generator sections. Change the r.f. amplifier grid and plate coils and the mixer grid coil from two to three turns, copying the general size and shape of the original coils other-

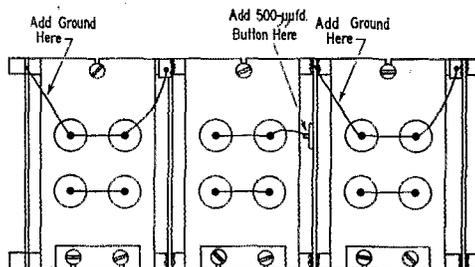


Fig. 1 — Sketch of the bottom of the tuning condenser for the r.f. section of the 522 receiver, showing placement of grounds and by-passes needed when 6AK5s are substituted for 9003s. The front end of the tuning-condenser assembly is at the left.

wise. These coils are numbered on the schematic diagram as 222, 223 and 224 respectively. Remove the r.f. amplifier grid coupling condenser, 201, and the grid resistor, 251. Replace 201 with a 30- $\mu$ fd. ceramic condenser, and connect the 0.47-megohm resistor, formerly 251, across it. Connect this combination from the hot coil support to the 6AK5 grid terminal as directly as possible. This cuts down the capacitance to ground considerably in comparison to the original arrangement. Be sure to include the resistor, however; otherwise the r.f. tube may be destroyed when the transmitter is operated. Replace the r.f. amplifier screen resistor, 267-8, originally 0.1 megohm, with a 15,000-ohm  $\frac{1}{2}$ -watt resistor. Add a by-pass (680- $\mu$ fd.) at the un-by-passed

\* 8 Lane Ave., Newport, Vt.

cathode terminal, Pin 2, and a 500- $\mu$ fd. silver-mica button-type by-pass at the cold end of the r.f. plate coil to ground. Add a ground lead at the left side of the r.f.-grid stator terminal and at the left side of the mixer-grid stator terminal, as viewed from the bottom of the condenser assembly with the front end at the left. The purpose of these ground connections and by-passes may not be clear to one who has not had extensive v.h.f. receiver experience, but rest assured, they are necessary. Though the points in question are already "grounded" in the conventional sense, it is only through leads or framework of appreciable length. These relatively long paths to ground provide common coupling for the input and output circuits of the r.f. stage, with a resulting tendency toward self-oscillation. Their positions are shown in Fig. 1.

The antenna coupling coil should be increased to 2 turns, or possibly 3, if 300-ohm transmission line is to be used. The tendency to regeneration, which develops when the 6AK5s are used, is reduced by tighter antenna coupling than the original arrangement provides. This is shown by the reduction in noise level which takes place when the antenna coupling is increased. The correct spacing for the 2-turn coil is approximately  $\frac{3}{16}$  inch from the r.f. coil, when 52-ohm coaxial line is used, though this should be adjusted for optimum results with the particular antenna system used with the receiver.

Moving to the mixer stage, ground both cathode leads. Replace the mixer grid condenser, 203-1, with a 30- $\mu$ fd. ceramic. Remove the 1.8-megohm grid resistor, 255-1, and connect it across this condenser. Remove the 60- $\mu$ fd. mica condenser from the mixer plate coil in the i.f. transformer and connect it right at the mixer plate terminal to ground. The plate potential on the 6AK5s must be dropped to 150 volts, approximately. This is done by changing the re-

sistor 263-1, in the mixer plate lead, from 4700 to 20,000 ohms, 2 watts. The lead from this resistor to the r.f. section should be removed from the top of the resistor and reconnected on the bottom. This allows it to serve as a dropping resistor for the mixer stage and r.f. plates and screens.

Next the bandsread is increased by removing plates from the variable condensers. The rotor plates should all be removed except the center one in each section, being careful not to break the ceramic shaft. From our own sad experience, we know that these shafts break *very* easily! In modifying the stators, remove three plates from each side. Unsolder the tie strap at the top of each section, remove the two middle plates, and resolder the tie strap. This results in a triple-spaced condenser of three plates, which provides a tuning range of approximately 143.5 to 148.5 Mc.

Now we turn to the oscillator harmonic-amplifier section, from which we remove the crystal sockets, crystal switch, slug-tuned plate coils, 227-1 through 227-4, and the condensers and resistors in the harmonic-generator grid and plate circuits, numbers 204, 205, 262-1, 202-15, 261, 203-2 and 255-2. Make a four-turn coil and install it in place of 226 in the 9002 plate circuit. Ground the cathode terminal. Shift the plate lead to the opposite condenser terminal. Insert a 50- $\mu$ fd. ceramic condenser between the 9002 grid terminal and the condenser terminal where the plate was formerly connected. Remove the two by-passes, 202-13 and 202-14, from the point where the B-plus is fed into the coil through the 27,000-ohm resistor, 260. Connect a 22,000-ohm resistor from the 9002 grid to ground. This converts the 9002 into an oscillator stage. The following stage operates as an amplifier, as previously.

Remove the resistor 255-2 and condenser 203-2 from the isolating-amplifier grid lead and put in a one-turn coil to ground from the 9003 grid, for coupling output from the oscillator to the amplifier grid. The isolating-amplifier plate coil should be two turns,  $\frac{1}{2}$ -inch diameter, positioned as the original was, to couple the injection voltage into the mixer grid coil. This coil should be loaded with a low-value carbon resistor, the actual value of which may have to be determined by experiment. We have found various values from 270 to 500 ohms to be optimum in different receivers. The spacing will be about  $\frac{1}{4}$  inch between the two. Isolation is very good with this arrangement and there is no oscillator pulling. Injection voltage, measured across the mixer grid resistor with a vacuum-tube voltmeter, should be about 1.2 volts.

The plates in the tuning condensers in this section should be cut down in the same manner as for the r.f. section. The process will be similar, except in the case of the oscillator condenser which has one more rotor and one more stator plate than the other condensers. The end result

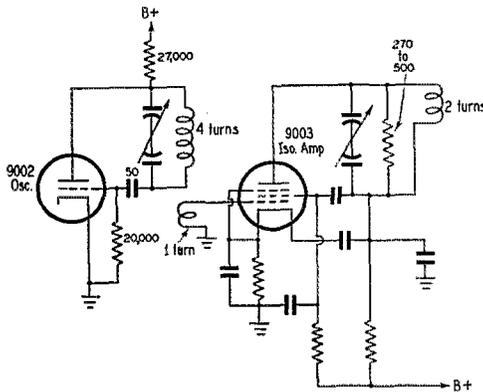


Fig. 2—Schematic diagram of the oscillator and isolating-amplifier circuits which replace the harmonic-amplifier stages in the 522 receiver.

should be the same, however; a triple-spaced condenser with two stator plates and one rotor plate in each section. The oscillator tuning range will be approximately 131.5 to 136.5 Mc. The circuit is shown in Fig. 2.

In the audio system the transformer (295) between the diode and the first audio should be removed and replaced with the coupling circuit shown in Fig. 3. Tie a 680- $\mu$ fd. mica condenser

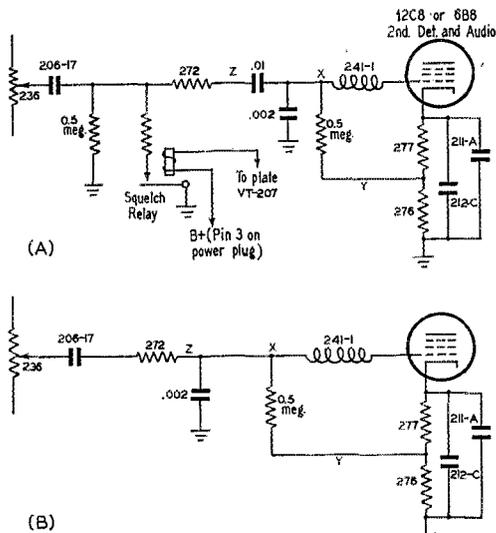


Fig. 3 — Suggested circuit for first audio stage in the 522 receiver, replacing the transformer coupling. Circuit A should be used if the squelch circuit is retained.

between the plate side of the first-audio load resistor, 266-3, and ground. This reduces receiver noise which was apparently the result of r.f. from the front end of the receiver getting into the audio system. This is further reduced by inserting a shield plate between the r.f. section and the audio portion of the receiver. This shield, an aluminum plate about 1 1/4 by 4 inches in size, is mounted between the r.f. section and the terminal strip at its right, when the receiver is viewed from the bottom with the r.f. section at the left. Prior to the installation of these by-passes and the shield, the set noise increased more rapidly than the signal as the audio gain was turned up.

An increase in i.f. gain can be effected by decreasing the value of the third i.f. cathode resistor, 270, to 200 ohms. The receiver is now ready for tuning up, unless it is to be converted to 6-volt operation, in which case the miniature tube sockets should be rewired for parallel connection. The tube line-up, for 6-volt service, is as follows: r.f. and mixer, 6AK5s; oscillator, 9002; isolating amplifier, 9003; 1st, 2nd and 3rd i.f., 6SG7; 2nd detector, a.v.c. and 1st audio, 6B8; 2nd audio, 6J5.

No attempt was made to gang the r.f. and oscillator controls. With the i.f. bandwidth of the 522 the oscillator setting is not too critical. Tuning of the band can be handled readily, even without a vernier. When regeneration troubles are properly cured the setting of the r.f. control is quite broad; thus the two-handed tuning is not the least troublesome.

### Converting the Transmitter

Working over the transmitter is a much simpler process. Many are used in exactly the original form, but improvements in both the quality and quantity of the signal may be made by the following simple changes:

Remove all relays. Tie the grid leads which come down through the shield together. Ground the loose volume-control lead (bare) wire. Remove the feed-back circuit on the terminal strip at the audio end of the chassis, unless use of the tone modulator is desired. This consists of three 0.5-megohm resistors, 140-2, 140-3 and 140-4, two 0.001- $\mu$ fd. mica condenser, 105-3 and 108-2, and one 5000-ohm resistor, 142. Cut down the oscillator plate condenser by two plates on each side, and the first multiplier by four plates on each side. The second-multiplier and amplifier condensers should have only one stator plate on each side left. These reductions in tuning range are merely for greater ease of adjustment. Remove the flexible plate leads from the 832s and substitute strips of silver or copper ribbon. This makes a considerable improvement in the efficiency of the two 832 stages.

In its original form the 522 transmitter has modulation applied to the screens of the 832 tripler, along with the plates and screens of the final. The quality can be improved considerably by removing the modulation from the tripler screens, which can be done by lifting the yellow shielded lead from the junction of the two 40,000-ohm resistors, 133-1 and 133-2, and reconnecting it on Terminal 2 on the modulation transformer, 160. The blue wire on the resistors should be left in place, as it supplies modulation to the power amplifier screens. An additional audio stage can be added if more gain is needed, for use with crystal or dynamic microphones. The circuit used here with a Turner 101B microphone is shown in Fig. 4. Considerable care is required to prevent r.f. feed-back troubles, when this amount of gain is used. The r.f. chokes and the 10,000-ohm resistor should be placed right at the tube socket. Other components may be mounted on the terminal board formerly used for the tone-modulator components, making a neat and professional-appearing job. The tube should be the metal type, only, and the by-passes should be of good quality. Shielded leads should be installed as shown. The by-passes below the chokes in the cathode and heater leads may not always be necessary. Some units have worked OK without them.

### Miscellaneous Tips

There is a world of difference in tubes at 144 Mc. Don't rely on a tube tester — try out individual tubes, one at a time, while listening to a weak signal. Tubes which are OK on a tube tester may be completely useless on 2 meters.

The racks which hold the two units may be connected together in any way one chooses, but leave the antenna and B-plus switching arrangement as is; otherwise the receiver will come to life slowly when going from transmit to receive. Separate power supplies are the answer.

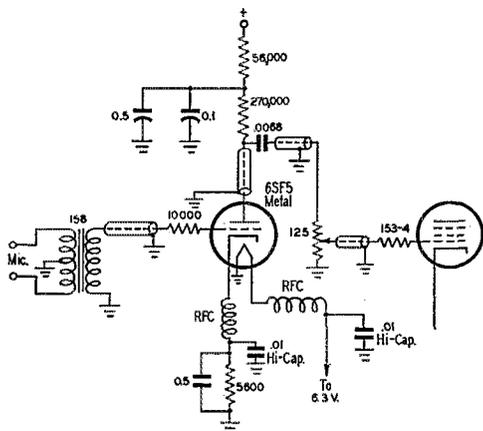


Fig. 4 — Schematic of the additional speech stage for use with dynamic microphones. The r.f. chokes in the heater and cathode leads are approximately 20 turns of No. 28 wire on a 1-watt resistor.

The transmit-receive relay can be operated from the 115-volt line by using the simple arrangement shown in Fig. 5. The 40- $\mu$ f. electrolytic charges up when the circuit is open and really snaps the relay shut when the switch is closed.

The stability of the receiver oscillator is quite good after about a 10-minute warm-up. If there is trouble with drift or frequency shift after this time, try another 9002. In one location here where the line voltage is very erratic it was necessary to use voltage regulation on the oscillator, but it is not ordinarily required.

On later units having the noise silencer it is necessary to remove resistor 254-3 from the hot filament lead of the 12H6 diode to the cathode of the a.v.c. clamper diode, or the a.c. will get into the a.v.c. line.

When removing the diode coupling transformer, 295, also remove the two short shielded leads going to the plug on the front of the receiver, the two 0.47-megohm resistors on the power plug, 275-2 and 275-3, mica condenser 214 on the transformer, the 0.56-megohm resistor, 262-2. The black wire with the green tracer at the junction of 275-2 and 275-3, the yellow

wire from 295, and the green wire from 295 in the shield should be traced and pulled clear. The green wire is the grid lead, point X in Fig. 3. The black wire with green tracer is point Y, and the yellow wire is point Z.

The a.v.c. line should be disconnected from the r.f. stage when a 6AK5 is used. This is done by removing the glass-insulated lead from decoupling resistor 267-1, in the first i.f. grid lead, and resistor 252 in the r.f. section.

### Conclusion

All the above represents quite a bit more work than is required to get the 522 into operation as a ham rig, but the extra work involved is very much worth while. Many fellows who are satisfied with the performance of the transmitter have long since discarded the receiver, feeling that its performance is not good enough for amateur work. In its original form the sensitivity of the 522 is quite low, and nothing much more than line-of-sight stuff can be worked with it, except when conditions are extra good, but we have found, by many hours of experimental work, that the performance can be stepped up remarkably. Any one of the changes mentioned above may not make much improvement when tried alone, but they all add up to make the 522 a wholly different receiver.

When W1IT and the writer first started in on 144 Mc. last year, with our 522s in pretty much the original condition, we had barely audible signals over the hilly path between North Troy and Newport. Now the signals are S9-plus, consistently, with completely noise-free reception. VE2FO, Montreal, some 80 miles of mountainous country away, is copied consistently under normal conditions, while he had previously been heard only when conditions were extraordinarily good. Several 144-Mc. stations are now active regularly in northern Vermont, and as improvements have been made on the 522 set-up at one of the stations the ideas have been tried out at the others, in order to check the performance. The writer

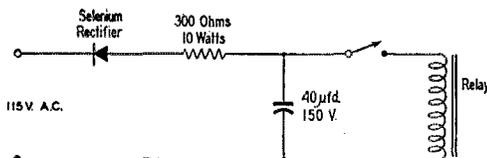


Fig. 5 — Rectifier circuit for operating the 522 send-receive relay on 115 v. a.c.

wishes to thank Clayton Paulette, W1IT, particularly, for the many hours of effort he has contributed to this conversion project, both over the air and in person. The 2-meter contingent up here has not worked any startling DX as yet, but some big antenna projects are in the works, and northern Vermont will be heard from when things begin to break this spring!

# VE/W Contest

*Begins April 29th at 8 P. M., EST;  
Ends May 1st at Midnight, EST*

**Object:** Each VE will work as many W stations as possible in as many United States ARRL sections as possible. Each W will work as many VE stations as possible in as many Canadian sections as possible. See page 6 of any *QST* for complete list of ARRL sections.

**Time Limit:** Operation must not exceed a total of 20 hours (list times on and off in your report).

**General Calls:** 'Phone — "Calling any 'phone station in VE/W contest." C.w. — "CQ VE/W CQ VE/W CQ VE/W DE [your call]."

**Frequency Bands:** Any or all amateur bands may be used.

**Scoring:** Preambles such as the following must be exchanged: (1) Number of contact. (2) Your call. (3) Check (report given, RST). (4) Your location. (5) Time. (6) Date. *Example:* NR 1 VE1KS 589 Sackville NB 10:12 PM April 29. Each preamble sent will count one point. Each preamble received will count one point. It is not necessary for preambles to be exchanged both ways before a contact may count, but one must be sent or received before credit is claimed. Mark each new section as it is worked. W stations multiply the final score by 8, there being approximately eight times as many U.S.A. sections. VE stations multiply by the number of U.S.A. ARRL sections worked. *Power Multipliers (final score):* Under 30 watts, multiply by 2; between 30 and 100 watts, multiply by 1.5. *Operator handicap:* If more than one operator participates at one station, the total score must be divided by the number of operators participating.

**Awards:** A Certificate of Merit will be awarded to the leader in each of the ARRL sections.

**Reporting:** The following certification is requested with each log submitted: "I hereby state that in this contest I have not operated my transmitter outside the frequency bands as specified by government regulation, and also that the log as submitted is correct and true." Logs must be received at Canadian Amateur Radio Operators' Association, 46 St. George St., Toronto, Ont., Canada, not later than May 31, 1949.

## Strays

WWVH, recently established by the National Bureau of Standards on the island of Maui, Territory of Hawaii, is now broadcasting continuously, on an experimental basis, standard radio frequencies, time announcements, standard time intervals, and standard musical pitch. Planned to serve the Pacific area, frequencies of 5, 10 and 15 megacycles are used, with the program of broadcasts on these three frequencies essentially the same as that of WWV (page 57, January *QST*).



**A**PRIL, 1924, *QST* confidently predicts imminent two-way communication between amateurs in the Antipodes and North America, now that Australian 3BD has been heard by two Californians, Frank Creswell of Los Angeles and Y. Ito of Moneta. A genuine Australian boomerang, suitably engraved, is offered by Traffic Manager Schnell to the first United States or Canadian amateur to turn the trick. Other DX fronts are also opening as the winter season closes, Denmark, Luxembourg and the Philippines entering the active column.

A wealth of sound, down-to-earth technical material is packed into this month's pages. Receiver-wise, the lead article by M. B. Sleeper describes a simple nonoscillating radio-frequency amplifier circuit. On the same topic, William W. Harper considers the question "Should Regeneration Be Eliminated?" and finds himself in accord with Mr. Sleeper's views. Transmitter-wise, Maurice G. Goldberg, 9ZG, delves into the design of loose-antenna couplers for lessening QRM to other local amateurs, Coast Guardsman C. P. Sweeney, 5KM, expounds on phase multipliers and mercury-arc rectifiers, Technical Editor Kruse discusses wavemeter calibration and mast building, and A. W. Parkes, 3YO, clarifies basic transmitter-circuit terminology.

This issue is leavened by former Midwest Division Manager George S. Turner's recounting of "My Biggest Thrill" — participation in the record-breaking 6½-minute California-to-Conn.-and-back relay of 1921. Further interesting reading is F. D. Fallain's (8ZH-SAND) early history of the Royal Order of the Wouff Hong.

Presented as typical stations of the times, we have picture-word introductions to Nathaniel Bishop's 1AJP, Bridgeport, Conn., Richard K. (Ken) Rohan's 9EKY, St. Louis, and 2AGB, Summit, N. J., the latter operated by D. A. Griffin, Wallace Lander, John Tiffany and John Dodman. Representative of 1924 British stations, we have Frederick L. Hogg's 2SH, London.

*Gleanings:* A District of Columbia newspaperman and well-known *QST* contributor, A. L. Budlong, has joined the ARRL staff to supervise League newspaper publicity. . . . At press time the Board of Direction has announced award of the 1923 Hoover Cup to Don C. Wallace, 9ZT, of Minneapolis, Minn.

## SWITCH TO SAFETY!



# Some Ideas for Low-Frequency Antennas

## Grounded Folded Dipoles

BY JAMES W. HUNT,\* W5TG

ONE of the simplest and most effective antenna systems I have seen in years is the folded dipole. Its advantages are well known: (1) it is broad enough to permit swinging from one end of a band to the other with little change in amplifier loading, (2) because it is broad its dimensions are not critical, and (3) it is efficient and can be placed in operation almost anywhere.

I am sure that many fellows fall into my category as a ham — too much antenna ambition and too little room for such ambition. I would like to put up a few rhombics, because I know they are good and not only get rid of the signal nicely but they literally reach out and snag the weak ones on receiving. However, I haven't room to put up even a half wavelength on 75 meters. I am also flanked on two sides by a multitude of open telephone and power lines. The telephone lines are right behind my shack.

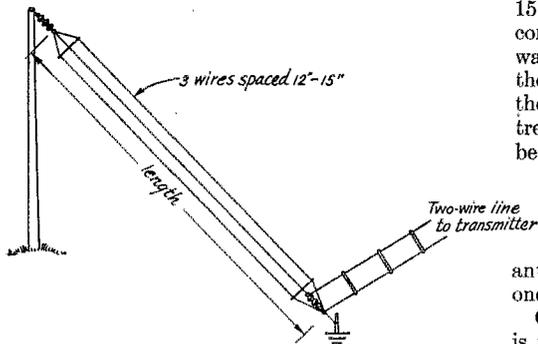


Fig. 1 — A three-wire quarter-wavelength folded dipole can be fed with open-wire line and requires less space than the usual half-wavelength antenna. The length is not too critical — W5TG has used 60 feet on 80 meters, 68 feet for 75 and 20 meters, 31 and 93 feet for 40 meters, and 16 and 46 feet for 20 meters.

I looked for a solution in the *Handbook* but didn't find anything that would fit my particular case. I remembered the old quarter-wave antenna working against ground, fed with twisted pair, that worked fairly well. I wondered about the folded dipole and if maybe it would work as a quarter-wave affair against ground. To my satisfaction, it seemed to work fine. I tried one on 7 Mc. and compared it with a half-wave flat top

• While the emphasis these days seems to be on high-frequency antennas, our low-frequency bands still have plenty of customers, and these faithful followers still have to use antennas. Here are a few ideas that might be of use to you the next time you revise your sky wire or if you lack adequate space for a conventional antenna.

and couldn't find a bit of difference in signal reports. Both three- and four-wire types have been tried, using 600-ohm feedline, and they are both fine antennas. The three-wire job is easier to build, however, so I will discuss only that type.

On 75 meters I have tried several lengths and numbers of conductors. We installed one down at W5AHK in Wharton, Texas. This three-wire unit on 75 is 67½ feet long, with the wires separated 15 inches, on wooden spacers. The bottom end is connected to a water hydrant, and the far end was raised to the top of a 50-foot pole right near the hydrant. A small rope, tied to a spreader near the bottom of the antenna, was run to a near-by tree and removes the slack in the antenna. It will be noticed that the antenna length is some 7 feet longer than is necessary for 75 'phone, but the antenna works fine on 75 and 20 meters. A 600-ohm feedline is used, and it connects to the hydrant and to the center wire of the antenna. Excellent results are obtained, as anyone who works W5AHK can vouch for.

On 40 meters a three-wire vertical 30 feet high is in use. Metal tubing about 1½ inches in diameter, obtained from a local metal goods dealer in 12-foot lengths, was used as the center conductor. The bottom section was fastened on insulators to the side of the garage. A small two-foot spreader was fastened at the top of the 30-foot mast of tubing. A piece of No. 00 wire was fastened to each end of this spreader and dropped straight down and fastened to an earth ground. The 600-ohm line is connected to the ground connection and to a 1-foot wire leading up to the bottom of the tubing. The feedline runs away at right angles to the antenna for only about 2 feet from one of the outside wires, then up parallel to the antenna for about 8 feet and then away under the eaves to the ham shack. Results are far in excess of expectations, and S9 reports seem to be the rule.

\* P.O. Box 7337, Houston 8, Texas.

On 20 meters I have used both a vertical 15-foot three-wire antenna and a semivertical 46-foot  $\frac{3}{4}$ -wavelength antenna of three wires. The latter is much better, probably because of its greater length and height. It is built like the 7-Mc. one, but it need not be exactly vertical. Mine runs straight up for 15 feet and then swings off to the top of the 40-meter antenna to make up the extra length. Here again the results have been excellent, with reports in the S7 to S9 range and no repeats requested.

Apparently any kind of ground can be used, but the better the ground system the better the performance of the antennas. I have used the metal framework in a building as the ground for a 75-meter antenna. A metal stake, driven into the earth at the base of the 20-meter antenna, with a wire running from it to a water pipe on the other side of the garage, is used for the 14-Mc. system. A water pipe serves for grounding the 40-meter antenna. You can see that almost any kind of ground can be used!

I like the 600-ohm line because it is simple and the losses are low, even in wet weather. All kinds of spacers can be used. I find that "Toni" plastic hair curlers make excellent spacers. By using Duco cement with them, the wire doesn't even have to be tied. I just stretch the wire between two trees or posts, place the spacers every two feet or so, then squirt some cement on the end of each spacer. When the cement dries, you have a simple but effective feedline.

One-foot spacing has been used on all the antennas except the 75-meter one, where the spacing was increased to 15 inches. I have varied the spacing in both directions and found very little difference in the matching requirements, but the signal reports seem to average a little higher with the greater spacing.

### A Really Compact Vertical

One other antenna system that has been used on 75 with good results is only 17 feet high. As shown in Fig. 2, it is a version of the folded dipole, with each conductor loaded. The top of each conductor was a 12-foot length of aluminum

tubing mounted at the end of a 5-foot  $1\frac{1}{4}$ -inch diameter ash pole. A coil of 30 turns of No. 11 d.c.c. wire was wound on the wooden pole below the end of the aluminum tubing, one lead from the coil going to the tubing and the other running in feed-through insulators into the shack and down the wall to the transmitter. The pole and coil were sprayed with Glyptal to protect them from the weather, and the two poles were

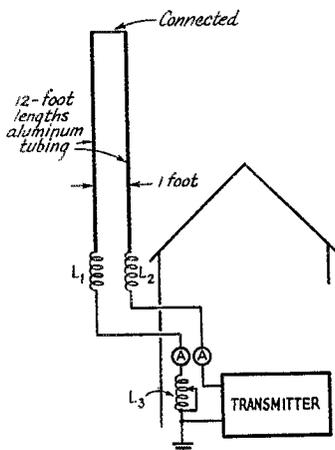


Fig. 2—This small antenna has worked well at W5TIG. The inductance  $L_3$  is adjusted for equal current in the two lines.  $L_1$  and  $L_2$  are each 30 turns of No. 11 d.c.c. on  $1\frac{1}{4}$ -inch diameter wooden supports for the aluminum tubes.

mounted a foot apart on the side of a metal Quonset hut, with only the tubing extending above the roof of the hut.

The loading coil at the ground connection is used to tune the system. It is varied until the currents in the two conductors are equal. When the currents in the two lines are matched, the system takes power nicely and the received signals come up. The results obtained with this antenna compare favorably with those from a much larger system, and many good reports have been received with only 75 watts to the transmitter.

## A Vertical Antenna for 75 Meters

BY STUART L. DUNKLE,\* W7BHN

A RECENT move to a new subdivision introduced the old problem of where to put the antenna. No supports were available without conflict with other interests, and so it was decided to try a vertical radiator for 75 'phone. It was expected that the maximum range might be about 1000 miles, but numerous QSOs in past months have proved this estimate to be too pessimistic.

The East Coast has been worked, and reports in the Rocky Mountain and Pacific Coast areas average S8.

A 50-foot pole was purchased from the power company for \$28.50. The cost of hauling and setting the pole totaled \$17.50. Iron steps were placed in the pole before it was raised. Nine stand-off insulators are mounted on the pole, spaced 5 feet apart up the pole. Clips for holding

\*1983 Redondo Avenue, Salt Lake City, Utah.

$\frac{3}{8}$ -inch diameter fuses were fastened to the insulators, and the  $\frac{3}{8}$ -inch diameter tubing used for the conductor was snapped in place in these clips. The tubing (duraluminum) was bought in 10-foot lengths in a surplus store, at a cost of 60 cents per length. Electrical connection between the four lengths of duraluminum was made by sweating in 4-inch lengths of aluminum tubing

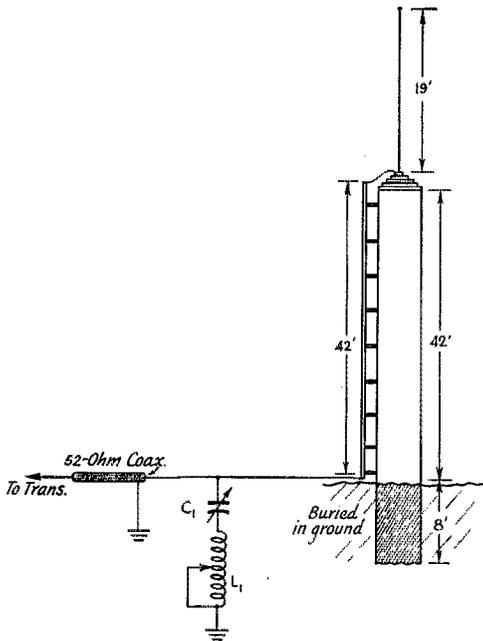


Fig. 1 — The 75-meter vertical antenna at W7BHN uses duraluminum tubing supported by a pole plus a 19-foot whip antenna. The coil and condenser help to tune the antenna, to provide a better match for the line. C<sub>1</sub> — 100- $\mu$ fd. variable. L<sub>1</sub> — 28 turns No. 10 wire,  $\frac{3}{8}$ -inch diameter.

that could be forced into the dural. The above-ground height of the pole is 42 feet. On the top of the pole the antenna was extended by mounting a 19-foot surplus whip antenna (five sections), to bring the total length of the antenna to 61 feet.

The antenna is fed at the base through 52-ohm coaxial cable, and a series circuit tunes out the reactance introduced by the slightly-incorrect antenna length. To adjust the circuit, the final amplifier is tuned to resonance and then the condenser at the base of the pole is adjusted for maximum current in the antenna.

## A.R.R.L. QSL BUREAU

THE QSL Bureau system makes it easy for American and Canadian amateurs to get QSLs from foreign stations. You simply ask your DX contact to QSL via ARRL, then send a stamped, self-addressed stationer's size No. 10 envelope to your QSL manager, whose address is listed below. He does the rest. When you receive cards from him, you should immediately send another envelope to him so that he always has at least one envelope on file for you. If you work DX only occasionally and don't care about the cards anyhow (perish the thought!), send along your envelope just the same; it will help your QSL manager, who performs all the hard work of providing QSL service on a voluntary basis, to keep his files in good order.

If you've had a different call at any time, submit an envelope to the appropriate QSL manager; all incoming cards are routed by Hq. to the home district of the call shown in the address. The QSL files are loaded with thousands of un-called-for cards; maybe some of them are for you.

And please don't send cards for Ws or VEs to domestic managers. They are so busy with DX cards they simply don't have time to handle cards from Ws or VEs to other Ws or VEs, much as they would like to help you. Such cards should be sent direct to the amateurs involved.

- W1, K1 — Frederick W. Reynolds, W1JNX, 83 Needham St., Dedham, Mass.
- W2, K2 — Henry W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
- W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia, Pa.
- W4, K4 — Johnny Dortch, W4DDF, 1611 East Cahal Ave., Nashville, Tenn.
- W5, K5 — L. W. May, jr., W5AJG, 9428 Hobart St., Dallas 18, Texas.
- W6, K6 — Horace R. Greer, W6TI, 414 Fairmount Ave., Oakland, Calif.
- W7, K7 — Frank E. Pratt, W7DXZ, 5023 S. Ferry St., Tacoma, Wash.
- W8, K8 — William B. Davis, W8JNF, 4228 W. 217th St., Cleveland 16, Ohio.
- W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wis.
- W0, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.
- VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
- VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
- VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
- VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Manitoba.
- VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
- VE6 — W. R. Savage, VE6EO, 329 15th St., North, Lethbridge, Alta.
- VE7 — H. R. Hough, VE7HR, 1785 Emerson St., Victoria, B. C.
- VE8 — Jack Spall, VE8AS, P. O. Box 268, Whitehorse, Y. T.
- KP4 — E. W. Mayer, KP4KD, P. O. Box 1061, San Juan, P. R.
- KZ5 — C.Z.A.R.A., Box 407, Balboa, Canal Zone.
- KH6 — Andy H. Fuchikami, KH6BA, 2543 Namaau Dr., Honolulu, T. H.
- KL7 — J. W. McKinley, KL7CK, Box 1533, Juneau, Alaska.

SWITCH  
TO SAFETY!



## • Surplus Corner —

### Adapting the SCR-274N Series Transmitters for 14 Mc.

WITHOUT doubt, one of the most popular items on the surplus market is the low-power SCR-274N or AN/ARC-5 series of transmitters. Literally hundreds of these compact little rigs are operating on the 3.5- and 7-Mc. bands.

The writer purchased two of the units for conversion to 80- and 40-meter operation and these transmitters performed so well that a series of attempts was made to get one of the units to work on 14 Mc. This was not as simple as it would seem. Drift, keying chirps and instability which had not appeared on fundamental operation showed up, and the note varied from T4 to T9! After a lot of rebuilding and strong language the following points were established with regard to 14-Mc. operation:

1) To obtain enough drive for Class C operation of the 1625 final amplifiers, the oscillator stage must be run at an input level that will result in excessive heat drift.

2) If the 1625s are operated as amplifiers on 14 Mc. they must be neutralized. If they are operated as parallel doublers, the efficiency of the stage suffers.

3) There is insufficient isolation between the oscillator stage and the output stage. If the 1625s are keyed a bad chirp will appear on the signal because of the varying load on the oscillator. If the oscillator is keyed, it is impossible to get away from key clicks and still have a good clean note.

About this stage of the game, I began to have my doubts as to whether the little rig would ever be a good 14-Mc. transmitter/exciter. Obviously something was lacking, electrically speaking. However, if an additional isolating stage could be added to the existing transmitter between the oscillator and the keyed 1625 stage the whole problem might be solved. The oscillator could be run at a comfortably low input level and be perfectly isolated from the output stage.

This was a tricky little problem and two 274Ns hit the dust before the satisfactory unit was found! I hope, in this article, to guide the interested reader around some of the many pitfalls that I encountered in this "war-surplus conversion."

The electrical design of the 274N is obviously unsuited for 14-Mc. operation, but, on the other hand, the construction of the 274N units is above anything that the average ham can equal. In addition, it has a directly-calibrated dial. In other words, it is a good basic design to modify for general ham use. If we can keep the excellent

mechanical features and modify the circuit to eliminate the above-mentioned difficulties we should have an excellent low-power transmitter.

For 7- and 14-Mc. output, a low-frequency unit, such as the BC-457A (4-5.3 Mc.) or the BC-696A (3-4 Mc.) should be used. The BC-457A unit is the least expensive and the dial calibration may be used for 14 Mc., as described below. However, either unit will work.

In order to achieve the desired driftless, chirpless signal, the following modifications to the unit are made:

1) A 6L5G low filament-current triode is used as an oscillator. The oscillator circuit is padded down to 3.5 Mc. by means of additional zero-drift condensers.

2) A 6AG7 is added as a 7-Mc. doubler/crystal oscillator.

3) One of the 1625s is removed, and the remaining one is used as a 7-Mc. amplifier or as a doubler to 14 Mc.

4) The unit is rewired for 12-volt filament operation. Since 1625 tubes can be bought for about two bits and a 12-volt filament transformer for a buck, it pays to use the 1625 instead of an 807. In addition, it saves some nasty socket substitution along the way!

5) Some plates are removed from the oscillator and amplifier condensers to allow better spread of the 14-Mc. band on the dial. Now if we are foxy, and take out just the right number of plates, the dial calibration may be used directly on 14 Mc. (e.g., 4.0 on the dial is 14-Mc., 4.1 is 14.1 Mc., and so on).

These modifications entail a certain amount of labor but it will take only a few evenings, and the results are well worth the effort. When the job is finished you will have a 25-watt VFO/transmitter that will be hard to beat. It will have chirpless keying and practically *no* drift. (My modified unit has a measured warm-up drift of 400 cycles and a transmission drift of about 30 cycles on 14 Mc.) Interested? Well, then, hook up the soldering iron and let's go!

The first step is to remove all the unused components and wiring from the unit and to "strip it for action." The following should be removed:

From the top of the BC-457A: the antenna relay, antenna loading coil, brackets and sliding arm, and antenna binding post. Take off the celluloid window and drill out the two little support pins. Also remove the frequency chart in the top right corner of the front panel. Oh, yes, you can toss the 1626 and 1629 away, too. Finally,

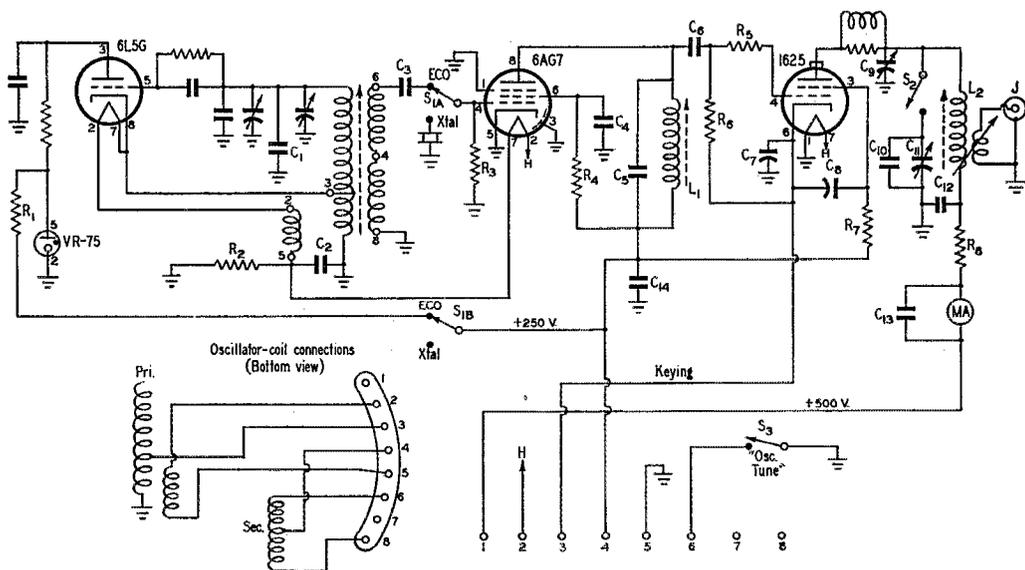


Fig. 1 — Schematic diagram of the SCR-274N transmitter revamped for 7- and 11-Mc. operation. All parts not listed below are in the original unit, and are not changed.

- C<sub>1</sub>, C<sub>5</sub>, C<sub>6</sub> — 100- $\mu$ fd. zero-drift ceramic.  
 C<sub>2</sub> — 0.0047- $\mu$ fd. 600-volt mica.  
 C<sub>3</sub> — 100- $\mu$ fd. 600-volt mica.  
 C<sub>4</sub> — 0.0022- $\mu$ fd. 600-volt mica.  
 C<sub>7</sub>, C<sub>8</sub> — 0.02- $\mu$ fd. 600-volt paper.  
 C<sub>9</sub> — 25- $\mu$ fd. midget variable, double-spaced.  
 C<sub>10</sub> — 150- $\mu$ fd. zero-drift ceramic.  
 C<sub>11</sub> — 50- $\mu$ fd. midget variable, double-spaced.  
 C<sub>12</sub>, C<sub>14</sub> — 0.01- $\mu$ fd. 600-volt mica.  
 C<sub>13</sub> — 0.006- $\mu$ fd. 600-volt mica.  
 R<sub>1</sub> — 10,000 ohms, 10 watts.  
 R<sub>2</sub> — 12.6 ohms, 5 watts.

- R<sub>3</sub> — 0.1 megohm,  $\frac{1}{2}$  watt.  
 R<sub>4</sub> — 10,000 ohms, 1 watt.  
 R<sub>5</sub>, R<sub>8</sub> — 47 ohms,  $\frac{1}{2}$  watt.  
 R<sub>6</sub> — 33,000 ohms, 1 watt.  
 R<sub>7</sub> — 33 ohms,  $\frac{1}{2}$  watt.  
 L<sub>1</sub> — Permeability-tuned coil, National XR-50 form, 18 turns No. 22 enam. wire.  
 L<sub>2</sub> — See text.  
 J — Coaxial connector, Amphenol SO-239.  
 MA — 0-100 ma. d.c. meter, 2  $\frac{1}{2}$ -inch diam.  
 S<sub>1</sub> — D.p.d.t. rotary switch.  
 S<sub>2</sub> — S.p.s.t. ceramic rotary switch.

clip out the plate lead of the *left-hand* 1625 (looking at the unit from the front). Also remove the free parasitic choke from the coil form.

From the bottom of the BC-457A: If you have gone this far you had better continue, 'cause the transmitter is no good now! Turn it over and from the bottom take out the cathode relay and associated resistor, the plate choke between the two 1625 sockets, the 1625 screen by-pass condenser, the neutralizing condenser, the variable padding condenser for the 1625 plate tank, resistor 7101 on the back of the chassis and its holder, and finally the crystal socket. Now clip out all the wiring from the 1625 sockets to the rear power plug.

This sounds like a major project, but all the above will take only ten minutes with a screwdriver and a pair of wire cutters.

#### Now We Operate, Doctor!

The last bit of major overhaul is to remove the 1625 socket. (Looking at the bottom of the chassis, it is the socket that was next to the cathode relay that you just removed.) This operation can best be done with a screwdriver and a light ham-

mer. Using the screwdriver as a chisel, tap around the turned edge of the socket on top of the chassis and the whole assembly will drop out. While you are about it, remove in the same fashion the power plug from the rear apron of the chassis and in its place put an Amphenol 88-8 octal socket.

Now, with a pair of long-nosed pliers, carefully flex one rotor plate at a time in the ganged oscillator tuning condenser until it can be lifted out. Remove seven plates this way. Be careful, or you might wrench the rotor out of the ball-bearing sockets. Be gentle but firm! It's easy once you get the hang of it! Now remove all but two plates in the ganged amplifier condenser. The circuits will now track roughly, and just need a little touching up for excellent tracking. More of that later.

That's all there is to it! Now comes the easy job — getting everything back together again.

#### Assembly

First of all, mount a plate over the 1625 socket hole and mount an octal socket for the 6AG7 on that plate. The 6AG7 slug-tuned plate coil is mounted in front of the socket. A vertical shield is placed one inch behind the front tuning gang

to support the crystal-oscillator switch and also to act as a shield between the output condenser and the 1625 grid components. Between the shield and the ganged condenser is placed the filament ballast resistor,  $R_2$ . A coaxial plug is mounted on the rear chassis wall next to the octal power plug. The 7-Mc. crystal socket is mounted against the shield next to the rotary "e.c.o./crystal" switch. An extension shaft is used to bring this switch out to the front panel. A tuning switch,  $S_3$  in Fig. 1, is mounted to the

nections to the oscillator coil. The under-chassis wiring should not take more than two hours. When all the wiring is checked, the top coil shield should be removed and  $C_1$ , the oscillator padding condenser, added to the circuit. It should be placed atop the variable condenser.

The 1625 plate coil should be rewound with eight and one-half turns, using the same wire that was removed, and spacing the wire every other groove on the coil form. The variable-link winding is attached via a short piece of RG-58/U coax to the fitting on the rear of the chassis.

All wires other than r.f. leads should be laced and firmly fixed in place to prevent any frequency change because of movement. All r.f. leads should be made of bare No. 18 wire.

### Testing the Unit

To test the unit, the 6L5G, 6AG7 and VR-75 tubes should be plugged in and a power supply such as shown in Fig. 2 connected. A potential of 12.6 volts should be applied to the filaments and the voltage on the 6L5G and 6AG7 measured. It should be 6.3 volts

on each tube. Now, the B-positive lead to the 6AG7 should be removed temporarily and we are ready to align the oscillator stage.

A receiver and a 100-kc. frequency standard are needed to adjust the oscillator. First of all, the oscillator padding condenser in the top coil can should be set so that the oscillator tunes to exactly 3500 kc. with the main tuning dial set at "4 Mc.," and the oscillator slug set about half-way into the coil. Now tune the receiver to 14 Mc. and listen to the fourth harmonic of the oscillator. It, of course, should fall at 14 Mc. Now tune the main dial of the ECO (we can call it an "ECO" now, you're almost finished!) to 4.4 Mc., and see if the fourth harmonic falls at 14.4 Mc. If not, a little plate bending in the oscillator condenser gang is in order. One of the rotor plates of this condenser is slotted and may be used to correct the calibration. If the dial is calibrated at 4 Mc. and if 4.4 Mc. on the dial falls short of 14.4 Mc. on the receiver, for example, say 14.38 Mc., then the variable condenser is tuning too slowly and the variable plate should be bent *in*. By bending this plate and rechecking the calibration, the 4- and 4.4-Mc. marks may be made to fall exactly on 14 and 14.4 Mc. When this is accomplished, the oscillator will be actually tuning from 3500 to 3600 kc. Now the dial will track within one or two kilocycles across the whole 14-Mc. band. For the 7-Mc. band, the dial read-

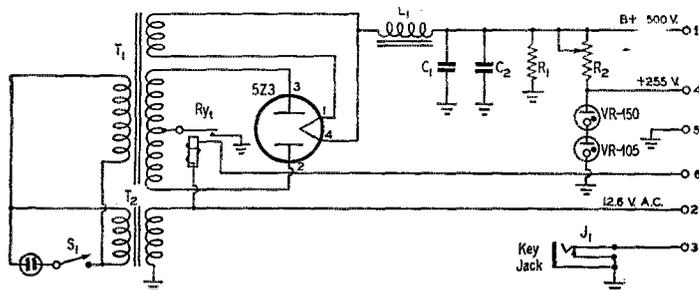


Fig. 2 — A suitable power pack for the rebuilt SCR-274-N transmitter.

- |  |   |
|--|---|
| $C_1, C_2$ — 8- $\mu$ fd. 600-volt oil-filled. | $R_{Y1}$ — 12-volt s.p.s.t. relay.              |
| $R_1$ — 0.1 megohm, 2 watts.                   | $S_1$ — S.p.s.t. toggle switch.                 |
| $R_2$ — 10,000 ohms, 50 watts, with slider.    | $T_1$ — 650-0-650 v. a.c., 150 ma., 5 v. 3 amp. |
| $L_1$ — 20-hy. 150-ma. filter choke.           | $T_2$ — 12.6-volt 2-amp. filament transformer.  |
| $J_1$ — Closed-circuit jack.                   |   |

right of the main tuning dial above the chassis. Finally the gaping hole left by the removal of the celluloid window is covered with a thin strip of dural. On this plate are mounted a 0-100 ma. d.c. meter and  $C_9$ , the amplifier trimming condenser.

### Bandswitching in the 1625 Stage

It is possible to pad the 14-Mc. plate tank of the 1625 so that the tube operates as an amplifier on 7 Mc. A ceramic switch,  $S_2$ , a ceramic padding condenser,  $C_{10}$ , and a small variable condenser,  $C_{11}$ , are all mounted on the top of the shield cover and a flexible lead is run from the switch to the top end of the 1625 plate coil. After the unit is tuned up on 14 Mc., the switch may be thrown and the variable padder adjusted to resonate the plate circuit to 7 Mc. with the same setting of the panel-controlled plate condenser. Thus a shift from 14 to 7 Mc. may be made by merely turning the switch. The 1625 stage remains stable without neutralization on 7 Mc. To determine the operating frequency, the dial readings will have to be divided by two. If 7-Mc. output is not desired, the above components may be omitted.

### Wiring

The unit is now ready for wiring. All the usual tried and true remarks about direct leads, good insulation and parts placement apply here. See the sketch at the bottom of Fig. 1 for the con-

ings may be divided by two. Above 14.4 Mc., the calibration gets progressively worse, so if this unit is used for 28 Mc., and better tracking is desired, more time will have to be spent with the oscillator condenser. Believe me, it is an easy job, and the trouble is well worth the satisfaction of having a directly-calibrated dial.

#### Buffer and Final-Amplifier Alignment

Regulated plate voltage should be applied to the 6AG7 buffer and the "e.c.o./xtal" switch set to the e.c.o. position. The plate-coil slug should be tuned for resonance at approximately 7 Mc. When the "e.c.o./xtal" switch is thrown to *xtal* the plate slug may be adjusted slightly to allow the crystal to oscillate easily.

Nothing need be done to the amplifier ganged condenser. This stage tunes broadly so that no adjustment need be made to make it track after the necessary number of plates is removed from the condenser.

The 1625 should be plugged in its socket and the plate-tuning slug of the 1625 should be adjusted to resonate the coil to 14 Mc. with the amplifier trimmer,  $C_3$ , set at midcapacity. The plate current should dip to about 15 ma. when the 1625 is correctly tuned to 14 Mc. The ceramic plate switch should now be thrown to the 7-Mc. position, and the auxiliary padder set for resonance on this band. Now, you are all set and ready to go!

The ECO unit will track across the 7- and 14-Mc. bands without any adjustment. The amplifier trimmer,  $C_3$ , need only be set to compensate for reactive loads on the 1625 plate circuit and then may be ignored. The unit will deliver 25 watts on both bands with crystal stability and excellent keying characteristics.

So there it is, a good-VFO for a few dollars and a few hours' work. Not bad, eh?—William I. Orr, W6SAI

## Re "Harmonic Suppression in Class C Amplifiers"

**I**N response to questions from a number of amateurs after the appearance of the article under the above title in February *QST*, the author, Frederick Q. Gemmill, W2VLQ, has supplied the following description of the method of adjusting the plate traps to obtain the data given in the article:

"The wavetraps were tuned to the frequencies specified while installed in the plate leads. The grid-dip meter was set at the specified frequency, coupled loosely to the trap coil ( $L_p$ , Fig. 1 herewith) and the trap tuning capacity,  $C_p$ , adjusted for the resonance dip. I would estimate the accuracy of frequency setting as about  $\pm 1$

per cent, although the pulling effect of the high- $Q$  traps may have produced greater error. It is now clear that this method of tuning the traps is not the most effective for harmonic suppression. The resonance frequency of the wavetraps as adjusted by this procedure in reality is not that of the trap alone, but is determined by the trap inductance  $L_p$  and the trap capacity  $C_p$  in parallel with the plate-lead inductance,  $L$ , tuning capacity,  $C$ , and tube output capacity,  $C_t$ , in series.

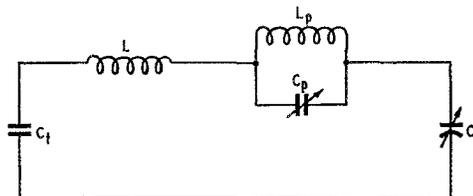


Fig. 1 — Equivalent of the amplifier output circuit with harmonic trap.

- $C$  — Plate-tank tuning capacitance.
- $C_p$  — Trap condenser.
- $C_t$  — Tube output capacitance.
- $L$  — Inductance of plate lead (and cathode return).
- $L_p$  — Trap coil.

"However, the results obtained (Table IV, p. 30, February *QST*) can be explained. At the trap resonant frequency, adjusted as explained above, the harmonic current circulating around  $L_p$  and  $C_p$ , in parallel with the series circuit composed of  $L$ ,  $C_t$  and  $C$ , will be increased over its value in the absence of the trap by the  $Q$  factor of the trap circuit. Since the total capacity tuning  $L_p$  to resonance acts as two capacitors in parallel, the current through the two parallel capacitors will divide in proportion to their individual capacitances divided by their sum. Thus, the harmonic current flowing through the tuning capacitor  $C$  can be increased many times even though the tube output capacity represents only a minor fraction of the total capacity to resonate  $L_p$  to a given harmonic.

"This thesis can be supported by comparing the data of Table III (February *QST*) with Table IV. With two plate-lead traps tuned to 42 Mc. as outlined above, the 42-Mc. output is 14 times that with no plate-lead traps; with 56-Mc. traps the 56-Mc. output is 43 times that with no plate-lead traps; with 70-Mc. traps the 70-Mc. output is 32 times that with no plate-lead traps. At 42 Mc.  $C_p$  was about 33  $\mu\text{fd.}$ ; at 56 Mc.  $C_p$  was about 20  $\mu\text{fd.}$ ; while at 70 Mc.  $C_p$  was about 8  $\mu\text{fd.}$  The tube output capacity was about 3  $\mu\text{fd.}$  Hence, I would expect this ratio of harmonic output to increase with frequency. This is generally supported by the data, within experimental error.

"In order to check this thesis further, the following data were taken using the grid-dip meter

(Continued on page 94)

# DEEP FREEZE

## *A Review of the Public Service Rendered by Amateurs During the Most Extensive Blizzard in History*

BY ALBERT E. HAYES, JR.,\* W1IIN

**I**N retrospect, the Weather Bureau tells us that it began with the first snows on November 18, 1948, but it did not become apparent to us that we were in the grip of one of the worst storms in history until the first few days of January. The blizzard itself, which ravaged the Midwest and Inter-Mountain areas, the attendant tornado which destroyed much of Warren, Arkansas, the disastrous floods in the New England States and the Hudson River Valley, and the damaging ice storms in Arkansas and the Texas-New Mexico area provided the backdrop for the greatest demonstration of the ability of the radio amateur to assist in the alleviation of human suffering and the saving of both life and property.

It is believed that at least half the active amateur licensees in the United States and Canada

\* National Emergency Coördinator, ARRL.

felt the touch of King Winter as they operated their stations — either in the handling of emergency traffic originating in their area, in the swift relay or delivery of traffic which originated in a faraway disaster zone, or in the conscious effort to avoid operations on channels being used for the handling of such traffic.

By the time this appears in print the Great Storm of 1948-1949 will have passed into the province of the historian, but the radio amateur — our most valuable public-service asset — can never forget. Here, then, are a few paragraphs intended to convey an idea of the intensity and scope of this effort. We can never hope to credit adequately all those who spent countless hours at their keys or microphones that their fellowmen might again see the first leaflets of Spring.

### *Iowa*

The Iowa 75 'Phone Net picked up the ball several times during December and January when the Great Freeze hit their area, and as its custom, performed admirably. Things were at their highest on January 23rd and 24th when the ice storm took out most of the Milwaukee Railroad's wire circuits in western Iowa and the hams were called upon to assist in keeping the trains running. The area involved was so great, and the number of amateurs participating was so large, that an accurate analysis of their work is almost impossible. Let it be pointed out, however, that W0BGB of Sioux City has been cited by SCM Davis as having done work worthy of special mention. He was not a member of any of the organized traffic groups, but gave his all for several days without thought of food or sleep. When several trains became "misplaced" near Algona, it was W0PUE of Mason City who was directly responsible for their location.

Reports of the participation of Iowa amateurs in this affair have been sparse, mainly because the gang there is beginning to regard emergency work as something to be taken in stride quietly, and without fanfare. We have, however, obtained a partial list of those who assisted, and here, acknowledgedly incomplete, are their calls: W0s AAL, ACC, AEH, AEQ, AWF, AYC, BGB, CHI, CPU, DOP, DXF, EDN, EFI, ELH, FBK, FKB, FP, FSI, GHZ, IYB, KAA, KAH, KLC, KSS, LFH, LJJ, LRY, MCK,

### **Federal Communications Commission Washington 25, D.C.**

January 15, 1949

*Communications Manager, ARRL:*

The Amateur Service and the radio amateurs of the United States are to be congratulated on the excellent service they have rendered in the public interest in the several communications emergencies that occurred during the past few months. It is gratifying to the Commission to note that on only one occasion in over a year has it been necessary to declare a state of communications emergency and invoke Sec. 12.156 of the regulations.

Self-monitoring of the communications facilities set up by your own Emergency Corps is working more effectively in these emergencies and should be a source of pride to the groups concerned. Also, there should be a growing realization among amateurs that overcrowding and unsatisfactory communications on a particular segment of one band call for transfer of some of the activity to less-congested channels that are usually available at these times, since attempting to handle everything by one mode in a congested band is not in itself sufficient to warrant request for clearance of that one channel by official action in time of emergency. The Commission desires to give all assistance and encouragement to the worthy efforts of the Coördinators and leaders in advance amateur planning which contribute so much to organized radio communication work in times of emergency.

*George Turner,  
Assistant Chief Engineer*

MTS, NGM, NTB, NXW, NZ, PHR, PP, PUE, RV, SQF, SQQ, SVS, SWI, UFL, UHC, ULJ, UVJ, VHK, WCC, YBX.

### Arkansas

The tornado which detached itself from the southern edge of the blizzard which was roaring through the Southwest and hurled itself through Louisiana and Arkansas on the evening of January 3rd was as much a freak as the blizzard itself. Missing the Springhill-Cotton Valley area which was ravaged by a tornado almost a year previously, to the day, the tornado destroyed a large portion of the town of Warren, Arkansas. Although telephone service into Warren was never completely wiped out, the Western Union lines were put out of service and the telephone circuits were running from two to ten hours "behind." K5NRL, the Naval Reserve amateur station at Little Rock, rushed a mobile unit, K5NRL/5, into Warren, with W5EGX along to operate the rig. Although K5NRL/5 was in Warren for less than ten hours the traffic count run up — 477 — will provide an idea of how intensive the operation was. W5DVI, W5OWW, W5LQZ and W5NBR, all of Little Rock, assisted W5EGX in keeping K5NRL/JEEP on the air. The rapid restoration of normal communications and power circuits was attributable in no small measure to the work of the Arkansas amateurs.

The blizzard and ice didn't spare Arkansas, however, for more was yet to come. On January 25th all toll lines and power circuits into Harrison

were interrupted because of the fury of the weather, and W5LUX became the sole communications outlet for the town. Operating exclusively on battery power on 3695 kc., W5LUX and members of the Ozark Net, including W5MRD, W5ASO, W5MED, K5NRL (with W5EGX operating), W5IGM, W5ICS, K5NRN, W5HPL, W5GWT, W5EA, W5SNW, W5QI, W5WY and W4BAQ, handled over 484 messages between the original alarm at 8:30 P.M. on the 25th and the official shutdown of the net at 9 A.M. on the 30th.

W5FIV, W5OCY, W5OXR and W5OXU are among the local hams who did so much to keep Harrison "in touch" through W5LUX.

### Kansas

W0EQD, of Parsons, did not realize that his community was out of touch with the outside world — of course his power had failed and it took a couple of hours to get running on emergency power, but power failures are nothing new in ham radio. It was when he checked into the Kansas Phone Net, and found that Wichita had traffic for the Parsons telephone company, and that Lawrence was ready with power-company traffic, that it dawned on him that things were really serious. As soon as the Parsons officials found that W0EQD was on the air traffic going both ways flew thick and fast, and EQD kept at it for over 48 hours as his town's only working communications facility. With the able assistance of other members of the net, including W0VBQ, W0BVU, W1RNL, W0NXJ, W0ZDQ and W5DRE, all traffic was successfully handled. Just as W0EQD was signing out of the net, telephone lines having been restored, he was stricken with acute appendicitis and was rushed to the Parsons hospital. Report has it that the operation on W0EQD was as successful as the on-the-air operation, and that he is now fully recovered. Great work, Maynard!

### South Dakota

Things began on the morning of January 3rd in South Dakota, when KOTA, Rapid City's broadcaster, let loose with the first hint that the impending storm was to be of record-breaking proportions. Unfortunately many ranchers, traveling people and others failed to hear the broadcast warnings and were totally unprepared for what was to come. It started coming down on the 3rd, and continued until about noon on the 5th. The actual snowfall was not of record-breaking proportions, but high winds, sometimes in gusts of 65 to 70 miles per hour, piled the snow into mountainous drifts, oftentimes 30 to 50 feet deep. While the snow was coming down W0ADJ in Rapid City and W0CZQ at the Air Force base near that city arranged traffic circuits with the 15th Air Force base at Colorado Springs, Colo. — "just in case." Likewise, W0BLK and



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W0GLA lined up the South Dakota nets to prepare for the trouble which was to come.

When the storm had abated, as in the rest of the Midwest, search planes took to the air, and ham radio played a big part in coördinating the activities of the search planes with the several civil and relief agencies which had to be kept informed of their findings. On 29 Mc. W0s JLS, CZQ, GLA, YKY, RPA, IWE, YOB, QHX and SUJ maintained a link between Halley Field and the local CAA headquarters.

### *New Mexico*

Hobbs, New Mexico, awoke on January 12th to find the coating of sleet on car tops, tree branches and power wires as much as one and one half inches thick, and telephone service virtually nonexistent. W5JYW got on the air at the KWEW transmitter building, on emergency power, and immediately made contact with SEC W5ZU and W5BQE on the NM Net frequency, 3705 kc. The first two messages out of Hobbs were orders for emergency repair equipment for the New Mexico Electric Service Co., addressed to firms in El Paso and Lubbock, Texas. By means of amateur radio the power company obtained badly-needed equipment and was able to restore electric service in Hobbs fully three days to a week earlier than would have been the case had not the hams been ready. The daytime NMN frequency, 7266 kc., and the night frequency, 3705, hummed with traffic between Hobbs and W5ZU, W5ZM, W5OCK and W5BQE. In addition W5MKZ, W5HWH, W0IPJ, W5ZG and W5NXE handled emergency traffic for many agencies including the press wire services. Other stations in Hobbs who helped maintain the outside link were W5LI/5 and W5ISW.

### *New England*

The members of the Western Massachusetts Net (3670 kc.) were alerted by RM W1BVR on the afternoon of December 31st, when it became apparent that the preceding several days of unseasonably warm weather would spawn high waters throughout the Connecticut River Valley. W1s AMI, IHI, JE and LTA in Worcester, W1BKG and W1JGY in Pittsfield, W1HNE in Dalton, W1JAH in Adams, W1JXE in Gardner, W1LLN in Templeton, W1MIV in West Brookfield, W1NY in Wilbraham, and W1BVR in Westfield handled emergency traffic coming out of Adams where W1JAH was providing the sole outside message service for the community. W1JAH and W1HI, with the assistance of W1KCT in Dedham, provided a traffic circuit between Adams and Boston when the Massachusetts National Guard found itself cut off from its Adams installation.

In Hartford, Emergency Coördinator W1LKF

was asked to provide intercom service between survey crews in and around Hartford County, as well as to provide communications between Flood Control Headquarters and the East Hartford Dike, which appeared to be threatened. W1s NEM, EMF, KHM, KZA, DAV, RFG, PTS, LGB, KXM, OFU, OON, REU, QUJ, QBH, ABU, CGD, CR, RFH and PHG contributed actively to the success of these operations. Fortunately the dike held and the gang relaxed after over 48 hours of continuous operation.

### *Oklahoma*

January 11th was "M-Day" for the Oklahoma gang, when one of the greatest blizzards in the history of the state had spent its fury. The Oklahoma Emergency 'Phone Net and the Oklahoma C.W. Traffic Net (OLZ) provided message service for railroads, pipe-line companies and public utilities when normal communications facilities were wiped out throughout a large portion of the state. The following stations have been reported to have been active during this operation: AAJ, ADB, ADC, APG, AQE, AST, ATJ, BFJ, BIE, BLW, CUH, DRE, DUF, EAK, EGR, EIH, PFU, FMB, FMF, FRB, GJP, GOL, GVV, GZK, GZM, GZU, HFW, HGC, HKH, HXC, HXG, HXI, HXM, HZD, IGO, II, IOW, ITF, JHA, JKQ, JKS, JML, KDH, LHP, LHU, LHY, MBV, MGH, MGZ, MHS, MJU, MMH, MOH, NDJ, NMM, NSD, OOV, OWV, PA, PAA, WQ, YJ, K5NRJ.

### *Texas*

It was in Texas, the largest of the 48 states, that communications circuits were most seriously disrupted by the weather. The many pipe-line companies that operate in north, central and west Texas generally rely on their own private telegraph and telephone lines to handle their dispatching problems, but they, and the commercial communications and power companies, soon found themselves without wire lines when the two-inch-thick coating of ice snapped thousands of circuits during January. Odessa, Texas, for example, was completely cut off from the outside world in spite of its normal position as an important wire-line junction point. But the hams of Odessa were ready. W5GUD, operated in part by ARRL Director W5NW, on 3.5- and 7-Mc. c.w. channels, together with W5LHW on 3.85-Mc. 'phone and W5s LKL, EJS and NBY on 3.5- and 7-Mc. c.w., maintained the circuits through Odessa for over 5 days and nights. Over 790 messages were handled by W5NW and W5GUD during this period. Amateurs outside the iced area who helped the Odessa gang included W5s ADZ, HBD and KTX.

A railroad snarl-up between Baird and Abilene was giving the T & P railroad no end of trouble until W5AWT moved to Baird with a ham rig

and W5DVQ handled the Abilene end. Because of skip conditions W5ECE acted as QNB for the many hours necessary to clear up the railroad traffic jam.

The following, by no means a complete list of all those Southwest amateurs who served Texas during their time of travail, is presented as an indication of the scope of the operation. These fellows have proved that they can be depended upon in a pinch: AAO, AHK, AJG, AKM, APW, ARK, AST, ATQ, AVG, AW, AWT, BBH, BFA, BJ, BKD, BKH, BLU, BLW, BNO, BNQ, CC, CDU, CEO, CJJ, DAS, DN, DSV, DVQ, ECE, EJS, EVI, EZP, FDI, FFX, FLA, FOY, FZB, GG, GGR, GSZ, GTJ, GUD, GYW, GVK, GZH, HB, HBE, HGC, HXI, ICB, IHG, III, IRZ, IZN, JDZ, JKM, JKY, JQH, JQU, JSP, KA, KOW, KRZ, KUJ, KVV, LCB, LGY, LHW, LOS, LTP, LUD, LUP, LWZ, LXE, MAW, MIJ, MQH, NII, NUJ, PA, PCC, PCO, PO, TW, WB, WV, ZU.

### Missouri

Missouri, the hardest hit of the "ice-bowl" states, was probably the scene of the finest demonstration of the ability of amateur radio to handle record traffic. The following is excerpted from a report by P. J. Brumback, manager of Western Union's Columbia office, addressed to his district superintendent. The report was framed by WØFRG, a Western Union employee.

Upon losing all wires at 8:30 p.m. January 10th due to an ice storm, I called WØROB on the telephone, asking him to handle a rush government Weather Bureau message and wire messages to our (WU) wire chiefs at Kansas City and St. Louis. He handled the weather message through WØUID, Kansas City, who telephoned it to the addressee five minutes after it was filed with us. He also handled the message for the KC wire chief while WØIQY took the one to the St. Louis wire chief.

On January 11th I contacted WØQXO and he advised that he had anticipated our need and had arranged a schedule with W4PL, Chattanooga, and W4BAQ, Memphis. They were to take our traffic and telephone it to the Western Union offices in their cities. We started our most important traffic to them on 7 Mc., working from 9 a.m. to 9:30 p.m.

On January 12th WØQXO's power went off. We set up our club transmitter at WØROB's place of business where there was a.c. available, and, after making contact with WØGCT, Kansas City, and after handling two messages on 3.85-Mc. 'phone, this transmitter failed. There were no repair parts available, and no substitute transmitter was available that could be pressed into service. Just at that time power was restored at WØQXO and we proceeded to his station and resumed traffic with W4PL and W4BAQ. Several long press dispatches were also handled with WØNDS in Kansas City.

On January 13th we continued routing traffic to W4PL and W4BAQ. On the same day WØROB's power was restored at his home, which allowed him to push traffic on 3.85-Mc. 'phone with WØGCT and WØNAQ.

On January 14th we resumed transmissions to W4PL and W4MRD, Memphis, who took W4BAQ's place on the circuit. We worked through WØQXO in this manner until 2:30 p.m., at which time the first line gang entered Columbia with new circuits, and the amateur traffic was discontinued.

W4PL and W4BAQ deserve much praise for their efficient and fast-operating ability and their excellent handling of our file. They are first-class operators in every sense of the word, and were on hand at all times.

It should be pointed out that the operating load at WØQXO was shared between the chief operator himself and WØFRG, the latter doing the bulk of the operating.

The following operators are among those reported to have been active in other phases of the Missouri blizzard emergency: WØCGJ, WØCGZ, CKK, DEQ, GMI, HDK, HUI, ICW, KJC.

Quantities of Frisco Railroad traffic between Springfield, Missouri and Ft. Scott, Kansas were cleared by WØs BHC, EBE, EUH, FUM, GBJ, HUI and MRD, with WØCXF and WØAEI holding down the Ft. Scott end of the circuit.

### Nebraska

One of the first Nebraska communities to be cut off from the outside world was Ogallala, a town of about 3000 souls. This windswept county seat in western Nebraska became the "head of navigation," so to speak, for blizzard-torn auto and truck travel over one of the main transcontinental highways, and, as usual, there was a ham there, ready and able to assist his fellows. WØLOD, running only 50 watts to a single 807, on 7 Mc. only, was a member of a little net including WØQXO, W8RJC, W5MN, W1LM and W4PL, when the whole world, it seemed, crashed in on him. No trains were running — a streamliner was stalled some miles to the west — drifts up to 30 feet in depth blocked the main highway in both directions — when state-highway snow plows broke through from the east, followed by a mile-long string of cars and trucks. A town with a normal population of 3000 was called upon to shelter, feed, and supply communications for some 2000 extra people. But all around WØLOD — north, south, east and west — were hams with sensitive receivers, and perhaps greater power, and, as the skip ebbed and flowed he was able to sit at his operating position handling emergency traffic in unbelievable quantity much as he had been accustomed to handle routine traffic night after night. It was a 48-hour session at the key, but no heroics, no frantic "QRRR" — just a traffic man doing that which he likes best.

The Nebraska C.W. and 'Phone Nets handled reams of traffic for power companies, communication facilities, and myriad relief operations including the now-famous "Operation Snow-bound." The gang included WØs AY, CMO, DI, DJB, DMY, EUT, FAM, FMW, FQB, GAS, GFI, GMZ, GTW, HSO, HYR, IXL, JCB, JLD, KDW, KJP, KON, LJO, OZC, PDH, SAI, TQD, THF, WGB, YCG and YDE — all on c.w., and, on 'phone, WØs AMY, AZH, BDE, BDO, BDQ, BPY, BXJ, CBH, CIL, DHO, ERW, EUT, EXJ, EXP, FBK, FDG, FYP, GTC, GYM, HYR, IDO, IMD, JED, LEF, LJF, LRF, LWK, MJY, MLB, MYT, NVE,

(Continued on page 94)

# How's DX?

CONDUCTED BY ROD NEWKIRK,\* W9BRD

## How:

Well, the clan should be all finished counting multipliers, replacing flattened p.a. tubes and getting in good with the family again. Since members have reported themselves in favor of a DXCC Round-up by a 17½-to-1 score, we're definitely setting the date for the week end of May 14th-15th betwixt the hours 2000 GCT (3:00 P.M. EST) on May 14th and 2000 GCT (3:00 P.M. EST) on May 15th.



If you hold either a prewar, postwar or an all-time DXCC diploma for your present call or one previously assigned to you, you're entitled to join the party. Put it in the same light as being one of the Club's social meetings. You'll have a choice of either flitting about shaking hands fast or you can locate an old bosom DX buddy, pull up a chair in the corner, and check up on the ravages of time.

While 14 Mc. is recommended for best coverage between the majority of members, if you can work only 10 meters give it a try there. Use your favorite medium, 'phone or c.w., and the mating call is simply "DXCC DE \_\_\_\_\_." No definite exchange is specified; make the contacts as long or as short as you like.

We'll comment upon the outcome of the affair at some future date as well as list individuals high in number of QSOs, although there is no

award involved. It's not a contest unless one chooses to enter it as such. Let us know how many of the gang you clicked with and how the deal turned out in general, in your own estimation.

Gosh, with all you wheels keeping each other occupied perhaps Jeeves & Co. can sneak in a new one or two in order to make the next get-together. The possibilities are intriguing, all around. [As DX men we should make pretty fair SWLs, anyway. — Jeeves.]

Now comes this painful business of seeing what somebody else worked. . . .

## What:

All kinds of stuff popped up on eighty during the recent Donnybrook but pickings outside of Test periods were good, too. VP2AJ (3551) and VP6PX (3508) bring W4BRB up to 55 postwar 3.5-Mc. countries. . . . W9AND received a personal visit from SM5LK which inspired him to catch YV4AW (3502), VP2LA (3512), KL7KB (3522), KH6NE (3525), VO2CY (3522), ZL2HP (3556) and ZL2BD (3588). . . . KH6VP/VR4 gave the West Coasters a workout on the band for a short period, says W7CWN. . . . W6LDJ has a long haul to make but succeeded with FA8BG, VP2LA, ZS2G, G6HL and PY2AC. . . . W7CZY states, via W9QHA, that KG6DI (3690-3525) is available for contacts in the wee hours. . . . W6UTU and VK5KO mention that the VKs are assaulting the low edge of the band in force of late. The latter needs but South America for his sextet. VK5KO (3504) at this writing has hit 80 for 209 DX contacts, 186 with Europe, and these include such as FA8BG, ZS1M, ZC8PM, JA2KG, a ZK1 and others of higher-frequency quality. . . . W1BPX has 52 countries on the band through the recent addition of ZK1AM, HA4EA, LU3EL, EK1AA, GC8OK, HH2BL, ZB1Q and ZB1AR; W4BRB take note! . . . W2EQS adds PA0LB, OX3MG (3550), OK1RW (3525), OZ1W (3540), HB9BX (3522), SM6EQ (3529), GI6TK (3510), a ZB1 and an HA, plus many Ds. . . . VE1EA caught up with ZC8PM, ZS1M, OK3AL, HB9AJ, HB9S and numerous others, still seeking South America for the big six. Incidentally, Clarry learned from G8JR that VP8CH, VS6AJ, KL7GH and ZS1T are calls being pirated on 80 in the vicinity of G. . . . JA3AA and JA2KG have been putting in their yearly appearance, bringing joy to many.

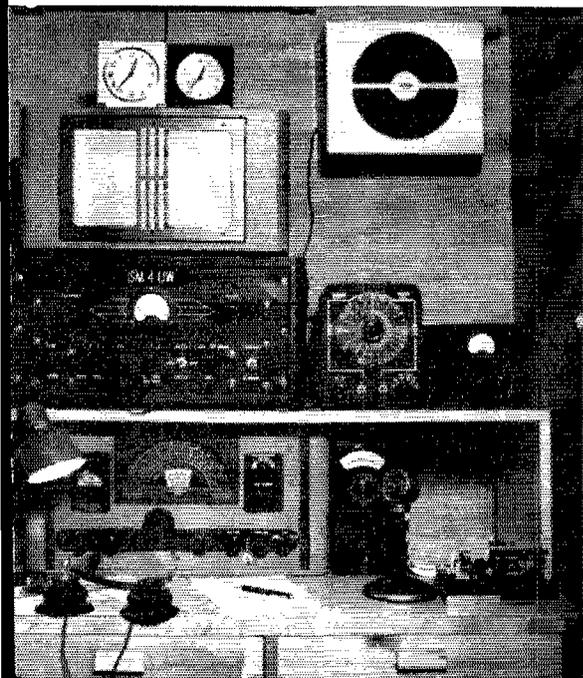
Forty seems to have had more than its share of interesting phenomena. W6BIL hears KC6EA

\* DX Editor, QST. Please mail reports of DX activity to W9BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.

(7090) and W0ETF ran into the old stand-by, HRIAT (7010) . . . . . W8YGR crooned to KS4AD (7282), GW3CRX (7004), VP9CC (7009), VP6CDI (7038) and F3CX (7013) . . . . . The most luscious lately at W1BPX are UF6AB, UD6KAB, UC2AL, ZC6UNJ, ZC6UNT and AR8XA . . . . . Seven Swedes, a ZC6 and KV4AA were greeted by W1GXJ upon his recent return to the air . . . . . VE3OY held confabs with ZS1M (7050), ZL2MM (7090), CN8AN (7085), CN8MI (7090), FM8AD (7050) and EA2LS (7090) . . . . . Sticking to 40 and liking it, W8PQK checked off the shady FP8AB (7017), W8SIR/KG6 (7040), W3CHH/KG6 (7040), EA3TA (7040), KH6VP/VR4 (7038), ZC8PM (7057), YV4AW (7005), VP4TR (7110), ZS2CR (7008) and somebody signing ZC2DL (7035 t7). Bob did a recent 3-hour WAC to top things off . . . . . W6ZGY wrapped up SM2AWG (7032), UA0FB (7030), W1LBW/C1 (7039), YV5AL (7023) and ZS2G (7033) . . . . . W2VJN collected HA4SA, CN8ER, HK5CR and D5AA while W2YDG spent time with EA3EE (7012), EI2T (7011), FA8BG (7045), PZ1WX (7010), GC4LI (7019), OESMW (7003) and VP2AA (7010) . . . . . HA1KK (7048), LA7BB (7065), HK3CT (7005), OH3NB (7012), VP4TZ (7060) and a pair of ZCs contented W1QMJ.

*Twenty* doesn't need much of a plug; just imagine any weird prefix possible and here it was during the past few weeks. Of course, raising it is a different story, but KH6PM's 807 managed DU1VVS (14,065), FO8AC (14,140 t8), HP2X (14,040 t7), KH6VP/VR4 (14,110), KM6AJ (14,075), KP6AB (14,025), KR6AX (14,140 t8), W0HWI/KS6 (14,070 t8), OA4CD (14,080), OA4CJ (14,150), OQ5QF (14,070), PZ1FM (14,055), UA0FB (14,060 t8), VK9PJ (14,150), VP8AI (14,070), VQ2PL (14,075), ZD9AA (14,070), ZE2JN (14,060), ZE2JS (14,065),

ZK1AS (14,050) and PY7WS (14,030) . . . . . W8PQK sampled 20 instead of 40 for a change and fared well with UD6AG (14,070), TA3AA (14,000), VP2LA (14,020), FF8GP (14,103 t7), OE1AD (14,048 t8), FO8AB (14,090) and LUIZA (14,075 t5) . . . . . A few at W0ETF: YN1RO (14,070), CR7IZ (14,060), KV4AB (14,020), OX3BC (14,090) and some VE8s . . . . . W6LDJ has his digits crossed on VQ4CUR/VQ1 while W9MDG does likewise on UN1AB (14,068) . . . . . W4MR specifies as victims W6ZNT/KW6, W0MCF/C3, VP8AK, ZM6AI, SV1A, ZS9D, ZD4AU, UA9KCA, UA0VB, VU2CR, EL4AD, TF3AR, CR6AI and CE7AP . . . . . At W3QLW we find CN8MZ (14,005), CX6AD (14,008), CX6BT (14,010), HI6EC (14,145f), HPIFD (14,124), OX3MF (14,065), VP4TBA (14,028), VP6PX (14,008) and LA4K (14,032) . . . . . ZS5FE (14,020) would have it known that he seeks several of the more uncommon states for WAS, quotes W4UTQ . . . . . W2VYO/1 consorted with PZ1Z, IS1AFM, GD4MZ, EA5BS, OE1FF, W0MCF/3, DU1AP, AG2AG, CR9AG and UL7BS while attending prep school, and W8WWU would like more info on UA3DH/0 who is supposedly representing some Siberian expedition . . . . . While curious about FY8R, W5LVD busied himself with UA1KEB, ZD8B (14,038), VP8AM (14,085) and the scrumptious FN8CT (14,009) . . . . . W5KC has a find in MD4BPC/VQ6 plus HZ1AB, ZC6RE, ZC6RO, CR6AF and FF8GP. Then Vince switched to 'phone for FQ8SN, AR8AB, 4X4AD, EK1AD, MI3SI, DULAK, VU2CQ, ET3AD, ZS3D, VP1SJC and ZS8A . . . . . Another mike man, W2MPA, found this stuff at large and to his liking: C3RA, C3EA, DU1AI, EL5A, LX1BU, OH2SE, KX6AF, OX3GG, EA2CQ, VP9WW, VP2KW, SM5YA and ZD1SW . . . . . W1KMY buttonholed ZB1AU (14,050), OE1FF (14,050), GD3UB (14,000), OQ5CH, TA3GVU (14,090), OY3BS (14,120), UC2CB (14,080) and UB5KAB (14,050) . . . . . To get his thoughts off the Nebraskan winter, W9FWW ran down UA9CC (14,020), UA9KHA (14,086), OH8NG (14,060), VP5FR (14,010), LA5WA (14,034), LA7WA (14,055) and that rare Atlantic duo, ZD9AA and LUIZA . . . . . W6ECJ got his ticket and started off with a bang; his first contact was with C1JH!



Here's a shot of the meticulous arrangement at SM4UW, manned by Lennart Herou at Krylbo, Sweden. The top deck holds the compact rig which runs 40 watts on c.w. and 25 watts 'phone, a Sonar VFO, and the antenna tuning unit; bottom, the RME45 receiver, a Hetrofil audio filter and a meter for transmitter grids.

**QST** for

Ed Tilton's idea of 160 meters, *ten*, hasn't been disappointing anybody if the mail is representative. While steaming through the Caribbean, W8QOH/MM passed the time of day with IS1AFM (28,035), YK1AF (28,040), TF3SF (28,040), UR2KAE (28,005), ZB1AP (28,010) and FUSAA (28,010). Paul intends to be on in the vicinity of F18, HS, PK4, VS1, KA1 and KA6 (now DU) using VFO but usually around 28,025 kc. . . . . When not busy keeping WOR on the air, W2VCZ throws his voice at FA3JY (28,246), ZB1AH (28,385), OK2HN (28,110), OY3G (28,346), MI3LZ (28,175) and MT2FU (28,415) and his brass toward UA3AM (28,025), UA1BE (28,030) and SP8XA (28,040) . . . . . W1EKU furnished a Vermont QSO for W4DFM/Iwo, OH2SE, SV0WF, W6WVJ/KW6, W5NRT/KS4, KG6CX, VK6HL and a large section of the JA personnel. This brings Vern to 115 on 28-Mc. phone . . . . . A pair of 1625s netted W0ARH communication with AP5Z, TF3SF, FA9IO, an IS1 and others, while XE1TE's voice squeezings featured OQ5BQ, EL2A, EL7A, ZK1AE, VR2AQ, PZ1M, CP5FB and CP1AP . . . . . Modulation at W2MPA resulted in CT1s IP, UA, NT, MF2AA, ST2AM, VQ4s RF, SC, VQ2DH, ZD4AB, ZC6XY, 4X4AD and ZB1AK.

**Where:**

Be it known that U. S. military personnel in Trieste, who will be strutting AG2 calls, may be QSLd through AG2AG (listed below) . . . . . Stations sporting YQ prefixes should be addressed via Box 326, Bucharest . . . . . A handy hint from the SARL bureau chief, ZS1FD: "Bureau-sent cards should always have destination calls repeated on their backs." A choice point inasmuch as we surely should lighten bureau burdens in all ways possible. Now let's see who's where. . . .

- AG2AG Capt. S. L. James, jr., Hq. TRUST, Signal Office, APO 209, % PM, New York City (Trieste, F.T.T.)
- DL4ZY Sgt. S. Robinson, AFN Frankfurt, APO 757, % PM, New York City
- DU1CD Maj. H. D. Avary, Dental Clinic, Clark Air Base, APO 74, % PM, San Francisco, Calif.  
(same as KA1ABT)
- DU1GT Box 249, Santander, Spain
- EA1AB Jose Azurza, Matia, 14, San Sebastian, Spain
- EA2LS Box 3, Valencia, Spain
- EA5PB (via W4IYT)
- EP1RJ (via REF)
- FF8GP % FZP, Papeete, Tahiti
- FOSAC % Standard Fruit Co., Port-au-Prince, Haiti
- HE2MF
- HP2RO Box 481, Colon, Republic of Panama
- HR1MM T/Sgt. C. Davis, % U. S. Embassy, Tegucigalpa, Honduras
- HZ1CC (via ARRL)
- KC6EA (same as W8WEA/Truk)
- KH6CA/KP4 TTU Atlantic, Navy 1506, % PM, New York City
- KR6AX APO 239, % PM, San Francisco, Calif.
- ex-MD4JG (VQ4CJG, via VQ4ERR)
- MO1A 13/18 Royal Hussars, Benghazi, Cyrenaica



You'll find KZ5XJ consistently active in all ARRL activities. Operated by Wally Wolford at Ancon, the station uses folded dipoles, an NC240D receiver, and an 829B final at 100 watts input. Twenty-meter c.w. is preferred.

- MT2FU % BOAC, Tripoli, North Africa
- PK4DA (via W2SNN)
- SP8XA (via W3JKO)
- TA3GVU (via W2SN)
- VE8PG Baker Lake, N.W.T., via Fort Churchill, Manitoba, Canada
- VO4AB Canadian Range Radio Station, Buchans, Newfoundland
- VP1SJC Box 186, Belize, British Honduras
- VP2KM Box 152, St. Kitts, B.W.I.
- VP4TBA 5921 Gp., APO 869, % PM, Miami, Fla.
- ex-VP9P W4OMI, RFD 1, Kerrville, Tenn.  
(to home QTH)
- W1JKP/KL7 (via ARRL)
- W1RAF/KL7 (via ARRL)
- W3ORD/C3 AACS, APO 980, % PM, Seattle, Wash.
- W4LSW/KL7 (via W4EAV)
- W5NEG/KP4 J. Norton, U. S. Naval Station, Pago Pago, Tutuila, American Samoa
- W0HWI/KS6 (via W3KXS)
- YK1AF % U. S. Embassy, San Salvador, Salvador
- YS1ZG W. Shutz, Schooner *Tahitiense*, Rarotonga, Cook Islands
- ZK1AL

Above bacon brought home by W1s BEQ, HDQ; W2s AEB, CJX, EMW, GUR, HMJ; W4CYY; W5ALA; W6s BIL, NTR; W9s CIA, FKC; W0ETF; KH6PM; KZ5AX; LU8BF; VE8OY.

**Tidbits:**

Every year the same old story: "Have you any info on XF1A? Is he legit? Et al." So we make haste to state again that XF1A is the contest *nom de plume* of one Juan Lobo y Lobo, otherwise known as XE1A and/or XE2N. [That should be *nom de guerre* boss; I was there. — *Jeeves*.] He's not a new country unless one needs Mexico and he does QSL . . . . . W2ADP learned from HA4SA that the number of authorized Hungarian amateur stations has grown to seven (!); HA4SA is ex-HA4EA . . . . . HZ1AB (present licensees) is keeping even with the QSL demand but the big difficulty appears to be the job of keeping cards in stock. An order of 500 disappears in no time. They'd like to befriend some philanthropic individual owning a print shop . . . . . It's the job of VQ8CB to see

(Continued on page 98)

# A New Approach to Antenna Design

BY LARSON E. RAPP,\* WIOU

THE year 1948 was a good one in amateur radio. Several new techniques were introduced or suggested to keep the hobby alive, and there was no real need for this humble author to give the art a "shot in the arm," so to speak. So many amateurs were kept busy praising or denouncing (1) single-sideband receivers, (2) single-sideband transmitters, (3) double-sideband anything, (4) single-sideband anything, (5) the Clapp oscillator, and (6) the series-tuned Colpitts oscillator, that a healthy and rather jolly feeling prevailed throughout the better-informed *cognoscenti*. This was as it should be, of course.

However, it is about time that something was done about the antenna situation. Too many amateurs have been misled into believing that one needs a lot of ground and high supports for huge arrays to enjoy any success in amateur radio. So many amateurs have bought huge plots of ground and thousands of board feet of lumber that they are now considered in some circles to have been instrumental in bringing about the present housing shortage. In the field of parasitic arrays (originally designed for a small space), a recent tabulation shows that they have become increasingly complex. Starting originally with two-element beams, they have gradually evolved into 5- and 10-element menaces to aerial navigation. Any real DX is out of the question these days for anyone with less than 4 elements and wide spacing, if you would believe all of the stories.

## A New Approach

This whole approach seems a little primitive. That "radio waves abhor a small conductor" can be shown from Maxwell's equations,<sup>1</sup> and it also can be proven experimentally. It is well known that a half-wavelength antenna cut for the high-frequency end of a band will work at the low-frequency end. But what seems to have escaped everyone is that it works slightly better! The reason, of course, is that the antenna is a little short for the frequency. Then, too, amateurs have been misled because when they have tried to work the antenna on the next lower frequency band, the results haven't been too good,

\* Kipping-on-the-Charles, Mass.

<sup>1</sup> Mr. Rapp did not submit this derivation. However, the principle was discovered independently by Dr. Scotten (*QST*, Feb., 1949, p. 46). Mr. Rapp apparently arrived at it by pure mathematics, which made it obvious that the law is valid for a three-dimensional space-time continuum, instead of the two-dimensional limit assumed by Dr. Scotten. Full credit goes to Dr. Scotten, however, because of his earlier disclosure. — Ed.

• Every year or so, along about deadline time for the April issue, we receive from Mr. Rapp an erudite paper on some pressing problem in amateur radio. This leaves us no time to confirm some of Mr. Rapp's statements by laboratory tests, so we must confess that we haven't tested the revolutionary new antenna described in this paper. However, his reputation is such that we felt it was unnecessary in this case. All of the mathematical treatment included in the original has been deleted, in an effort to reach the largest possible audience.

and they have assumed that this was because the radiator was too short. *Au contraire*, it is because the wrong part of the now-shortened antenna had been cut off.

This is illustrated in Fig. 1. The diagram at A shows the normal current distribution on a half-wavelength antenna. When the antenna is shortened by removing the ends, the current distribution changes to that shown at B. But when the antenna is shortened by removing the center of the wire, the current distribution of Fig. 1-C is obtained, a very desirable condition indeed. While this may seem to be a puzzling effect at first, the explanation is quite simple. When the ends are removed, the remaining wire must replace it electrically, as is well known. But the corollary, that when the center is removed the ends take its place electrically, seems to have passed unnoticed.

This, then, is a step in the right direction, if we are ever to have antennas of reasonable size. However, as the antenna length is shortened, the radiation resistance goes down but the ohmic resistance remains the same. Thus when normal copper conductors are used, the efficiency of a really short antenna is not too good because of the low ratio of radiation resistance to ohmic resistance. Possibly this is one reason why such systems have never enjoyed any great vogue.

While casting about for a solution to the problem, the writer was called in (in an advisory capacity) on a project involving "super conductivity," and it became apparent that this might be the answer. It was!

As is well known, the resistance of any conductor decreases as the temperature is lowered. Signals are better in the winter than in the summer because the coils in receivers, transmitters and antennas have lower resistance. (This effect

is more apparent in extreme climates and in unheated stations.) At absolute zero ( $-273.1^{\circ}\text{C}.$ ), any conductor has zero resistance and hence no loss. Currents once started flowing never stop unless radiated from the conductor.

### Experimental Antennas

The first antenna was a simple thing 142.2 cm. long, and it was cooled down to  $-268.4^{\circ}\text{C}.$  Hot as it was (compared with absolute zero), it nevertheless showed amazing properties. Signal reports averaged 52 db. above S9 without preselectors on 14.23 Mc., and 67 db. above S9 on 3.94 Mc. The higher average on the lower frequency is readily explained by the fact that the same antenna was used on both bands, and it was shorter (in wavelengths) on the lower frequency.

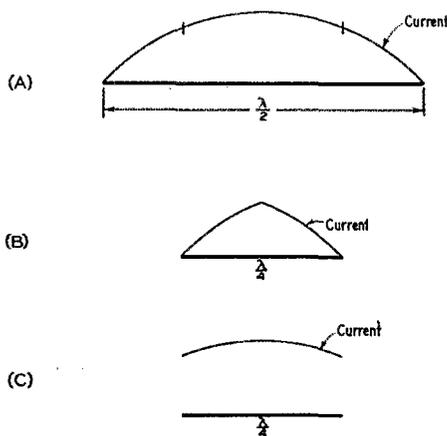


Fig. 1—Current distribution on various types of antennas. The current on a conventional half-wavelength antenna is shown at A. When the ends are cut off, the distribution is that shown in B, which is equivalent to the two end  $\frac{1}{4}$ -wavelength sections of A moved together. When the center is removed, the distribution is as shown in C, which is equivalent to the center  $\frac{1}{4}$ -wavelength section of A. Comparing the current amplitudes shown in B and C, it is obvious which is the better radiator.

Unexpectedly, it loaded well on any frequency between 30 and 3.5 Mc. and, when fed with 73-ohm coaxial cable, the standing-wave ratio never exceeded 1.07. A further unexpected development was that when fed with 300-ohm line, the s.w.r. never exceeded 1.07 over the entire range. In fact, when fed with 600-ohm line or with 52-ohm coaxial cable, the standing-wave ratio never exceeded 1.07, which leads to the conclusion that the antenna can be fed with any line and the s.w.r. will not exceed 1.07. This was a little difficult to explain at first, but the answer is really quite simple. It is the principle of "indefinite impedance" now rather widely used by amateurs without their knowledge. When they say "Cut the line to the length that loads best and you

have eliminated the standing waves" they are doing the same thing but for one frequency. Obviously such a broad-band device as this antenna eliminates the need for a critical feedline length.

A second experimental antenna 94.3 cm. in length was cooled down to  $-269.9^{\circ}\text{C}.$ , and the results were even more amazing. Signal reports were even higher, and the s.w.r. was reduced to 1.06 at all impedance levels. But the results were not as consistent as they were with the first antenna, and this was finally traced to band conditions. When the bands were good and a large number of signals were coming through, their combined energies tended to heat the antenna and raise its temperature slightly! While this was disconcerting at first, it was decided that the effect might be used to indicate band conditions without turning on the receiver. Actually, this required only a sensitive thermometer calibrated in "signals per kilocycle." It works out quite well, although it doesn't show *where* the signals are coming from. An autoalarm, to indicate when there are sufficient signals coming through to justify turning on the transmitter and receiver, was used for a short time but added nothing to the enjoyment of other pursuits around the house, and several neighbors complained of the constant sounding of the alarm siren.

Further experiments showed conclusively that the antenna is indeed such a broad-band device that it works equally well over the entire radio spectrum.<sup>2</sup> In fact, it was found that there is *no* way to prevent the antenna from picking up weak harmonics from the transmitter and radiating them with quite high efficiency. Since this would only aggravate the TVI problem, it is felt that this is too dangerous an instrument to put in the hands of the amateur, and no disclosure of the constructional details will be made, despite the importunities of the editors of *QST*. Sorry.

<sup>2</sup> Actually, the highest frequency at which tests were made was 27,000 Mc., so this is rather an extravagant statement. — Ed.

### A.R.R.L. NEW ENGLAND DIVISION CONVENTION

Framingham, Mass.

April 30th

The ARRL New England Division Convention, sponsored by the Framingham Radio Club, will be held on April 30th at Nevins Memorial Hall, in the heart of downtown Framingham, Mass. Registration will begin at 1:00 p.m. Registration tickets will be \$2.00; combination registration-banquet tickets \$4.50. To purchase tickets in advance by mail, contact Ed Parsons, W1BWJ, 35 Pitts St., Natick, Mass.

## • Technical Topics —

### More on the "Super-Selective C.W. Receiver"

THE article by T. A. Githens, W9AEH, on "The Super-Selective C.W. Receiver" (*QST*, August, 1948) generated so many inquiries to the author about the availability of the 72-kc. i.f. transformers that he has been unable to keep up with them. To save further correspondence, and to answer some of the questions that developed from the article, we herewith print Mr. Githens' reply to such inquiries:

"I would like very much to be able to write a personal answer to all of the inquiries regarding the 'super-selective' receiver in use at W9AEH. However, since time will not permit this, I have found it necessary to resort to this method, and will try to answer all of the questions here.

"At present I know of no way the iron cores and shells for the 72-kc. i.f. transformers can be obtained except through some coil manufacturer. The core manufacturers are not set up to do business with the individual, but will be glad to supply the cores and shells to any coil manufacturer who plans to build the transformers. This means more delay for some of you, but if all of you will write to any coil manufacturers that you think might be interested in this sort of thing, and enough interest is shown, I am sure some of them will be willing to take on the job. In the meantime, watch *QST* for advertisements and further information.

"I would not recommend that any individual attempt to build these coils unless reliable equipment is available for testing each transformer before it is assembled into the receiver. However, in case some of you are able to obtain the cores and shells, some further information may be in

order. The coil forms can be either bakelite or paper impregnated with a good grade of wax. The iron shells are conductors and are usually left floating. In other words, they are completely insulated from the coil and surrounding parts.

"When these transformers and shells are available there are several ways they can be used to improve the regular communications receiver, provided it has the stability necessary to handle the increased selectivity. Any receiver with three or four i.f. transformers at 455 kc. can have the first i.f. tube changed to a converter, with only one transformer at 455 kc. and the remainder replaced by 72-kc. transformers. As stated in *QST*, three of these transformers will give a bandwidth of 2 kc. at 1000 times down. The capacity can be lowered to 0.006  $\mu$ f. to make the transformers work at 85 kc., and they can be used to replace the transformers in the BC-453 to give the same 2-kc. bandwidth. The shells can be used to improve the BC-453 or other i.f. transformers, but the inductance will also be increased, and it will be necessary either to decrease the tuning capacity or to remove turns to keep the coils tuned to the original frequency. It has been suggested that the i.f. systems of two BC-453s might be connected in series to give increased selectivity. This would cut the bandwidth in half, but the over-all gain would be high and might be hard to control. We would prefer to replace the transformers in one unit, as suggested above, and use that unit for c.w. and the original one for 'phone.

"Audio filters will help but will not do the whole job because of cross-modulation effects in a broad i.f. system."

### ... The Other Foot

FOR many years the standard defense in cases of BCI has been "Aw, that cheap receiver is no good" or "Heck, you can't explain anything to that stubborn BCL!" Fortunately, and to the eternal credit of amateur radio, many cases of BCI have been cleared up (at both the transmitter and receiver), despite the terrific odds. Some BCLs have been even made to understand.

A letter from W3MBY reminds us that now the shoe is on the other foot, and it pinches in a few places. Mr. Mann (who is one of the very active operators using single sideband) writes: "We have run into a seemingly bad trend in connection with single-sideband operation on 20 . . . the apparent broadness of the stuff on a receiver with the

a.v.c. in operation. This has been rather awkward to explain for two reasons. It appears that there are amateurs who take a personal resentment in having the limitations of their receivers pointed out to them, especially when single sideband is the intruder. To make matters worse, the term 'splatter' has been used freely and, being a misnomer, carries a malignant impression that does no good in getting the 'stuff' (single sideband) started. The next gripe is that if single-sideband QRM forces them to use manual control of gain, then this is discrimination against the popular and sacred a.m. which apparently should be untouched until everybody agrees to the 'stuff,' which they hope will never happen."

Naturally, everyone doesn't have an antagonistic attitude, but we have found in visiting conventions and clubs that there is a lot of curiosity as to just what is happening in the receiver when a single-sideband signal is tuned in on a receiver set for normal a.m. reception. Let's see if we can explain it.

Normally your receiver for a.m. is set with the r.f. gain at maximum, the audio gain at some level you have found by experience to be what you like, and the a.v.c. (automatic volume control) turned to the "on" position. The a.v.c. works to reduce the r.f. and i.f. gain of your receiver in proportion to the strength of the incoming carrier — the stronger the carrier, the lower the r.f. and i.f. gain. It takes a little time to change from one setting to another, so rapid variations such as the audio modulation of the incoming signal have no effect, but slower changes caused by fading and detuning do. The S-meter works from this circuit — the higher the meter reading, the more the gain has been reduced. It is obvious that the a.v.c. saves you a lot of trouble — if it weren't in the set you would probably have to touch up the r.f. gain control once in a while as you tuned across the band, because you need gain to bring in the weak ones, and you have to cut gain to avoid distortion on strong signals.

That distortion can be quite something under some conditions. It takes a number of forms, but it is caused by operating some of the tubes in the receiver (generally in the i.f. amplifier) over more than the linear portion of their characteristics. Thus if the gain isn't held down throughout the receiver on strong signals, by the time the amplified signal reaches the tail end of the i.f. amplifier it will have too much amplitude to be accommodated by the linear part of the tube characteristic. The grids may be driven positive in some cases, resulting in further distortion. *Spurious signals are generated*, through cross-modulation effects. It was because these effects bothered the BCL that a.v.c. and variable- $\mu$  tubes were developed. Why a.v.c. helps is apparent from the earlier discussion — the variable- $\mu$  or "remote-cut-off" pentodes offer linear operating characteristics over a wide range of tube transconductances (stage gain).

The control for the a.v.c. is obtained at the second detector of the usual superheterodyne receiver, and holds the gain down in proportion to the steady carriers within the passband. This means that if you are listening to a signal and a much stronger one comes on 3 kc. away, some of the carrier of the stronger signal gets through the passband and tends to reduce the gain still further than did the one you are listening to. (Yes, there's a whopper of a heterodyne present, too.) And it is a good thing that the gain was reduced, because if it hadn't been you would be having a lot of trouble with cross-talk and intermodulation products of the desired and the

interfering signal. (You probably do anyway, but your ear has become accustomed to it.) These intermodulation products extend on either side of the signal (in the receiver only, remember) and are what was erroneously termed "splatter" earlier in this article.

Actually, unless your receiver has a nice steep-sided selectivity characteristic (like a "Q5-er"), a strong signal 6 or 8 kc. away can sneak through your i.f. It will be attenuated, of course, but what does get through will help to reduce the gain (through a.v.c. action) and thus minimize the cross-talk and intermodulation effects.

But when that adjacent signal is a single-sideband job, the a.v.c. (which never claimed to be perfect anyway) just doesn't have a chance to act. Oh, it may kick around a bit at a syllabic rate, but it never is quick enough to catch the receiver gain before the QRM has raised plenty of hob. There are two possible remedies known at the present time. The r.f. and audio gain controls can be ganged so that increasing one decreases the other, and then the common control shaft can be connected to a motor. The motor can be made to kick in when the a.v.c. becomes frustrated, and all will be serene. The other, and more simple solution, is for the operator to turn off the a.v.c., reduce the r.f. gain, and increase the audio volume, by hand. But if he doesn't use one method or the other, he isn't in a position to condemn the signals he hears, any more than the BCL should condemn the ham who rides through on the cheap or inadequately-protected receiver.

Let's not leave the impression that single-sideband stations can't have spurious signals of their own, because they can. If the amplifiers in the transmitter aren't linear, some of these intermodulation products can be generated and radiated. Possibly some of the single-sideband stations now on the air radiate these distortion products but, even if they don't, it will be a major miracle if none of the future rigs does. After all, despite the available information and measuring techniques, there are a.m. and n.f.m. signals that take up more than their rightful share of the spectrum, and in Class A bands, too. But don't forget that this "splatter" can be developed in your receiver just as easily, if you don't know how to handle the chromium-trimmed darling.

If there are any doubting Thomases in the crowd, we suggest an evening's tuning through the 'phone bands with the a.v.c. turned "off" and the r.f. gain set up to or near maximum. You will be amazed at the normally-clean signals that have developed gremlins all of a sudden! — B. G.

**SWITCH  
TO SAFETY!**



# I.A.R.U. News

## ITALY

The Headquarters was recently honored by a visit from Luigi Bargellini, IIKS, president of the A.R.I. A most interesting day was spent discussing the problems of amateurs both in the United States and in Italy.

The lot of radio amateurs in Italy has not been an easy one. In prewar days, almost all amateur activities were carried on strictly under cover. Even the national society, A.R.I., had to function so. Subsequent to the war a strong movement was launched to receive official government sanction. The difficulties facing the leaders of this movement were enormous: transportation was hard to obtain, funds were low, governing officials were indifferent toward amateur radio, and rival organizations prevented a solidly-united front by the amateurs.



Interrupting discussions of I.A.R.U. affairs, A. L. Budlong, WIBUD, acting secretary, A.R.R.L. (left), and Luigi Bargellini, IIKS, president, A.R.I., step out into the bright New England winter sunshine to face the camera.

After continual representation by the amateurs, the government finally agreed to issue 50 temporary authorizations for amateur operation. This limiting to 50 created a tremendous problem in selection. Amateurs were instructed to make application to A.R.I., and the latter found so many applicants of apparently equal qualifications that, in the end, the 50 were chosen by lot from the list of applicants. Fortunately, this quota was subsequently removed. However, amateur radio licenses in Italy are still the so-called temporary ones. Licenses are issued for a period of one month, but are automatically renewed at the end of that time. There is no theory or code examination in connection with obtaining a license.

Today amateur radio in Italy is flourishing, with much of the equipment used being war surplus. Although there is quite a bit of German surplus used in Italy, particularly in the northern portion, most of the surplus gear comes from Allied sources.

The A.R.I. now owns its own publication, *Radio Rivista*, and has a membership of about 2000. The affairs of the society are administered by an eleven-man council, which consists of the elected officers and six elected council members. The Italian society is working hard toward the adoption by the government of a set of amateur regulations patterned somewhat after the FCC regulations.

## NETHERLANDS EAST INDIES

Amateurs in N.E.I. have been unsuccessful in their attempts to obtain licenses, and N.I.V.I.R.A. officials believe that this condition will exist for some time. With amateur radio not permitted, members of the society find it extremely difficult to keep in touch with each other. Their being so widely separated and the lack of adequate communication facilities operate to bring activities to a low ebb, but contact between N.I.V.I.R.A. officials and Union headquarters will be maintained.

## AUSTRIA

Unsettled political conditions are making amateur radio operation in Austria somewhat complicated. No licenses have been granted by authorities, although there are several amateur stations working under cover. Mail censorship apparently exists, and some QSL cards are being confiscated.



# Military Amateur Radio System



## Coming Up!— Army Day QSO Party

Here it is, gang — a sure-fire Army Day celebration. Get that rig perked up now for the most ham-operating fun you have had in a long time. The reward if you win? A handsome certificate to add to your shack wallpaper.

Here's how the Army Day QSO Party works. It starts at 0501 GCT, 6 April, when the first transmission of the Army Day message from the Secretary of the Army will be made simultaneously on 6997.5, 14,405 and 20,994 kc., using A1.



Secretary of the Army Kenneth C. Royall, whose Army Day message will be transmitted by WAR during the MARS QSO Party.

This message will be transmitted twice on the hour, once at 15 and once at 20 w.p.m., from WAR, the headquarters station of MARS-Army, Pentagon Building, Washington, D. C. The hours of transmission: 0501, 0800, 1200, 1400, 1700, 1900, 2100, 2300 and 0200 GCT. If you copy the Army Day message you have started with a bang — it will net you 50 points.

Messages transmitted to Army personnel during the Party will count 25 points when transmitted, 25 points when received, and 25 points when relayed. If you receive a message destined to any Army camp, post or station, and relay it, it counts a total of 50 points; 25 points if received and delivered, or if originated and sent.

Each MARS member worked will earn you 4 points, each non-MARS participant 2 points. Information to be exchanged during QSOs is shown in the sample log.

Your points total is to be multiplied by the number of Army areas<sup>1</sup> worked; e.g., 1st, 2nd Army areas, etc., including overseas areas. No station can receive more than 4 points for any one contact. Working the same station on more than one band will not count, except in handling a message, and then only the message credits will count.

“CQ AD” will show you are taking part in the Army Day Party. MARS members, in logging their contacts, will use MARS 1, 2, etc., instead of NR 1, 2, etc.; non-MARS participants will use NM 1, 2, etc. Two certificates will be awarded, one to the high-scoring MARS member and one to the top non-MARS participant. Closing time of the Party will be 0500 GCT, 7 April.

Logs and copies of messages should be sent to MARS Headquarters, Room 3B337, Pentagon Bldg., Washington 25, D. C.

See you on!

<sup>1</sup> Army areas by states: *First:* N. Y., Conn., Maine, Mass., N. H., R. I., Vt., Del., N. J.; *Second:* Penna., Ohio, Ind., Ky., Va., W. Va., Md., D. C.; *Third:* N. C., S. C., Tenn., Ga., Miss., Ala., Fla.; *Fourth:* Texas, La., Ark., Okla., N. M.; *Fifth:* Mich., Ill., Wis., Minn., N. D., S. D., Neb., Mo., Kans., Wyo., Colo., Iowa; *Sixth:* Calif., Wash., Ore., Mont., Idaho, Nev., Utah, Ariz.

Sent						Received						
Date	Local Time	Station	QSO NR	RST	Army Area, State	Date	Local Time	Station	QSO NR	RST	Army Area, State	Points
6 April	0002	W4EEP	MARS 1	579	2nd Va.	6 April	0001	W2GQR	NM 1	589	1st N.J.	2
" "	0005	"	MARS 2	569	" "	5 April	2304	W9USA	MARS 3	579	5th Ill.	4
" "	0008	"	MARS 3	589	" "	" "	2107	W6WIR	NM 5	579	6th Calif.	2
Contact points . . . . . 8						Army Day message . . . . . 50						
3 Army-personnel messages . . . . . 125												
183 × 3 (Army areas) = 549 points												



# Hints and Kinks

For the Experimenter



## R.F. INDICATOR FOR SMALL CURRENTS

THOSE of you who have a 20,000-ohm-per-volt meter incorporated as the heart of your v.o.m. will find one of the small germanium diodes a handy addition to the bench. Clip it between the test prods, first setting the range switch to the 100-microampere scale. Minute r.f. currents can be located in tubes used for low-potential generation by simply throwing a loose loop of one of the test leads around the body of the tube in question. Enough will be picked up to show an indication on the scale. This set-up is much more sensitive for showing up small currents than small dial-light or neon bulbs. — Stan J. Mahurin

## LAYOUT KINK FOR METER HOLES

A PROBLEM frequently encountered in the radio workshop and in the drafting room is that of drawing the bolt circle on which to lay out the three mounting holes of a meter or a special socket. The problem is that of finding the radius of the bolt circle to be drawn. The following

method provides an easy solution when the three holes are equally spaced:

First, measure the center-to-center distance between mounting holes. This is the distance  $D$  in Fig. 1. Then multiply this distance by 0.577, which is actually two-thirds of the cosine of 30 degrees. The result is the radius of the desired circle. — George L. Downs, W1CT

## SCREWDRIVER — MINIATURE STYLE

HAVE you ever had a sudden need for a really small screwdriver . . . one that can be used in those tight spots that always manage to show up at the worst times? Here's how to make your own.

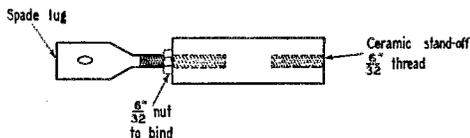


Fig. 2 — A "pee-wee" screwdriver that you can make from parts out of your junk box. It's just right for getting into those tight corners.

A small ceramic stand-off insulator becomes the handle, and a spade lug is threaded into one end to make the blade. Then all you need is a nut to lock things in place, and the gadget is complete. — Mel Dunbrack, W1BHD

## "FLUTTER" PREVENTION FOR BEAM ANTENNAS

To eliminate wind "flutter" of rotary-beam elements (especially 20-meter center-supported "plumber's delights"), slip wood strips inside of the elements to damp out the vibrations. The strips should not be fastened down, but the ends of the elements may be either plugged or deformed to keep the strips from sliding out. You'll find that the strips rattle around a little when the wind blows, but the elements show no signs of getting the jitters and remain almost stationary.

In my own beam the elements are made of 1¼-inch ST61 tubing supported from a 2½-inch square boom. Before treatment the beam had a terrific flutter which shook the elements, the boom, the tower, and the house. Strips ⅝-inch square and 10 feet long were slipped inside of each element, and the ends were plugged. From that time on the problem ceased to exist. — William Vandermy, W7DET

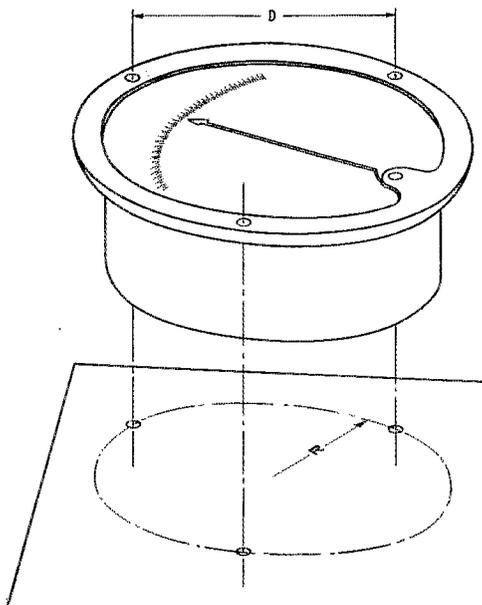


Fig. 1 — Spotting the mounting holes for a meter has always been a tough job. Here's a simple way that will result in cleaner-looking gear for you.

# The 1949 Governors-to-President Relay

**I**N 1921, when practically all amateur operation was in the 150-200 meter region, the first activity resembling the GPR was held. This was known as the Washington's Birthday Relay, in which a message from President-elect Harding was forwarded by amateur radio to governors of states, mayors of communities and leaders of civic organizations. It was in 1925, however, on the occasion of the inauguration of President Coolidge, that the GPR assumed its present form. On that occasion 22 states were heard from. In 1929 the total was 37 states and 4 possessions. This record was not equaled in 1933 when 35 states and 3 territories came through, but was bettered in 1937 when 39 states and 3 territories were heard from.

On the evening of January 19, 1949, thirty-four volunteer Washington-area amateurs again "spread out" over five amateur bands, making their presence known by occasional calls of "CQ GPR," and listening carefully for replies. Their purpose: to provide Washington outlets for the fifth ARRL Governors-to-President Relay, and to see that messages received for the President were delivered to the Official Delivering Committee in as short a time as possible. Some of the messages were relayed through routes planned long in advance, many were sent direct to Washington from the originating stations, others went through various and sundry relays, nevertheless arriving in Washington in good time.

In all, 41 states were heard from. Messages were received in Washington from 39 governors of states and 4 territorial governors. A number of other messages received from mayors and civic organizations were also delivered to the President (see photo p. 36, March *QST*). A message was received from every state which had previously informed ARRL it would start one, and several more. No GPR message that was known to have been originated failed to reach its destination. This reflects the greatest credit on the Washington amateurs who participated, and on those amateurs who originated the messages and relayed them.

Five amateur bands were utilized in the relay. As usual, the 3.5-Mc. band, always a natural for traffic-handling facilities, bore the brunt of the activities with 32 GPR messages being received on that band. Nine GPR messages were received on the 7-Mc. band, six on 3.9 Mc., two on 14 Mc., and two on the 28-Mc. band, which figured in the relay for the first time. The above figures include several duplicates which were received.

Of the Washington stations on the receiving end of the GPR messages, W3AKB (operated by W3AKB, W3BWT and W3CDQ) handled 10 messages. W3BWT (at his own station) and W3ECP each handled nine. Other receiving stations were W4LRI (5), W3AM (3), W3BHK (2), W4ITA (2) and one each by W3EIS, W3FQB, W3KBE, W3KZH, W3LTW, W3MCG, W3OVP, W4FF, W4IUU and W4LAP. Other Washington-area stations who were on deck to help in relaying and delivering the traffic were W3ER, W3EYX, W3FWP, W3IL, W3JTC, W3KAM, W3LFG, W3LVJ, W3OXC, W3QL, W4IA, W4KFC, W4KFT, W4LBM, W4MOJ and W4NN. Quite a turnout! Anyone seeking Washington contact on the evening of the 19th should have had no trouble, and judging by the results, no one had any!

Several stations outside Washington were of the greatest help by combing the bands for Washington traffic. When they would get some, they would QSY immediately to one of the frequencies being monitored by Washington stations. Outstanding among these stations were W3GZH, W3MJQ, W4CFL and W4PL.

No messages were received from Arkansas, Florida, Illinois, Indiana, New Hampshire or New Mexico. Messages were received from the SCMs of Eastern New York and Western Virginia stating the circumstances which made it impossible for them to originate messages.

It was a truly busy evening at W3AKB, which was designated by the Washington Radio Club as the master receiving station. Fran, W3AKB, and "Emzie," W3CDQ, besides continuously

(Continued on page 100)

◆  
Typical of amateur participation in the GPR all over the United States and Possessions is this shot of KZ5PA who, along with other Canal Zone amateurs, saw to it that Canal Zone was represented in the GPR for the first time. "Pinky" himself is at the controls.





# Correspondence From Members-

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

## HISTORY REPEATS

255 E. Avondale Ave., Youngstown, Ohio

Editor, *QST*:

Reference "25 Years Ago" on page 10, February, 1949, *QST*, mention is made of "portraits of *QST*'s capable illustrators, Carl D. Hoffman, 8UX, Clyde E. Darr, 8ZZ, and Harry R. Hick, ex-1ESS." The name is Don A. Hoffman. It was published incorrectly 25 years ago so of course incorrectly again now!

Yes, I'm still kicking — though a little less strenuously than 25 years ago — am now 50 years young. Darr, whom I met at a hamfest one time, has passed to the Great Beyond. I never met Hick and wonder if he's still alive. [Very much so. — Ed.]

My call is now W8FRY and when I hesitatingly mention to contacts at a safe distance that I'm the originator of the QSL card they generally come back with, "So you're the

make the signal a continuous blur to the type which changes the letters so they read differently. While listening on ten meters, I heard G4IV calling VQ2RG. For several seconds during this long call I heard an echo on G4IV, unusual by its time interval of approximately 2.5 seconds. G4IV's signal was RST 589x here and the echo also was strong; both signal and echo were clear.

I believe it possible this signal was reflected off the moon. I wonder if anyone else has noticed this phenomenon of the long-delayed echo.

— G. Bolton, VE1YB

## MEMBERSHIP DUES

100 Knox Court, S.W., Canton, Ohio

Editor, *QST*:

I would like to explain the lapse in my membership subscription to *QST*. I think that the price of \$4.00 per year is too high. I think that the increased costs of producing *QST* could have well come from your advertising customers, instead of throwing the cost, by raising the subscription price, onto the amateur.

— Warren O. Anderson, W8EQJ

25 West 1st South, Preston, Idaho

Editor, *QST*:

The only reason I did not renew membership is that I have not been able to get my head above water (financially). I am attending college under the G.I. Bill, am married, and have two junior ops, so you can see I'm having a rough time.

I enjoy *QST* very much and think you fellows are doing a wonderful job. I read *QST* at W7TMK's every month from cover to cover, so I'm still keeping up with the new developments, even if I have failed in one respect — to keep my membership up — but I intend to renew as soon as possible.

— Rola I. Morrison, W7JJC

6321 Bakman Ave., No. Hollywood, Calif.

Editor, *QST*:

There is certainly little doubt within the realm of Hamdom that *QST* is the amateur's magazine — of the amateur, by and for the amateur.

Sure, there's a reason when one of us doesn't renew — specifically, in the case of this amateur's failure to renew membership, it was simply a matter of deciding on the more important of two essentials — new shoes for the junior operator or membership renewal. It wasn't easy to decide but then it dawned on us that the "jr. op" could never become a full-fledged ham with cold feet and a frozen fist.

Don't worry, OM — we believe that *QST* is what we need and want. Needless to say, the first extra "four greenbacks" are destined for West Hartford — with the appreciative request "pls renew it."

— Robert L. Hyder, W6BEC

32 Main St., Box 511, Wakefield, R. I.

Editor, *QST*:

Not worth \$4.00.

— O. W. Greene, jr., W1CPI

419 Warren Ave., Lynchburg, Va.

Editor, *QST*:

No, I didn't overlook. Just not going to belong at your inflated membership rates.

— A. P. Marsh, jr., W4JAD

[EDITOR'S NOTE: See page 9, this issue, for a discussion of membership dues.]



— Reproduced from April, 1924, *QST*

guy! Wait till I catch you at a hamfest sometime!" The old timers I work all remember the Old Man and occupational cartoons I used to draw for *QST* back in those early days of publication.

Met Hiram Percy Maxim at the First ARRL Convention at Chicago. Happened to mention that I drew the Old Man cartoons. He winced noticeably. I didn't know until after his death that he was the one who wrote the Old Man yarns.

— Don Hoffman, W8FRY  
Lt. Comdr., USNR (Ret.)

## FMT

1222 9th Ave. West, Ashland, Wis.

Editor, *QST*:

Thank you very much — not only for the clock but for conducting these frequency-measuring tests. I get a great deal of enjoyment and satisfaction out of building, improving and operating my frequency-measurement equipment and your tests are really the only positive means I have of proving its accuracy. Here's hoping that you'll carry them on indefinitely.

— Bob Palmer, W9CIH

## ECHOES

Sussex, N.B., Canada

Editor, *QST*:

I am writing in regard to the interesting topic of echoes in the 40-, 20- and 10-meter bands.

I have heard many echoes on signals from the type which



# The World Above 50 Mc.



CONDUCTED BY E. P. TILTON,\* WIHQ

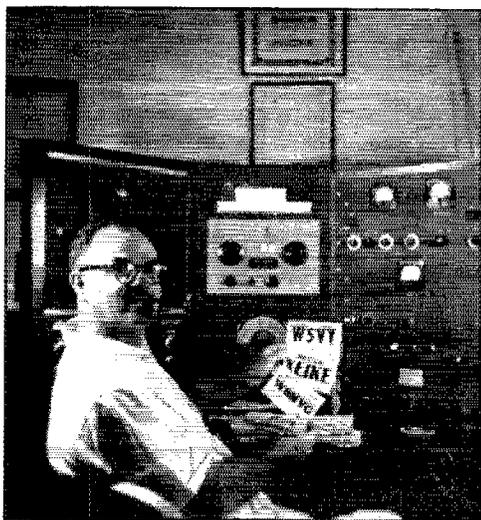
ONCE again, as in January, we have the coincidence of visible aurora in the northern part of the United States and 50-Mc. band openings to South America. Chances are that this has been going on for years, but heretofore we've not had alert 50-Mc. men at the right places in Latin America to make it possible for many Ws to work that continent. True, the band has been open to South America from W4 and W5 on quite a few occasions, and now and then W8, W9, WØ and W7 have broken into the picture, but in February W1 and W2 made the grade for the first time. The Canal Zone also appears in the DX records for the first time this month.

A beautiful aurora lighted the northern skies on the evening of the 21st, but it was of short duration and not many of the v.h.f. gang got going in time to work much of the well-known north-reflected stuff. HC2OT, Guayaquil, Ecuador, found the band open for a short time, however, and contact was made with XE1KE at 9:14 p.m. EST. Signals were weak and erratic then, but next morning it was quite a different story. The band sounded alive and a CQ by HC2OT at 10:05 netted W2BYM, Lakehurst, New Jersey, for the first 50-Mc. contact between South America and Northeastern U. S. Up in Cambridge, Mass., W1AF had seen the aurora the night before, and was taking advantage of the Washington's Birthday holiday to check the 6-meter band. Hearing W2BYM apparently working some DX he called CQ and was almost floored when HC2OT came back! Remembering that W1CLS, Waltham, Mass., had been running schedules with HC2OT, Bill called Doc, who then found it necessary to leave his work at the office for a short time and go home. He, too, having heard no DX signals in a quick look across the band, called CQ and was likewise rewarded by a call from HC2OT.

During the interval between the two W1 contacts, HC2OT worked W5ML, Oil City, La., and several checks were made with W2BYM after working W1CLS, before the band finally went dead at 11:30. There was a period of nearly an hour when W2BYM was the only station coming through at Guayaquil. The band opened again at 9:45 p.m., when XE1KE was worked again, with erratic signals, as on the previous evening. At 10:25 HC2OT worked YV5AC, who stayed in

until 11:05 p.m. Even then the band still seemed open, but no more amateur signals were heard. With a 200-watt rig, a 4-element beam, a VHF152-HRO combination, and, most important of all, a real interest in 50 Mc., Steve has demonstrated that 50-Mc. DX is where you find it; that DX contacts can be made on 6 at times and in directions that would not have been believed possible a few years ago.

The first 50-Mc. DX was worked from the Canal Zone in this same period. After more than two months of operating and listening on 6, KZ5NB worked CX3AA at 9:06 p.m. EST on Feb. 20th. This contact was repeated at about the same time on the 23rd, when KZ5NB also worked LU8AQ and an LU1, whose call was not received completely. He is using a converted 522 with 20 watts input, a 4-element array, and a VHF152-SX28 combination. His only other observed opening came in January, when he heard OA4AQ. KZ5NB will be watching 50 Mc. at every opportunity, in the hope of making a contact with this country soon.



That smile on the face of HC2OT, Guayaquil, Ecuador, is the result of the receipt of his first 50-Mc. QSLs. Steve, formerly W5DNN, has worked 7 U. S. call areas, 13 states, and 6 countries on 6. His contacts with W2BYM and W1AF were the first ever made with these call areas from South America.

\* V.H.F. Editor, QST.

The aurora effect experienced during February was mild in comparison with the January sessions. Very few 50-Mc. aurora contacts were reported, and only one instance of 144-Mc. DX has come to our attention. On the evening of Feb. 3rd, W3RUE, Pittsburgh, heard W0NFM, Solon, Iowa, calling CQ on 144.1-Mc. c.w., at 9:45 p.m. This is a distance of nearly 600 miles, the greatest yet reported as the result of aurora reflection on 144 Mc. It would appear that the present 2-meter record might well be broken by this means of propagation.

### Here and There on 6 and 2

*Adelaide, Australia* — Making a 50-Mc. WAS is a little easier in Australia. At least more fellows have done it — VK5s RT, QR, LJ and KO all completed their WAS on 50 Mc. in December, 1948, by working VK6HM.

*Melbourne, Australia* — The relief party which left Melbourne in late January, to take over from the present crew of the Australian Antarctic Expedition on Heard Island in the South Indian Ocean, included two amateurs, VK3VU and VK4FE. They are equipped for operation on 7, 14, 28, 50 and 144 Mc., and will be in business as VK1VU and VK1FE. Insofar as practicable, continuous watches are to be kept on the two v.h.f. bands, with the hope of being able to take advantage of possible openings of either band immediately. Regular daily schedules will be kept on the lower frequencies. This information is from VK3UM, federal secretary of WIA.

*Halifax, Nova Scotia* — As a means of promoting regular activity on 50 Mc., VE1QZ suggests the establishment of a 6-meter relay between Halifax and the most distant possible points in the United States. For the Canadian end, he nominates VE1TR, Chester, N. S., VE1DF, Caledonia, N. S., and VE1FL, St. John, N. B. From here on it would be up to the Ws, the nearest of whom at present is W1PWW, Bangor, Maine, a quite long but not impossible hop.

*Montreal, Quebec* — Vermont contacts on 144 Mc. are not difficult for VE2FO. He works six stations in the northern part of Vermont consistently, and has a clear shot in the direction of Malone, N. Y., and the Lake Placid area. He wishes it known that the 2-meter gang concentrate on listening at five minutes before to five minutes after the hour.

*Rochester, N. Y.* — An organization of the v.h.f. enthusiasts of the Rochester area is announced by W2ZHB, secretary. Affiliated with the Rochester Amateur Radio Association, the Rochester V.H.F. Group, comprising about 25 members at present, is concentrating on the promotion of interest in the bands from 50 Mc. up. At present most of the activity is on 2 meters, where 144.1 Mc. is used as a calling frequency. There is definite activity on Monday, Wednesday

and Friday, starting at 8 p.m. Vertical polarization is employed. Missionary work is being done on lower frequencies, to sell more of the gang on the use of v.h.f. for local and semilocal contacts, and an occasional round table of all members is conducted, with a different station taking over control each time.

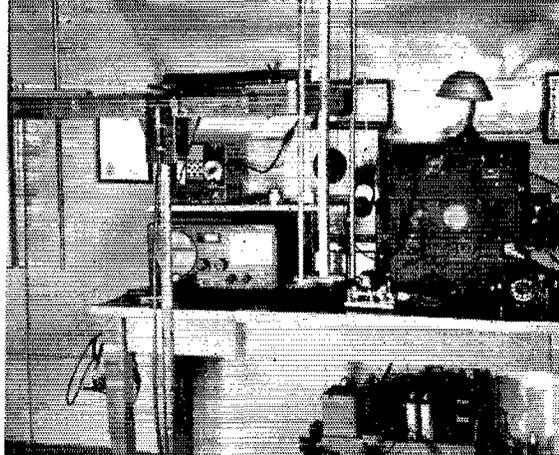
A contest is being sponsored during the period of April 23rd to May 1st. Open to anyone within a 50-mile radius of Rochester, it is scored on the basis of one point per contact for 50 Mc., and two points for 144 Mc. Portable work is encouraged and contacts so made count the same as those made from the fixed station, and the same station may be worked twice in this way. A prize will be awarded to the winner.



### Standings as of Feb. 25th

W9ZHB	48	W5AJG	43	W9DWU	46
W0ZJB	48	W5ML	42	W0QUV	44
		W5VY	40	W0PK	43
W1CLS	44	W5HLD	40	W9ZHL	43
W1LLL	40	W5JLY	40	W9JMS	43
W1HDQ	39	W5FRD	38	W0ALU	42
W1CGY	37	W5FSC	37	W9QKM	41
W1L5N	37	W5DXB	35	W9RQM	38
W1HMS	36	W5ZZF	34	W9UIA	37
W1JLK	35	W5GNQ	32	W9AB	26
W1NF	35	W5JBW	32		
W1KHL	34	W5IOP	30	W0USI	47
W1AF	29	W5LIU	24	W0NFM	46
W1EIO	24	W5LWG	19	W0BJV	46
W1HIL	21			W0QIN	45
		W6UXN	47	W0CJS	45
W2BYM	39	W60VK	40	W0KYF	44
W2IDZ	39	W6ANN	38	W0DZM	43
W2AMJ	38	W6BPT	35	W0FPQ	42
W2QVH	37	W6AMD	35	W0TQK	42
W2RLV	37	W6IWS	37	W0SV	42
W2RGV	26	W6FPV	31	W0INI	42
		W6BWG	18	W0HXY	41
W30JU	38			W0YUQ	39
W30R	35	W7BQX	45	W0JHS	38
W3RUE	34	W7ERA	43	W0PKD	36
W3MKL	33	W7DYD	41	W0GSW	29
W3MQU	26	W7HEA	40		
		W7FDJ	36	VE1QY	28
W4EQM	43	W7FFE	35	VE1QZ	28
W4QN	40	W7KAD	35	VE3ANY	27
W4GLY	40	W7JPA	35	G5BY	24
W4EID	40	W7QAP	32	XE1KE	23
W4DRZ	38	W7JRG	29	VE4GQ	20
W4FBH	34	W7ACD	28	G6LK	16
W4GMP	34	W7JPN	19	XE2C	14
W4WMI	33	W70WX	15	VE2GT	14
W4FNR	33			HC2OT	13
W4KKU	31	W8QYD	44	XE1QE	10
W4HVV	29	W8NQD	31		
W4LNG	28	W8RFW	25		
W4MS	26	W8TDF	22		
W4FJ	26	W8LBH	21		

Five hundred and seventy different stations worked on 144 Mc. is the record of the neat attic station of WIKB, Haverhill, Mass. Two 522s are used, with the converter (patterned after the one described in March, 1948, *QST*) mounted on hinges at the right, feeding into the i.f. of one of the receivers. The 522 r.f. section of the other receiver is used to tune the f.m. band, in order to provide a continuous check on propagation. The antenna is a 6-element mounted alongside the operating position. At the upper left is a lighthouse oscillator, which may be used on 144, 220 or 420 Mc. It is modulated by the audio system in the TR-4 on the shelf above the S-40 receiver.



*Sacramento, Calif.* — Take it from W6PIV and W6BLP, the use of 6J6 push-pull r.f. and mixer stages is great stuff in a 2-meter receiver. These fellows put 6J6s into their 522s, leaving the oscillator circuit unchanged, and a very considerable improvement in sensitivity and signal-to-noise ratio resulted.

#### The World Above 420 Mc.

*Phoenix, Ariz.* — Nightly check-in time for the 420-Mc. gang has found at least a couple of stations active, with five or six on over week ends. The 420-Mc. group in the Phoenix area at present includes W7s KWO, QLZ, MIW, MIV, KTJ and QNO. W7KWO has a parabolic reflector which he is able to set up for use with his car rig, making it possible to work the gang out to a distance of 30 miles or more. It brings in signals up to S7 which are inaudible on a dipole, and makes the signals which are barely audible with the simple antenna come up to S9. Equipment, in addition to home-built, includes an ASB-7, BC-788, APT-5, APQ-9, APQ-2 and BC-645.

*Hartford Area* — Some commercial faces are going to be red if and when television moves into the 500-Mc. range. Harmonics (4th, in the case of f.m. stations above 100 Mc., and 5th from those near the low end of the f.m. band) are heard with excellent strength at distances of 10 miles or more by W1HDF and W1HDQ. Since they fall just outside the 420-Mc. band, at both ends, they do no harm at present, and they make a wonderful means of lining up receivers.

The 12½-mile path from W1HDF to W1HDQ is worked regularly, despite the direct line between the two being 350 feet below line of sight. W1HDF uses a hopped-up BC-645, and at W1HDQ we run the 703-A doorknob oscillator (January *QST*) at 30 watts input, and a 6J6

superregenerative detector. The 6J6, used in push-pull, with a half-wave line in the plate circuit, makes a fine detector, incidentally. We substituted it for the acorn used in the November, 1947, *QST* receiver, with a vast improvement in sensitivity and smoothness of operation. More details soon.

*Syosset, L. I.* — To provide a signal for others to shoot at, W2JND operates his rig each evening from 7 to 8 p.m., with tone modulation automatically keyed. Voice breaks are made each five minutes.

*Woodhaven, L. I.* — The Richmond Hill, Ozone Park, Cypress Hills, Forest Park and Woodhaven sections of Queens should be ideal for 420-Mc. work, according to W2MWB. He suggests that those interested get together and form a 420-Mc. club, in order to promote development work. Operation on 420 may be a way of beating the TVI problem, provided that the frequency is chosen so that none of the subharmonics falls in television channels in use in your area. Wes found subharmonics from his 430-Mc. rig in Channels 12 and 8 on two receivers in the same house with the rig. Since neither of these channels is in use in the New York area no harm is done.

*Arlington, Mass.* — If a section of the 420-Mc. band is to be set aside for the use of crystal-controlled transmitters, W1CTW suggests that it be in the region where it is possible to triple from 144 Mc. or double from 220. The stretch from 440 to 444 Mc. would allow the use of a single crystal for all three bands. Will that do? That four-megacycle stretch would be just about right as a tuning range for a crystal-controlled converter, too. Your conductor's experience with selective reception on 420 would indicate that the modulated-oscillator gang could operate in there too without causing undue interference. Unless they were very close you'd never hear them as they swished by, if you were using communications-receiver selectivity! Even the selectivity of our 6J6 superregen is such that the voice is heard at a point widely separated from the spot where the carrier dents the background.

#### Note to 144-Mc. Operators:

No new states were reported during February so the states-worked standings are as listed in March *QST*.



# Operating News



F. E. HANDY, WIBDI, Communications Mgr.  
J. A. MOSKEY, WJIMY, Asst. Comm. Mgr.  
ALBERT HAYES, WIIIN, Natl. Emerg. Coördinator

GEORGE HART, WINJM, Communications Asst.  
JOHN E. CANN, WIRWS, Communications Asst.  
LILLIAN M. SALTER, Communications Asst.

ARRL Field Day June, 18th-19th. During February every ARRL-affiliated club received a preview of the "FD" rules that will appear in June *QST*. Any interested groups *not* in the affiliated category are now cordially invited to ask for a copy of the advance mimeographed information on the Field Day, if it will assist in local plans for that activity.

This year the operating plan is along time-tested lines with some modifications such as experience showed desirable. Rules have been revised to provide for four types of participation. *Mobile Rig Entries* will be a brand-new classification in which we hope the many hundreds of amateurs now so equipped will find a chance to test mobile or portable work in the FD using their completely transportable facilities. *Unit or Individual Portable Stations* are entered for comparison with similar set-ups away from home sites, scores to be submitted in all cases by either one or two licensed amateur operators. *Club and Group Portable Station* entries as usual will be compared with those of other clubs and groups that operate with the same number of simultaneously-operative portable transmitters. *Home Stations* are those customarily listed as to their contacts with the above classifications of field entries . . . the reports of those unable to be afield but helping out in the test and getting their fun that way.

Stations designed to give several hours' service from car batteries, suitcase portables, car rigs with installed equipment for h.f. as well as v.h.f., capable of giving local contact service (as in the Vanport disaster when dike patrolling was necessary) should all be part of our Field Day planning and testing. Some clubs have indicated plans for early local workouts for their gas-driven generators and message-center facilities. All individuals and clubs are urged by ARRL to review their equipment lists; emergency coördinators to count up the *number* of rigs-with-handles, full mobile installations, etc., and to report through SECs the complete units that could be made operative simultaneously in the event of local disaster be it industrial like Texas City or as a natural result of tornado, hurricane, flood, etc. Be ready for the FD and you will also be ready for any type of communications emergency!

Some thoughts excerpted from a bulletin just received from a prominent club are quoted as

definitely applicable to Field Day:

Your club officers feel that *more* of the gang should have individual emergency gear that they can put on the air with a minimum of headache and backache. It doesn't take much money and not too much effort to get some gear together that will work very well for emergency work. We have visions of having an "all-portable" net sometime this summer with an invitation out to the DF men to get their direction-finding gear out and try to find the portable men.

Coördination of inadequate facilities, untrained operators, and uninterested personnel will *not* win a Field Day. . . . FDs are won by operators, and the activities of operators during the year between events to a great degree determines their value on Field Day. . . . The club has developed several good club nets with excellent attendance. . . . Basically FD is a show of PREPAREDNESS. Besides having a good time we are showing ourselves and the world what we can do with emergency power, and emergency antennas. It might be wise to ask ourselves just what *each* of us is doing to prepare for emergency conditions.

— W6KMQ, SARO News, Society of Amateur Radio Operators, San Francisco.

**Strive for Accuracy.** One amateur who has specialized in QSP of traffic for many years mentioned he had *six* messages on the hook awaiting replies to service messages. Improper or scanty addresses on some of them made *delivery* impossible without new information, requested by a "svc" to the originator. Originating amateurs can save trouble and delay by care in spelling out. LA can be taken for Louisiana or Los Angeles. A static crash at the wrong moment can change MO for Missouri into ME for Maine. City names are duplicated in many of the states. Be *sure* you hear correctly. Send carefully and *spell out* where misunderstandings can occur. Group count or check on messages should be questioned, as required, to insure that the number of words in the text are correct. *Good* operators will *not* guess at addresses or text. They will *ask* before receipting for any message. Strive for accuracy!

**QSG.** During this season, traffic nets have flourished. Volume nearly approaches prewar levels. This is a most constructive development. While a good deal of our traffic moves well in single units, there are increasing opportunities to save time by sending several messages in a string with the merest break between as coöperation for the receiving station to get set on a fresh blank. B or BK indicating "more to follow" or "break" works fine when passing a message at a time. Use and understand the following signal when conditions are right and good operators can

shove traffic through in bunches:

QSG? Shall I send . . . telegrams (or one) at a time?  
QSG Send . . . telegrams at a time.

**Operating Points.** W2QBG writes, "On 7 Mc. I heard one of the boys calling CQ, but with all the weights and part of the bar cut off his bug! He only signed once every 25 or 30 CQs. He *thought* he was some operator all right." The place to listen to one's self or show off is *not* on the air. Page 514 of the new *Handbook* goes into the matter of *proper* speed-key adjustment. The slap-happy bug addict is most frequently judged to be in the weak-minded category, since he spends so much time repeating and showing off. "Steady" operators who are slower but are up on their procedure often move *more* communications with accuracy than the show-offs. This is not to say that a bug is not a fine accessory where set heavy and used correctly. Coming back to W2QBG, good sense requires that stations identify themselves *frequently* when calling. Otherwise listeners tune away to other stations and calls. Short snappy calls, with breaks to listen for replies, get the best results.

FCC currently has been citing certain net operators for neglecting to identify their transmissions properly. Call numerals and prefixes are definitely part of calls, and FCC requires complete use of assigned call-identity at the intervals specified by regulations. At least *once* every 10 minutes, during every transmission of more than ten minutes' duration — and at the beginning and end, a repetition of the call of the station called and the call assigned the station being operated (in that order) must be sent. The only exception is that where there are several exchanges in sequence, each less than 3 minutes' duration, the calls of the communicating stations need be sent only once each ten minutes, as well as at the beginning and end.

**Public Relations.** Suggestions have been made time and again concerning the responsible and helpful things amateur communication can do that make the amateur service a *respected* institution in the eyes of our neighbors. The ideas run the gamut from undertaking message-handling communications or schedules arranged for friends and neighbors to technical-educational demonstrations of our know-how and information. Also, it helps to have one's station *neat* if he invites many visitors. Here is a gem of wisdom that might well be posted in front of every amateur operator in every amateur station.

Remember that all the good that is accomplished by the few industrious operators that brave the flood or storm in emergencies can be *undone* in a very short time by the thoughtless ham who allows his rig to annoy neighbors, with interference or with a lot of long-winded drivel or off-color language.

— VE7HR in *The Victoria Short-Wave Club Bulletin*

Each amateur operator, whether he appre-

ciates it or not, is in actuality the representative of the whole amateur fraternity. Be a good ambassador!

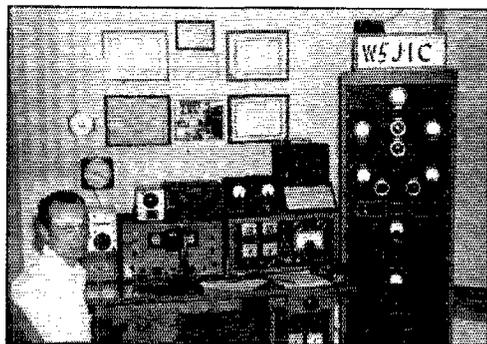
— F. E. H.

## MEET THE SCMs

Marshall B. Riggs, W5JIC, recently elected to his second term as SCM of Arkansas, has been a radio amateur since 1940, although his interest in the art dates back to 1927.

Since securing his license he has been consistently active in many phases of the game. In particular, he performed noteworthy work in the Amarillo ice storm, the 1947 Woodward, Okla., tornado, the Texas City disaster, and the 1947 Gulf Coast hurricane. Other activities include participation in all ARRL Field Days and Sweepstakes Contests. Marshall holds official 'phone station, emergency coördinator and official observer appointments and possesses RCC, WAS, Code Proficiency (with 20-w.p.m. endorsement), and Public Service certificates. Although not a DX hound on the regular DX bands, he enjoys trying to work it on 3.5 Mc. where he considers it a real accomplishment. W5JIC is a member of the Ozark C. W. Net, the Arkansas Emergency 'Phone Net, and the Delta 75 'Phone Net.

There are two transmitters in JIC's living-room



station with line-ups as follows: (1) 6SS7 VFO-1852-6L6-807-TB-35-pp. 100THs, and (2) p.p. 6L6 oscillator driving p.p. 24Gs on 3.5 and 7 Mc. For 'phone work the larger transmitter is provided with means for narrow audio response, splatter suppression, negative peak limiting and speech compression. Receivers are HQ-129, BC-453, BC-454, BC-342N and Howard 436. Emergency equipment consists of BC-654, BC-459, BC-457, BC-454, Howard 436 and a PE-103 dynamotor. Antennas are an end-fed Hertz, a three-element beam on 28 Mc., a doublet on 14 Mc., and a Zepp on 7 Mc.

When not busy with amateur radio SCM Riggs obtains enjoyment from hunting and photography. His present employer is the Yell County Telephone for whom he does maintenance work.

## HIGH CLAIMED SCORES — ARRL-MEMBER PARTY

Presented below are the high claimed scores for the Seventh Annual ARRL-Member Party, held January 22nd-23rd as a climax to the celebration of ARRL Week. Open only to League members, the party was well attended and productive of an excellent batch of high scores. The list is liberally sprinkled with the calls of contest "regulars," although competition from many newcomers is evident. Top score was again claimed by Vic Clark, W4KFC, who increased his sections-worked total of last year by two for a final score of 73,360. "Doc" Stricker, W8WZ, third-high last year, scored 72,170, to earn second place in this party. Another battle-scarred contest veteran, Reno Goetsch, W9RQM, placed third with 65,240. A complete report listing the section winners will appear in a later issue. The figures following the calls in the tabulation represent the claimed score, number of members worked, and sections worked.

W4KFC....73,360-482-70	W2CLO....35,341-262-59
W8WZ....72,170-476-70	W6ISQ....34,658-242-62
W9RQM....65,240-426-70	W8SCW....34,633-251-59
W2IOP....64,101-424-69	W9GFF....34,368-226-64
W9LVR....55,683-366-69	W0DYX....34,335-260-63
W4FIJ....53,312-379-64	W2CWK....34,200-260-57
W0BRD....52,095-360-69	W4DZE....34,200-248-60
W1BIH....50,895-350-65	W1KRV....34,100-250-62
W9CYU....48,888-345-63	W2KTF....33,208-257-56
W9WEN....48,576-340-64	W0IC....33,020-212-65
W9STE....44,544-309-64	W8ONK....32,940-240-59
W5KC....44,352-312-63	W1CJH....32,860-279-53
W4CYO....43,112-282-68	W3LIW....32,804-253-59
W9NII....43,028-347-62	W8TRN....32,640-232-60
W3EIS....42,904-306-62	W3JHW....32,214-231-59
W1JYH....42,578-309-61	W7UTV....31,964-262-61
W5IUW....41,382-301-66	W6GTM....31,689-209-63
W3FUF....40,992-336-61	W4FBJ....31,398-266-59
W2GFG....40,310-305-58	W2PGT....31,610-235-58
W3FQB....39,804-279-62	W5VT....31,030-225-58
W0GBJ....39,300-285-60	W1AQE....30,837-273-57
W0BJQ....38,208-261-64	W1NJM....30,609-251-57
W1OJM....38,003-294-61	W2TPJ....30,525-235-55
W2EQD....36,698-271-59	W0CDP....30,149-218-57
W1EOB....36,540-262-60	W4ILE....30,031-212-59
W8GSJ....36,036-231-66	

### BRIEFS

W4KFC, Virginia SCM, sends us the following statistics which some of you married OMs might wish to quote to your long-suffering XYLs: W4JFE (ex-W6FZH) in his first year of operating from Falls Church, Va., tallied about 1340 operating hours, had 2476 DX contacts and 1422 W/VE QSOs, worked 150 countries (108 confirmed) and made WAC on 7, 14 and 28 Mc.

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W0GZD reports a rather uncommon event, an all-call-area 75-meter round table on January 11th between 0020 and 0120 CST. All signals were Readability 5 and conditions were exceptionally good. The following participated: W1AR, W1ORO, W2JBF, W3FSW, W4JQY, W5NU, W6BXT, W6HBT, W6PLY, W7LFA, W8QJR, W9IDZ, W0GZD, W0IFX and W0SQQ.

## BRASS POUNDERS LEAGUE

Winners of BPL certificates for January traffic:

Call	Orig.	Del.	Rel.	Extra Del.	
				Credit	Total
W6CE	22	21	878	18	939
W4PL	30	226	460	205	921
W5CJJ	112	126	552	126	916
W5GUD	605	107	117	0	829
W1IIN	46	327	58	320	751
W7CZY	46	46	650	4	746
W0HMM	27	37	638	1	703
W7CKT	2	8	656	6	672
W7BED*	0	0	616	0	616
W5LUX	207	163	50	158	578
W8UUS	212	185	60	70	527
W8WXO	36	19	435	19	509

The following made the BPL for deliveries:

K5NRL 296	W0CXF 137	W3ECP 105
W0EQD 257	W2QHH 126	W4BAZ 104
W1NJM 185	W6DDE 125	W7ZU 104
W4BAQ 154	W5JYW 123	

A message total of 500 or more or 100 "deliveries plus extra delivery credits" will put you in line for a place in the BPL. The Brass Pounders League listing is open to all operators who qualify for this monthly "honor roll."

\* December traffic.

## TRAFFIC TOPICS

This column in the future will not only continue to carry general news of traffic nets, but will also contain an occasional blurb commenting on good or bad practices observed in the traffic nets throughout the country. *This is your traffic column*, and we want news and comments from you. There is always plenty to talk about in traffic circles, and this is the place to bring good ideas to the fore. We'll write the column, you send in the dope. Okay?

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A word about "net-hopping." Some traffickers spend most of their evenings going about the band reporting into first one net, then another. Object: to collect traffic for their area, or to get rid of traffic on their hook. This practice has both good and bad features, and we suggest that it be done only with due consideration for the net involved and its NCS. In the first place, some nets are "closed" and do not want outside QNIs. Before reporting in, first try to determine if you are listening to that kind of net, and if you are, *don't* QNI. Secondly, assuming that the net is "open," or at least has no particular objection to "outside" stations reporting in, do not QNI unless (1) you have traffic that you are sure can be cleared in that net or there is traffic on the net which you can clear but appears to have no other outlet, and (2) you can QNI within a reasonable time after the net convenes. Then, before reporting in, *listen* to find out who is NCS (don't break into a net with "QNN?"), whether the channel is busy, and whether the NCS is receptive

to new QNIs. When reporting into a net of which you are not a regular member, always indicate your location (by state or section) or your net affiliation, or both, in addition to the usual formalities, for example: "W3ABC DE W4XYZ QNI NC TLC QRU K." Once you are *in* the net, behave yourself. You are a visitor.

Some traffic nets make a policy of sending representatives around to various other nets in order to clear traffic both incoming and outgoing. This idea has some merit, but should not be worked to death as it sometimes is. Section nets, for example, have regular members with certain traffic outlets, and these members often resent their outlets being "short-circuited" by QNIs from outsiders. We suggest that it would be wisest policy for nets *not* to send representatives to other nets unless an agreement exists between the nets concerned. Of course many of these ethical considerations go out the window in an emergency, when your best guide is your own best judgment.

Do you know how to count your traffic total? Good! Not everybody does. It has recently come to our attention that some stations have been robbing themselves of points by counting each relayed message *one* point when it should be counted *two*, one when received and one when sent. And some have been failing to give themselves an extra delivery credit for deliveries outside their stations. If you are not sure how to count up your traffic total, read up on it in *Operating an Amateur Radio Station* (p. 12) or in the *Handbook* (p. 524). Don't cheat yourself.

More provisions are being made every day for the benefit of those amateurs interested in traffic handling who lack the ability or the inclination to operate at speeds above 20 w.p.m. We record the latest herewith:

From W0NCV, Kansas RM, comes the info that the Kansas Traffic Net (QKS) has formed a slow-speed net known as the Kansas Slow-Speed Traffic Net (QKS SS) with meetings Tuesdays and Thursdays at 1846 CST on 3610 kc. W0WGM will be NCS. Sez the Kansas RM: "Maximum speed will be 13 words per minute and all amateurs, whether traffic men or not, are welcome to participate. Regular QKS members, when working in QKS SS, are cautioned to observe the maximum speed regulation, even when working another 'high speed' station."

The New York State Net (NYS) also has formed a slow-speed section which meets on

The wide-awake RM of the N. Y. C.-L. I. Section is George Cooke, W20BU, Bellerose, L. I., N. Y. George is also ORS, Asst. SEC. member of the A-1 Operators' Club, RCC, AEC, holds a 30-w.p.m. Code Proficiency Certificate, and is president of the Lake Success Radio Club. He is looking for Utah and Wyoming for his 3.5-Mc. WAS.

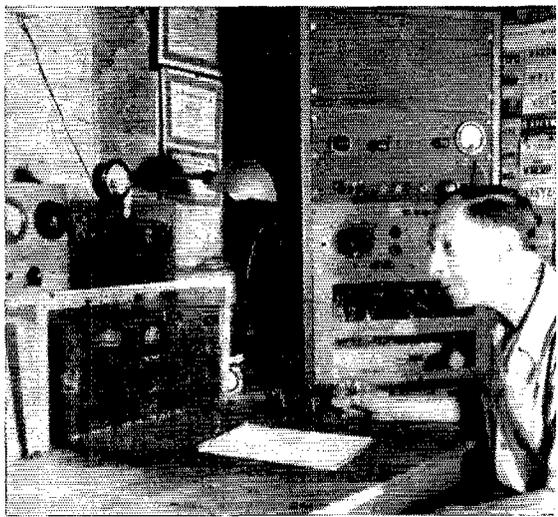
3720 kc. at 2100 EST daily except Sunday. W2ITX says, "This QRS net will give those desiring to break into net operation a chance to do so rather painlessly."

The N.Y.C.-L.I. Traffic Net (NLI) has invited all amateurs who have traffic to report in regardless of code speed, as follows: "If you have traffic, report into the net regardless of code speed and you will receive courteous cooperation from our net control stations." Meeting place is 3710 kc. at 1900 EST Monday through Friday.

Trunk Line I is doing a bang-up job as the trans-Canada trunk. Traffic for Canada may be routed through this trunk for speedy delivery in each province. Connections are maintained on the West Coast, Middle West and East Coast.

W1JE, in his Swing-Shift Net bulletin, calls attention to the fact that many net stations take considerable liberty with the FCC regulations concerning identification. Complete identification of both stations involved in any amateur communication must be given both at the beginning and end of each transmission of more than three minutes' duration, never less than every ten minutes, and at the beginning and termination of the contact. All netters should contrive to observe this requirement on pain of possible citation.

Must we depend on fairs, expositions, seasonal rushes and special events to swell our traffic totals? How about originating some? Many are the relay stations who make BPL every month but originate a mere pittance of traffic themselves. How about some overseas schedules to handle and solicit traffic to and from areas in which it is legal? Before the war we used to be deluged with traffic from Hawaii. Could we maybe drum up some business out that way? Guam? GI-Japan and near-by islands? Canal Zone? The late lamented DX Contest has shown that there are stations alive at those places; all we have to do is get them to handle some traffic. Can anyone report some progress on this? We would be much interested.



**WITH THE A.E.C.**

The following is extracted from a letter from SCM Woods. Does it strike home? "I want to report that one day this month an incredible thing happened in this city to accentuate the importance of stand-by power supplies. All the power in the city went off for 15 to 20 minutes and apparently the power company was unable to tie in from another source. So it DID happen here — and the implications are nefarious. Hitherto I had regarded the possibility of this city being vulnerable to a power cut-off as being so remote as to be disregarded. But right in the middle of an average day, with no storms going on, our power went out. Sabotage could achieve identical results. The positive requirement for emergency power is thus defined."

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The imminent reopening of the 1.8-Mc. band gives all of us who take a serious interest in the emergency communications efforts of the amateur service something to think about. Many of the 3.85-Mc. emergency 'phone groups which have experienced difficulty from QRM due to the long-distance-and-high-power "situation" on "75" will welcome the opportunity to obtain a "low-power" and comparatively short-distance channel for use both during drills and emergencies. It would also permit amateurs without Class A tickets to participate in low-frequency 'phone-emergency-net drills again.

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A combined CAP-Red Cross-ARRL simulated emergency test was held in northern New Jersey on December 4th and 5th. An "atomic-bomb attack" on New York City and northern New Jersey provided the participants with plenty of training for possible future eventualities. W2s CMO, DAE, DHJ, ENU, HRN, OEW, OYH and WKL provided the bulk of the amateur communications involved.

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Why not "AEC/BPL" after your call? In accordance with the announcement in January QST, permanent BPL membership is open to any amateur who once attains BPL standing. Each AEC member should strive to make BPL at



- GENTLE PERSUASION IS THE BEST A.E.C. RECRUITING METHOD

least once a year in order to get the feeling of the handling of third-party traffic in real quantity. Remember, in emergency you may have to make BPL two or three times over. Are you sure of your ability to handle record traffic?

**JANUARY FMT RESULTS**

The ability of many amateurs to measure the frequency of radio signals with considerable accuracy was convincingly demonstrated in the First 1949 ARRL Frequency Measuring Test, January 18th. Entries were submitted by 85 official observers and 97 non-observers in the competition for two electric-clock awards. A report comparing the accuracy of his measurements of the special W1AW FMT transmissions with those of a commercial frequency-measuring laboratory has been sent to each participant. The following frequencies were used by W1AW in this test:

3502.687	3649.597
7199.000	7119.917
14,097.548	14,150.709
28,359.192	28,160.600

Leader in the OO group and winner of a clock award was Harold R. White, W2MRG, who entered the most accurate set of measurements reported thus far in any postwar test — 0.168 part per million! Lloyd W. Root, W3HB, won the award in the non-observer category. Lloyd now has two of the nifty time-switch type clocks; he won his first in the January 1948 FMT.

The standings of other leaders in the test are given below. In accordance with the announced rules, no entry covering a single measurement was considered eligible in the prize competition.

**LEADERS**

Observers	Parts/ Million	Non-Observers	Parts/ Million
W2MRG.....	0.168	W3HB.....	1.7
W0OTR.....	0.6	W2CVV.....	2.0
W9CIH.....	0.9	W2IWH.....	3.3
W1VW.....	1.1	W8GX1.....	3.3
W2BF.....	1.4	G66IS.....	3.4
W2WOQ.....	1.5	W6LFE.....	3.6
W2RYT.....	1.7	W8TDO.....	3.6
W2OUT.....	2.2	W3IGX.....	5.4
W9WEA.....	2.3	KZ5AX.....	6.5
W1MUN.....	2.4	W6AXV.....	6.7
W1BKG.....	4.1	W4NRB.....	8.4
W2ZT.....	4.2	W9PVA.....	9.3
W2BEI.....	5.2	W9GFF.....	12.0
W3JDM.....	6.1	W0GMI.....	12.0
W5BKH.....	6.1	W3MCG.....	12.6
W1BFT.....	7.2	W2TBQ.....	13.2
W2AIQ.....	9.0	W4ZV.....	13.6
W0TKX.....	9.6	G6PF.....	14.8
W6GC.....	10.1	W1ODU.....	15.5
W3VNE.....	10.1	W9MDG.....	16.7
W0IWE.....	11.4	W6QM.....	17.2
W2ATE.....	12.7	W8JUJ.....	17.8
W6GTE.....	13.9	W3KNT.....	18.6
W7KL.....	13.9	W3KXP.....	19.0
W4IYC.....	18.1	W7HCV.....	19.8

The following ratings are based on a single measurement: OO's — W4OLL 6, W7CKZ 17.3, Non-OO's — W0HY 1.4, W8ZCJ 2.3, W1JAK 3.4, W8TDJ 12.0, W1LNI 14.9.

## 28-MC. CODE-PRACTICE STATIONS

Subsequent to the listing of code-practice stations on page 64 of February, 1949, *QST*, some additional stations have volunteered. They are listed herewith:

W1ROF, Robert S. Hardwick, 122B Niagara St., Middletown, R.I., 28,688 kc., Thursdays, approx. 9:30 P.M. EST.

W2ZOA, Andrew Jackson High School Amateur Radio Club, 116th Ave. and Francis Lewis Blvd., St. Albans 11, N.Y., 29.5 Mc., Mon., Wed., Thurs., 1:00-1:30 P.M. EST.\*

\* Supersedes February *QST* listing.

W7ADX, Herbert S. Clarke, 651 N.W. 7th, Pendleton, Ore., 29,250 kc., Tues. & Thurs., 12:00-1:00 P.M. PST, 6-8 and 12 w.p.m.

W9EUC, Lawrence S. Flannery, 1318 Minton Dr., New Albany, Ind., 28,602 kc., Mon., Wed., Fri., 9:00 P.M. CST.

Schedules of stations sending code practice on 28 Mc. and higher will be recorded on these pages from time to time. Complete information and suggestions for sending such practice are available upon request. Stations listed above, and those listed in February *QST*, would be glad to get reports from listeners.

## DX CENTURY CLUB AWARDS

DXCC Certificates based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below. The countries-worked totals indicated have been certified by examination of written evidence under the award rules as published in March, 1947, *QST*.

### HONOR ROLL

W1FH.....213	G2PL.....194
W3BES.....197	W4BPD.....188
W2BXA.....196	W2AQW.....187
W8HGW.....196	W3GAU.....186
W6VFR.....194	W1CH.....184

### NEW MEMBERS

W2ZA.....124	W4CYC.....105
W3OCU.....122	W2NFR.....105
W9CYU.....117	W8WUU.....104
W4HA.....115	W6EPZ.....104
W1PKL.....114	W2ICO.....104
W2GUR.....111	W5GEL.....104
W5CEW.....110	W6BAX.....103
W1FTX.....110	W6GHG.....103
W1BLF.....110	W4KVX.....103
W9PSR.....110	W9YFV.....103
G8IH.....110	MD1D.....103
G3TK.....110	GM6MD.....103
W4VE.....109	W1BFT.....103
W3LVJ.....108	W3AFW.....102
G6KS.....108	G5RM.....101
G5GK.....108	W4DHZ.....101
I1OJ.....108	ZS6FN.....101
W4IUO.....108	W2LTP.....101
G8QZ.....107	W2SGK.....100
W9CKP.....107	G3AAE.....100
W3ALX.....107	W6BUY.....100
OK1WX.....106	W3FQB.....100
W9ABB.....105	W3FLJ.....100
VK2ADE.....105	CE3DZ.....100
W8LFE.....105	W8EYE.....100
W2ADP.....105	W3HRD.....100

### ENDORSEMENTS

W1FH.....213	ZS2X.....171
W2BXA.....196	W2AGW.....171
W8HGW.....196	W3BVG.....170
G2PL.....194	ZL1HY.....170
W2AQW.....187	W1ME.....170
W3GAU.....186	W3IYE.....169
W3GHD.....184	W6MJB.....168
G6ZO.....182	W4CYU.....167
W3JNN.....180	VE7ZM.....167
W2GWE.....180	W2IOP.....166
W1TW.....180	W2CYS.....165
W2QKS.....179	W2HZY.....165
G6RH.....179	W6MX.....162
W3KT.....177	W6GHU.....161
W6SN.....173	W2DS.....161
W3CPV.....173	W2COK.....161

W9KOK.....160	W4FVR.....132
W1ADM.....160	PA0GN.....131
W2NSZ.....159	W6TI.....131
W3KQF.....158	ZL2QM.....131
W6NNV.....157	W3BXE.....130
W2SAI.....156	ON4QF.....130
W5FNA.....153	G5OO.....129
W1AXA.....152	W4FIJ.....127
W6AM.....150	W1FJN.....126
W3FGB.....146	W9LNM.....123
W2QHH.....146	W2RGV.....123
W6OMC.....146	OZ7EU.....121
W7DL.....144	W7GU.....121
W6BPD.....143	J2AHI.....121
VK2DI.....140	ZS6CZ.....120
W7GUI.....140	KH6IJ.....120
W6RM.....140	W6IBD.....119
W2TQC.....140	W6CIS.....119
W6KUT.....139	G6LX.....116
W2UFT.....138	W3IXN.....116
W3OP.....138	HB9FE.....113
G4CP.....138	W3BEN.....112
W5CPI.....134	W3ZN.....111
G4JZ.....133	W3KZQ.....110
W6SRU.....133	VE8IJ.....110

### RADIOTELEPHONE HONOR ROLL

W1FH.....173	XE1AC.....140
W6DI.....150	W8HGW.....140
W4CYU.....146	W2BXA.....139
W1JCX.....143	W2AFQ.....139
G2PL.....142	W1HKK.....133

### NEW MEMBERS

W8BKP.....113	W8NXF.....102
W3FGB.....110	W4AQR.....102
W3MWP.....108	W0VSK.....101
W4HA.....108	W8BIQ.....100
G5OO.....103	W9CKP.....100
W2DYR.....102	G6LX.....100

### ENDORSEMENTS

W1FH.....173	W1NWO.....131
W4CYU.....146	G2ZZ.....131
G2PL.....142	W8EB.....131
XE1AC.....140	W3JNN.....128
W8HGW.....140	W1LMB.....125
W2BXA.....139	ZL1HY.....122
W2AFQ.....139	G6RH.....120
VQ4ERR.....133	W9RBI.....120
W2APU.....132	G4JZ.....105

## A.R.R.L. ACTIVITIES CALENDAR

Apr. 3rd: CP Qualifying Run — W6OWP  
 Apr. 18th: CP Qualifying Run — WIAW, WØTQD  
 Apr. 23rd-24th: CD QSO Party  
 May 6th: CP Qualifying Run — W6OWP  
 May 20th: CP Qualifying Run — WIAW, WØTQD  
 June 3rd: CP Qualifying Run — W6OWP  
 June 4th-5th: V.H.F. Contest  
 June 15th: CP Qualifying Run — WIAW, WØTQD  
 June 18th-19th: ARRL Field Day  
 July 2nd: CP Qualifying Run — W6OWP  
 July 19th: CP Qualifying Run — WIAW, WØTQD  
 July 23rd-24th: CD QSO Party  
 Aug. 7th: CP Qualifying Run — W6OWP  
 Aug. 18th: CP Qualifying Run — WIAW, WØTQD

— . . . —

First Saturday night each month: ARRL Officials Nite (get-together for SCMs, RMs, SECs, ECs, PAMs, Headquarters Staff, Directors, Alternate and Assistant Directors).

## CODE-PROFICIENCY PROGRAM

The next qualifying run from WIAW/WØTQD will be made on April 18th at 2200 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from WIAW will be 3555, 7215, 14,100, 28,060, 52,000 and 146,000 kc., from WØTQD 3534 kc. The next qualifying run from W6OWP only will be transmitted on April 3rd at 2100 PST on 3590 and 7248 kc. For additional dates, see the ARRL Activities Calendar elsewhere in these pages. These W6OWP-only runs will have different text from the runs sent by WIAW and WØTQD, but copy will be handled in exactly the same way as the transmission from WIAW and WØTQD.

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 five speeds transmitted, 15 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 are made from WIAW each evening, Monday through Friday, at 10:00 P.M. EST. References to texts used on several of the transmissions are given below.

Date Subject of Practice Text from February QST.  
 April 3rd: Qualifying Run, 1900 PST, from W6OWP only  
 April 5th: *The "Little Slugger,"* p. 11  
 April 8th: *A "Plumber's Delight" Beam for 14 Mc.,* p. 18  
 April 11th: *A Compact Converter for 6 and 10,* p. 23  
 April 14th: *The Military Amateur Radio System,* p. 34  
 April 18th: Qualifying Run, 2200 EST, from WIAW and WØTQD  
 April 20th: *"Souping Up" a War-Surplus HRO,* p. 39  
 April 22nd: *The World Above 60 Mc.,* p. 42  
 April 26th: *The Invisible Antenna,* p. 46  
 April 28th: *Operating News,* p. 62

## CORRECTIONS & ADDITIONS, FD RESULTS

In the Twelfth ARRL Field Day results (Feb. QST) the score of the Nassau Radio Club, K2AC/2, was incorrectly listed as 2025. We hasten to credit this group with their correct total of 6345, sixth place in the 5-transmitter class and highest East Coast score. The following scores were inadvertently omitted: in the nonclub class WØUCU, manned by ten operators using three 100-watt rigs, made 419 QSOs for 2434 points; in the two-transmitter club class W3KT/3, operated by ten members of the Frankford Radio Club, had 458 contacts for 4527 points; the Helix Amateur Radio Club scored 8335 from 575 contacts, used seven rigs, each running 30 watts or less input.

## ELECTION NOTICE

(To all ARRL Members residing in the Sections listed below:)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nomination form is suggested:

Communications Manager, ARRL [Place and date]  
 38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the . . . . .  
 . . . . . ARRL Section of the . . . . .  
 Division, hereby nominate . . . . .  
 as candidate for Section Communications Manager for this  
 Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

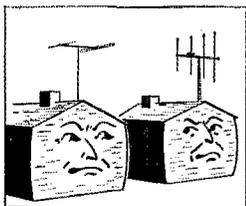
— F. E. Handj, Communications Manager

Section	Closing Date	SCM	Present Term Ends
Maine	April 15, 1949	F. Norman Davis	Feb. 17, 1949
Utah-Wyoming	April 15, 1949	Alvin M. Phillips	May 1, 1949
Wisconsin	May 2, 1949	Reno W. Goetsch	May 12, 1949
Nebraska	June 1, 1949	William T. Gemmer	June 16, 1949
Iowa	June 1, 1949	William G. Davis	June 16, 1949

## ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

Philippines	M/Sgt. Stanley J. Gier, KA1AI	Nov. 15, 1948
Hawaii	Dr. Robert Y. Katsuki, KH6HJ	Jan. 14, 1949
Michigan	Robert B. Cooper, W8AQA	Feb. 17, 1949
Minnesota	John B. Morgan, WØRA	Feb. 17, 1949



"TV or not TV, that is the question!" in the minds of many people today, but with the amateurs this is changed slightly to "TVI or not TVI." That is the question that is bothering more and more hams with each passing day. Unfortunately, the average manufacturer does not look at amateur interference as being of primary concern. Here at National, however, the engineering, testing and production ranks are bulging with radio amateurs. One by-product of this is the care given to the design and testing

of the amateur section of our communication receivers. After having first-hand experience with TVI, (I am still trying to find out why my two meter second multiplier messes up Channel 7!) it is only natural that we should give more than passing attention to the possibilities of TVI when we set out to design and manufacture our own television receivers. This was the prime reason why we chose to use a 35 mc. instead of 25 mc. intermediate frequency, for example. When the new fifteen meter band is opened for amateur use, the anticipated QRM due to direct I. F. pick-up in receivers using 25 mc. I. F. will not occur with users of National television receivers. The higher I. F. also means a higher image ratio and therefore better rejection of ham signals or harmonics landing on the image of the channel being used. Double band-pass tuned circuits and tuned R. F. input circuits further improve this image rejection and reduce the possibility of cross-modulation.

Of course, much as we would like to be able to do so, we still cannot design a receiver which will distinguish between a television carrier and an amateur harmonic when *both* are on the same frequency or channel. We're afraid that from here on it's up to the hams.

We feel that one approach to eliminating harmonic trouble lies in not generating the harmonic in the first place. For example, the higher the crystal frequency, the fewer the number of harmonics generated and the farther apart they are, making them more susceptible to elimination by tuned circuits.

The writer's present six meter transmitter messes up Channel 4 quite thoroughly while the two meter transmitter bothers Channel 7. Both of these transmitters use crystals between 5.3 and 6 mcs. and the interfering harmonics are coming from the *early* stages of the exciter. Both rigs will be rebuilt using 25 mc. crystals with which the previously noted harmonics will not be generated. It is better not to generate a harmonic than to try to get rid of it after it is found to be bothersome. Incidentally, the 220 mc. transmitter does not show signs of interference on *any* channel even though the two antennas are less than fifteen feet apart. Of course, my television receiver is a National!

For some time now, quite a controversy has been raging on the VHF bands as to whether vertical or horizontal polarization should be used. TVI is becoming an important factor in the final choice of polarization. Of course, if the interfering signal is being radiated directly from the early part of the transmitter without observing the formality of being radiated from the antenna, then polarization does not enter the picture. But if the interference is due to the signal radiated from the antenna, then polarization becomes important. The New York boys claim that, on two meters at least, up to 20 DB reduction in this interference can be had by using cross-polarization. Since the TV boys have chosen horizontal, it looks as though we were stuck with vertical as best choice from this point of view. Hmm! Personally, I prefer vertical.

CAL HADLOCK, W1CTW

We've just been reminded by C. C. Miller, W2RDK, that we're celebrating an anniversary. Sure enough—as of this month we have monopolized this page for 15 years! Sometimes we wonder if it serves a useful purpose for which it was intended. W2RDK assures us that it does. We would like to keep going if you fellows think the stuff is worth reading. What say?

W. A. READY



• 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, Jerry Mathis, W3BES — MET is doing a conscientious job as OO. AQN reports 24 full AEC members in York with 10 supporting, and an average attendance of 15 in the net drills. Drills are held twice a month. The frequency meter at EU went sour one minute before the Frequency Measuring Test. ITZ has replaced IUD as secretary-treasurer of the West Philadelphia Radio Assn. LTU says the new DX Club will make its efforts felt in the coming contests. He has done a fine job of organizing. The Harrisburg Club now has more than 50 members and has a 144-Mc. net on 144.1 Mc. HWN is Net Control. Harrisburg amateurs are invited to attend the meetings held the last Friday night of each month at the Harrisburg Y.M.C.A. ASW gets 250-cycle selectivity from his s.s.s.c. ADE handled the Governors-President Relay for Pennsylvania. The York Road Radio Club's new bulletin, QUA, is edited by LVF and is full of club news of particular interest to members. OGB will show a movie of the Philco microwave relay system. Future meetings will feature talks by representatives of National and Millen Companies. Traffic: W3NHI 141, CUL 95, DZ 63, EU 63, ELI 44, VMF 44, QNH 30, AQN 14, ADE 13, GDI 11, WTS 9, OML 7, VR 6, CAU 2.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA** — SCM, Eppa W. Darne, W3BWT — The Washington Mobile Radio Club's January activity, on the 19th, was a roll call and message exchange between mobile units in the Washington area, with the city divided in two parts. KBE was Net Control Station. The Club's regular meeting featured a technical discussion and demonstration of the new gadget permitting club members operating mobile to raise fixed member stations at any hour, day or night, in an emergency. The Washington Radio Club's first January meeting was an auction of spare parts. Chet Cunningham, MHW, was auctioneer. Much gear changed hands and the club's treasury benefited considerably, with the ten per cent "take" on each sale. The second January meeting was movie night; subjects of the film were tube theory and submarine warfare in the recent war. Members of the Baltimore Amateur Radio Communications Society participated in a 28-Mc. two-way contact demonstration between mobile units in the city and a fixed station at the Main Enoch Pratt Library. This was in conjunction with the Maryland Academy of Science's amateur program on "most useful and distinctive hobbies" which was broadcast over WBAL on Jan. 27th. Charles Landis, W3UA, was guest speaker, and his topic was "Ready and Standing By." Following this, ten-minute QSOs took place between the fixed and mobile stations. The club sponsored a social and dance on February 5th at Workmen's Hall. The Delaware Amateur Radio Club's February 3rd meeting consisted of a business meeting, swap night, rag chews, eats, and a talk on television by Justis, EKB. JHW has been working some nice DX on 3.5-Mc. c.w. MTQ is on 28-Mc. phone. LFG has been appointed ORS and OBS. NB and MCG are newly-appointed ORS. CIJ has been appointed Emergency Coordinator for the Hagerstown, Md., area, and also is ORS. KRJ has perfected a method of predicting 144-Mc. openings as accurate as Weather Bureau predictions. EYX schedules 1RJV and has been getting DX on 7 Mc. LVJ received his DXCC Certificate. CIJ schedules VP4TZ and is on 7- and 14-Mc. c.w. ENR and ODL are planning a trip to Delaware shortly to use their 28-Mc. mobile rigs and work some of the gang out West for WAS. OFG is building a new rig for 'phone and portable work. EFZ has moved to Virginia. DK is new OBS in the section. CJS recently made WAS. EIS has been appointed Section Emergency Coordinator. Traffic: W3AKB 398, ECP 38, GZH 372, MJO 66, OFG 64, BWT 53, JZY 53, NP 23, QI 21, HWY 20, MYM 14, MCG 10, AKR 5, CJS 5, EYX 5, CIJ 3, LVJ 2.

**SOUTHERN NEW JERSEY** — SCM, G. W. (Bill) Tunnell, W2OXX — The Hamilton Township Club magazine *Scuttlebutt* reveals the following: New officers are: TGC

pres.; DET, vice-pres.; 3MVG, secy.; TDU, treas. UNT, sgt. at arms. ZNO is a new ham as a result of a class sponsored by this club. A recent family night was a success with ninety attending. The Delaware Valley Club will sponsor its fifth annual Old Timers Nite at the Stacy Trent Hotel, April 9th, 6:30 p.m. Contact ZI for details. The Lakeland Club reports the following new officers are now in office: PEV, pres.; SEZ, vice-pres.; WCM, secy.; YXR, treas.; RGV and FQS, act. mgrs. RFF applied for an ORS appointment. UKS says that his new n.f.m. equipment is working fine. In addition he now has WAS mobile. YAO converted his basement into a nice shack. VUM has a new 152A converter. Prewar 3VW now is K2BG. ZNB and ZNF are new hams in Delanco. SXX applied for MARS. BEI continues his emergency practice on 3.85-Mc. phone. 3NF/2 has a new VFO and is planning an emergency net. ZI handled the New Jersey GPR message; he has copies of the GPR messages which he sent to Hoover and Coolidge. SJRA piled up an excellent VHF SS score according to the club's contest manager. PAU, FXX is experimenting with 144-Mc. converters. OSV is making commendable progress with his emergency group. Several practice drills have been held and a regular schedule is in the making with ample provision for fun. Traffic: W2ZI 46, 3NF/2 35, W2QUEH 32, RG 19, BAY 18, BEI 9, SXX 8, ORS 7.

**WESTERN NEW YORK** — SCM, Harding A. Clark, W2PGT — SEC: SJV. RM: FCG. New officers of the Sidney Amateur Radio Club are: AU, pres.; CYV, secy.; and George Horton, treas. The Rochester Amateur Radio Club will hold its annual hamfest on May 14th in the Powers Hotel; \$3.50 in advance and \$3.75 at the door. More details next month. New calls in Watertown are ZSE, ZSK, ZSC, ZIT, and ZIE, who joined the Army. UPH lost half his beam in recent 65-m.p.h. wind. He says it is better to let the boom swing with the wind than to lash it tight. KBT's annual Monte Carlo night was a big success. PZB, ex-D4AEH, now is living in Buffalo and gave a demonstration of Geiger Counter at RAWNY meeting. PUT is running code classes Mon., Wed., and Fri. at 9 p.m. on 28.6 Mc. BAZ is back on the air and is having good success with 14-Mc. vertical "YF" antenna. New ECs are: HQB, Tompkins County, and JRF, Massena. ZRC and ZRW are new calls on 144 Mc. in Buffalo. RUF instructs code class at RAWNY meetings. QHH proves that DX men can handle traffic by making BPL — and he still finds time to add new countries. WLR is having trouble eliminating car noises in mobile receiver. WSZ announces the arrival of a baby YL. RTX lost his 70-ft. tower and beam in windstorm. Rochester v.h.f. group has been formed with 14 active stations on 144 Mc. and has become affiliated with RARA. ZPP and ZRO, brother and sister, are new calls in Scottsville. RLI sticks with 50 Mc. and works some DX. NES is using new six-element beam on 144 Mc. with an SCR-522. PWY and VWX are on 3.85-Mc. mobile. OVP gave a talk on s.s.s.c. at recent Niagara Radio Club meeting. QNA had a barrel of fun in the VHF Sweepstakes. IGI is rebuilding. IFW is building all-band rig. VEN is building new de luxe double conversion superhet for 28 Mc. QBZ keeps activity going on 144 Mc. in Ithaca. Traffic: W2RUF 365, WFU 233, QHH 221, PGT 193, WOE 75, SJV 72, YGW 64, VIQ 47, WZQ 43, QZI 31, RZP 18, FCG 13, USO 4, BLO 3.

**WESTERN PENNSYLVANIA** — SCM, Ernest J. Hlinsky, W3KWL — EC: UST. PAM: AER. RMs: NUG, TOJ. Several new calls popped up to bolster the v.h.f. active list. Along this line was LWN, who claims hearing only CUM and LAT outside of the Pittsburgh stations. *The ATA News*, edited by LFK, tells us the annual SHBP&M Hamfest will be held the second or third Sunday in August. The ATA has a good program called "Gadget Night," when gadgets constructed by club members are shown. AER has a super-deluxe homebrew receiver. PAP, the son of VZA, is a new-comer. RAT's new QTH is in the land of snow and California Kilowatts. IWH hopes his surplus 50-kc. frequency standard will keep the Polecat Net on frequency. The Polecat Net operates on 3695 kc. each Sunday from 11:30 to 1:00. Those active are KKA, NUG, IWH, NRB, UHN, YDJ, USM, and LFK. LOC constructed a swell mimeograph viewer for the club paper. KSR and AVY came to life in the ARRL Party. OD is working hard to keep the new Kensington Club rolling. OB is catching up on his QSL cards since inaugurating the "McKinley Stamp." Congrats to the following clubs for their last Field Day efforts: The ATA, Steel City Radio Club, Mon-Yough ATA, South Hills BP&M, the Mercer County Radio Assn. Congrats to UHN for his Navy Day perfect copy. LSS is now at new QTH. LGL is now in Charleroi. KSI is heard on 28 Mc. KFB is sporting a new QTH. AER has turned expert in curing T.V.I. KQR transferred from Eastern Pennsyl-

(Continued on page 64)

# VARIACS



## For Smooth, EFFICIENT VOLTAGE CONTROL

● THE VARIAC — the original continuously adjustable auto-transformer — is designed to give years of trouble-free service. The Type V-10 (*illustrated*) will handle up to 1.725 kva . . . meeting the total voltage-control needs of most amateur stations. It can be used for either behind-the-panel or table mounting. Unique unit brush construction makes brush replacement simple without tools; new molded terminal plate with barriers to prevent short-circuits; both solder and screw terminals provided; wiring diagram on terminal plate shows normal voltage between terminals; large, easy-to-grasp knob with extra large voltage calibration figures easy to read at a distance . . . these are only

some of the many features found only in the VARIAC.

The Type V-10 has a rated current capacity of 10 amperes and a maximum of 15. Its no-load loss is only seventeen watts, compared to the usual high loss in a rheostat type of control. Output voltages are essentially independent of load with the VARIAC. VARIACS are correctly designed to provide the ideal method of varying a-c voltage . . . and to give output voltages 17% higher than that of the line.

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vanis to our section. UVD says the gang around Jeannette is active. LOE's DX total is 203 countries. VNE finds his new QTH to his liking. TTN works 7 and 28 Mc. NJH is studying hard for his commercial ticket. ORP has a 600-watt 'phone rig on 28 Mc. GRZ has a VFO on every band down to 28 Mc. MKH says he likes the 144-Mc. band. In Mercer County the MCRA is making big plans for Field Day. NDD is doing a nice job as program chairman. The nightly club schedules on 144 Mc. and 3610 kc. are kept regularly and v.h.f. stations are urged to beam their way at 9 p.m. each night. My heartiest thanks to each one of you for your splendid cooperation. Traffic: W3KKA 131, GEG 69, KWL 52, NCJ 33, NUG 30, AER 14, LIW 6.

### CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — Net frequencies: ILLN, 3765 kc.; IEN, 3940 kc. RMs: KQL and SYZ. PAM; UQT. SEC: QLZ. Illinois 28-Mc. emergency calling frequency now is 29,640 kc. Chicago Area ECs met with EVJ at DUA and discussed plans for an extensive emergency set-up. Those in attendance were BUK, LLX, MDO, LQP, NUX, OLU, SW, HXE, SYZ, and many members of the Amateur Radio Emergency Assn., Navy and Naval Reserve, and three major railroads. Newly-elected officers of the Illinois Valley Radio Assn. are: PBY, pres.; OBB, vice-pres.; ACJ, secy.; OLM, treas.; IQC, code class instructor. QKL and JVC are brassing around on 3.5 Mc. OBB is active on 7 Mc. IZY is proudly sporting a new receiver. EVJ lacks one state for WAS. ZPC is getting ready to knock 'em dead with high power. FRP rarely misses a night on ILLN. FED has been confined to his home since the holidays. YTV can't find time for radio. ASN is going on 144 Mc. soon. EBX sends in a nice traffic total. FVJ worked 3RUE during the Aurora, a distance of about 430 miles, and now has 9 states on 144 Mc. FKI has eight. KQL is fighting key clicks. HON is having a succession of rig troubles. OLU reports ZULV now is QBJ again and 2RVE now is PEI upon return to Wilmette. HKA will soon have a separate rig for 28-Mc. 'phone with four-element wide-spaced beam. RSM reports new antenna has both ends off the ground. BRY had a siege of the fu. The wind took down his 3.85-Mc. Zepp and 144-Mc. beam. DBQ went to California for a vacation. VOQ is awaiting the arrival of a pair of 4-65A tubes. DJG's XYL has been in the hospital for several months. We wish her a speedy recovery. The Kickapoo Radio Operator's Club has the following new officers: SXL, pres.; MMH, vice-pres.; CFV, secy.-treas. MRT retires to the board of directors. NN is our most active OO and sends in a lengthy report. DXL had 4BAG as a visitor during his recent trip to Chicago and worked ZL2WP on 7 Mc. BPT is the only active ham in Carroll County. KPQ is attending Beloit College. SYZ complains of lack of traffic. WEA is having landlord trouble and the antennas may have to come down. LQP has a new rig on 3.5 and 3.85 Mc. and an HRO. BRX bought a t.v. set to study T.V.I. problems. NIU's XYL gave him an ARC-5 a year ago and he has finally started to work on it. AQH has new rig nearly completed but can't find time to work on it. FLQ nearly beat KQL in traffic this month as he predicted. The Chicago Area Radio Council will have a booth at the World Hobby Show in Chicago. Equipment will include 28-Mc. 'phone and 3.5-Mc. traffic station. (BPL here we come!) TWM reports ULL has new Subraco 75T transmitter and is active on 3.85-Mc. 'phone. NON is very active in EC work in Kankakee County. MZW was so eager to crash the recent LO-Nite that he put the antenna up after dark. Traffic: (Jan.) W9EBX 375, KQL 176, FIQ 174, EVJ 156, SYZ 35, DUA 54, CMC 37, CTZ 37, SXL 37, BUK 36, CBA 28, RSM 26, LQP 24, ASN 16, DXL 14, FRP 14, LIN 12, ZPC 12, MRQ 9, AQH 8, VOA 7, APK 6, DJG 6, BRY 4, HKA 3, VOQ 3, FKI 2, HON 1. (Dec.) W9BRY 6, FKI 3.

INDIANA — SCM, Charles H. Conway, W9FSG — UKT is teaching f.m. and t.v. at Kokomo night school. The Kokomo Radio Club has been approved for affiliation with ARRL. SNQ has new Meissner Signal Shifter. EQN joined the Emergency Corps. AB renewed OES appointment. A kind neighbor who owns a t.v. receiver discovered that EQG has parasites. EVC schedules Puerto Rico for traffic to and from Louisville. LPQ has a new two-section 8JK on 14 Mc. that really works. BKJ has gone mobile and finds it to his liking. CKP has 104 confirmed, all on 28-Mc. 'phone. Someone, who wasn't an SCM, once said "No news is good news." The news, then, gets better each month. If anyone has any bad news, please send it to 3335 College, Indianapolis 5, Indiana. Traffic: W9NH 215, TT 112, DKV 48, HUV 44, BCJ 30, EVC 26, BKJ 23, ENB 21, PMT 5, QLW 5, IOH 4, LPQ 2.

WISCONSIN — SCM, Reno W. Goetseh, W9RQM — Newly-elected officers of Central Wisconsin Radio Club are: BDE, pres.; PIW, vice-pres.; OAE, secy.; LDO, treas.; QJW, act. mgr. DJV handled GPR message for Wisconsin. FCF acquired a new VFO, a new bug, and HQ-129. ANM reports lots of emergency traffic this month. LVR is new ORS. UFX is busy with mobile operation. EIZ is looking for a 3775-kc. crystal. CGO uses a 304TL with 600 watts on 14-Mc. c.w. CTD is up to 63 countries with only 20 watts on 28 Mc. I WJH, now OO, took part in January Frequency Measuring Test. LZU, our SEC, and RUF, Milwaukee EC, have done a commendable job in securing the installation

of a complete station in local Red Cross Headquarters. SIZ and the BEN handled traffic for Milwaukee Road during Jan. 21st snow storm. LZU joined MARS. KXK has worked 75 countries. DND is ORS and OBS, with a new kw. rig on all bands. LFK received 35-w.p.m. Code Proficiency Certificate on 6TQD copy. FZC has installed 5' scope for modulation monitoring. VHA augmented OBS schedule on 28 Mc. with 3.5- and 7-Mc. transmission of ARRL Week message. ARE now is IJR in Massachusetts. CIH, as OO, issued 50 cooperative notices in January. FXA and ZTO have new Meissner VFOs. CWZ has been doing an FB job in handling the 6 p.m. c.w. net. BZU is busy getting 144-Mc. rig on the air. The Wisconsin Valley Radio Assn. provided communication for timing the Central U. S. Ski meet on Rib. Mt. FAD is Asst. EC for new 28-Mc. mobile net in Milwaukee. 9 p.m. is "2-meter time in the valley," promoted by WVRA. Look for 144-Mc. contacts at that time from the Wausau area. EWM has new Millen 500-watt final. SFL is active on both the c.w. and 'phone nets. Traffic: (Jan.) W9ESJ 191, SIZ 80, CWZ 51, ANM 40, SZL 38, DJV 36, BVG 25, CBE 25, FCF 24, IQW 24, RQM 18, DND 15, LVR 8, UFX 7, MUM 6, BZU 5, EIZ 4, WJH 4, DKH 2. (Dec.) W9MUM 23.

### DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Bossoletti, W0GZD — New officers of the Jamestown Club are YIZ, pres.; FX, vice-pres.; and EOZ, secy.-treas. AAU is active in the traffic net. RNS has trombone T on 50 Mc. JPW has new SX-42 and leads ZRT a merry DX chase. The Governors-President message was originated by RSW. HIV has new HT-19 transmitter. UNU got a new VHF-152 and is on 50 and 28 Mc. KHG has a new exciter. ZNM, KAI, PGO, and EVQ are mobile on 3.85-Mc. 'phone. WZQ has new 813 final. PPK is on with 300 watts on 3.5 and 3.85 Mc. NRQ is the new call of the Cendak Club station. OZY is a new call in Grand Forks. NBS put up a "V" beam to spray the output of his 807. SWC and KLYNF operate from Jamestown. RGT has speech clipping in his n.f.m. DAO put up 28-Mc. vertical. EOZ is OPS appointee. GHN has a new exciter unit. PVS has BC-522 on 50.1 Mc. Plan to attend the HAMBORRE to be held in Mayville Park this spring. Traffic: W0CAQ 18, LHB 18, GZD 11, AAU 6.

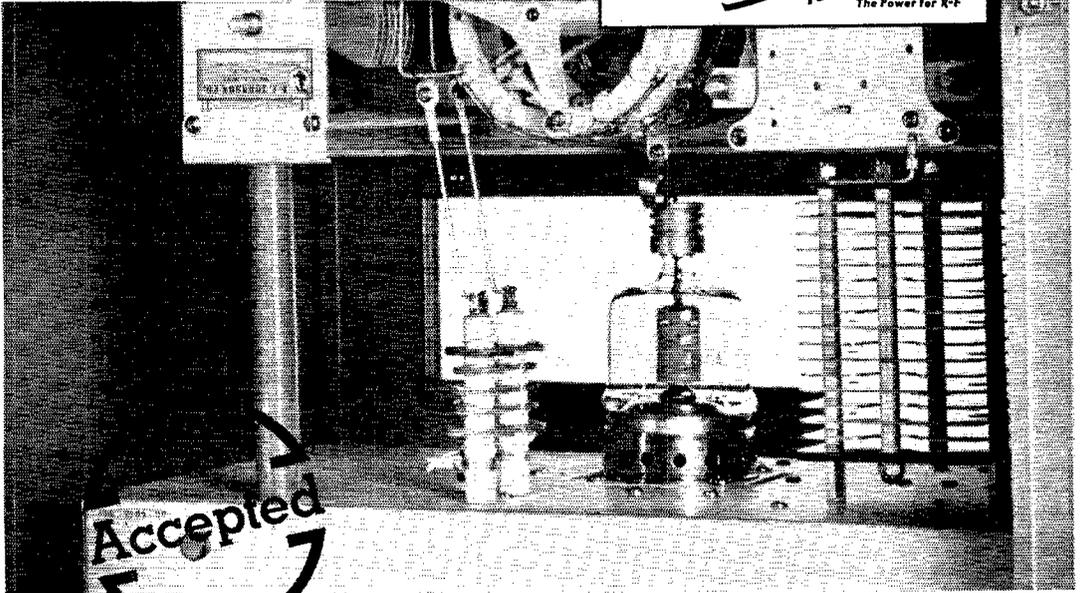
SOUTH DAKOTA — SCM, J. S. Fosberg, W0NGM — VT reports that a new radio club, the Howlin' Wind Radio Club, has been formed in Watertown with twelve members and application for affiliation with ARRL has been made. GLA, SEC for Western South Dakota, reports that during the January storm the AEC in Rapid under ECs IWE ('phone) and SUJ (c.w.), with the help of JLS, CZQ, YOB, QHX, YKY, and GLA, formed a link between the airport and the CAA to dispatch rescue flying out of that field as the land lines were out. Also the State C. W. Net with BLK, ZWL, OLB, PHR, ILL, and ADJ formed a link with KVD at Colorado Springs when the two Army Air Bases were having trouble with communications. A Red Cross distress message originated at BLK in Rapid City, was sent to ILL in Huron, and then to UFL in Sions City, just in time for the evening newscast. Traffic: W0BLK 54, NMG 36, IWE 30, ILL 15, OLB 10, HDO 4, WUU 4, FJS 3.

MINNESOTA — SCM, Walter G. Hasskamp, W0CWB — HFF almost made BPL; he works only 6 nets! SEC BOL reports the section AEC now has 31 full members and 13 supporting members. The following have accepted EC appointment: RPT, UMD, ANU, ZOB, ORJ, HKF, and QIN. BOL is trying to rebuild his rig without going off the air. OEH and MXE are new hams in Duluth. KYE built a broadband crystal-controlled converter. GNZ rewound a pole transformer for his final power supply. CNE had a new final with p.p.s. 810s. NRV, Duluth, secured a classroom in one of the schools for a one-night-a-week deal where the Duluth club furnishes instructors for Class B and C hams to study for Class A. GNZ is fixing the classroom with tape keyers. EJP is making the tapes. UWG is rebuilding with a pair of 808s in the final with 811a modulator, having sold his kw. rig to RA. PPK, formerly of Fargo, is now grid-modulating a 500-watt rig from New York Mills. IXR holds daily schedules with 9DNB. After 28 years, EPJ has his Class A license and is on 3.85-Mc. 'phone. ITQ, another c.w. man, is giving 3.85-Mc. 'phone a whirl. QIN, of 50-Mc. fame, is now on 3.85 Mc. RQT has a VHF-152 and is getting started on 144 Mc. VEV is on 3.85-Mc. 'phone. CGK acquired a BC-696 and a complete Brace of Command receivers. BHA is working on a modulator for his 696. OMC sports an electronic keyer while HEO is arousing no end of interest with his legal telephone hookup to his rig. BHY rebuilt a Q-5er into his receiver and a monotone and electronic keyer. He and TOZ visited EA. The Minnesota State 'Phone Net has undergone some reorganization with a change of frequency to 3960 kc. and the addition of a Noon Section meeting at 12:05, daily except Sundays, with RQT as NCS and ANU, ORJ, and IXR as Alternate NCSs. Unscramble this — Just 11 years ago, 2JIE and 9JIE became acquainted on 14-Mc. c.w. 2JIE, now 9JIE, worked former 9JIE, now 9JIE, on 3.85-Mc. 'phone. This being my last report as SCM, I wish to thank the entire Minnesota section for giving me the opportunity of working and becoming so intimately acquainted with so many of you the past two

(Continued on page 68)

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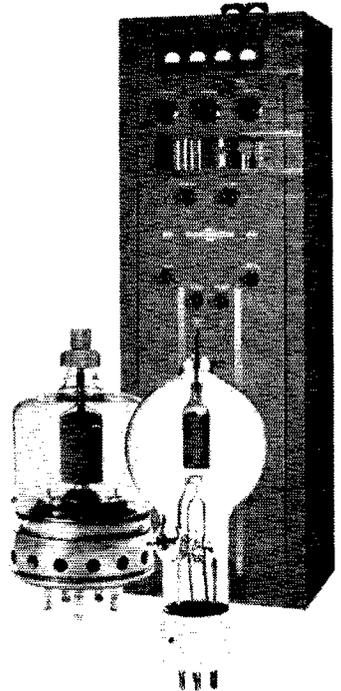
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## DELTA DIVISION

**ARKANSAS** — SCM, Marshall Riggs, W5JIC — DYF A has new 32V-1 and is burning the oil on 14-Mc. c.w. BAB is running THE gallon on 3.85, 14, and 28 Mc. DRW has new 75-A receiver. JHL has come out on top with p.p. 812 running 300 watts after so long with gremlins. OCX is on 28 Mc. AUU is on 3.85 and 28 Mc. at present. NBG is chewing the fat on 14 Mc. OOS is trying for 28 Mc. Hope he makes it. OQS is out for WAS. OXL is on 7 Mc. with 5 watts. ICS, Ft. Smith, is EC for the County. PGA is a new call around Ft. Smith. Glad to see you, Neal. The first quadri-annual meeting of the Cat Fish Club was held at FPD with great success. The next meeting will be held in Ft. Smith in May. Traffic: W5LUX 578, K5NRL 477, W5HPL 133, FMF 128, ICS 106, MRD 53, IGM 32, JIC 27, DRW 15.

**LOUISIANA** — SCM, W. J. Wilkinson, Jr., W5VT — KTE, the SEC, is about to get his new QTH fixed up. CEW, the PAM, has received his DXCC Certificate. PJM is on 7 Mc. DC is looking for someone to QSO on 50 Mc. IUW schedules HLI AE. LQO is active on 28 Mc. with low power. Following are the new officers of the Caddo Amateur Radio Club of Shreveport: JHY, pres.; IOF, vice-pres.; LQV, secy. The club meets the second Friday night of each month. KTD has been trying DX. CGC is getting very close to DXCC. LER, MWE, MAV, and EB helped in setting up K5NAC and N8CAH. PLQ is a new ham. MZI advises that KUM and FVK are engaged in a building feud. JET is putting his BC-459 on 7 Mc. HOS gets on 28.5-Mc. 'phone week ends. DRF has been very ill in the hospital. DXL is active after a layoff. HEJ and HEK are active again. IVF is keeping schedule with W6 on 3.85- and 28-Mc. 'phone. JEY has mobile rig in the car. KYK is on 7, 27, and 28 Mc. NUH has applied for ORS and OBS appointments. HBV, KME, CQJ, IZS, and EB visited MBY. MXI has QSOed 20 states and two VE districts on 50 Mc. BGK is on 14 Mc. exclusively. HQY is on 28-Mc. 'phone. IXW is back in Monroe. MRS is building e.c.o. MRU is on 7 Mc. JVT has a BC-610 on 3.85 Mc. LLL has BC-696A. KC has 169 countries confirmed. QH is on 3.85 Mc. VT has been trying to boost his DX total. We still need an RM. Won't someone please apply? Your SEC or EC will be happy to hear from you regarding the establishment of an effective Emergency Corps. Traffic: W5KTE 105, IUW 14, NUH 11, KC 8, VT 8, KYK 7.

**TENNESSEE** — SCM, Ward Buhman, W4QT — Several operators in this section were able to provide ice-bound Columbia, Mo., with communication facilities for five days while wire service was out. BAQ, MRD, and PL are the experienced traffic men who were on the job when needed and literally delivered the goods for 0QXO, at Columbia. New officers of the Nashville Amateur Radio Club are: AY, pres.; HWC, vice-pres.; KFK, secy-treas. Bill Slade will edit *Bandspread*, the club's newspaper. The Smoky Mountain Amateur Radio Club at Maryville also put in a new slate as follows: MEU, pres.; NLJ, vice-pres.; BXQ, secy-treas. The club station has been assigned the call OLB, and runs 100 watts on 3.5 and 3.85 Mc. There are seven active hams in Maryville. ONX is a new call in Clarksville. APC has new rig, 300 watts to 812s. ETN is new EC for Chattanooga and vicinity. IYV was elected president of the Mid-South Amateur Radio Assn. for the year 1949. VT, CV, DIY, EVK, and GPH have rigs working on 420 Mc. The first case of T.V.I. in Memphis is reported by AQR, who now is checking over the rural real estate market. Traffic: W4PL 921, BAQ 275, NNJ 261, CZL 47, ETN 47, CVM 37, DIY 24, LCB 16, EBQ 4, FLW 3, HOJ 2.

## GREAT LAKES DIVISION

**KENTUCKY** — SCM, W. C. Alcock, W4CDA — Kentucky still has far too few ECs. Every community of any size should have one. The SCM awaits applications. BAZ has fixed-frequency receivers on 3600 kc. and 3955 kc. to monitor KYN and KYP nets. He says net attendance and coverage is better. JCN has new p.p. 803s final and is planning 813s for 28 Mc. CDA helped his VFO's note by replacing 6V6. KWO reports in on both nets. MSC says 105-watt screen-grid modulation now works fine. MRT is using 28-Mc. three-element beam. 9DMD/4 moved to Louisa. KKG is on 14-Mc. c.w. with a kw. to a pair of 4-125As — with no bugs in them! He has 144-Mc. beam and is planning one for 14 Mc. OGB has been appointed EC for Henderson. He has eight new AEC members getting set for drills. MWX's slow-speed net (KYW) on 3600 kc. (Mon.-Wed.-Fri. 8 p.m. CST) counts eleven members already! Any operators over the State are welcome to join. FKM won ARC-5 transmitter as first prize in Kentucky QSO Party, after the receiver went dead and he used a 2-tube battery set. TXC still is keeping 'phone net active on 3955 kc. JRO, with two brothers at Oak Ridge, Tenn., wants a schedule there. KWO is new OPS. CRI is new OBS for 3.85 Mc. BPE's beam was damaged in wind. FBJ's net has been re-designated KYX. He says he's about whipped key clicks. He also lost elements off 144-Mc. beam in wind. (And let

the birds out!) JRA, KLP, and JDN are new-comers on 144 Mc. Traffic: W4BAZ 151, MWX 70, CDA 47, MSC 30, JCN 15, TXC 13, FKM 10, FBJ 5, JRO 4, KWO 4.

**MICHIGAN** — SCM, Joseph R. Beljan, Jr., W8SCW — SEC: GJH. RMs: GSJ, NOH, PVB, and UKV. Section Net Certificates have been issued to CRH, DOL, DPE, JUQ, RJC, and YMO. The Genesee County Radio Club station, ACW, is now located in the Red Cross building and operates 3.85-28, 144-Mc. 'phone and 3.5-7-, and 14-Mc. c.w. ZJU is new president of the Allegan Club. The Lake Superior Radio Club is now affiliated with the ARRL. Congrats to the newly-formed Holland Radio Club. The Detroit Amateur Radio Assn. has been issued ZZ as club call. VV has received official recognition from the Western Union for services rendered during an emergency condition in New Mexico. AAM, BGY, and DAW have new Collins 32V-1s. DAW is planning on a pair of 250THs in a new final. TBP worked FMSAD on 3.5 Mc. SAY continues to work nice DX on 3.5 and 7 Mc. YFI is DXing on the video channels. AVN, WBG, and QZV are proud owners of new Collins 75A-1 receivers. YIN has a new HQ-129X. YMO has a new HRO. GBB has a new SX-42. Ex-ONW now is W2ZLV. MGQ and NNF are now VFO with Meissner kits. CNN has a new Gon-Set. KMZ is back on 28 Mc. QBM is mobile again. AMT is on the air with 150 watts. YMO is VFO with 35 watts and is a regular on the five p.m. QMN Net. CRH is another QMN regular and is planning on n.f.m. on 28 Mc. NRU has a small rig all set to fire up on QMN. UDS is running a pair of 8000s in the final with up to a kw. input. AUR will have 70 watts on 7 Mc. EH keeps blowing 813s. WDR is active on 14-Mc. 'phone with an HT-9 and NC-183. VQD is n.f.m. with a Meissner FMX kit. YIB has a new three-element Premax beam. AGG is active on 14 and 28 Mc. with a BC-610. BMH is n.f.m. with an HT-18. RTN operates 14 Mc. week ends and reports for the Flint gang. YLA reports for the Marquette gang. IDZ is back on the air. DIW is building a new rig for 7 and 14 Mc. CLW is experimenting with antennas. CBZ has a new rotary two-element beam on 28 Mc. Unofficially, GSJ leads the State in the ARRL QSO Party with 231 contacts in 66 sections for 36,036 points. Runner-up is SCW with 251 contacts in 59 sections for 34,633 points. TRN made 232 contacts in 60 sections for 32,640 points, and NOH made 170 contacts in 52 sections for 18,460 points. My sincere thanks to all who cooperated with me during my term of office. Traffic: W8UUS 527, WXO 509, TRN 411, TBP 200, SCW 134, NOH 111, UKV 97, GSJ 83, IV 52, RJC 50, IHR 37, DPE 34, UES 34, YMO 30, AQA 29, ZKZ 18, FX 17, JUQ 16, DNW 14, UFH 7, CRH 6, BLR 5, BGY 1.

**OHIO** — SCM, Dr. Harold E. Stricker, W8WZ — Asst. SCM, Charles F. Lohner, RN. SEC: UPB. RM: PMJ. PAM: PUN. Your SCM visited the CARA and GCARA and important ARRL matters were discussed. UPB gave an interesting talk on EC work at the March meeting of the Intercity Radio Club. 1949 officers of the club are: WPF, pres.; YCV, vice-pres.; VTP, secy-treas. Your SCM dropped in on TTH, RN, and BUM. Q-5, Springfield, reports WXA is very busy with EC work. AUP has new HRO-7. JRG visited CDT to see his homemade double conversion receiver. The Dayton Amateur Radio Assn. *Bulletin* reports the following officers: ENH, pres.; ACE, vice-pres.; QDI, secy.; CUJ, treas.; KKH, editor. OVL is chairman of the B.C.I. Committee. HB gave a very interesting talk on frequency measuring. VOS and CVH lost their antennas during the high wind. ZJM and CEA took part in the ARRL Member Party. FRY reported in with excellent Red Cross Disaster plan for Mahoning County. Trumbull County has a similar plan. IOQ was appointed vice-chairman and did most of the organizing. New officers of the Conneaut Radio Club are MJM, pres.; TAC, vice-pres.; MNJ, secy-treas.; BKH, director. DPK is a new ham in Youngstown. DQE has 120 watts on 14 Mc. CCV has a pair of 808s on 28 Mc. and is looking for DX. New officers of the Mahoning Valley Amateur Radio Club are CQL, pres.; FUY, vice-pres.; EJP, secy. The *Carascope* reports that WXM and WRN have formed a 144-Mc. emergency net and that all 144-Mc. stations are welcome. The GPR message was originated by BKE and relayed to IVC/8, who was demonstrating emergency equipment to the Red Cross. The message was relayed direct to 3MJQ from the portable-mobile installation on demonstration. The CARA is putting on a membership drive. EDY is back on the air with a Collins transmitter and receiver. NXP and CEI received DXCC Certificates. ZCQ, QQ, MQG, CPA, and WZK attended the Cincinnati meeting. The Cleveland Area Council of Amateur Radio Clubs held an all-band contest on Feb. 12th. One point was allowed for each contact in Cuyahoga County. This was instigated by JNF, our new QSL Manager. PBZ was appointed Council Emergency Chairman. H0X still is busy with t.v. project in Washington. AQ is having T.V.I. trouble. UW got WAC after 20 years. ARP has BC-606 on 3.5 Mc. and BC-459 on 7 Mc. IVC and WYH will represent the Buckeye Net at OCARC. EFW states his 12-year-old 203As still are OK. VDT has electronic key. EBJ says he worked ZG8PM on 3.5 Mc. and only needs 99 more countries for DXCC. UPB spoke on emergency set-ups at the March meeting of the Toledo Radio Club. The Toledo CARMAR Net is going again. Board members for 1949 are ESN, BCQ, TWD, VDR, and DQR. LBH is experi-

(Continued on page 68)

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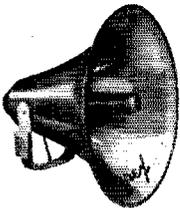
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**MODEL VH-91 HYPEX**  
 15 WATTS; 300 CPS CUT-OFF

menting on 420 Mc. using 316A oscillator, OKC is building triple converter. PR had 27 Official Bulletin transmissions. FEB has new Hunter exciter. ZRV has new commercial 750-watt transmitter and 80-ft. steel tower. The Cleveland Brasspounders Assn. already is starting FD preparations. WDJQ blew his plate transformer just before his first OBS transmission. ZMH has three-element  $\frac{1}{4}$ -wave spaced beam on 28 Mc. and states it works better than his old four-element closed-spaced array. UKC is running 250 watts. QBF, IKA, and ZQC are on 420 Mc. BLI has new NC-183. UZ worked HC2OT on 50 Mc. WRN is putting up a new beam with 8 half waves in phase on each side, one set vertical and the other set horizontal, using a chicken wire reflector. Traffic: WBRN 174, UPB 142, EBJ 118, WE 111, HOX 110, IVC 97, GZ 82, VWX 75, TKS 71, PIH 69, CBI 58, QBF 52, DAE 43, PNY 38, SJF 33, PMJ 32, BEW 24, LJH 23, PUN 22, WZ 18, EQN 15, ZAU 15, WXA 14, BLI 8, QIE 8, YFJ 8, BCI 5, DZO 5, ARP 4, ROX 4, BUM 3, UW 3, AQ 2, EFW 2, LCY 2.

### HUDSON DIVISION

**EASTERN NEW YORK** — SCM, Fred Skinner, W2EQD — CAZ was appointed EC for Schenectady County. NHY did a fine job as temporary EC. New stations around Troy are ZJO, ZLB, and ZPH. LBB, ILA, and VYQ are keeping 28 Mc. busy. DSU and KED are blasting out on 14 Mc., DSU with a half kw. PV worked New Jersey from East Greenbush on 144 Mc. The AEC gang in Rensselaer, Albany, and Schenectady is perfecting emergency plans after the recent storm emergency showed need for more portables and closer coordination. New Asst. ECs are: OMD, Albany County; ILL, Rensselaer County. PCQ reports the AEC club station in Middletown has kept 30 consecutive schedules through rain, sleet, and snow to Philadelphia. BV, PAU, and PEN participated. ZKP is a new station in Peekskill. EQD is a member of the MARS Net. NJF, GTI, and CLL covered the GPR with a message representing the section. VB is Official E.N.Y. "Shmoo." He recently took unto himself a spouse. CLL is new president of the Albany ARA. AWF needs just a few for WAZ. WIK relaxes on 3.85 Mc. these days. JQI has been giving 3.5 Mc. a working over. HCS is back on 3.85 Mc. LKM is making revolutionary new tank circuit with copper gutter pipe. We soon shall hear another gurgling note. KUJ now runs 1-kw. peak on 14-Mc. s.s.s.c. RDC is a new-comer to 144 Mc. in Scotia. CBO, formerly of Scotia, is convalescing in Syracuse and operates 3.85-Mc. bedside rig. Traffic: W2ITX 209, CLL 80, WIK 56, TYC 30, EQD 29, BLU 11.

**NEW YORK CITY AND LONG ISLAND** — SCM, Charles Ham, jr., W2KDC — President OHE, the new SEC, is beginning to take hold. A new car caused a slight lag in interest, but he has worked many of the nearby ECs and is lining things up for a get-together soon. CJZ also is digging in, in Suffolk. Frank has an active net on 3995 kc. Sundays and Mondays on 3600 kc. AJF is handling the southwestern section of Suffolk and held four drills in January averaging eleven stations. Twenty-one different stations were active. WEB, from Manhattan, is lining up Red Cross and Weather Bureau. He has had the rig on several bands during the month and is doing a good job in an area seemingly devoid of interested AEC members. BSP has been heard from. Bill is in Palestine installing the U.N. station but does not mention when he will return. TUK dropped the Thursday NCS but will keep up some activity. AT, ex-WR, is on 7 Mc. KL700 will be portable at 232-94 St., Brooklyn. Mark has been in the Signal Corps 30 months and is anxious to settle back in the States. ZNM is about to join the NLI. Red seems to really enjoy traffic at the tender age of 17. JVO reports the North Shore Radio Club has shown great interest in the T.V.I. pamphlet. A copy is available from the secretary, 5 Willow Place, Great Neck. Jim also says a two-man committee will work on the Hudson Division Convention arrangements. KV4AF/2 is back from KV Land with a nice suntan. VAF says the Mid-Island Radio Club is making Field Day plans. K2NRK is getting out on 14-Mc. c.w. with 200 watts. Any messages to this area Red Cross Headquarters should be sent to WHB direct or phone TR7-9168 or via UZX on 3.5 Mc. 4DG finally WACed with a KH6. Jack is very busy with school. RQI went back to prewar e.c.o. and has 56 countries, mostly on 7 Mc. TYU is back again. We all missed you, Pop. QBS has a folded dipole on 14 Mc. OBU says NLI's annual drive for members is on. All NCS will slow down to 20 w.p.m. and this has created great interest. RTZ is doing fine in Palm Beach. She has worked NLI twice and is handling local net traffic. The reorganization committee announces the reformation of the Knickerbocker Amateur Radio Club of New York City. All lower east side Manhattan hams are cordially invited to make inquiry regarding membership. Full information may be obtained by writing Mack Santer, ZPW, 544 East 6th St., New York 9, N. Y., temporary recording secy. Other temporary officers are as follows: DRM, temp. chairman; PJH, temp. vice-chairman; EFB, temp. treas. Traffic: W2TYU 231, VNJ 173, OBU 119, OUT 115, RTZ 87, EC 46, TUK 31, KV4AF 26, W2QBS 21, LWB 13, RQJ 13, YDG 5, WHB 3, VAF 2.

**NORTHERN NEW JERSEY** — SCM, Thomas J. Lydon, W2ANW — The Section Emergency Coordinator is John J. Vitale, IIN. The N.N.J. C.W. Net meets daily,

except Sunday, on 3630 kc. at 7 p.m. The J. N. Net meets Monday through Friday on the same frequency at 9 p.m. The 40-Meter Net meets Monday, Wednesday, and Friday on 7260 kc. at 7:30 p.m. Anyone with traffic is welcome in any one of these nets. NOZ, Long Branch Senior High School Radio Club, is now on 3.85-Mc. phone. NKD is transmitting Official Bulletins Tuesday, Thursday, and Saturday at 6:30 p.m. on 3630 kc. He also has applied for MARS call. NCV now is a member of the A-1 Operators Club. OUS has made WAC. The Monmouth County AEC Net has been having direction-finding practice on hidden transmitter during drills. The Ridgewood High School Radio Club, using the call YNU, is on the air running low power. Officers of the Ridgewood Radio Club are WCF, pres.; VMJ, vice-pres.; GNQ, secy.; and JQJ, treas. CIU, BAI, GRZ, DRV, EKU, LFT, GPV, and CWK, from the Raritan Valley Radio Club, attended the T.V.I. meeting in Newark. VJN has new e.c.o. Traffic: W2CGL 193, LFR 159, K2USA 95, W2KUS 90, CQB 80, ZCT 77, NKD 72, NCV 66, H1H 49, CQB 47, LMB 17, OXL 16, VJN 15, NIY 14, K2AO 13, W2OUS 10, CJX 8, EWZ 8, KMK 8, CWK 1.

### MIDWEST DIVISION

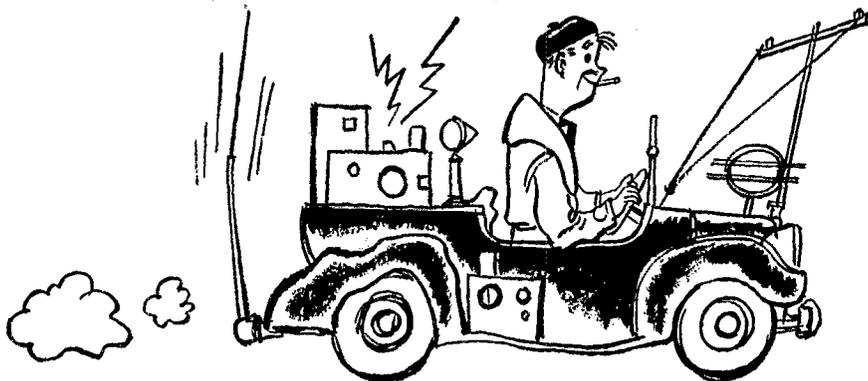
**IOWA** — SCM, William G. Davis W6PP — AUL handled the Iowa Governors-President message. The Sioux City Club elected 6AOH, pres.; 0POY, vice-pres.; UHC, secy.; Matt Ruppert, treas.; BGB, sgt. at arms. JAD reports the Clinton Club has at its disposal a 2500-watt a.c. plant for emergency power by courtesy of Climax Engineering Co. BGB served as key station in Sioux City during the recent emergency. DIB has received his WAVE No. 33 with endorsement of Yukon and Northwest Territory. The TLGN has YL operator, 9JTX/0, which evens it up with Iowa 75 with its XYL, NXW, AUL, YBD, and WMU gave service to b.c. station KAYL by getting weather reports from Des Moines Weather Bureau and later notified CAA of the loss of tower lights at KAYL. YI found an elusive bug in the transmitter. AND is working on a high power rig for use on TCN. TGI is back on the air. JDV is going to 28 Mc. UJL is on Iowa 75 Net. CZK is program director at KIFI, Idaho Falls, Idaho. The Council Bluffs Club is thinking about its hamfest. The Mason City Club, through its bulletin, *Splatter*, informs us that they are using ARRL Training Aids films. LQY is sporting a new HT-19. The Iowa hams got some good publicity on its emergency efforts. The Mason City 10 Ground Wave Net is going strong. The Des Moines 10 Emergency Net holds weekly drills and has 22 active stations. Traffic: W6HMM 703, FP 224, SCA 118, WMU 79, CPU 61, SEF 57, TWX 52, KSS 38, TTU 32, NYX 29, WML 28, QVA 23, PP 21, JAD 18, LAC 18, SQJ 12, AYC 8, 9JTX/0 6, OM 3.

**KANSAS** — SCM, Earl N. Johnston, W6ICV — Kansas blizzards and ice storms kept emergency nets busy this month running high traffic totals. EQD, with the highest total, made BPL in spite of illness during the ice storm emergency. All were relieved to know Blackie recovered rapidly from his appendectomy. Club memberships and activities are increasing. WARC is taking charge of the amateur station at Red Cross Headquarters in Wichita. KVRC is furnishing portable station at Red Cross Headquarters to tie in with Disaster Headquarters at Police Dept. The Central Kansas Radio Club is holding a weekly emergency drill besides the monthly meeting. The club at Olathe is awaiting station license. PHI is moving to San Diego. LIX and SSB are new OBS. DRB is reporting into five traffic nets. IYR and CC handled emergency traffic Jan. 23rd for W.U. and b.c. station KXXX. They say 3610 kc. is not so good for daytime so 7220 kc. was used. IZJ has another NC-173 and new final using 829B. PNN has new SX-43. UWV, PNN, CAG, and OOT have BC-645 for conversion to 420 Mc. ZWK has new HT-19. OEU is a new ham in Merriam. NEI is new EC for Marion Chase and Butler Counties. WGM, of Topeka, heads Kansas Slow Speed Traffic Net (QKS SS) which meets Tues. and Thurs. at 6:45 p.m. on 3610 kc. Maximum speed is 13 w.p.m. and all amateurs, whether traffic men or not, are welcome to participate. Traffic: W6EQD 316, CFX 235, NED 152, DRB 113, IYR 105, OC 78, IFR 74, NIY 63, WGM 57, FRK 48, ICV 46, BNU 31, OOU 26, KSY 22, BPL 19, VBQ 16, ZUA 12, DYX 8, AWP 7, OZN 7, MXJ 6, KXL 5, WKA 3.

**MISSOURI** — SCM, Ben H. Wendt, W6ICD — The following reported this month: YSM, OUD, GCT, ICV, OMG, TYZ, TGG, WAP, NNH, ROB, PUQ, DFU, TGG, DEA, VMI, BCD, and UID. During the recent severe ice conditions in Southern Missouri, Southern Kansas, Oklahoma, Eastern Missouri, and Nebraska amateurs handled traffic for Western Union and various railroads, telephone companies, and news services. Joplin reports 150 hours without power. Stockton will be without communication for three or four months because of the severe damage caused to wires. The Missouri Emergency Net was active throughout the emergency. New appointments: IAC as OBS and PMI as EC. ARH brought his total number of countries worked to 80 by adding GI, TF, AP, and IS calls. CKS received a 30-w.p.m. Code Proficiency Certificate. A pair of 813s soon to go on the air should increase contacts. QMF is loading his six-element 144-Mc. beam with an SCR-522.

(Continued on page 70)

# MALLORY HAM BULLETIN



With good old summertime just around the corner, our favorite crystal ball tells us that at this very moment there are precisely 99,999 amateurs who are dreaming of building that super-duper, never-to-be-equalled, portable-mobile rig.

By this time next month the glove compartments and the luggage trunks of 99,999 family jalopies will have been filled with a miscellaneous collection of radio parts connected together in 99,999 different ways to produce the most efficient, the most versatile rigs the world has ever seen.

This is great dreaming! And we're all for it! Because we know that a high percentage of those 99,999 rigs will be powered with an efficient Mallory Vibrapack\* vibrator power supply.

The power supply is the most important single unit of the portable-mobile rig. It must be rugged, it must be dependable, and above all, it must be tailored to fit your needs.

Why don't you let Mallory help you with your portable power problem? We have prepared an Engineering Bulletin describing the Vibrapack vibrator power supplies . . . it contains a wealth of practical information about connecting them to your equipment, voltage vs. current output curves, and filtering specifications. This Bulletin may be had simply by addressing a QSL card (or postal) to P. R. Mallory & Co., Inc., Box 1558, Indianapolis 6, Indiana, and asking for vibrator power supply information.

And don't forget, your Mallory distributor can supply you with the most dependable line of: ham band switches, push button switches, controls—rheostats—potentiometers—pads, tubular capacitors, dry electrolytics, transmitting capacitors and dry disc rectifiers—practically every component you need to keep your rig in A-1 condition.

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**P. R. MALLORY & CO. Inc.**  
**MALLORY**

The Show-Me Net operates Sundays at 1600 CST on 7272 kc. and needs outlets north of the Missouri River. DEA lost three 60-ft. poles during the recent emergency. Len's score in the ARRL Party was 240 contacts in 65 sections. OUD gets better reports with her replacement antenna than with the regular, which came down with one of the poles. BJL uses an automatic keyer to 700 watts. CGZ reports fine club meetings, using ARRL Training Aids. Proud owners of new gear are LFW with 28-Mc. beam antenna, INK with S-20R receiver, ICD with 275-watt transmitter. The Heart of America Radio Club has all new gear for emergency operation. A BC-459A for 7-Mc. operation is under construction at FSQ. UYD has 800-watt gasoline-powered gear for emergency use. KSR has television antenna. Traffic: W9GCT 154, HUT 138, GEP 73, CGZ 52, WAP 51, ICD 48, CKS 32, NIP 18, OUD 18, SKA 14, IAC 13, NNH 12, OMG 11, PR 11, VMI 6, ARH 5, KIK 5, GBJ 4, QMF 4, DEA 2, FSI 2, NMD 2, LWF 1.

**NEBRASKA** — SCM, William T. Genmer, WØRQK — The Nebraska c.w. and 'phone nets are to be commended for the excellent communication provided during the "Blizzard of '49" and also the non-net members who worked hand in hand with the nets to provide more outlets into the stricken area. We know it can happen here so become emergency-minded and join the Emergency Corps. M.W., J.L.D., and THF are new ORS. CMO rebuilt to T55 final. The Hastings Radio Club held a covered-dish dinner at which the auctioneering of radio parts provided \$15 for relief of English hams. BVR, LJO, and PLF are trying some airborne 3.85-Mc. tests. WBU is running a full gallon to a 304TL final with a 100TH driver. ESX is rock bound on 3.5, 7, and 14 Mc. with 30 watts to an 807. VOIS lecture on propagation and the matching and feeding of antennas at the December meeting of the Southeastern Nebraska Radio Club gave the gang something to think about. At the January meeting NWC talked on power supplies and the members took an ARRL quiz. 3910 kc. will be the SENRC Net frequency on Tuesday and Thursday nights at 7:30 p.m. CST. WKP worked 6NFH airborne 3.85 Mc. in a C-47. KAL and CMO moved to Lincoln. DNV has ART-13. BMK is on with RCA AVT-112. AY furnished portable BC-610 with crew from USNR to Army at Atsworth for Operation Snowbound. The crew also included DKV and HSO. JEL has 60 countries on 14-Mc. 'phone. LYI has a new HRO. Traffic: W9JED 181, FAM 97, THF 76, FQB 69, DMY 60, KJP 57, SAI 30, JLD 26, RQR 25, LJO 24, AY 20, IXL 20, KON 19, CMO 11.

## NEW ENGLAND DIVISION

**CONNECTICUT** — SCM, Walter L. Glover, W1VB — O CGD, PNA, JAK, AOS, ROP, VW, and C.W. Polo participated in the January Frequency Measuring Test, with VW leading with an average error of .00011 per cent. Nice work. AH is getting settled in his new shack. RWS, ex-3IEM, has taken over Al Hill's job at Headquarters and has applied for ORS appointment. IIN is bragging about his new rig, a pair of 818s with 1 kw. input. TVI puts KUO off the air in the early evening. SJ bought a new car. CTI is getting back into traffic-handling again. BDI worked 27 in the VHF SS. AW has installed new sixteen-element 144-Mc. beam. VW is looking for prospects for a 'phone net. HUP is playing around with 420 Mc. Phil Rand gave his T.V.I. talk before CARA at its last meeting. A large crowd turned out, with everyone plenty interested. NARL's secretary has his new call, RRS. AVN, NARL president, has been transferred to New York. DXT has been elected to fill his unexpired term. FWH and DXT operated in the VHF SS. MPB has been elected to fill the unexpired term as vice-president of CWA which was vacated by QMI. LKF handled the GPR message from Governor Bowles, and received some nice newspaper publicity. The HCARA station, NEM, uses the slogan "New England Monitor," and is planning to be active on all bands. The AEC gang in Hartford and East Hartford was alerted over New Year's week end under the direction of LKF, EC, because of flood conditions. Operations went very smoothly and proved what regular drills will do to produce gratifying results when confronted with a real emergency. At a recent meeting of the Norwalk Amateur Radio Assn. the following officers were elected: LRT, pres.; MRP, vice-pres.; OOT, secy.; MGX, treas. Traffic: W1IIN 751, NJM 337, VB 98, ORP 94, LKF 93, AW 84, CTI 82, DAV 72, HYF 66, BDI 48, BIH 36, 3IEM/1 31, WIBHM 21, JTD 20, NYC 18, KUO 17, JMY 8, VW 6, RUP 4.

**MAINE** — SCM, F. Norman Davis, W1GKJ — RM: NXX, PAM; FBJ. The Portland Amateur Wireless Assn. is planning a hamfest to be held in Portland sometime in June. NGV built a new final using an 829 running at 150 watts. 3MLL, formerly HWY, is looking for contacts with Rumford on 7 Mc. QUA is new Emergency Coordinator for Portland. RSX keeps the key warm at KVI, club station of the PAWA. RMF operates on 7 Mc. using a BC-459. RPZ also haunts 7 Mc. running 40 watts to an 807. ROM has an elusive parasitic in his rig that hops from one band to another and sneaks around traps with ease. NXX has been on 3.85-Mc. 'phone occasionally. AFT divides his time between 3960 kc. and checking t.v. reception from Boston. You may think 3.5 Mc. is dead during the day but give a call around 3700 kc. and your chances of raising BWB are good. The mem-

bers of both the c.w. and 'phone section nets have turned in fine traffic reports this past winter and both nets have been operated smoothly. The Net Control changes on both nets every night Monday through Friday. The RM and PAM deserve credit for building up their respective nets. Traffic: W1NXX 71, OHT 65, EFR 58, NGV 54, LKP 52, YA 41, JAS 34, FBJ 30, OHY 27, OIL 13, PWA 12, KYO 7, PDN 7, GKJ 6, AFT 5, ROM 4, RSB 3, AMR 1, TO 1.

**EASTERN MASSACHUSETTS** — SCM, Frank L. Baker, jr., W1ALP — The following have had their appointments endorsed: DJ and GDY as OPS, MDU as ORS, PLQ and PMC as EC. PLQ has applied for OO Class 4. We are very sorry to have to announce the death of KTE. More on 144 Mc.: KSB, QJG, LVR, NPU, JTA, and ØSL/1. 50TF visited the South Shore Club and worked the gang on 28 Mc. 2QYO, in Roxbury, is going to B.U. We see 7JKD's car in Boston. Ex-1DND, of South Boston, a member of a crew, is missing and presumed dead. BB handled the message from Governor Dever of Massachusetts to President Truman in Washington. Ex-1AOG, in Medford, is going after his license and will get back on the air. The Brockton Radio Club elected the following officers: NZZ, pres.; FRZ, vice-pres.; OEG, secy.; OHB, treas. The club is holding its 12th Annual Banquet at the Alamo, North Abington. OEG is getting married in the fall. PLQ is a freshman at M.I.T. LMS is starting a new job up in Worcester. BGU gave a talk at the South Shore Club on super-her receivers and AKY auctioned off parts. NF is in new QTH. The Quannapowitt Radio Assn. had movies at its recent meeting. The T-9 Radio Club held a meeting at MVQ's QTH. PIM gave a talk at the Eastern Mass ARA on Mobile Design Trends. BGW is looking at t.v. receiver instead of ham receiver. HA has home-building QRM. MCR had six stations on Emergency Net drill. We are sorry to report that MUD is not very well and will have to have an operation. HLL worked 117 stations in VHF SS and is director of QRA Club. RBK has new sky wires. MEG has new jr. operator and is on 3.5 Mc. working across the pond. AWA is in the hospital. DMS is on the Shuttle Net and has 176 watts with 807s in final. MDU is working on final for v.h.f. QMJ has 42 countries on 7 Mc. PU has "V" beam on 3.85 Mc. ZR says she has been in SSN in Boston. Fred Mills is RUW and Walt Robinson is RVA, both members of Framingham Club. We hear that the Framingham Hamfest is going to be held April 30th. REA, in Taunton, is on 144 Mc. The 144-Mc. band sure was busy in this section on Jan. 15-16th during the VHF SS. ALP has his 522 receiver going and now we can hear some of you fellows. Walter White, jr., of Haverhill, a captain in the Army writes us a letter and says he operates AG2AB. AHP gets on the air once in a while, but is very busy with other things. BYL is building a converter. Traffic: (Jan.) W1LM 118, JCK 85, TY 80, QMJ 69, QJB 54, EMG 47, ZR 40, DMS 31, WU 25, DWO 16, BB 12, PU 10, MDU 9, P'YM 9, JDP 8, BDV 2. (Dec.) W1LM 110, P'YM 108.

**WESTERN MASSACHUSETTS** — SCM, Prentiss M. Bailey, W1AZW — RM: BVB, SEC: UD, PAM; NY. We have a new radio club covering Southbridge and Webster, Mass., and Putnam Conn. The officers of the Quinebaug Radio Club are HFO, pres.; DCH, vice-pres.; Mrs. HFO, secy.-treas.; LIB, act. mgr.; RWY is new call in Springfield. RFU made high scores in VHF Sweepstakes for Hampden Radio Club. APA, OAG, KFW, JVTI, and EOB are getting their share of DX. JYH and EOB made nice scores in the ARRL CD Member Party. MUN renewed OO appointment. QLP has returned to W2 Land. ODU works plenty of DX with his 810s and beam. RCS wants company on 3500 Mc. UD and NLE are organizing coordination between amateur radio and National Guard Emergency Communication Network. RHU and PQW are new QRS. AMI renewed ORS appointment. GZ has to take it easy for a while, thus slackening his activity on the air. The DX seems to be biting all of us — even BVR has been knocking off DX on 14-Mc. c.w. JAH has new 3.85-Mc. doubler to keep his full-wave company. BDV renewed ORS and OPS appointments. Jim took part in the ARRL Member Party. COI works 28 Mc. mostly with an ear on 144 Mc. DPY is working on clipper for speech amplifier and bandswitching exciter. New officers of the Wachusett Amateur Radio Club are OBU, pres.; MBL, vice-pres.; QGV, secy.; RCC, treas. JE gets lonesome on his new job at f.m. station. GVJ is building new power supply for BC-696A. JLT is back on the air working DX again. PYR, BKG, and EZT have been busy week ends timing ski races by radio. The Pittsfield High School Radio Club is a new club for the training of potential hams. Pittsfield Radio Club members assist in instruction. JTA was working in Pittsfield for a month. JGY finally has VFO working FB. Traffic: W1JE 79, BVR 72, IHI 68, NY 64, GZ 52, AZW 40, RHU 17, JAH 8, JGY 8, UD 6, GVJ 5, BDV 3, RDB 2.

**NEW HAMPSHIRE** — SCM, Gilman K. Crowell, W1AOQ — New officers of the Manchester Radio Club are: OCV, pres.; PZU, vice-pres.; NKI, secy.; RHW, treas.; BT, member at large. Meetings are held the first and third Fridays at 8:30 p.m. at the local YMCA. Doc Morgan, HMA, is now active from Hanover. CRW reports that RMY, RFP/1, and NMB are reporting into the net nightly. BWR has a new rig with p.p. 810s. EWF is active from Hanover. KKT and BBH are handling the 28-Mc. net and report increased activity. The Concord Brassbonders are sporting new club badges. The Nashua Mike and Key Club had a

(Continued on page 72)



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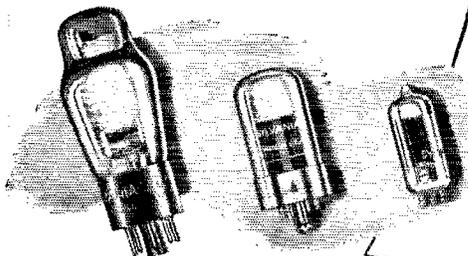
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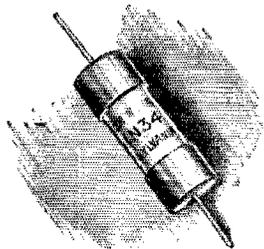


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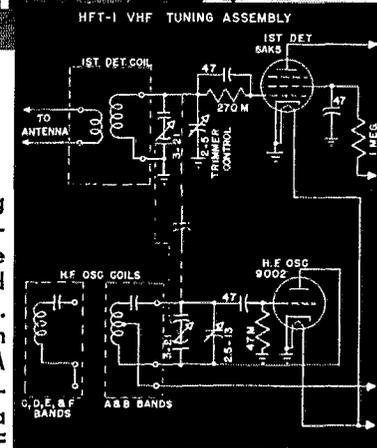
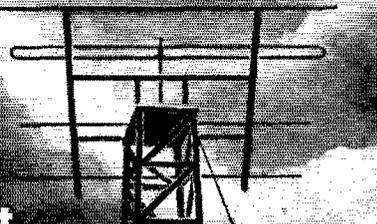
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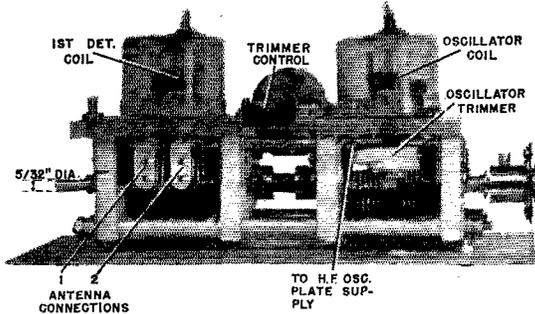
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very successful annual banquet and dance. Roy Waggoner addressed the group on T.V.I. and related problems. A dance was held following the banquet, at which time PTJ actually got BFT to participate. The food was excellent. Let's all start thinking about Field Day and don't forget that the battery-operated equipment sure helps your score. Traffic: WICRW 268, BWR 94, QJY 44, MXP 30, ANS 20, CVK 19, PFU 11, QJX 9, EWF 8.

**RHODE ISLAND** — SCM, Roy B. Fuller, W1CJH — The NAARO and Newport Emergency Nets held a joint drill with good success. A drill message was started from JFF, Net Control at Newport, and was handled by 16 net members. Other drills are being planned for the future. PXI has been appointed EC for the Kingston Area. NCX was appointed EC for the NAARO. NQN is active on 28 Mc. It is the only Boy Scout station in the United States. LTH is now active. LWA is operating portable-mobile on 28 Mc. MJL has left for California with his kilowatt stored in the luggage compartment. The Newport gang has started a club that meets on the second Monday of each month at the Seamans Church Institute. OIK is the trustee. KNE now has 600 watts on the air operating from a house trailer. HRC is completely rebuilding with hopes of hicking the T.V.I. problem. Traffic: W1QR 35.

**VERMONT** — SCM, Burtis W. Dean, W1NLO — The Governors-President Relay message was handled by KJG/1, NDL, OKH, QXU, PSD, KRV, and BTV and then to a W3 in Washington for delivery. RHQ is on 29-Mc. 'phone with 60 watts and has a VFO and three-element Workshop. KRV is back on the air after many months of inactivity with a VFO on 3.5-, 7-, and 14-Mc. c.w. Joe also is taking his turn as NCS on VTN. JNC visited QVS, QQN, OHD, OKH, RPR, and NLO recently. BOH and crew were down to Burlington recently to clear up QRM on high tension lines. AAJ is EC for the Green Mt. Amateur Radio Club, Inc. The Club recently purchased PZX's BC-348 to add to the club station. The 28-Mc. 'phone boys in Vermont are doing their share of working DX. Many a foreigner is the proud possessor of a Vermont QSL card. At a recent meeting of the BARC, FYL gave a talk on converting BC-458 and 459. Traffic: (Jan.) W1QVS 9, KRV 8. (Dec.) W1KRV 3.

## NORTHWESTERN DIVISION

**ALASKA** — SCM, Charles M. Gray, KL7IG — GG has a new three-element rotary beam and kw. on 14-Mc. c.w. KU has worked 35 zones on 14 Mc. with a pair of 813s. GT is on 14-Mc. c.w. with a new rig and has a new shack. OL has a new HRO receiver. BE has 250 watts on 'phone and c.w., all bands. AH is on 3.85- and 28-Mc. 'phone. MZ is using a Collins on 3.85-, 14-, and 28-Mc. 'phone. OW worked 7 Russians in one evening. NK, on Adak, is working all bands; he likes his 75-A receiver, and is experimenting with n.f.m. with speech clipping. UM is handling traffic to Berlin through 4A4LN for the 54th Troop Carrier Command. The Juneau Radio Club held its monthly meeting at GP's house and was well attended. FM originated the Governor's Day message for this area. W7CO is doing radar work in Juneau. Traffic: KL7UM 63, GP 7, FM 4.

**IDAHO** — SCM, Alan K. Ross, W7IWU — Kendrick: KDV applied for AEC membership; also LQU of Downey. Make your outlet the Gem Net, 3745 kc., or the FARM Net, 3935 kc. The following reported direct by radio: GTN, EMT, BAA, BDL, DMZ, JMH, BEO. Twinfalls: KEK has a snappy photo-QSL card and is now VFO on 29 Mc. JMX lost his four-element beam in a storm. 6CZK/7 moved to Idaho Falls. Moscow: MAS reports North West Net on 7212 kc. doing PB, MVA and HME meet with Gem Net. Gooding: JJK is on 29 Mc. but is planning other bands. KBP is on 29 Mc. Mountain Home: IY is on 27- and 29-Mc. n.f.m., also 7 Mc., and checks with Gem Net. New hams are 50LX/7 and NBJ at the Air Base. ABK is on 3.85 Mc. with a new antenna. Burley: LQN was home for a short spell but is back in the Army. Boise: Four 3.85-Mc. mobiles are AHS, DOE, GTN, and IWU. Traffic: W7DMZ 49, EMT 46, IWU 21, MAS 20, BAA 15, GTN 6, JMH 6, BL 4.

**MONTANA** — SCM, Fred Tintinger, W7EGN — CVQ reports that the North Montana Radio Club is donating a *Handbook* to each high school library in that area to promote interest in amateur radio. COH schedules both CAP and ARRL nets and has three QAP SCR-511 rigs in readiness for emergencies. BHP was in CASO with EF in Vale, Ore., during a fire that disrupted normal communications in Vale, and alerted other stations to stand by until local communication was restored. The Glacier Radio Club of Kalispell has been issued ABT, the call of the late Dr. J. Arthur Lamb, as a club memorial station call. BLU is trustee. GBL is old, p.p. 210s snagged a ZL on 3.5 Mc. for the first QSO in 1949. FTO is Net Control of the newly-formed Montana 'Phone Net on 3995 kc. HBM keeps schedules with his brother in the Dakotas. CAL is experimenting with speech filters. BNU purchased a tailor-made rig that worked perfectly but discovered the atmosphere about the shack was amiss. Everything worked. He sold it and is happy again rolling his own. EMP resigned as SEC and LOB has been appointed to fill the vacancy. Traffic: W7CT 317, KCJ 103, COH 52, EGN 49, KGB 49, CVQ 28, EWR 21, BNU 17, KIY 5.

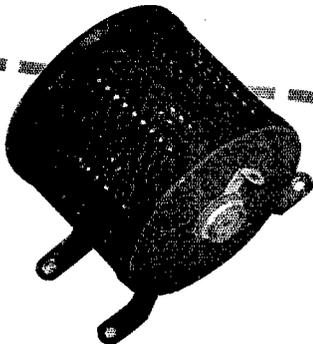
**OREGON** — SCM, Raleigh A. Munkres, W7HAZ — The most important news in Oregon this month was the

(Continued on page 74)



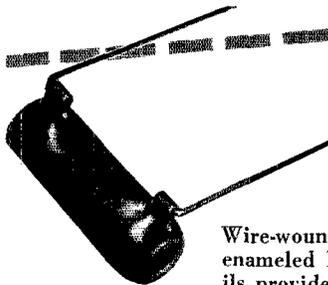
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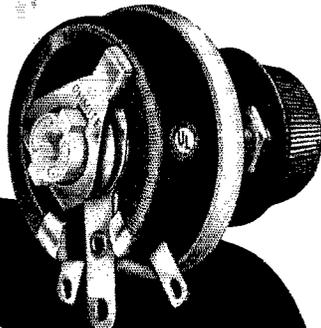


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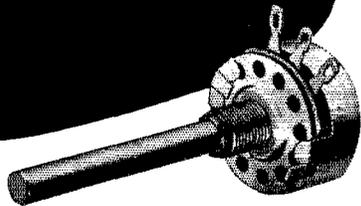
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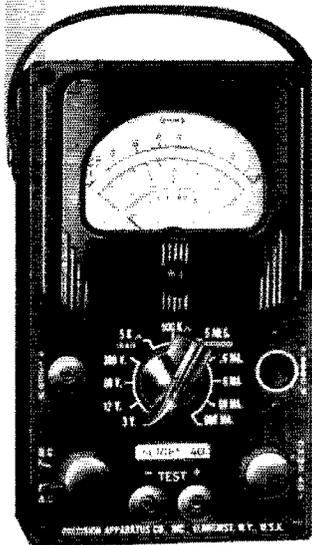
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formation of the Oregon Emergency Nets. These nets are a product of the Emergency Corps and were formulated under the direction of the Portland Area EC. Two nets are in operation nightly with roll call at 7, 8, and 9 p.m. Frequencies are 3600 kc. for c.w. and 3865 kc. for 'phone. Secondary to the emergency duties, the net members are handling considerable traffic. Announcement will be made next month of the appointment of an EC for the Columbia River Basin who will work directly with the U. S. River Forecaster. Astoria: New club officers are: G.O. pres.; BOO, vice-pres.; HJU, secy-treas. BOO has a new jr. operator. KNM is contemplating marriage. Klamath Falls: The Klamath Amateur Radio Society held a chicken feed with a good turnout from Lakeview. K7NRH is the call assigned to local Naval Reserve Unit. HVD is going mobile on 3.85 Mc. with a BC-654. Prineville: The Central Oregon Radio Amateurs recently met at the home of CNA in Prineville. New officers are: KGR, pres.; CNA, vice-pres.; JOP, secy-treas. Baker: Code classes under the direction of AMI, AOL, and HAZ are progressing in good shape. The club is proud of having made the top score in the Seventh Call Area at last year's Field Day. With this incentive plans are well under way for the 1949 affair. Traffic: W7DIS 116, HWK 65, GXO 60, ESJ 42, AXJ 38, FY 35, HDN 30, VT 29, SO 27, HVD 20, CNA 19, LPZ 17, MIC 14, GNJ 12, GUP 12, HAZ 12, HVX 12, LT 11, LBV 8, JOP 6.

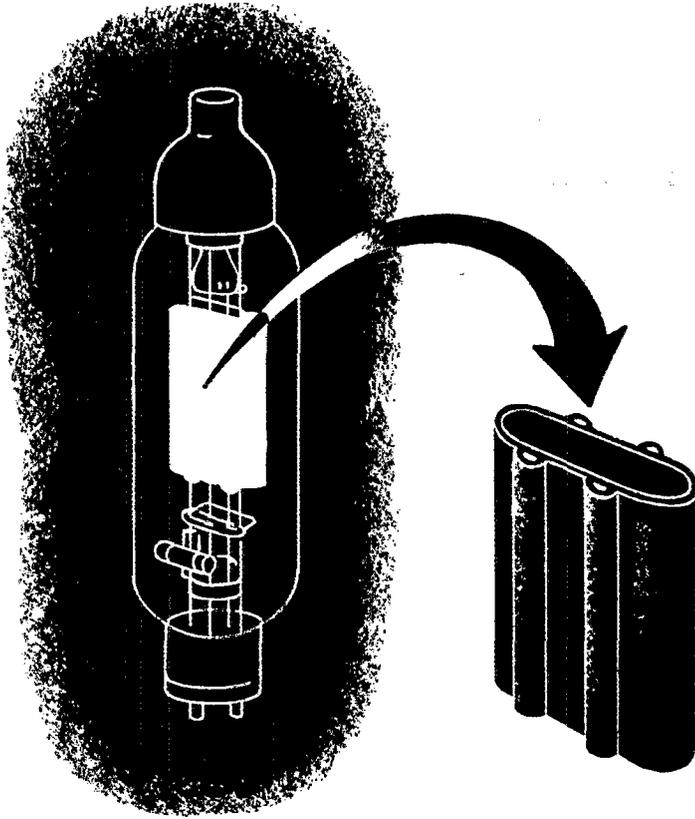
WASHINGTON — SCM, Clifford Cavanaugh, W7ACF — SEC: CP, RM; GZY, PAM; CKT, LFA is NCS for WARTS Net. IOQ handles all traffic going trans-Pacific from two State Nets. LLL has a radio operating job with State Patrol. ETO still is hunting for new VFO. GR moved the rig into the bedroom when the shack got too cold. ZU, FRU, IOQ, KWC, GZY, and CKT were the first stations to receive the new BPL wallpaper. ZU handles lots of traffic as anchor man for WSNET in Seattle. EGR is interested in getting AEC going in Ellensburg. The Valley Radio Club at Puyallup is building emergency gear for AEC drills. MPH, the EC, is squarely behind the move. EHL is taking a course in television. JJK has done a real nice job with his 'phone patch. KHL is raring to go on WSNET, but he has to work nights. LEC has gone into the short story writing business. JVV, IYU, and CKT had a big time at the Bremerton Hamfest. GZY, the RM, worked K6DI on 3695 kc. after JC had softened him up for Larry. IJJ is interested in OO appointment. DGN puts up a new 7-Mc. folded dipole. KCU now is a member of the RCC and she is handling lots of traffic, both c.w. and 'phone. APS is having a bad time keeping schedules. CWN says his shack is too cold for operating. LVB has built an inter-com between the shack and the kitchen just so he can enjoy turning off XYL when she calls. CKT is going great guns again at new QRA. FWR says personal QSOs are taking most of her time. GHI, Seattle EC, is getting ready for the flood season. FWD did an FB job handling the origination of GP message. DRA installed new monotone. FIX says WIAW is too far away to put a signal out here good enough to be measured. AMZ had a fine time in the CD Party. KTL has built a new mobile transmitter. EYS schedules VESMC, who is north of Pt. Barrow. MBO, who used to be 7BFC years ago, reports there is an FB XYL operator in Republic with the call EXY. New OPS: BX, LFA, CKT, EGR, KTL, KWC, EVV, GR, and IJJ. New ORS: WY. How about a few ORS to even things up, gang? Lots of traffic reports were received but not much news. Add a couple of lines, fellows, and give me some dope for the report. JDC, old-time 'phone man, sold the mike and bought an oscillator and key. Traffic: W7CZY 746, CKT 672, IOQ 327, ZU 220, FRU 207, LFA 160, HWK 80, FIX 73, LEC 72, KCU 69, LVB 69, FWR 43, MCW 43, ACF 36, FWD 35, EGR 32, ETO 25, AMZ 24, KAA 22, EYS 20, IJJ 19, DGN 18, GR 18, DRA 15, CWN 10, KTL 9, LNW 8, LIL 4, JC 1.

### PACIFIC DIVISION

NEVADA — SCM, N. Arthur Sowle, W7CX — Asst. SCM, Carroll Short, jr., 7BVZ. SEC: JU. ECs: JLV, TJY, KWZ, HJ, JVV, and KSR. OPP has just received a new call, "Honest John," W7HJ. New officers of the Southern Nevada Amateur Radio Club are: JU, pres.; TFF, 1st vice-pres.; LVP, 2nd vice-pres.; LBE, treas.; LUV, corr. secy.; and Allan Sedgwick, rec. secy. PZY has finally de-bugged his new modulator system and is on 14-Mc. 'phone with 1/4 kw. MDG is on 7 Mc. and operates between station breaks at KWRN. BWX, the only ham known to be in Lander County, is on 14-Mc. c.w. KRG, the only ham in Storey County, is on 7-Mc. c.w. LVS and JLN have moved to Inyokern, Calif. TJY has a kw. on 50-Mc. 'phone. GC has an FB n.f.m. signal on 3.85 Mc. BYR has a quad on 14 Mc. JVV was active in connection with Nevada's Operation Haylift. There is lots of activity in Nevada but most of the boys seem to have broken their "write arms." Watch for "Nevada Week End." Traffic: W7JU 145, TJY 56, CX 41.

SANTA CLARA VALLEY — SCM, Roy E. Pinkham, W6BPT — The Santa Cruz Radio Club has applied for affiliation with the ARRL. YRB can be heard on 3.85-Mc. 'phone now from Sunnyvale, WGO gave a talk on mobile 'phone as used by the Pacific Tel. and Tel. which was very interesting. DAE has experienced T.V.I. as the first case

(Continued on page 76)



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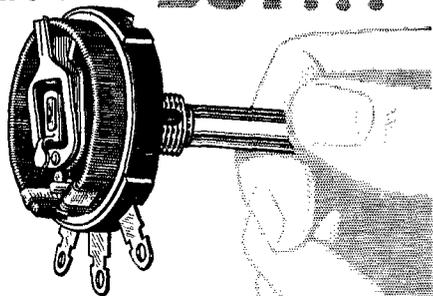
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reported in San Jose. Al says that traps in the a.c. lines to the receiver has cleared the interference. VIQ is holding schedules on 28-Mc. 'phone for the Los Gatos-San Jose area. AEW is new president of the Palo Alto Radio Club. SYW is building a new rig for 23 Mc. with 813 in final. LXA is active in the Buzzard Net on 3.85-Mc. 'phone. ZGG has traffic schedules with KG6DI on 7.05 and 14.08 Mc. Ray can handle any traffic going to Guam and points west. YPM was visitor at the last SCCARA meeting. Over eighty were in attendance at this meeting in January. WVOZ is active on 3.85-Mc. 'phone and the Mission Trail Net with new Collins 32-V transmitter. AVJ is converting GF-11 for emergency work. LCF is QRL with work as principal of school in Menlo Park. FBK is active on 144 Mc. working in San Mateo County Emergency Net. This net drills on Sunday nights. Say, gang, the reports have been very few the last few months and are not getting in on time to meet the deadline. Please get your reports in the mail not later than the fourth of the month. Traffic: W6ZGG 98, WGO 56, WJM 51, WZE 10.

**EAST BAY**—SCM, Horace R. Greer, W6TI—Asst. SCM, C. P. Henry, 6EJA, SEC: OBJ, ECs: AKB, EHS, NNS, IT, IDY, QDE, WGM, Asst. EC u.h.f.: OJU, RMs: ZM, FDE. QXN won the Hammond Memorial Traffic Trophy for the past six-months period for the most traffic turned in. FDR, the previous winner, turned in the highest traffic totals but no one can win twice in a row. QXN is a former winner. IT received his 100th postwar 'phone card so this gives Elvin the first 'phone postwar DXCC award for Northern California. Elvin also was the first to receive his postwar DXCC. DUB is putting up two new steel towers for 14- and 28-Mc. beams and also a 70-ft. telephone pole for a television receiving antenna. ELW is making an outstanding secretary for the Oakland Radio Club, which meets the 2nd and 3rd Thursdays of each month at the Oakland Red Cross Building, 9th and Fallon Sts. EBI has new rig and antenna farm. DNX is active again. CZQ has made some changes in the old rig. DAC is working on two-element beam. CJI is on 3.5 Mc. NJO and GMY are on 28-Mc. 'phone. CA is on 14-Mc. c.w. QUL is QRT. JZ needs a new VFO. KEK got the bugs out of the rig. JK seems to get two QSL cards from some of the rare ones. CTL worked a CE6 for WACE. Recent wind storms played havoc with some of the antennas. MEK lost his tower and beam. PB, LDD, and RCC all lost part of their elements. Replacements were made without much delay. Frank bought three steel towers which will be up soon and Dan put up a new beam. OBJ is planning an antenna farm. BIG reports that the San Leandro Radio Club is going FB. Visitors are always welcome. FDR, the traffic king, had seven heart attacks in eight weeks but you can't keep a good man down. YDI is QRL Mission Trail Net. ZM says hello and would enjoy hearing from the gang. WTI is getting new ECO. QXN is handling traffic between Pioneer Net and TLAP. ZUI rebuilt high power voltage supply. TI is building a 14-Mc. beam aided by a dozen experts, with IKQ as chief. UPV is getting ready to rebuild 28-Mc. beam. EJA has new 28-Mc. and 7-Mc. antennas up. OJW has been working on television receiver and antenna exclusively. QDE has new p.p. 100THs in final. SARO is after 10,000-Mc. record. EY made a flying trip to ARRL. Mac now is a Class I OO and will be glad to make checks with the gang. Bill Nations is making a great chief operator for OT. Traffic: W6QXN 231, OT 177, FDR 61, ZUI 47, OBJ 12, YDI 11, TI 11, QDE 1.

**SAN FRANCISCO**—SCM, Samuel C. Van Liew, W6NL, Phone JU 7-6457, SEC: DOT, CEC: BYS, BYS is rebuilding. ADQ, newly-appointed ORS, and an old-time traffic man from W7 Land, is using a Stancor 250-watt transmitter and operates on 3.5, 7, and 14-Mc. c.w. NL is rebuilding. RBQ is out to get DX Certificate on low power using Colling 32V transmitter. CXO will become OBS, ORS, and OPS. NL delivered a radiod proposal and was promised an invitation to the wedding. JWF suffered the loss of mobile gear in a collision. Several complaints have been received on bad signals, both c.w. and 'phone. We now have four OOs, so clean up those signals or you're going to be in line for a card from one of them. Please remember, these men are ready and willing to help you with suggestions and their technical knowledge. The Marin Radio Club held its Christmas Party at the Blue Rock Hotel in Larkspur. A swell program was furnished through the efforts of Charlie Catania. The new officers were installed and the president-elect, PVC, took over his new duties for the coming term. A new call in Marin County is CEW, on 7 Mc. with a 75-watt rig. GPB gives all indications of getting back in the DX game in a big way. Joe has built a new shack, purchased a ten-over-twenty beam, and is toying with a new Collins receiver. WDG was host recently to 9LQC, from St. Paul. PVC is plenty hot on 28-Mc. 'phone with his BC-610 and planning a new eight-element beam. BCC had his orders revoked and will remain at Hamilton Field, where he is president of the Radio Club. IXQ is assembling a gallon for a big noise from Tiburon. RAK is on 28-Mc. n.f.m. YME still has the outstanding 28-Mc. signal in the county. GFW reports the first case of T.V.I. in Marin County. DIX and UDF, of Novato, leave him speechless to say nothing of picturesque. 6JTP is active on 28-Mc. 'phone. GZ has a low-power surplus rig going good on 28 Mc. MHZ has gotten the bugs out of his rig. ZUB has built a new e.o.o.

(Continued on page 78)



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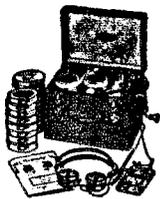
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that not only looks good but works good. DNY is going to school for the telephone company in San Jose. BCM is back on 28 Mc. From the Eureka area we have the following: FYY is working all bands with mobile equipment. ZHE is rebuilding his rig. SLX's antenna blew down. AEY is on the air with a pair of 807s. CWR is trying to find time for a little c.w. work. BME is converting an ART-13. BUO is installing 813 final. FCL is a new ticket in Eureka. BWV still is trying for Vermont QSO. EQQ is rebuilding rig for 7 Mc. OUT is trying to find time to get back on the air. NAO is ready to get back on 3.5 Mc. QBC is president of Humboldt Radio Club. Ex-7NP is treasurer. WYP has moved to Eureka. FCR is a new licensee in Eureka. The regular meeting of the San Francisco Radio Club was held January 28th. Sam Cooper and W. E. Bachman, of the General Electric Corp., spoke on "Circuit Analysis of General Electric Television Receivers." A very fine talk plus an opportunity to learn what goes on inside a television set was enjoyed by all present. The S. F. Naval Shipyard Radio Club, at its monthly meetings, put on a drive for more recruits for Emergency Corps work and also a program to obtain more equipment for the local Red Cross Chapter. The Golden West Frequency Club, at its recent meeting, voted to back up the local Red Cross Chapter with its f.m. mobile equipment and operators. Traffic: W6NL 102, JWF 40.

SACRAMENTO VALLEY — SCM, Ronald G. Martin, W6ZF — Asst. SCMs: Northern Area, Ray Jensen, 6REB; Central Area, William Van de Kamp, 6CKV. SEC: KME. EC: BVK. RM: REB. OO: ZQD. Northern Area: JDN is on 3854 kc. and Mission Trail Net with new antenna. REB. NCS of Pioneer Net, and the gang did an excellent job handling GPR message originating at PIV. Central Area: New officers of GERC are WYX, pres.; CKV, vice-pres.; GUV, secy.-treas. ZUJ is stirring up local 28-Mc. net activity. TSR finally made 3.5-Mc. c.w. FOD is on 3.85-Mc. 'phone and 3.5-Mc. c.w. LYQ is studying reflection of 144-Mc. signals. WTN is on 3.85- and 28-Mc. 'phone. ZFJ is on 7 and 28 Mc. K6NAK is active on 28 Mc. GUV is building new n.f.m. 35T rig to join new Chico 28-Mc. 'phone net. TID has four 813s on all bands with kw. CLG finished 500-watt 28-Mc. 'phone rig and three-element beam with sixteen-element 144-Mc. beam on top. RAQ was caught in the new 28-Mc. activity. AF renewed OBS appointment. Southern Area: PIV is the professor on v.h.f. studies. WTL worked NYLB. AUO is putting up a new 144-Mc. beam. BLP tried 676 as a mixer in 522. YV joined SV Emergency Net on 28 Mc. ASI completed 833s final. 7ILJ/6 reports a new club at McClelland Air Force Base. CQK completed radio remote selector control system. NHA is building new exciter. OKZ has new 3.5-Mc. center-fed skywire. IHZ received his old call, AAC, and is on 7 Mc. with BC-459. IY is on 7- and 14-Mc. c.w. SUB and MIW are building new rigs. Roseville sports UNT on 28-Mc. emergency net. GHP is new EC. KKL, with BC-940, has the loudest signal on 144 Mc. ASE, GHP, OXG, and UNT have 522s on 144 Mc. KME and BVK have ARC-5s and PE-103s in their cars. YLO has 400 watts to HK54s on 144 Mc. MYL put p.p. 24-Gs in final and extended 144-Mc. range to 150 miles. CAS and PIV put dipoles atop 60-ft. trees. BTY is new OBS and OPS. WLI licked 120-cycle vibration in rig. QDT is on 3.85- and 28-Mc. n.f.m. Traffic: W6REB 409, PIV 102, JDN 72, WTL 4.

SAN JOAQUIN VALLEY — SCM, Ted R. Souza, W6FKL — Asst. SCM, James F. Wakefield, 6PSQ. SEC: JPS. ECs: KUT, PHL, and WBZ. The following is gleaned from the SARC Fly-Sheet: The first-known case of T.V.I. was reported in Stockton. SMH, VPV, and BHI put heads together and effected a cure. DIE, VMP, PNM, and YEX all have t.v. in their backyards. RWI just moved and finds the basement too short for the rack. YGZ is rebuilding. ETA is back at Calif. Poly. DVI now has 117 countries and 39 zones. DBH has a new rig. WBZ is EC for San Joaquin and Calaveras Counties and has another n.f.m. rig on 28 Mc. SF now is located in the Armory. The new officers of the SJVRC in Fresno are: KMI, pres.; JPS, vice-pres.; ZVP, secy.; JWK, treas. Board members are UVN, EJD, SRU, PSQ, and PXP. TFH was seen recently busily equalizing the lines into the new b.c. station, KGST, in Fresno. This station is partly owned by QEU. BNP lost both poles and is now on 7 Mc. with a temporary 3 watts. CUA is a new ham in Sanger and reports for the first time. PTF and ZVP are busy on 14 Mc. PHL is rebuilding completely. OEB now has a wire recorder in his shack. KMI and FKL are busy acquiring and experimenting with emergency equipment. The Fresno County Sheriff's Aero Squadron boasts the following local hams: AKK, WYT, KUT, EJD, HXA, and PSQ. TV is moving down from the city by the Golden Gate to the city of Sun Maid Raisins. How about some more reports and appointments, fellows?

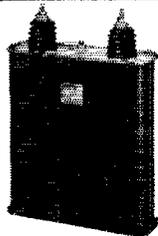
## ROANOKE DIVISION

SOUTH CAROLINA — SCM, Ted Ferguson, W4BQE/SANG — AUT is EC for Clemson area. I am indebted to DX for the report on the gang in the eastern part of the State. OMP works 28-Mc. 'phone and 50 Mc. AUL has moved to this section from Florida. ELM is on 28 and 50 Mc. LLH is on 14-Mc. c.w. MAR operates on 14-Mc. 'phone. MCS is on 7-Mc. c.w. MGY operates on 7-Mc. c.w. and 28-Mc.

(Continued on page 80)

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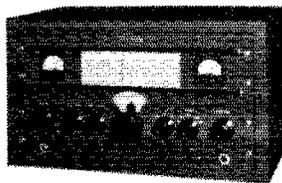
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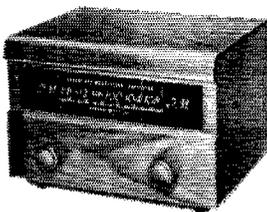
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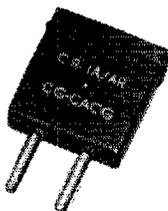
Exactly the same as the  
RCA 630TS chassis, com-  
plete kit of parts, in-  
cluding pre-wired and  
aligned RCA front end,  
punched chassis, with all  
major components and  
sockets mounted, etc., all  
RCA tubes including kine,  
complete manual with  
service notes, all RCA.  
New, simplified point-to-  
point instructions. (Free  
circuit and parts list on  
request.) Shpg. . . . .**\$198.50**  
Wt 85 lbs. ....



Kit as above but  
less 10BP4 tube....**\$168.50**  
Shpg. Wt. 55 lbs.  
12" kine tube..... **69.75**  
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## XTALS

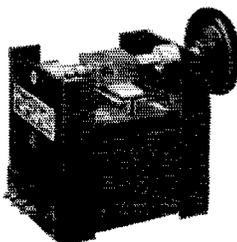
20 meter xtals for a buck!  
Mounted in holder with 1/2"  
pin spacing. Also 40 and 80  
meter and 6 and 13 mc  
bands at the same low price.



Specify your frequency.....**\$1.00**  
5 mc precision xtal, as shown, many uses.....**\$1.95**  
Special 8 mc xtals for 2 meter xtal control.. **1.50**  
Lucite adapter for 1/2" xtal holders..... **.35**  
Include 10¢ postage with your crystal order.

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250 watts. Input 115 volts,  
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103-126 volts. Shpg. Wt. 15  
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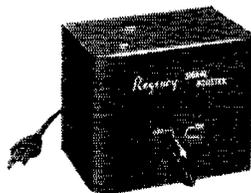


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Constant Voltage Transformer. Primary 95-125 v.,  
15 va., Sec. 115 v., 0.13 amps. Surplus,  
like new, Special.....**\$7.95**

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Extremely stable, high-  
gain, wide band pre-  
amps using push-pull RF,  
self-powered. Either 300-  
ohm line or coaxial cable  
may be used on either  
input or output. Proper  
impedance match and  
push-pull performance maintained under all conditions.  
Amazing improvement in signal to noise ratio under all  
receiving conditions. Models: SB-29, 27-30 mc; SB-52,  
50-54 mc; SB-69, 44-48 mc; SB-98, 88-108 mc; SB-146,  
144-148 mc; SB-157, 152-162 mc; SB-189, 174-216 mc  
(SB-69 for TV channels 2-6; SB-189 for TV  
channels 7-13). Any model, each.....**\$19.95**



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for immediate  
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(20 Feet Square at Base)

For Commercial FM Station  
And Advanced Experimenter

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KANSAS CITY

(Delivery Beginning March, 1949)

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1/3 down. Write for free details.



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on all 8 popular sizes. Note  
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### 5th WEST VIRGINIA QSO PARTY

The Mountaineer Amateur Radio Assn. will  
sponsor the 5th West Va. QSO Party starting at  
6 p.m. April 1st and ending at 6 p.m. April 10th.

Rules: Open to all West Va. amateurs. No power  
limitations. Any and all amateur bands may be  
used and the same station may be worked on dif-  
ferent bands for credit. C.w. and 'phone and c.w.-to-  
'phone contacts on one band are permissible but  
cross-band QSOs are not allowed. Score two points  
for each completed QSO when the following informa-  
tion is exchanged: date, time, call, city, county.  
Multiply total QSO points by number of different  
counties worked. All logs must contain the exchange  
information and will be cross checked by MARA  
members. Incomplete and incorrect logs will not be  
counted.

To be eligible for prizes, logs must reach Don  
Morris, W8JM, Activity Mgr., MARA, 303 Home  
Street, Fairmont, West Va., not later than April  
20th. Highest scorer will receive a two-year ARRL  
Membership, second an ARRL Handbook. A special  
prize will be awarded to the highest scoring amateur  
who has been licensed less than a year, if date of  
license is marked on log.

'phone. HXZ is reported to be increasing power. MRR  
hopes to have his rig on 28 Mc. soon. According to DX the  
Palmetto Net (3.85-Mc. 'phone) meets Sundays at 9:00  
A.M. and 3:30 P.M. with BPD and DPN as Net Control Sta-  
tions. Members are AIS, AZT, BSS, BPD, BZX, CE, DX,  
EOO, FNC, FM, GFP, HEV, HXZ, ILQ, IYA, KMK,  
LSD, and MRJ. Those interested are invited to join. IYA  
has changed his QTH to the beach and uses sky wire for  
rot line on high tide. The Rock Hill Club elected the follow-  
ing: CXO, pres.; MYM, vice-pres.; NTD, secy.; and Ralph  
A. Buddin, custodian. FMZ reports that a new club is being  
formed in Orangeburg and that DPN is spearheading the  
move. BSS reports that a new club is being formed at Green-  
wood. Are you ORS, OPS, OBS or OES? If you are a mem-  
ber of the League and active you are eligible. Information is  
available on request.

VIRGINIA — SCM, Victor C. Clark, W4KFC — A  
total of 72 Virginia stations have qualified for Section Net  
Certificates as a result of having reported in on VN or VFN  
on at least 15 occasions. About 125 livewire Virginia hams  
are now receiving KYD's excellent Section Net Bulletin as a  
result of having reported in on VN or VFN at least once.  
Fellows, we have two of the best state nets in the business —  
give 'em your support! VN operates in two sessions, starting  
at 6:30 and 7:00 p.m., 3680 kc., and VFN at 7:30 p.m., 3880  
kc., Mon. through Fri. BZE, FJ, KAO, and ZV cooperated in  
obtaining and originating a message from the office of the  
Governor of Virginia for the Governors-President Relay.  
The message was routed via KAO, GLD, FV, and ITA.  
Active in guarding the key frequencies and receiving GPR  
messages for delivery were: FF, GKY, ITA, IUU, JDL,  
KFC, LRI, MOJ, and NNN. IA and LRI were members of the  
group delivering the messages to President Truman.  
Arlington Hall Radio Club (LOI) officers for 1949 are:  
3MIP, pres.; 4OJA, vice-pres.; OQE, secy.; and MG, treas.  
MSL was appointed chief operator of LOI. New officers of the  
Arlington Radio Club are: OJL, pres.; BF, vice-pres.;  
MSL, secy. This club has undertaken code and theory  
classes for a group of about 12 Arlington youngsters. JLK  
has 35 watts on 7 Mc. New appointees: WY as EC and  
QWM as OBS. IWO has 116 countries confirmed. A new  
beam is underway at LUE. OEM is working 7- and 14-Mc.  
c.w. IPS joined AEC. EMJ is setting up a new QTH in  
Falls Church. KYD now has 20 watts on 28-Mc. 'phone.  
Active in the ARRL Member Party were: BZE, FF, FV,  
IA, IPC, JFE, JHK, KFC, KFT, KYD, KYN, KVM,  
LAP, LRI, LPP, LUE, NCR, NNN, QWM, and 3MLP/4.  
NQV worked an F on 7 Mc. for his first DX contact. Traffic:  
W4KVM 125, KYD 75, LAP 74, KFC 63, IA 51, FF 47,  
ITA 42, FV 37, II 27, QWM 13, IPC 7, KFT 7, VE 7,  
GLD 6, IWO 5.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM —  
MARA received W8SP for its club call, a call which al-  
ways has been associated with Fairmont amateurs and clubs  
and made history in the spark days. OXO leads the traffic  
handlers this month with WVN and TLCS schedules. Be-  
sides WVN Net work, CSF has been building EC equip-  
ment. AUJ has new 803 final with 350 watts. ZFB is operat-  
ing portable from Glenville College. BVH schedule\* AUJ  
from his camp at Wildcat, which is the only communication  
out of that town. BWI and BWD are active on 3.5 Mc.  
New amateurs: DTK, CaneBrake; DPT and DQX, Fair-  
mont; GBF, working his Signal Shifter from the house, dis-  
covered it would drive the rig in the shack, over 150 feet  
away. QC assisted in the relay of important message about a  
B-29 down in the ocean off the African Coast. DFC and  
YPR keep Princeton on the c.w. and 'phone nets. JM, ESQ,  
YGL, TDJ, JKN, EP, and EHA have rigs on 144 Mc.

(Continued on page 82)

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*The* ARRL

# ANTENNA

★ ★ ★ **BOOK . . .**

**T**HE PRESENT EDITION of the ARRL Antenna Book represents an accumulation of ten more years of the amateur's experience in both war and peace in making the all-important ever fascinating "sky wire" carry signals to the ends of the earth. The data contained in this book are the result of practical experience both of the authors and hundreds of amateurs who have contributed to the practical know-how that this book expresses.

The book has two principal divisions. Chapters 1 through 5 deal with the principles of antennas and transmission lines, wave propagation and its relationship to antenna design, and the performance characteristics of directive antenna systems. These five chapters might be called a textbook on antennas; they enable the reader to design a system of his own to fit his particular needs. Beginning with Chapter 6, there is a series of chapters in which complete data are given on specific designs for the various amateur bands. The amateur who has not studied the first section, or who wishes to avoid the necessity for making his own calculations, will find in these chapters the information necessary for putting up the system that appeals to him. The remaining chapters deal with the highly important mechanical features of construction and related subjects such as determining geographical directions.

This required twice as big a book as the previous edition but we are sure you will find it well worth more than the nominal cost.

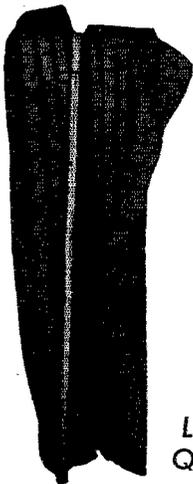
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# LOOK

## 35-FT. MAST KIT



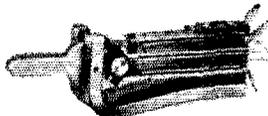
New, Signal Corps type. Kit has seven 5' 6" sections of 1 1/2" o.d. steel tubing, heavy 1/16" sidewalls, green enameled finish. One end of each tube is ferruled 6" for tight fit into next section.

An inexpensive, sturdy, portable antenna mast or vertical radiator. Easy to erect. Complete with heavy canvas carrying case with sections for each tube and wrap-around straps. 6 ft. length overall. Total weight 45 lbs. Complete,

Limited Quantity

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One set of 3PDT contacts, two sets of SPST contacts normally closed. Center, up down action on rubber cushioned cams, positive hold in. Nickel plated metal bracket for plate mounting. **60c**

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2.5 Volt 10 Amp., 6.3 Volt 5.5 Amp., 6.3 Volt 1 Amp. 5000 Volt insulation, hermetically sealed, ceramic feed thru connections, 110 Volt, 60 cycle primary, 4 1/2" x 3 1/2" x 5 1/2" **\$2.95**

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Famous make double-bearing condensers, regularly listing at \$2.70 and \$3.00, isolantite insulation, semi-circular plates (straight-line capacity) .024" air-gap, 100 mmf. or 140 mmf. either size, brand **59¢**

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1000 KC crystal, in FT-243 holder, ground to exact frequency to duplicate performance of original crystal in **\$3.50**  
BC-221 Frequency Meter. New.....  
Special frequency crystals, outside amateur bands, \$5.00.  
Specify exact frequency.

*Steinberg*

633 WALNUT STREET - CINCINNATI 2, OHIO

FMU visited the Charleston and Huntington Radio Clubs on the EC program. MARA again will sponsor the West Va. QSO Party, the 6th to be held. Read the rules in this issue and enter. See you in the Contest. Traffic: W8OXO 308, CSF 88, GBF 43, DFC 33, JM 17, AUJ 11, QHG 7, KWL 5.

## ROCKY MOUNTAIN DIVISION

**COLORADO** — SCM, M. W. Mitchell, W0IQZ — SEC: CUGD, RM, IC. The following are on the IUN Net: IC, FPL, EKQ, IPJ, DRB (Kans.), HWH, LZY, MOM, IC, TRJN (Ariz.), 7UTM (Utah), 7HPE (Wyo.), 7HRM (Wyo.). IC reports the Net still needs stations in Pueblo, Boulder, Greeley, and northeast Colorado, and more on the Western Slope. SDGG visited IC for a couple of nights. Code and theory classes in Brush resulted in four taking the exams, and all passing the code test. OPF is a new ham in Brush. In three hours on the air with a 5-watt rig, WO worked 16 states, 7 U. S. districts, and 2 countries on 7-Mc. c.w. Anyone interested in a slow speed c.w. net and a Colorado c.w. emergency net, contact LZY, MOM got caught in the blizzard emergencies with his oscillator down! WAS is building new Clapp oscillator. He did get on long enough to handle 6 messages. OTR's daughter placed in the junior ski meet. AML keeps us posted as to the amount of snow on the watershed. A meeting of the Western Slope Radio Club was held Jan. 30th. Emergency communication was discussed and planned, with the State Highway Patrol and Mr. Picone, of the CAA, promising cooperation. FXQ has new 350-watt rig on 3.85 Mc. with 810 in final and a Clapp oscillator which works FB. Denver hams, through FGH, provided communications with G.I. patients at Fort Logan and their relatives on New Year's Day. OKW is having QRM trouble with neighbor's electric blanket. Traffic: W9IC 63, LZY 47, QJR 45, IPJ 29, MOM 8, OWP 6, IQZ 5.

**UTAH-WYOMING** — SCM, Alvin M. Phillips, W7NPU — Asst. SCM, Charles M. Conley, 7UOM. SEC: UTM, RM; GBB, PAM; FST. Your report this month was written by UOM. TPV, of Layton, is being heard on 28-Mc. 'phone. MWR is new OBS in Sandy. JOE now is operating mobile. Those interested in CAP communications are urged to contact Jim Littlejohn at KMUR, Murray, Utah. KGL is doing a nice job of DXing. The Salt Lake gang reports T.V.I. Go West, young men, go West. A new-comer to the ranks is NAY of Roy, Utah. KL7CI enjoyed a visit with relatives in Coalville. George went back to Alaska where it is warm. NPU, our SCM, enjoyed a very pleasant evening with the UARC and received many pledges for reports for this column. A nice turnout at OARC was attended by Asst. SCM UOM. Requests for various appointments were received and are being reviewed by the SCM. UTM did a fine job on GPR. Congratulations, Floyd. LRV is doing nicely on 3.5-Mc. 'phone. FST is keeping schedules with DULAK, KG8DI, JA2OT, and others when conditions permit. In the local WAS Contest MFU leads LXX, 35 to 32. LWH is proud owner of new Collins 75A. LWY is going mobile. Traffic: W7UTM 179, LKM 7, FYR 2.

## SOUTHEASTERN DIVISION

**ALABAMA** — SCM, Dr. Arthur W. Woods, W4GJW — A. The pre-Field Day 3.85 Mc. discussion was so successful that it was decided to have a monthly QSO Party on the second Sunday of each month. YL, formerly AGI, is back on 3.85 Mc. with a kw. JYB maintains schedules from 3.85 to 28 Mc. with low power. MXU schedules AENB, 0QXO, and 60YA daily for moving traffic. BDH and BMM have a ready-to-go emergency portable in a trailer at all times. MUW uses Bud VFO and 815 final, and recently received his Class A ticket. KIX is a regular customer on AENB and Rebel Nets. CNQ, formerly 8CNQ, is new in Montgomery and works all he hears with 25 watts. GMH deserted 'phone for 7- and 14-Mc. c.w. using an 813 final. The Birmingham Club is helping seventeen-year-old Ellen Peak to get her ham ticket. She has been a polio victim since the age of four and is currently using a code machine to aid her in acquiring her ticket. DID has the first of four new finals on the air, this one for 3.85 Mc. and others to follow. Traffic: W4MXU 26, KIX 15, GJW 5, JYB 5.

**EASTERN FLORIDA** — SCM, John W. Hollister, jr., W4FWZ — A heavy volume of traffic is being handled by DUG, Tampa Radio Club, at State Fair with the Palmetto and Gator Nets cooperating. The Dade Radio Club is advocating more activity on 50 and 144 Mc. for local chats. The Orlando Club bulletin talks up more c.w. activity. Clearwater: AXX wants QSOs on 144 Mc. Fort Lauderdale: MGW reports a t.v. station in the offing. Jacksonville: 30GQ visited FWZ with dope on amateur Red Cross coordination and talked to the JARS. W30GQ/K3NRW was in Florida Nets during the recent hurricanes. Lake City: IQV worked EID and RU in Jacksonville, a distance of over 60 miles, two way on 144 Mc. Lake Placid: BYR reports the AEC circuit now includes AMW and AFZ at Avon Park, and NMO at Wauchula, all on 7 Mc. BYR is running 144-Mc. experimental schedules. Miami: LVV got confirmation for DXCC. ES copped the Governor's message from KP4CO right out from under JEP, KJ, NN, and CPG. New Port Richey: KJ issued six K. of Kc. certificates in January. Orlando: Here's the dope on NHC — 100TH on

(Continued on page 84)

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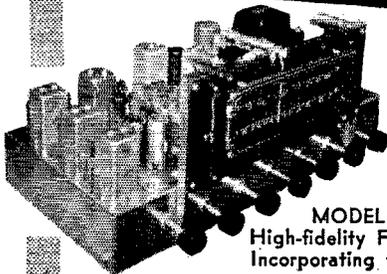
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Free Bulletin 449H gives performance curves and data on these high-fidelity tuners.



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7 Mc., 304TL on 28 Mc., 829B on 50 and 144 Mc. Palatka: QR made his one-hundredth consecutive K. of Kc. meeting. St. Petersburg: KQR has 250 watts dressed in rack and panel. EWS has 811s on 28-Mc. 'phone. MCT is on 28-Mc. 'phone with 35 watts. A new VFO for HUY makes for 100 per cent QSOs on 3.85-, 14-, and 28-Mc. 'phone. KTN takes it easy with push-button control. EZG runs a full gallon. MCH took the Pinella County Fair traffic with portable rig. JZ put up a 55 windcharger tower for 28-Mc. 'phone. OJH is gunning for 28-Mc. 'phone QSOs with 60 watts. Umatilla: AYV's ARRL Party score was 24,644 and CD score was 1,996,164. West Palm Beach: We all mourn with FNR on the loss of his father. 2RTZ/4 handled plenty of traffic. Traffic: (Jan.) W4RP 156, RTZ 87, MNT 74, DES 51, KJ 8, AXX 3. (Dec.) W4RTZ 65.

**WESTERN FLORIDA** — SCM, Luther M. Holt, W4DAO. — RZT was elected treasurer of the PARC following the resignation of DAO. EQR, CNK, and NDB got Class A tickets. MS made a trip to Pennsylvania on business. NDM got on 28 Mc. OKD is a new call in Tallahassee. OTY is a new call in Pensacola. HJA installed FB mobile rig. OHJ and OHS work 7 Mc. exclusively. The Goslin Radio Club operates under the call NBF. HIZ, EQR, and CNK participated in VHF Sweepstakes. NDB joined *Parasitics* as staff cartoonist. BFD plans more power. QK keeps busy as PARC secretary. LUF plans a new beam. MPY visited Pensacola. UC works for JNP. HQ renewed his ticket. MTN visited Missouri. BGI was transferred. BKQ lost his quad antenna. NWC is building 28-Mc. 'phone. LRC experiments with 420 Mc. QU is active with Naval Reserve. OKA and OKB run low power on 28 Mc. NJB built grid dip oscillator. Traffic: W4AXP 92, NGS 8.

**GEORGIA** — SCM, Clay Griffin, W4DXI — MCM, of Marietta, made a good score in the January ARRL QSO Party. He is building a new rig for 14 and 28-Mc. 'phone and has joined the Teenagers Net. Atlanta: LNG has rebuilt his 829-B rig and has 29 states on 50 Mc. He will graduate from Tech. in March. OPS and OTA are on 144 Mc. now. TO has a dual 14- and 28-Mc. beam. The Georgia Tech. Radio Club, AQL, has a 14-Mc. beam. The Club now is active on all the popular bands. ZD finished his steel tower and has a 14-Mc. wide-spaced beam on it. Welcome to ex-20CC (now 49QI) and his XYL, 2QMZ. They moved to Warm Springs from New Jersey and have a five-watt 7-Mc. rig on Pine Mt. MMQ reports that FEH is new president of the Savannah Club. GMA, EWY, and JNL comprise a B.C.I. committee. More reports are needed for this column. Traffic: W4BVK 19, DXI 10, LNG 1.

**WEST INDIES** — SCM, Everett Mayer, KP4KD — AM has new long wire up and reinstalled the beam and tried 14-Mc. 'phone. BE continues schedules with HR and usual Stateside contacts. DJ handled AEC C.W. Net while KD was on vacation in W4. ES keeps the AEC 'Phone Net going in addition to OBS schedules. EZ moved to new QTH. FM transferred to the States. FX is now CE7AP. HA returned to duty in KP4. HJ reports from Losey where he keeps KP4IL on. HR, with the Subraco, is working oodles of new ones on 28-Mc. 'phone. HU schedules W06AS for traffic to Puerto Rico. KD's schedule with W4OLC is running 100 per cent. QIC Miami? For the first time in history Puerto Rico was represented in the GPR, thanks to CL who obtained the message from Puerto Rico's first elected Governor. How are YOU planning to help out in an emergency? For details on the AEC, contact your EC, SEC, or SCM, or call in on the 3559-ku. C.W. AEC Net or the 3935-ku. 'Phone Net. Traffic: (Jan.) KP4EX 32, HU 15, KD 15 (Dec.) KP4HU 17.

**CANAL ZONE** — SCM, Everett R. Kimmel, KZ6AW — CO and PA were the Governors-President Relay operators for the Canal Zone. FL is chairman of the Canal Zone Chapter of the Red Cross. Our SEC, GD, is serving as radio advisor on Disaster Committee, with AW as alternate. With 'phone acts in the terminal cities and c.w. nets to bridge the Isthmus, the first Emergency Corps drill in February successfully linked both coasts. Our new OBS, MZ, also is building the Sunday morning 7-Mc. round table into a traffic net on 7040 kc. Aiming to join the net, BD, FL, and WJ desert 28-Mc. 'phone almost nightly now for three-way c.w. net procedure practice among themselves. AX is gunning for Far East 7-Mc. contact, receiving on a 7-Mc. 8JK beam, transmitting on a line wire. MZ's regular schedule moved from Iwo Jima to Guam. Ex-OJ now is in Guam. Ex-SW is looking for KZ6s from KZUSA while PB hopes to appear soon as a WI. Your activities and traffic reports are requested. Traffic: KZ5GD 6.

## SOUTHWESTERN DIVISION

**LOS ANGELES** — SCM, Vincent J. Haggerty, W6IOX — SEC: Samuel A. Greenlee, ESR, 1701 Sepulveda Blvd., Manhattan Beach. The following is from the Southwestern Division Director, John R. Griggs, W6KW: "I would like to take this opportunity of expressing through you, as SCM, my appreciation and thanks to those members of the Los Angeles section who supported my candidacy, and to pledge my wholehearted cooperation and sincere representation to all." ZOL reports BYT has a new shack and NTR has 70 countries on 14 Mc. with 100 watts and an ARC-5. MU runs daily 28-Mc. schedules with 50L, 5CN, (Continued on page 88)



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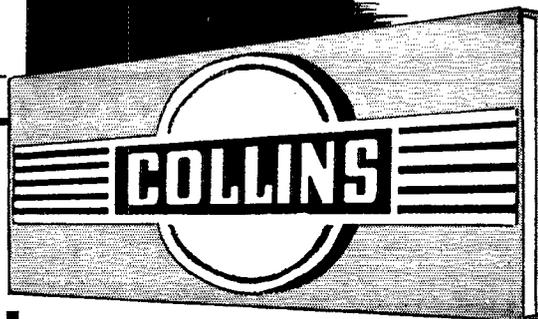
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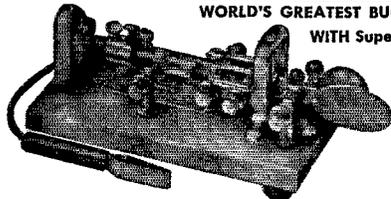
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and 9GZT. ZQV has a new p.p. 211 final working fine at 225 watts input. FYW was active on 7 Mc. during the ARRL Party. VAQ is working some swell DX and finds it much easier to WAC out here than when, as 8SFV, he vainly stalked the elusive Asians. 1WU reports many hours of official observing in which no off-frequency stations were detected. AEE rebuilt his rig to eliminate T.V.I. RPO has been rag chewing on 7 Mc. YSK operates auxiliary station EAJ/6 at Mt. Wilson on 50 Mc. In Santa Barbara the 10-Meter Round Table meets Thursdays at 7:30 p.m. with the following usually checking in: AMD, DGN, DTH, ERD, FFF, HBT, IJ, JTN, NCT, SEP, SRI, TMT, TWT, and K6NRA. SBARC officers are: OQX, pres.; FFF, vice-pres.; KFM, rec. secy.; SEP, corr. secy.; and SRI, treas. Meetings are held monthly on the fourth Friday, 7:30 p.m., Recreation Center, Santa Barbara. WQV has applied for ORS appointment. DDE received RM appointment. Ed has developed the habit of BPLing lately. AEE received endorsement as OBS. DLR is fixing a new antenna. Our PAM reports: The Two Meter and Down Club's VHF Contest was well received, with eight operators making more than 100 contacts on 144 Mc. WSQ was the winner with 140 contacts, closely followed by ZRU. Other high scorers were: FOW, CRV, EKK, WKO, WWT, and MJ. WHV is the ARRL code practice station on 147.5 Mc. Sundays from 10 to 10:30 a.m. and Thursdays from 7 to 7:30 p.m. MBA has 12 countries confirmed on 28-Mc. mobile DX. WKO installed a Paraday screen to kill T.V.I. on his 144-Mc. rig. CE leads the section in traffic. It was a shock to learn of the death of MFK, who was accidentally electrocuted in his radio shack. AEC activities: Effective Feb. 1 ESR became SEC for the section. The Bay Cities gang under EC PTR has its new control station, VB, in operation. It comprises equipment for simultaneous operation on 144-, 56-, 28-, 3.85-Mc. 'phone and 7-Mc. c.w. On drill nights (Mon.) it is a mighty busy place. The Long Beach group, under EC AOT, has an active group of mobile units. From Centinella Valley ESR reports his 28-Mc. mobile net, under RIT, staged a simulated flood and tidal wave drill using emergency power and mobile units. After drill the rendezvous point was crowded with non-member hams who turned out to meet the gang. So realistic had been the drill, one visitor reported his mother-in-law lit out for parts unknown. (He applied for AEC membership!) The 50-Mc. gang, under RNN, and the 144-Mc. gang, under ZLV, are active on drill nights plotting the area as to radio conditions. KEI, San Fernando EC, reports the Golden State Net checks in about 20 members. Portable and mobile equipment is required and monthly drills are held. Traffic: W6CE 939, DDE 182, ZMZ 74, IOX 56, ZQV 41, RSX 29, MU 15, AM 8, KEI 4, ASW 3, ZOL 3, FMG 2, FYW 1.

ARIZONA — SCM, Gladden Elliott, W7MLL — GYK and RU cooperated to save the lives of a family stranded in a blizzard. TCQ stood by to serve as emergency communication agent in a blizzard that stranded thousands. SBN and UAF stood by to take over communications in Safford when a flood threatened. Write JPY now and join the AEC. FGG worked HC2OT on 50 Mc. on two consecutive days. FGG, with 5 watts mobile on 144 Mc., worked UPF, OWX, LLO, and SLO in Tucson from White House Canyon. JMQ has a new FB speech amplifier. JXL, KRW, UAF, and SBN are on 3.85-Mc. 'phone. UAF has a ¼-wave, 180-ft. steel tower on 3.85 Mc. KRW keeps a weekly schedule with KL7RF. QJL has a new 28-Mc. beam. MNE has 300 watts on 7 Mc. at Litchfield Park. KTP has an 832 tripler crystal-control on 420 Mc. and a BC-788 receiver and 60-degree corner reflector antenna. LYS is working into the 3515-ke. net. Casa Grande, Eloy, and Maricopa hams have formed a radio club. KAE keeps a daily schedule with the YLRL Net. LIZ is working 28-Mc. 'phone in Tucson. LOJ is using plate modulation instead of n.f.m. on 28 Mc. Arizona hams will be looking for ex-Arizona hams on Apr. 10th. Call CQ Arizona. Arizona nets — 3515, 3757 low speed, 3865, and 7090 kc. Sundays at 10:30. Traffic: W7RJN 218, MWZ 139.

SAN DIEGO — SCM, Irvin L. Emig, W6GC — Asst. SCMs, Gordon W. Brown, 6APG, and Shelley E. Trotter, 6BAM. RM: BGF. SEC: DUP. DBZ is new ORS. BKZ holds high traffic honors with BGF next. FMZ reported for duty at the Sonar School. SKZ is busy installing fire alarm systems. HU has been using a BC-474A on 3.5 and 7 Mc. for the last year. BGF reports the Southern Border Net is going strong from 8 until 10 p.m. on 3550 kc. CNQ has moved from Calexico to Chula Vista to take the engineering aide job for the Immigration Service. AD reports a daily schedule with W9ASA/KL7 and that UYK is now station chief for AACs at Fairbanks. PTN expects to be operating 3.85-Mc. mobile soon. CCK bought a new 28-Mc. beam. Members of the Los Angeles YLRL were guests at the February meeting of the San Diego YLRL. The guest speaker was TBI. Another radio class, particularly for YLs, is being formed with VCD and VJQ as instructors. BYC, who has just received his second daughter, works the following with 20 watts on 3.5-Mc. c.w.: HHZ, KH6, and VEL. FFV still is pounding away on 3.5 and 3.85 Mc. A new call in San Diego is FED, heard on 3.5 and 7 Mc. MI still is looking for new countries. DWE is rebuilding for 28 Mc. while VHX is active on that band. KW is rebuilding a band-switching kilowatt. YTH lost his new rotatable tower during the last blow. BBP is building

(Continued on page 83)

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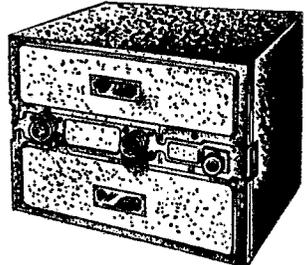
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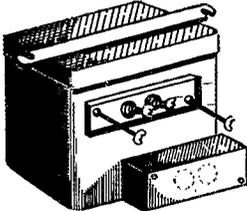
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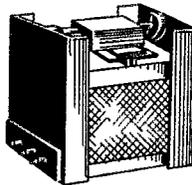


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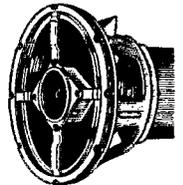
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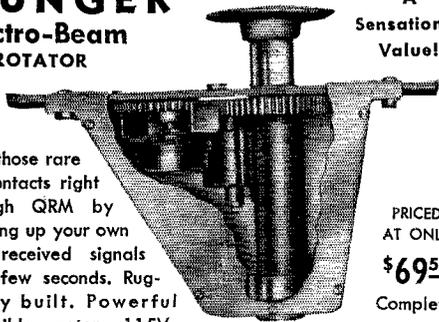
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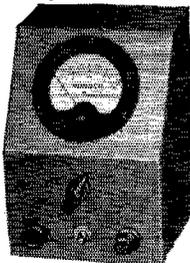
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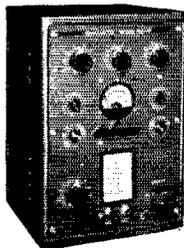
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a 28-Mc. mobile rig and is getting ready to get on 3.85 Mc. WUW is operating portable in Foxboro, Mass. BKZ has been appointed Assistant Director. A new club, to be known as the Soledad Radio Club, is being organized. A delay in naming a new SCM has occurred. Until this election has been completed, please send all reports to me as you have in the past. Traffic: W6BKZ 117, BGF 99, FMZ 93, CNQ/6 4.

## WEST GULF DIVISION

**NORTHERN TEXAS** — SCM, Joe G. Buch, W5CDU — January was a hectic month for members of this section. The justification for organized nets was clearly and definitely proven. The loss of communications, caused by heavy icing of power and communication lines, isolated a major portion of this section. The outstanding performance by members of our section and the community value of amateurs was widely acclaimed by press, radio, and utility companies. LGY has a new grid dip meter. NRY now is Class A. GUD and NW made BPL working GUD's rig. IYO sold his rig to OGS. NRY is physics teacher at Le Tourneau Tech. Institute. Officers of the Ft. Worth Club are: BBH, pres.; LPU, secy.; and KXSX, treas. Meetings are held the 2nd Thurs. of each month. Dallas club officers are: CSU, pres.; CJJ, vice-pres.; EG, secy.-treas. HIP is not active but someone is using HIP/KL7 call. TW has a kw. on 3.85-Mc. 'phone. MQH moved his 32V to Strawn and Mineral Wells to help T. & P. during the second West Texas emergency. DVQ, BKH, AWT, and DN are seasoned dispatchers now. AWT moved his rig to Baird during the emergency. CJJ lost his antenna but worked right through the emergency with a 10-ft. high wire. AAK lost antenna and one 40-ft. pole. EVI demands QSO from b.c. station KFYN. Dallas Convention plans are well underway. Thanks to all for a swell performance during the emergencies. Traffic: W5CJJ 916, GUD 829, GZU 277, LSN 270, CDU 175, ARK 141, BBH 88, IHG 65, GYW 43, FMZ 22, LGY 15, BKH 4.

**OKLAHOMA** — SCM, Frank E. Fisher, W5AHT/AST — Snow, sleet, and ice gave Oklahoma netters a busy time this month. The value of organized network operation was vividly shown in the effective operation of both 'phone and c.w. nets. The finest cooperation existed between our nets and those of our neighbors in Kansas, Missouri, and Texas. Here was one emergency where much more listening and less transmitting was the rule on net frequencies. Nice job; let's do even better next time. Your SCM spoke to the club at YJ via 3.85-Mc. 'phone at HGC when ice prevented a personal appearance. Contact was 100 per cent both ways and was enjoyed by both amateurs and faculty guests. The Lawton-Ft. Still Club is sponsoring its third code class, with fourteen top students also to have theory. PAA has a Collins kw. on 3.85 Mc. and a new Zepp antenna. MIJ is attending flight classes at Will Rogers Field. II and OOO are welcome additions to OLZ. During the emergency HGC and the 'phone net demonstrated that they could work within 7 kc. of adjoining nets without interference — the secret, reduced modulation. HGC resigned his Assistant SCM and PAM appointments to take on the duties of SEC. PA has put both a broken foot and his big rig back in service. News from this section must be snowbound and is sadly lacking. Come on, gang, let's hear what's going on. Traffic: W5MBW 225, NMM 145, AST 90, PA 82, OWV 84, LHP 46, KDH 45, HXG 23, K5NRJ 20, W5ADB 18, FRB 18, ADC 9, GCM 7, EHC 4, PAA 2.

**NEW MEXICO** — SCM, Lawrence R. Walsh, W5SMA. SEC: ZU. RM: NXE. PAM: FAG. The Los Alamos Radio Club elected new officers this month. They are: AFU, pres.; GXU, vice-pres.; OII, secy.-treas. Congratulations to all of you. This past month saw the first emergency of the year in New Mexico. JYW, at Hobbs, carried the bulk of the traffic using a clothesline as an antenna. The emergency nets on 3.5 and 7 Mc. were ready and able to handle the emergency traffic. JXO recently moved to Albuquerque from Arkansas. Doc runs 20 watts on 3.85 Mc. and has been working the East Coast. Anybody want a kw? CXP has been heard on 3.85 Mc. from Clovis with a very nice signal. NJR has a new antenna tuner which he hopes will help the B.C.I. 8AG/5 has a new converter for 14 Mc. which is really hot. NQG soon will be on the air with a BC-459. BIH is a new ham in Hobbs. PEJ has been checking in the 75 'Phone Net. MYA has a new SX-25 receiver. BYX has been heard from Hot Springs with a very good signal. OXC has been working 14 Mc. with an "undersnow" antenna. The gang at Farmington has organized a club. Traffic: W5ZU 210, JYW 171, NXE 78, IGO 82, OPN 26, OCK 15, NKG 10, PEJ 10, MYA 9, NJR 5, SMA 4, KAO 3.

## CANADA

### MARITIME DIVISION

**MARITIME** — SCM, A. M. Crowell, VE1DQ — SEC: MFQ. A slightly belated welcome to the PCARC, and thanks for the interesting information from Secretary NL, who is on 3.5-Mc. c.w. DZ is putting the finishing touches to the new bandwitching exciter. HR has completed his new home and is back on 3.8 Mc. PG is doing FB on 7 and 3.5 Mc. using Command sets. TX spends most of his time on

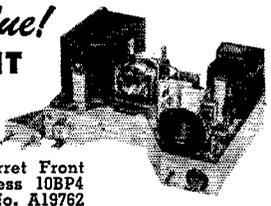
(Continued on page 90)

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**An Amazing Buy!** This is an exact duplicate of the famous 630TS chassis that is acknowledged by engineers and technicians to be the best performing TV set yet produced. All the original features intact! Now you can build it yourself with RCA schematic and 42-page service manual—at a Terrific Saving! New 12-channel Turret Front End Tuner is factory-wired and aligned with matched tubes. Will operate with 12", 15" or 16" tubes with slight modifications.

**MAHOGANY CABINET** (Table Model) for 630TS. Hand-rubbed, satin finish. With brackets for 10" tube & safety glass. **\$42.50**  
20 lbs. No. A19753

**KIT OF METAL PARTS** to Mount 15" Picture Tube on 630-type chassis. 3 lbs. No. A19764 **\$4.45**

**CONVERSION KIT**—Basic parts to convert any 630-type TV receiver to operate at maximum efficiency with 16AP4 Tube. All genuine RCA parts. Instructions included. No. A19765 **\$16.95**

**TELEVISION PICTURE TUBES**

10BP4 (RCA—10")	\$ 34.00
10FP4 (G.E.—10")	37.80
12FP4 (G.E.—12")	59.75
12JP4 (Dumont—12")	69.75
15AP4 (Dumont—15")	129.50
16AP4 (RCA—16")	79.50

**630TS TELEVISION CHASSIS**—Heavy steel, plated, punched and formed. Including 4 brackets. 10 lbs. No. A19751 **\$7.45**  
Special

**TV POWER TRANSFORMER**  
Equivalent to RCA #201T6, as used in 630TS receiver. Reg. \$27. Excellent qual. No. S-826 **\$12.95**  
Special



**Last Call! BC-645**

**RECEIVER-TRANSMITTER**  
Brand New. Complete with 15 tubes. 25 lbs. No. S-588, Only **\$9.95**

**Prices Reduced!**  
**RCA TV COMPONENTS**

No.	RCA No.	EACH
35626	201D1	\$ 4.41
35627	201D2	7.64
35756	201R4	.59
35758	201R5	.71
35636	201T6	15.29
35639	202D1	4.41
35757	202D2	6.45
35650	204T1	11.76
35651	204T2	3.38
35652	204T3	7.06
35753	204T9	2.65
35684	208T1	2.29
35655	208T2	1.82
35656	208T3	1.62
35658	211T1	5.59
35659	211T2	11.17
35754	211T3	5.59
35755	211T5	7.35
35759	Dual Socket for 1B3 Tube	2.94

## BIG TRANSFORMER BUYS!

**POWER XFORMER**—Flush Mtg. Pri. 120 V tapped at 110, 60 cy. Sec. 768V, CT @ 305 ma. Electrostatically shielded. For low power xmtr., xciter, amp., etc. 4-7/16x3-9/16x5-3/16" H. 12 lbs. No. S-851 **\$3.45**

**FILTER CHOKE**—4.2 Hy-300 Ma. 78 ohms DC resist. 2500 V breakdown. 4-stud mtg. Fully enclosed round metal case. For power supply in xmtr., amp., etc. 4 1/2 H x 3 1/2" dia. Base 4" sq. 9 lbs. No. S-853 **\$2.69**

**FILAMENT XFORMER**—6.3 V heavy duty. Flush Mtg. Pri. 117 V AC, delivers 5 V at 6 amps., 6.3 V, CT at 6 amps. Electrostatically shielded. For small rig, xciter, amp. 3-11/16 x 3-3/16 x 3-13/16" H. 5 lbs. No. S-852 **\$1.75**

**SAVE MORE ON ALL 3 UNITS**—Nos. 851, 852, 853 (as above). 26 lbs. No. S-854 **\$6.95**

## BY-LINES... by

*Bob Gunderson*  
W2JIO



**160 Meters to OPEN!**  
Good News! 160 meters has been allocated to all type A1 and A3 emissions. Frequencies to be used by amateurs in this area (East of the Mississippi) are 1800-1825 and 1875-1900 KC. to avoid interference to Loran in this part of the ether. Power is limited to 500 watts daytime, 200 watts night. Newark Electric has foreseen this new allocation and we now have a complete stock of 160 meter tube, and complete coil lines. From time to time we will announce surplus gear for these new frequencies.  
BOB — W2JIO

**IMMEDIATE DELIVERY!**  
Alliance "Tenna-Rot"  
**BEAM ROTATOR \$23.49**

### H-23U DeLuxe HANDSET

Popular S.C. Telephone Handset. High imped. phone, low resist. carbon mike. Butterfly switch. PL-55, PL-68 plugs, 6' cord; 3 lbs. No. S-674 **\$3.95**



**T-17B SHURE MIKE**—Single button, carbon hand mike. 200 ohms. 5 ft. cord, PL-68 plug. Dust cover. No. S-467 **\$1.49**

**CRYSTAL DESK MIKE**—Famous make. Complete with non-breakable 3-piece plastic stand, 7 ft. cable. High output, excellent quality. No. S-697 **\$4.49**

**RCA 3" OSCILLOSCOPE**—Model 155C. Regularly \$115.00. Bring your shop up to date—Save \$45.50! 25 lbs. No. A49 **\$69.50**

**RCA 12" PM SPEAKER**—Up to 10 watts. Heavy Alnico V magnet. Excellent reprodu. 3.2 ohms. 7 lbs. No. S-1055 **\$3.95**

**RCA 12" Heavy Duty PM SPEAKER**—Up to 15 watts. High fidelity reprodu. 3.2 ohms. Extra heavy Alnico V magnet. 8 lbs. No. S-1057 **\$4.95**

**Sig. Corps KEY**—Type J-38. No. S-143 **49c**

**LEACH DPDT RELAY**—110 V AC coil. Sturdy 3/16" silver contacts. No. S-876 **\$1.39**

**McMURDO SILVER 700 XMITTER**—For 114/148, and 235/240 Mc. Xtal controlled. Less tubes, power supply; crystal, mike. 12 lbs. No. S-964, Reg. \$36.95, Now **\$19.95**  
Kit of 6 tubes (3-6AQ5, 2-6CA4, 832) **\$5.93**  
Crystal (specify freq.) Each **\$3.95**

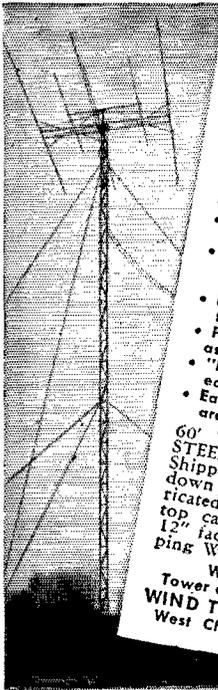
**HAMMARLUND Four-11 MODULATOR KIT**—With 500 ohm output xfomer. All parts, tubes, cabinet, etc. 41 lbs. No. S-713 **\$29.50**  
Reg. \$72.50, Now

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- "PALNUTS" supplied with each and every bolt
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### ALUMINUM CALL PLATES

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14 Mc. but comes on 3.8 Mc. to work locals. UK is on 28 Mc. Officers of the PCARC are: DZ, pres.; NL, secy-treas.; TX, vice-pres.; UK, act. mgr. QZ reports 28 states on 50 Mc. and 98 countries on I.f.s. and schedules G6DH Sundays on 28-Mc. phone. TA and HD are 28-Mc. phone men. Both are n.f.m. and are using finals with p.p. 812s. Gerry recently worked his first 7L on 28 Mc. HT is high traffic man this month. Reports on all emergency plans are welcomed by your SEC and on all general items of interest by the SCM. Traffic: VE1HT 91, MK 69, CP 25, GB 20, BN 15, HJ 11.

### ONTARIO DIVISION

**ONTARIO** — SCM, Thomas Hunter jr., VE3CP — Asst. SCM, M. J. McMonagle, 3AWJ. SEC: KM, RMs: ATR, AWE, BUR, DU, GI, PAMs: FQ, DD, RG. New appointments include FT as ORS; BQL as OPS; BNQ, BPE, BPV, BHW, and BQL as ECs. DBN is a new station in Brantford. BSG is coaching the OM along for his ticket. OR finally received his card from TF3EA. BWI has been bitten by the t.v. bug. DBU and EAK are new hams in Toronto on 7 Mc. APA is using n.f.m. on 3.8 Mc. BCJ, BAX, and BCZ are new-comers to 3.8-Mc. phone. QE and AWB are WAS. QU has 23 countries on 7 Mc. and 5 on 3.5 Mc. NX and CP leave the mike occasionally to take up the key. APS is heard on the Ontario Phone Club 9:30 A.M. Sundays on 3815 kc. FP is QRL with GKLW's new 50-kw. transmitter. BUR is now a member of the A-1 Operator's Club. LO, HI, and IL operate 3.8-Mc. mobile. EAE is the most recent addition to Hamilton on 7 Mc. HP has moved to London. The Air Force Net is going very fine on 3815 and 4290 kc. under the call GHR with numerals to identify the stations. The London Club reports an emergency group is under way. VD has a new frequency meter. ZO, of the Canadian Customs, inspected YJ and UJ when they returned from a visit to the surplus stores in Detroit. HK is heard on 28-Mc. phone when not on OFN. YS is looking after donations for the Food for Britain fund for the Ontario Phone Club. GG is back on after an illness. YQ is using p.p. 813s. ADB, IL, and BNQ visit hams around Ontario during their travels. BTE is enjoying 28-Mc. phone but also can be heard on 7 Mc. DBY is operating on 7 Mc. from Toronto. Traffic: VE3ATR 169, APS 116, BUR 99, DU 90, WY 58, AWJ 54, CP 46, AWE 42, AIL 41, BQL 32, NI 31, RG 30, KM 27, DH 22, ASL 21, AZZ 19, WK 19, BMG 18, AQB 17, IL 16, YJ 15, VD 12, AG 11, AZW 11, AKJ 10, BHS 10, LA 8, ZE 7, BSG 6, HK 6, AXQ 5, AZH 4, BBM 4, DD 3, ADN 2, FT 2, AOT 1, BRH 1.

### QUEBEC DIVISION

**QUEBEC** — SCM, Gordon A. Lynn, VE2GL — SEC: 2SA. ECs: BB, TA, ZZ. RMs: BB, GM, PAM: DX. QQ, finding the duties as president of the MARC somewhat heavy, has relinquished the post of SEC. This post is being taken over by SA, who solicits the support of every VE2 in the important Emergency Corps. BB received from Santa Claus a new cabinet in which to house the rig and had to QRT while setting it up but is back on in full swing again. LO keeps schedules with PQN on 3.5 Mc. and W1LM and VE3WK on 7 Mc. and finds it keeps him busy enough. XB has 40 watts on now and still is building higher power and plans a new sky wire. EC is on 144.8 Mc in addition to 3812 kc. now and schedules JAM, ABJ, PV, EI, AEM, AIM, AT, and ZG twice daily. Reseau Mauricien, consisting of AT, ZG, EM, AIM, TI, VE, and KY, is on daily at 8:30 A.M., 12:30 and 9:30 p.m. on 144 Mc. Reports from anyone hearing any of them will be appreciated. QJ and ABB are rebuilding elaborate all-band rigs. PQN is going ahead even better than anticipated under the excellent managership of GM, and a net bulletin, edited by XB with XR as publicity manager, has been issued. QR, AV, VT, AFV, and IG are new net members. The QEN is still meeting regularly on 3570 kc. Sundays 10:30 A.M. Stations from Montreal to Rimouski are on regularly and all other interested VE2s are invited to report in. DU has new Collins transmitter which he is using on indoor antenna and is getting marvelous results. Traffic: VE2GM 155, XR 150, XB 103, BB 100, LO 59, EC 47, XO 38, VA 34, AEH 20, QR 5, RZ 3.

### VANALTA DIVISION

**ALBERTA** — SCM, Sydney T. Jones, VE6MJ — The Alberta Hamfest will be held in Edmonton July 30-31 under the sponsorship of the Northern Alberta Radio Club. For up-to-the-minute news regarding the Hamfest listen for official bulletins from JP, NA, and MJ. The Hat Ham Club now boasts fifteen members and is conducting a campaign to eliminate B.C.I. BX has completed a new rig using T20. LZ is doing a real job as OO. NO is a new call in Raymond. QS now has Clapp VFO. PV and VJ are QRL with plans for the forthcoming Hamfest. JJ has signed up twelve members in the AEC. TK has signed twenty-six. OD has installed n.f.m. AL is active with AFARS. RU is building new rig using 807s and MB-150 unit. Plans are well advanced for the formation of a phone net in this section. EH claims that flying in cold weather agrees with him. KS is active again with a fine signal from Cowley and renewed acquaintance

(Continued on page 98)

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Model 630  
VOLT-OHM-MIL-AMMETER

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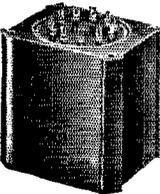
- 32 Ranges-Volts-Microamperes-Milliamperes-Amperes-Ohms-Megohms-D.B.
- Only One Switch flush with panel
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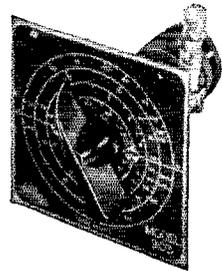


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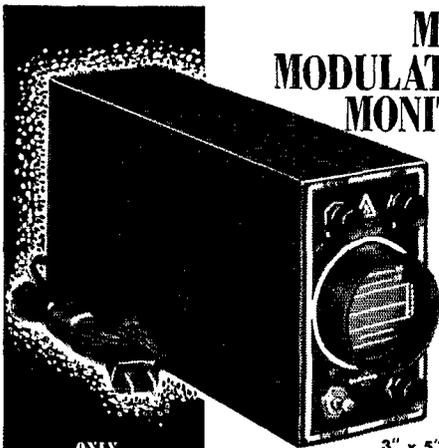
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# MM-2 MODULATION MONITOR



3" x 5" x 10"

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\$24<sup>95</sup>

COMPLETE WITH TUBE  
REVERSIBLE PANEL CALIBRATED  
TRACE INTENSIFIER WINDOW  
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**ADD SIGHT  
TO YOUR  
SOUND . . .**

with this basic oscilloscope featuring calibrated modulation percentage scale, linear 60 cy sweep with return trace blanking, trace intensifier window, complete controls, reversible panel, rack mounting provisions and many other outstanding features. See the MM-2 at your dealer or write Dept. 4-9.



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## 16-ELEMENT TWO-METER BEAM

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Four elements high, two wide, gets gain from sky and ground. Finger-tip rotation.

**POWER GAIN OF 40 OVER  
FOLDED DIPOLE**

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Used by dozens of FM broadcasting stations for relay work. (Cut to FM freqs.)

Also: 32-element two-meter beams; wide spaced ten and twenty meter beams, three to eight elements. Write for literature and pictures.

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**U.H.F. RESONATOR CO.**

**Guion Road RYE, N. Y.**

with MJ after many years. Join the Emergency Corps in your own district and let's put this worthwhile venture over gang. JZ visited NARC. BH and IR are heard on 3.8-Mc. phone. Traffic: VE6QS 35, NA 22, BN 15, MJ 13.

### PRAIRIE DIVISION

**MANITOBA** — SCM, A. W. Morley, VE4AM — There are several new-comers on 3.8-Mc. phone. DU is using 16 watts to a 2E26 while getting the big p.p. 813 rig in shape. GK has been heard, and EN, at Rivers, is using a TBS50. WF is there, too, with a converted ATR8. JO has been elected SC for this area AFARS. TM has relieved AM considerably on TL "I." RZ works an 807 on 7, 14, and 28 Mc. ER is running p.p. 807 on 7 and 14 Mc. to the tune of 150 watts. 5EP now is located in Brandon and will be signing VE4. HS, at Miami, rebuilt to p.p. 807s and n.f.m. GW, who has been appointed DR for CAROA, is permanently settled on 14-Mc. phone with an 812 final. EA handled press for the local broadcast station during the RCAF mercy flight. AP, at Brandon, is running 807s and RME-45 on 3.8 Mc. AB and CS are heard on 7 Mc. BM has new 814 final on. NI has been heard on 28 Mc. LC worked cross band with a.m. 3.8 to 28 Mc. with GK relaying LC. CV is still on 50 Mc. CI has 813 going all bands. DH has p.p. 807s. WY has SX28A bought from LN. AL moved from Shilo to Winnipeg. Once more I have heard traffic being taken by Winnipeg amateurs which they don't deliver. If you can't or won't deliver it, refuse it. Traffic: VE4AM 110, TM 20, DN 8, JO 6.

**SASKATCHEWAN** — SCM, J. H. Goodridge, VE5DW — DR spent a two-weeks holiday working 28-Mc. phone and hooked HB9 and ZL with his n.f.m. EE is working on 14- and 28-Mc. phone and sometimes on the 75 Net. FD is working n.f.m. on 3.8 Mc. but uses a.m. on 14 Mc. FG has the rig on 28-Mc. n.f.m. and o.w. FL is working all bands and is on the 75 Net. FY has the VFO finished. KQ is on 14-Mc. c.w. with 400 watts and a new HQ-129X receiver. YF is on 3.8-, 14-, and 28-Mc. phone. EP is using a 250TH and n.f.m. LV reports on the 75 Net regularly. OM had Jimmy Jink's dad in at Christmas to speak to Jimmy, 7ZC, at 7VP's shack. BF continues experiments with n.f.m. CM is on occasionally. LM is active on 3.8 Mc. with n.f.m. IC is located at CKBI transmitter and is heard daily on 3.8 Mc. VB recently did a fine job handling traffic on 14 Mc. concerning an air crash near Yellowknife. SD is on with a Meissner Signal Shifter. AB now has rig working on 28 Mc. CE is using his new modulator and working hard on the design and construction of r.f. section with 320s in final bandswitching 3.5 to 50 Mc. PD is a new mayor of Melfort. Let's have any ideas or suggestions for activities in this section, and news of this column. Traffic: VE5HR 63, KJ 63.

### Strays

#### From a Beginner's Notebook

Date	Event	Cost
1st	Received license!	
	Parts for VFO.....	\$25.00
	Hand drill.....	2.25
	Tablecloth and Band-Aids.....	7.50
	New chassis, drilled by Acme Machine Shop.....	6.50
2nd	VFO wired and ready for test!	
	House fuses.....	.30
	New transformer and condenser.....	9.50
4th	Removed grounds from a.c. line and high-voltage winding of new transformer.	
	Flipped switch.	
	New rectifier.....	.98
5th	Removed short from condenser.	
	Ah!	
6th	Erected antenna.	
	200 ft. No. 12, 6 spreaders, insulators....	5.50
	4 spreaders, 1 pr. trousers, 1 ladder.....	37.50
8th	Received notice from FCC.	
	Answered same.	
9th	Off air remodeling rig.	
10th	See 9th.	
11th	Sold VFO to an "old timer." (\$10.00)	
	Pawned golf clubs. (\$10.00)	
	ARRL Handbook and one dozen crystals..	19.90
20th	Whoopee, worked AC3- II	
27th	QST arrives. "How's DX?" says AC3- is a bootlegger.	

Boy, ain't ham radio fun! Sure is kinda expensive, though.

— Jack D. Gallagher, W5HIZB

# BARGAIN PAGE

*Fellows Let's Get Acquainted!  
Hams the world over are talking  
about my E3 Payment Plan, Liberal  
Trade Ins and Personalized Service.*

## SPECIALS

New BC-458A XMTR 6.95

New BC-456 Modulator 2.95

### OIL FILLED CONDENSERS

1MFD — 1500V — 49c	1MFD — 5000V — 2.95
.5 — 2000V — 95c	1MFD — 2000V — 1.55
.25 — 2500V — 95c	2 x 1MFD — 3000V — 3.95
4MFD — 600V — 59c	8MFD — 1500V — 1.95

### TRANSFORMERS

—Completely Shielded

6.3 @ 6 amp. 2.49	6.3 @ 3 amp. 1.75
24V @ 10 amp. 4.95	

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810 — 6.95	815 — 2.95	872A — 1.95
VT-127A — 2.95	807 — 1.35	1625 — 59c
805 — 4.95	829 — 3.95	1626 — 59c
809 — 1.50	832 — 3.95	1/4 WATT NEON 12c (with leads)

### WRL TUBING

—For Beams—Comes in 12' Lengths

Seamless ALUMINUM 24 St. Tubing

5/8" O.D. — 2.98	1/2" O.D. — 2.40	3/8" O.D. — 1.62
1" O.D. — 3.90	7/8" O.D. — 3.57	3/4" O.D. — 3.29

Above tubing will telescope into the next size

**SAVE UP TO 75%**

Crystals Guaranteed!

In FT-243 Holders — you name the frequency —  
we will hit it or come darn close!

### FREQUENCY RANGES

3500 to 4000 KC	79c each
6700 to 7500 KC	79c each

### 20 METER CRYSTALS

12.514 to 13.1 MC	1.19 each
14.0 to 14.4 MC	1.19 each

**FLASH! JUST RECEIVED!**

New 160 Meter Crystals in  
FT-243 Holders. All Frequencies

**98c**

Get Ready for 160!

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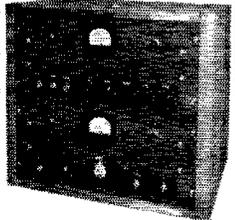
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RF Section a complete 150 Watt XMTR—Pro-  
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Buffer—Voltage regulated Oscillator and Buf-  
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input from 10 thru the 80 meter band—  
complete with tubes and meters including  
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**\$279.00**

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# TUBES

ALL BRAND NEW IN ORIGINAL FACTORY PACKAGE

<b>TRANSMITTING</b>	417B..... 9.80	957..... \$ .49
15E..... \$2.95	723A..... 4.00	<b>MAGNETRONS</b>
24G..... .49	726A..... 4.75	2122..... \$15.00
<b>VT-25A</b>	<b>SPECIAL</b>	2132..... 15.95
(10Y).... .39	<b>PURPOSE</b>	2138..... 15.95
VT-158A.. 4.90	1B24..... \$2.95	2148..... 15.95
211..... .98	VR-150.... .69	5123..... 15.95
388A..... 4.95	724B..... 1.95	5129..... 15.95
GL434A.. 7.95	2051..... .49	714AY.... 9.80
446A..... .74		725A..... 12.50
(2C40).. .74	<b>RECEIVING</b>	<b>RECTIFIERS</b>
WL530... 19.95	3A5..... \$ .98	2X2A..... \$1.80
708A..... 2.00	3D6/1299 .39	3B2A..... 1.95
RK715B... 9.95	6AK5..... 1.56	RK60.... .69
801..... .95	7C4/1203A .39	CRP-72.. 2.95
804..... 6.95	12A6..... .39	250R.... 4.95
829B..... 4.50	12A6GT... .39	WL-531... 19.95
841..... .69	VT-82.... .39	WL869B... 29.95
1625.... .49	446A..... .74	<b>CATHODE RAY</b>
1626.... .39	(2C40).. .74	3BP1..... \$2.95
7193..... .29	717A..... .98	5AP1.... 2.49
<b>KLYSTRONS</b>	954..... .49	3BP1..... 1.98
417A..... \$9.80	955..... .98	9GP7.... 3.95
	9002.... .98	

SPECIAL: 3CP1/S1 Cathode Ray Tube with Altimeter Markings... 98¢  
We invite inquiries on large quantities.

MINIMUM ORDER \$2.00

TERMS—Cash with order for 20% deposit, Balance C.O.D.

**SREPCO** INC. prices are net, i.e. b. Dayton, O.  
STANDARD RADIO & ELECTRONIC PRODUCTS  
135 E. Second St. - DAYTON 2, OHIO. - Tel. Fulton 2174

## CALL LETTER PLATES

Type A-18 - For Your Car  
**W8ENH**  
A large, sturdy cast aluminum plate with satin-finished letters and border against a black baked enamel background. Red, green, blue and gray -- 50¢ extra. Size - 2 1/2" x 8 1/4" with 1 1/2" letters.

Type A-19 - For Panel Mounting  
**\$2.95 POSTPAID**

**LAPEL BUTTONS**  
An attractive metal button with highly polished raised letters against a black background. Other colors 50¢ extra.

**W9HKZ**  
#1241 577 **\$1.10 POSTPAID**

Type A-26L With Screw Backing  
Type A-26P With Pin Backing

**SREPCO** INC. CASH WITH ORDER Allow 2 weeks for delivery  
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Send for Catalog

Licensed by Commonwealth of Mass.

Department of Education

## Harmonic Suppression

(Continued from page 34)

and the circuit of Fig. 2 (p. 29, February QST) with the load coupling reduced to zero:

Circuit Constants —

Tube output capacity = approximately 3  $\mu$ fd. for 3D24 tubes

$L_p = 7$  turns, 1/2-inch diam., 8 turns per inch (B & W Miniductor 3002)

$C_p = 50 \mu$ fd. (Millen 22050)

$f_o =$  resonant frequency of plate-lead trap

Data —

$C_p$	$f_o$ — Plate Lead On	$f_o$ — Plate Lead Off
Removed	112 Mc.	—
4 $\mu$ fd. (min.)	81	95 Mc.
8	72	83
20	56	60
33	42	44

NOTE: Values of  $C_p$  were estimated and not actually measured.

"At the trap resonance frequency obtained with the plate lead connected, the grid-dip meter showed reaction when coupled to the regular tank coil. I feel sure now that the tank-coil reaction is due to direct capacity coupling through the tube output capacity and not by inductive coupling, as I implied on page 30, February QST, when I recommended shielding the plate-lead wavetraps. Obviously, the reaction frequency at the plate tank coil must differ appreciably from the harmonic to be suppressed or the trap will not be very effective."

W2VLQ's explanation is entirely consistent with the observed fact that as the trap condenser is tuned over its range the harmonic output, as checked at the regular tank circuit, goes through a maximum as well as a minimum, the maximum being much larger than the amplitude observed when there is no trap in the circuit. The last sentence of W2VLQ's letter also suggests the reason why a condenser shunted from the tube plate to cathode, as recommended by W1DBM,<sup>1</sup> makes the trap tuning less critical: The additional capacitance at  $C_t$  makes the circuit as a whole tune to a much different frequency than the harmonic frequency to be attenuated. — G. G.

<sup>1</sup> Rand, "More on TVI Elimination," QST, Dec., 1948.

## Deep Freeze

(Continued from page 33)

NXJ, NZ, OKI, OWP, OZC, PDH, RQK, SSZ, SUG, TGD, TYG, UFZ, UVJ, VAA, VAD, VEC, VMP, VPR, WGB, WKP, WML, WRY, WVE, YMU, ZNI, ZTE, ZUT.

W0BDO collected information regarding federal relief aid for stranded ranchers and put it on wire lines to Washington, thus saving precious hours for the rescue workers.

Dwight, Nebraska, was entirely without communications of any kind for several hours, with the exception of W0OZC who operated exclusively on battery power. W0LEF at Brainard was, likewise, the sole outlet for his town.

(Continued on page 36)

# SUN RADIO'S

# ANNUAL CLEARANCE!

## CRYSTALS!

All crystals have Army MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

### CRYSTALS WITH A MILLION USES

Fractions Omitted											
kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc
412	420	429	437	444	453	473	483	491	497	506	515
413	422	430	436	445	462	474	484	492	498	507	516
414	423	431	440	446	466	475	485	493	501	508	518
415	424	433	441	447	468	477	487	494	502	509	519
416	425	434	442	448	470	479	488	495	503	511	522
418	426	435	443	451	472	481	490	496	504	512	523
419	427	436									

49¢ each

I.F. Frequency Standards	Crystal Frequency Standards 98.356kc	For Crystal Controlled Signal Generators 525kc
kc kc kc	kc kc kc	kc kc kc
450 452,777 464,815	Easily altered for 100kc Standard. Mounted in low loss 3 prong holder.	526,388 533,333 537,500
451,388 461,111 465,277		527,777 534,722 538,888
		529,166 536,111
		530,555
		531,944

99c each

\$3.89 each

99c each

200 KC CRYSTALS	Assorted Miscellaneous Crystals Fractions Omitted	For Ham and General Use Fractions Omitted
Without holders 2 1/2 x 2 3/32"	370kc 377kc 384kc 372c 379 386 374 380 387 375 381 388 376 383	390kc 397kc 405kc 391 398 406 392 401 407 393 402 408 394 403 409 395 404 411 396

69c each  
3 for \$2.00

39c each

79c each

CRYSTALS FOR SCR 522	Crystals from BC 610 3/4" Spacing—2 Banana Plugs
5910kc 7480 6370 7580 6450 7810 6610 7930 7350	2045 2260 2415 3202 3550 2105 2282 2430 3215 3570 2125 2300 2435 3237 3580 2145 2305 2442 3250 3945 2155 2320 2532 3222 3955 2220 2360 2545 3510 3995 2258 2390 2557 3520

\$1.29 each

\$1.29 each

• Payments must accompany order. Enclose 20c for postage and handling. Minimum order—\$2.00 plus postage.  
• Crystals are shipped packed in cloth bags inasmuch as they are shock mounted. All shipments guaranteed.

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ALL NEW—NO SURPLUS

- Modulation Trans.**—Univ. 300 w. Peerless M-2107-T \$70.00 list. Only.....\$28.00
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- Filament Trans.**—PRI-105—120v, SEC 2.5v Ct—20A—4500v insulation, Peerless F-8513J \$8.00 list. Only.....\$3.20
- Universal Modulation Trans.**—20 w. Peerless M-4081Q \$9.25 list. Only.....\$3.70
- Driver Trans. Univ.**—70 MA for 15 w. audio, Peerless A-4237Q \$10.75 list. Only.....\$4.30
- Grid Modulation Trans.**—Kenyan, Only.....\$1.50
- Transmitting Tubes**—KU-23 was \$30.00 list. Now only...\$20.00

- DYNAMIC MICROPHONES**—200 ohms; (a) D-5T, was \$39.00 list, now.....\$15.60
- (b) D-7T, was \$27.00 list, now.....\$10.80
- (c) VR-2T, was \$42.15 list, now.....\$16.86
- (d) D-220T, was \$71.00 list, now.....\$28.40
- (e) D9AT, was \$45.00 list, now.....\$18.00

## SERVICEMEN'S SPECIALS!

ALL NEW—NO SURPLUS

- Communications Receiver—RME 84A**—Was \$98.50. Now only.....\$66.50
- Communications Receiver—RME 45**—Was \$198.50. Now only.....\$140.00
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- Hallcrafters HT-9**—Transmitter, with 80 & 40 meter coils. \$270.00
- Famous Make**—V.F.O. XTAL or VFO, NBFM or C.W. on 5 bands. Was \$110.00, now.....\$66.50

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- RCA TV Antenna**—Sgle. Dipole w/reflector—fits any. Only \$2.95
- Phone Plug**—to connect 4 prs phones to one jack. 6 for...\$1.19
- Auto Radio Speaker**—6v field, (3 for \$5.49). Only.....\$1.95
- Oval PM Speaker**—6 x 9 w/PP output transformer. (3 for \$5.49) Only.....\$1.95

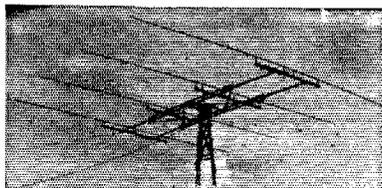
## FAMOUS MAKE TRANSMITTING CONDENSERS

Split Stator—All New—Boxed—Below Cost					
.500 spacing		.375 spacing		.250 spacing	
Cap. per. sec.	Price	Cap. per. sec.	Price	Cap. per. sec.	Price
11 MMF	\$ 8.35	11 MMF	\$ 8.15	13 MMF	\$ 7.95
20	10.20	22	9.95	30	9.80
30	11.85	34	11.30	46	11.20
40	13.20	45	12.90	62	12.55
49	14.75	58	14.35	78	13.95
59	16.20	70	15.90	95	15.40
68	17.80	82	17.20	111	16.80
77	19.20	94	18.75	127	18.25
87	20.65	106	20.15	143	19.85
96	22.15	118	21.60	159	21.00
105	23.80	130	23.10	175	22.50
115	25.20	141	24.50	192	23.95
124	26.65	153	25.95	208	25.25

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## Illinois

Most of the members of the Illinois Traffic Net (ILN) and the Illinois Emergency Net were at their designated posts when Illinois was in the grip of a sleet storm between January 11th and 14th. The area affected, where most communications and power circuits were interrupted, extended an area within the western "bulge" of the state, from Pittsfield to Galesburg, and from Quincy to Jacksonville. Quincy and Jacksonville were probably the worst-hit of all communities affected. Traffic was handled for the Illinois Power Co., the Central Illinois Public Service Co., the Illinois Bell Telephone Company, Western Union, the CB&Q Railroad, Quincy Broadcasting Co., Joliet Ordnance Plant, and numerous local concerns including hospitals and sanitariums.

W9FIF of Jacksonville set up his station in the police station in that city, and, with the able assistance of W9DKQ and W9TZL, provided the only means of contact between there and the areas still in touch with the nation's communications circuits.

At Barry, Ill., W9FNE, operating on battery power, provided the only outside communications link for his community.

Quincy was represented on the air by W9AEX, W9LHU, W9DJT, W9MTO, W9TMI and W9BIQ, while Macomb was "in touch" through W9OFU, W9OSQ, W9YS and W9YOL. Galesburg owed its communications to W9YPS, and Warsaw and Canton were served by W9SKM and W9BLP.

The State Highway Commission, charged with keeping the highways passable, was ably assisted by a net comprising mobile units W9AHV/9, W9AND/9, W9AWA/9 and W9UNG/9 working with fixed stations W9PIG, W9BPT, W9BRY, W9BT and W9AUU.

## Utah

In Utah, W7RPX reports that the FARM Net was active during the period of the blizzard emergency in the handling of emergency traffic between points in the Inter-Mountain region, including the handling of a quantity of traffic relating to the occupants of several trains which were stalled in the Laramie and Rawlins area.

## Colorado

In Colorado, W0KYD was the anchor man on the circuit between the Rapid City, S. D., Air Force Base and AF Headquarters in Colorado Springs. KVD and W0ADJ of Rapid City handled AF traffic on a continuous basis for nearly eight hours. Emergency traffic for snowbound rail lines was handled by W0PGX.

## Canada

When portions of Vancouver were isolated by the great blizzard for several days after December 19th, the Canadian gang came through as quickly and efficiently as did their W brothers. Large stretches of the Canadian-Pacific Rail-

(Continued on page 98)

Our 26th Year



QUALITY — PRICE  
DEPENDABILITY

**GRID DIP METER  
LYSCO**

**"DIPMASTER"**  
3Mc to 150Mc freq. range; calibrated dial, band switching (no coils to plug-in). Complete power supply and tubes. A really good buy  
@ ..... **\$33.50**



**GREENLEE PUNCHES —**

Cuts to 1/8" thick metal.  
1/2" ..... \$1.94  
3/8" ..... \$1.94  
5/8" ..... \$2.12  
1" ..... \$2.25  
1 1/8" ..... \$2.25  
1-3/16" ..... \$2.25  
1 1/2" ..... \$2.88  
We carry a complete line of all sizes of punches up to 3 1/2" diameter.

**ISOLANTITE Sockets for 832's or 829's** ..... 49c  
**ISOLANTITE Sockets for octal tubes** ..... 08c  
**STEATITE Sockets for 813 and other large 7 pin tubes** ..... 73c  
1/4 watt bayonet base neons ..... 20c  
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**RAYTHEON VOLTAGE STABILIZERS**

Positive Stabilization ± 1/2%  
Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized to ± 1/2%. \*Output 6.0 or 7.5 volts stabilized ± 1/2%.



Catalog No.	Output Watts	Net wt. lbs.	Net Price
VR-6110	15	4	\$15.00
VR-6101*	30	5	\$17.00
VR-6111	30	8	\$24.00
VR-6112	60	14	\$31.00
VR-6113	120	25	\$48.00
VR-6114	250	45	\$75.00
VR-6115	500	45	\$75.00

**CHOKES**

SMOOTHING TYPE	Hy	TYPE SWINGING	Hy	MA	PRICE EACH
C-80	10	C-87	4-16	150	\$3.09
C-81	10	C-88	4-16	200	\$3.82
C-82	10	C-89	4-16	250	\$5.29
C-83	8	C-90	3-14	300	\$5.59

All above 3000 Volts Insulation

**SCOPE & TELEVISION TRANSFORMERS & CHOKES**

2500V. RMS @ 5 Ma D.C.—6.3V. @ 3 amps tapped at 2.5V. @ 3 amps; 2.5V. @ 2 amps; Type P-3171 ..... \$6.76  
1700V. RMS @ 2 Ma D.C.—6.3V. @ 9 amps; tapped at 2.5V. @ 2 amps; 2.5V. @ 2 amps; Type P-3170 ..... \$5.14

2 Hys @ 250 Ma D.C. 50 ohms ..... \$1.62  
type C-2991 ..... 1.62  
2 Hys @ 200 Ma D.C. 50 ohms ..... \$1.92  
type C-2974

**VERTICAL BLOCKING OSC.** turns ratio pri. to sec. 1:4.2  
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**VERTICAL OUTPUT** turns ratio pri. to sec. 10:1  
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**PLATE TRANSFORMERS**

For Small Transmitters, DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke input Filter. Using Mercury Vapor Rectifier Tubes Pri. is for 115 V. 60 cy.

Type No.	Sec. Rms. Volts	DC Sec. Volts	DC MA	H.	W.	D.	Price Each
P 57	660-660+	500	250	4 1/2"	3 1/2"	4 3/8"	\$ 6.76
P 58	550-550	400	400	4 1/2"	3 1/2"	5	8.23
P 59	1080-1080	1000*	125	4 3/4"	3 1/2"	5 1/8"	7.94
P 67	500-500	400	150	5 3/4"	6 1/8"	4	19.84
P 68	900-900	750	225	5 3/4"	6 1/8"	4 1/4"	24.99
	800-800	600					
	1450-1450	1200	300				
	1175-1175	1000					
	2100-2100	1750	300				
	1800-1800	1500					

\* For dual operation with simultaneous use of both sec ratings.  
† Has 40-volt bias tap.

**OIL FILLED CONDENSERS**  
4 Mfd 600V ..... \$ .49  
7.5 Mfd 330VAC ..... \$ .69  
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05 Mfd 2500V ..... \$ .95



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Type 20 (illustrated) 3 amps ..... \$12.50  
116 for table mtg 7.5 amps ..... 23.00  
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1156 45 amps ..... 118.00  
Also available for 230 volt input. Write for descriptive literature.

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Heavy Duty  
7 x 7 x 2 ..... 94c  
7 x 9 x 2 ..... \$1.06  
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**TRANSFORMER SPECIAL**  
870 volt CT @ 250Ma with 80V bias tap  
5 volts @ 3 amps  
2 1/2 volts CT @ 10 amps  
2 1/2 volts @ 3 amps  
6.3 volts @ 1.5 amps  
115V. 60 cycle primary } **\$5.88**

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10 x 17 x 3 ..... \$1.44

**STEEL CASES**  
Black Crackle  
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4 x 5 x 3 ..... 79c  
6 x 6 x 6 ..... \$1.03  
6 x 7 x 6 ..... \$1.91  
12 x 9 x 7 ..... \$2.65

**ISOLATION TRANSFORMERS**

All 117 Volts to 117 Volts 60 Cy.  
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P-97, 80 watts. \$5.10 P-97, 250 watts \$17.70

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The 1949 edition retains the material on theory, principles and design which made the *Handbook* so valuable, but it has been revised and integrated with constructional data. This is not only of value to the practicing radioman but to the student as well, for it gives him practical applications and examples of the theory he is learning. As a text, the *Handbook* is probably more used in radio schools and colleges than any other single volume.

In constructional material, no publication equals the *Handbook* in practical utility, its treatment of radio communications problems in terms of how-to-do-it rather than by abstract discussions and abstruse formulas. There are few radio manufacturers, schools, engineering firms, experimental laboratories and military communications units which do not possess at least one copy of this valued and modern reference work.

Text, data book, constructional manual, operating reference book—it is all these and more. Its annual rewriting assures a modern up-to-date text, so necessary in a science so fast-moving and progressive as radio. Yet in this virtually continuous modification there has always been the objective of presenting the soundest and proved aspects of current engineering practice rather than the merely new and novel.

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THE AMERICAN RADIO  
RELAY LEAGUE  
WEST HARTFORD  
CONNECTICUT

road's right-of-way through the Pacific Northwest were snowbound, and train dispatching was becoming impossible when VE7FB, VE5AQ, VE7US and VE6LQ sprang to the rescue and assisted the railroad people in getting things rolling again. This circuit was for several hours the only contact between Edmonton and the Pacific Coast of Canada. In addition to the railroad traffic considerable Canadian Press traffic was handled by this group.

## How's DX?

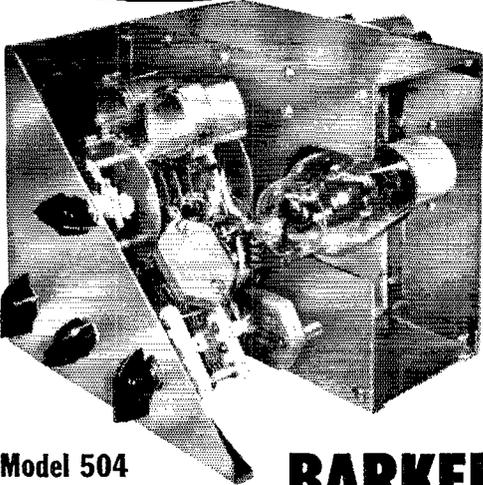
(Continued from page 41)

that radio communications between Mauritius and the Chagos are maintained. After a hard day's work gadding about the islands Leny then goes home to Diego Garcia and opens his ham overseas circuit. VQ8CB uses 35 watts to an 807 modulated by 6V6s, an SW3 receiver and an 80-meter half-wave sky wire; power is obtained through a rotary converter running off 12-volt batteries. VQ8CA in the Solomon group has recently been put on the air by way of a 10-watt 6L6, operating mostly around 14,050 kc. . . . . If you think that Ws and VEs have the monopoly in the QSO Derby, VK3MH informs us that he recently concluded his 120,000th contact. Without the benefit of a yearly Sweepstakes, too! . . . . . W6SHW has it that any C3EA QSOs after January 24th, 1949, involve pirate activity. Al closed up shop on that date . . . . . W4GDQ sees no reason why VO2DB shouldn't get out in fine fashion; the latter is located next door to Cabot Tower, Marconi's QTH for the first Transatlantic. GDQ further observes that a well-labeled individual is Major M. H. R. Carragher, who holds the active licenses for MF2AA/XAFG, I1AZS, G3BQZ and MF2ABC . . . . . VK2CI reports a rash of commercials populating the ham bands down under. The gang there is slowly but surely having them forcibly removed . . . . . According to W2QHH, who quotes VP9D, there has been some intermittent funny business afoot in that vicinity. For instance, VP9U is unknown there despite an influx of QSLs for him . . . . . Not only will OQ5QF QSL every contact as soon as he returns to ON4QF but he will send a monthly list of QSOs with full data pertaining thereto addressed to ARRL so that DXCC aspirants in search of that one more confirmation may not be unduly held up. While Maurice likes rag-chewing at ON4QF, he intends to make 'em short and snappy from the Congo . . . . . W2VLG now assumes he's taken care of the AR1WW card situation and awaits word from those still unsatisfied . . . . . AP4A notifies us that there was a temporary curtailment of amateur activity in Pakistan. Supposedly nothing serious, however . . . . . With 807s at 200 pesetas a copy, our Spanish counterparts are having quite a battle to get a decent rig on the air despite recently-relaxed regulations there. Perhaps there might be a way to alleviate the problem if any of the W gang have a hankering to swap for-

(Continued on page 100)

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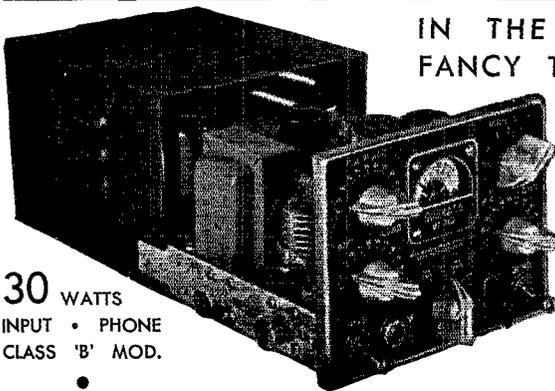


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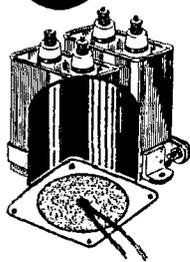
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EA art objects or the like . . . . . The addition of VR5HA makes it a total of four Tonga stations active upon latest word from Norm, VR5PL . . . . . A particular peeve of VR2BC is the typical Tail-end Charlie. He cites many an instance when a station will send VR2BC 20 times while in the clear and then sign his own call thrice under a spurt of QRM. A lengthy call isn't unethical under certain conditions but, the same as when calling CQ, the caller should insert his own identity at intervals before signing. Personally, we like the use of break-in but it's tough to employ when digging down into the fourth or fifth layer on DX bands . . . . . A glance at the meaty *FEARL News* reveals that JA2KG now holds the record WAC over there at 31 minutes. JA2KG also made WAC on 7, 14 and 28 Mc. as J2AHI, JA3AA and JA2AZ are the third and fourth Js to work 100 countries since the war and more of the boys are active on all bands than ever before . . . . . W3JTC has taken time out to put together a mimrod *PVRC DX News*. Cards arriving from VQ8CB and KH6VP/VR4 are wreathing many of the boys in wide smiles . . . . . W4CYY laments that the YD5CO that had him and others going ga-ga merely turned out to be KZ5CO with a sticky relay or something. [I tried using AT9BRD last night like you said, boss, but all I got was two QSDs. — Jeeves] . . . . . A fire at KL7LL did away with the QSL file and logs with Glenn well on the way toward DXCC. If you've worked KL7LL and have QSLd, he'd appreciate another pasteboard to aid him in starting all over. Along this same unfortunate line, PK5LL's files have been lost, plus log. If you're still shy his card, try another of yours via W9BUD . . . . . Pink-elephant calls seem to be at low ebb but KL7PJ contributes one ZY1RN who gives his location as "Suro." Anybody in the know re this bird?

When we thought we had a good chance to raise something in the Test the guy always came back to W9QRZ or W9IMI. Jeeves would like to look them up and get the lowdown on their sky wires as they were certainly getting out, but darned if we can find them in the *Callbook*.

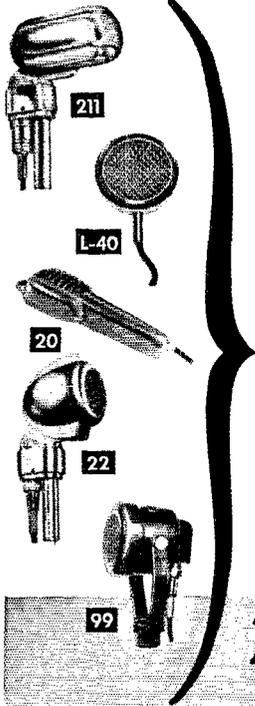
## President Relay

(Continued from page 48)

monitoring 3610 kc., also answered the telephone when the area stations called reporting certain states "in." They not only checked the states off as they were accounted for but took each message down word for word and typed it out on ARRL message blanks.

A word of appreciation should be added for the stations farther afield who did such a fine job of relaying the traffic quickly toward its destination. The fact that relay stations were spread out over a wide area and that no single station handled more than four relays attests that there were many stations on the air willing and eager to participate. While not all of the relaying stations reported their participation to ARRL, there

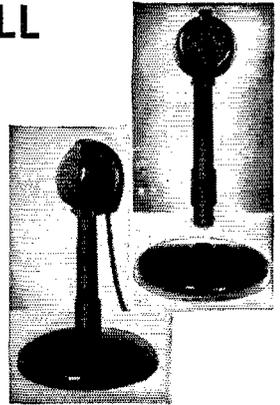
(Continued on page 108)



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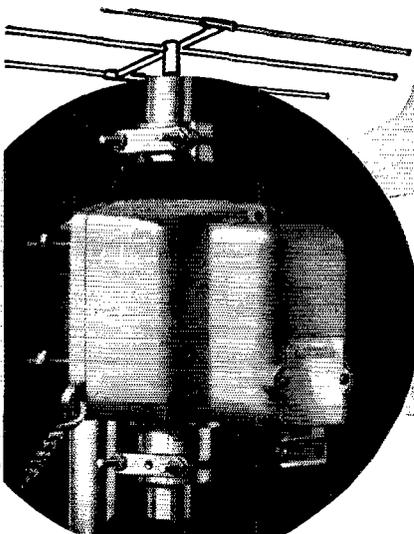
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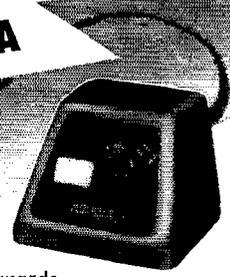


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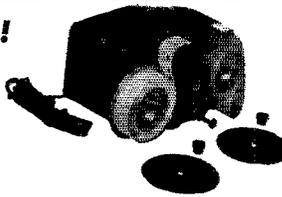
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is nothing to indicate that any GPR message "died" on anybody's hook. A stellar performance, gang!

This report would not be complete if we did not say that it was primarily due to the long hours of fruitful labor, organizing and planning put in by Eppa Darne, W3BWT, the live-wire SCM of the Md.-Del.-D.C. Section, and his XYL and assistant SCM, Fran, W3AKB, that the 1949 Governors-to-President Relay enjoyed greater success than any previous GPR.

**Message Routings**

Date-time groups are used to indicate the date and time each message was sent from the originating station and delivered to the Delivering Committee at W3AKB. The first two digits are the date in January, the next four the time, and the letter following is the time zone -- A for Atlantic, E for Eastern, C for Central, M for Mountain and P for Pacific. A question mark indicates that no information is available on how the message got from one station to the next, whether through additional relay stations or direct. When the originating station is in parentheses it means that the message was supposed to have been originated at that station but the actual originating station was not reported.

**Alabama:** W4JYB (191810C)-W4LEN-W9DUA-W3BHK-?-W3AM (192200E).

**Arizona:** (W7MWZ)-?-W4LRI (192040E).

**Arkansas:** No record of origination or delivery.

**California:** W6PIV (191839P)-W6QXN-W6TQD-W3ECP (192300E).

**Colorado:** (W0IC)-?-W3ECP (192300E).

**Connecticut:** W1LEF (191927E)-W3BWT (191927E).

**Delaware:** (W3GZH)-W3AKB (191915E).

**Florida:** No record of origination or delivery.

**Georgia:** W4DXI (192235E)-W3AM-?-W3BHK (192240E).

**Idaho:** W7IWU (191985M)-W4LRI (192115E).

**Illinois:** No record of origination or delivery.

**Indiana:** No record of origination or delivery.

**Iowa:** (W0AUL)-?-W3ECP (192300E).

**Kansas:** W0NCV (191933C)-W4LRI (192115E).

**Kentucky:** (W4FQQ)-?-W3AKB (191830E).

**Louisiana:** W5MHZ (191800C)-W5VT-W4LAP (191900E).

**Maine:** W1TO (191723E)-W3BWT (191725E).

**Maryland:** W3MJQ (192010E)-W3AKB (192010E).

**Massachusetts:** W1BB (191720E)-W3BHK (191720E).

**Michigan:** W8DOI (191930E)-W8SCW-W1IIN-W3BWT (192240E).

**Minnesota:** W0JIE-W9DUA-W3BHK-?-W3AM (192200E).

**Mississippi:** W5FFF via W5IGW-W3ECP (192300E).

**Missouri:** W0LCD (192000C)-?-W0ZLN-?-W3ECP (192300E).

**Montana:** W7IVY (191800M)-W7COH-W7CT-W7CZY-W4PL-?-W3AKB (200240E).

**Nebraska:** (W0HYR)-?-W3ECP (192300E).

**Nevada:** W7CX (191950M)-W4LRI (192255E).

**New Hampshire:** No record of origination or delivery.

**New Jersey:** W2ZI (191936E)-W3AKB (191940E).

**New Mexico:** No record of origination or delivery.

**New York:** No message filed, although several attempts made by W2CLL. Message from SCM stating circumstances received at W3AKB (192200E).

**North Carolina:** W4JQO/4 (191702E)-W4CFL-W3BWT (191753E).

**North Dakota:** (W0SSW)-?-W3AKB (200255E).

**Ohio:** W8BKE (191700E)-W8IVC-W3MJQ-W3AKB (192000E).

**Oklahoma:** (W5NMM)-?-W3BWT (192400E).

**Oregon:** W7ASG (201145P)-W9BGN-?-W2CGG-W4FF (211815E).

**Pennsylvania:** W3ADE (191931E)-W3BWT (191938E).

**Rhode Island:** W1BTV (191710E)-W4ITA (191710E).

**South Carolina:** ?-W3KZH (192045E).

**South Dakota:** W0UVL (191836C)-W0NGM-W0JIE-

W9DUA-W3BHK-?-W3AM (192230E).

**Tennessee:** W4GQQ (191740C)-W4LCB-W4NNJ-W3MJQ-W3AKB (192200E).

(Continued on page 104)

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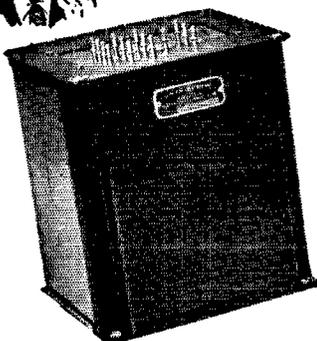
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• INCORPORATED •  
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*Texas:* W5CVQ (191806C)—W5DAA—W5LSN—?—W3ECP (192300E).  
*Utah:* W7GGB via W7UTM (191914M)—WØTQD—?—W3ECP (192300E).  
*Vermont:* W1NDL—W10KH landline to W1QXU—W1PSD—W1KRV—W1BTV—W3BWT (192040E).  
*Virginia:* W4KAO (191700E)—W4CLD—W4FV—W4ITA (191948E).  
*Washington:* W7FWD (191945P)—W7CZY—W4PL—?—W3AKB (200240E).  
*West Virginia:* No message filed. Message from SCM indicating that repeated attempts had not met with success received at W4IUU (192030E).  
*Wisconsin:* W9DJV (191713C)—W3FQB (191815E).  
*Wyoming:* No record of origination or delivery.  
*Alaska:* KL7FM (192210C)—W5DRW—W3BWT (192400E).  
*Canal Zone:* KZ5CO (191700E)—KZ5PA—W3LTW (191733E).  
*Puerto Rico:* KP4CL received message from Governor and bulletined it on 3.9 Mc. Several KP4 stations copied it and originated messages to the President. The following originations and reports of routing have been received:  
    KP4DJ (192000A)—W2UZX—W3BWT (192030E).  
    KP4KD (192037A)—W4OLC—W4IYT—W4LAP.  
    KP4KD (192101A)—W4BVK—W4LAP.  
    KP4KD (192143A)—W4LRI (192120E).  
    KP4KD (192202A)—W3EIS (192145E).  
    KP4CO—?—W4ES—W2UZX—W3ECP (192300E).  
    KP4CD (200925A)—W3KBE (200825E).  
*Virgin Islands:* KV4AA (191840E)—W2BLS—W3MCG (191900E).

### Miscellaneous Observations

W2ZI sent us a copy of the New Jersey GPR message on an ARRL message blank, vintage 1915. . . . The longest hop we know of was the message from Alaska which went from KL7FM to W5DRW on 14 Mc. . . . The longest direct contact from the originating station to Washington was the W7CX—W4LRI hop, made on 7 Mc. . . . First message delivered to W3AKB was the Rhode Island message, received at 1710. Maine and Massachusetts were neck-and-neck at 1720. . . . The greatest number of reported relays was four. . . . W3BWT has played a major rôle in all five ARRL Governors-to-President Relays. . . . The Pennsylvania message followed the same route via the same stations as in 1933, W3ADE direct to W3BWT. Two other outstanding "repeaters" were W2ZI (formerly W3ZI) and KV4AA (formerly K4AAN). . . . The California message was received at W3ECP, via the Pioneer Net and Trunk Line Atlantic-Pacific, twelve minutes after being sent from W6PIV, going through W6QXN and WØTQD in between. . . . W7IWU, SCM of Idaho, asks "Why should I appoint someone to get the message when I live right across the street from Governor Robins myself?" — G. H.

### Back on "160"

(Continued from page 18)

safer to check. About the only trouble we encountered in stabilizing the final was cured completely by using a fairly-large plate by-pass condenser as specified at C<sub>15</sub>. Don't use anything as large as a 0.01-µfd., however, or you'll by-pass some of the modulation frequencies, too. You may have a little difficulty getting the amplifier to deliver power to a lamp load connected to the link winding, and because the plate coils are close-wound the bulb can't be tapped across part

(Continued on page 108)

# BUILDING?



If you are constructing any gear described in any 1949 issue of QST or CQ, or the 1949 ARRL Handbook, send for our special listing of specified parts, and our guaranteed lowest prices. Or - if you are building any other piece of gear, new or old, send us a list of parts you want and we'll be glad to quote a good price.

## LUCKY BUY! - OSCILLOSCOPES

Cancellation of an Export Order enables us to offer you these brand new, latest model, pocket size OSCILLOSCOPES at a little more than ONE HALF the regular price! Most selling price! Will do most anything a large one can! Has internal relay, 10 cycle to 50 KC sweep, vertical and horizontal amplifiers giving sensitivity of 1 V. RMS/inch at 0 to -2 DB from 20 cycles to 100 KC (to 200 KC within -6 DB). Complete with tubes including 2A1PIA. Original factory packing. Cat. S-10-A. Quantity limited!



"Never-Again" Bargain! **\$39.99**

### MEET ME ON 160!

- |   |                          |
|---|--------------------------|
| 160 METER CRYSTALS  | PETERSON Type Z-2 - 2.75 |
| BLILEY Type AX-2 - \$2.80   | 8 & W. COILS for 160     |
| Low Power Coils for 5-Pin Sockets                                       | Specify Type \$1.04      |
| 25 WATTS: End link (160 MEL); Center link (MCL); or Variable link (MVL) | Specify Type \$1.04      |
| 75 WATTS: End link (160 JEL); Center link (JCL); or Variable link (JVL) | Specify Type \$1.34      |
| Millen 33005 Steatite 5-pin socket                                      | Power Up to 150 Watts    |
| End Link - No Tap   | 160-BEL \$3.44           |
| Center Link - Center Tapped   | 160-BCL \$3.44           |
| Variable Link - Center Tapped   | 160-BVL \$2.88           |
| A-56 Jack Bar (BEL, BCL) 85c  | EVL Base Ass'y \$3.44    |
| Power Up to 500 Watts   |                          |
| Center Link - Center Tapped   | 160 TCL \$3.93           |
| Variable Link - Center Tapped   | 160 TVL \$3.10           |
| TCL Jack Bar \$1.25   | TVL Base Ass'y \$5.50    |

### ANTENNA RELAY VALUE!

110 Volt, 60 Cycle Coil



Throw out those old fashioned knife switches and hazy-wire antenna changing systems. We have quality antenna relays at a price anyone can afford. Buy several! Steatite insulation. DPDT antenna relays. Pure silver contacts 1/4" diameter rated up to 700 watts RF power! (10 amps current at 110V AC) Quiet, positive operation - adjustable spring tension! Size 1 1/2" x 2 3/4" x 1-5/16" high. List value \$9.25 Special \$2.98

Same as above but with auxiliary SPDT contacts. List price \$10.15 Special \$3.75

### SPECIAL CAPACITORS FOR HARMONIC SUPPRESSION

(See "Little Slugger", February, 1949 QST)  
 Electrical Reactance Corp. (ERC) Ceramic standoff .001 by-pass capacitors as specified. 25c each 10 for \$2.25  
 Ceramic Pigtail type for By-pass and Coupling  
 10 mmf to .003 mfd - 15c .005 to .01 mfd - 18c  
 Ceramic Temperature Compensating Capacitors  
 Neg. TC: 10 mmf to 750 mmf - 25c Zero TC: .5 to 3.3 mmf - 44c; 4.7 to 20mmf - 35c; 22 to 300 mmf - 29c  
 Silver Mica Button Capacitors  
 30 mmf to 500 mmf 69c 750 mmf to .0024 mfd - 98c  
 Ceramic Standoff types: 50 mmf to .0015 mfd - 36c  
 Ceramic Feed thru type: 50 mmf to 500 mmf - 59c  
 SPRAGUE "Hy-Pass". .01 mfd. 600 Volt - \$1.37  
 (See Page 33, February QST)

If we happen to be out of stock of the size you specify, we will ship the nearest available capacity unless you tell us not to.

The Current Issue of THE HARRISON HAM-A-LOG has some swell hints on BCI/TVI reduction. Also some FB bargains, club activities, etc. A postcard will put you on our mailing list without obligation!

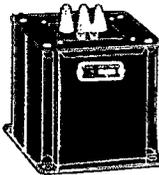
## GOING MOBILE? NAME YOUR BAND!



**SUBRACO MT-15X**  
 NOW AVAILABLE FOR  
 10-11, 20, or 75!  
**\$79.95**  
 (Less tubes and accessories)

Here's the best mobile transmitter available today! Under-dash mounting for fingertip QSY'ing, metering, and tuning - while you drive! Distinctive styling with chrome trim, illuminated meter, etc. 30 Watts - 100% Class B modulated. Push-to-talk - Built-in antenna relay. Small enough (4 1/2" x 5 1/4" x 6 1/4" deep) so that two or more can be mounted side by side for multi-band operation! Complete with all tubes, Billey crystal, antenna connectors, mounting brackets and hand microphone.

**SUBRACO DS-400** Power Supply for maximum MT-15X output and efficiency. Heavy duty dynamotor, relays for complete clean break-in, etc. Input 5.8 Volts DC, output 400 Volts DC at 175 MA, completely filtered. 8 1/2" x 7" x 7" Ready to install \$59.95  
 (The extremely compact MT-15X makes an FB portable rig to take along on your vacation, etc! Details given for simple AC power supply.)  
**NEW GONSET 3 - 30 CONVERTER**  
 Continuous coverage from 3 to 30 MC. Vernier tuning - 3 bands. Same size as famous 10-11  
 Latest Model 10-11 Converter \$39.95  
 Gonset Noise Clipper \$39.95  
**96" Solid steel whip MOBILE ANTENNAS**  
 In Bumper Mount (NA) Complete \$6.17  
 With split-ball Universal Mount (R) - Complete \$9.90  
 (For stainless steel whips - add 88c extra)



### WORLD'S BIGGEST TRANSFORMER BARGAIN!

1500 Volts DC at 550 MA (ICAS)  
 Item TP-17  
**\$19.95**  
 (Add 85c for crating if shipped)

Rated 1750 - O - 1750 Volts AC at 400 MA. CCS!! Completely shielded and potted, porcelain HV terminals - mounts upright or inverted. Brand new (not overrated surplus) with rating clearly marked! 37 lbs. - 6 3/4" x 8" x 7 1/4" high. Because of the sensational low price, we cannot advertise the manufacturer's name.

### COLLINS 75A-1 RECEIVER

One of the finest receivers available today. Double conversion gives maximum image rejection. Ask the ham who owns one!  
**\$375.00**  
 Want to use your 75A-1 on 160? Just ask me - Bil, W2AVA



**I WANT YOUR USED GEAR!**  
 Tell me what you have to trade, how much allowance you want, and what you wish to buy - or ask for my high offer. I guarantee the best trade-in deal! All material shipped in original factory-sealed cartons (never opened). Another reason why it pays to deal with me.  
 73, Bil, W2AVA

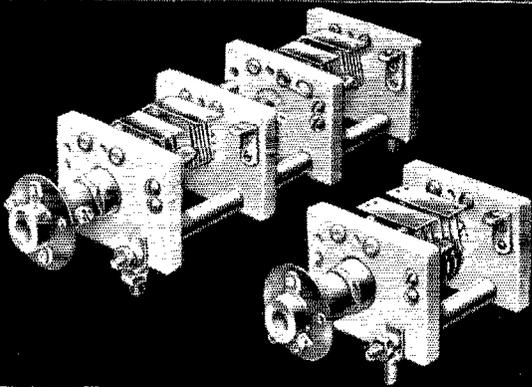
EXPORT DEPT. HARRISORAD

**HARRISON**  
 RADIO CORPORATION  
 12 WEST BROADWAY,  
 NEW YORK 7, N. Y.



# NATIONAL

- **P**roven
- **D**ependable
- **Q**uality



Here are two new National precision condensers ideal for building your own VHF equipment. Available in single or double sections as shown, with single or double spacing. Double-spaced models, 3.0 to 6.75 mmf, \$6.50. Single spaced models 3.0 to 22.5 mmf, \$3.25. Shaft extension at rear for ganging. Dual condenser ideal for mixer-oscillator unit. Ball bearing front and back. Brackets for mounting 7-pin miniature tube socket. Wide low-inductance stator strap connections raise frequency limit of condensers. Stators, rotors and strap connectors silver plated. High capacity units for general coverage. Low capacity double spaced units for bandspread. Flexible couplings available for ganging and for  $\frac{1}{4}$ " shaft. Write for bulletin.

**National**  
  
**NATIONAL COMPANY, Inc.**  
 MALDEN, MASSACHUSETTS

of the coil. This problem can be sidestepped by rigging a temporary tuned circuit consisting of an 80-meter tank coil (of large-enough wire to permit the lamp load to be tapped across a few turns) and as much capacity as you need to make it resonant at the operating frequency. Wind a temporary link of about 8 turns of insulated hook-up wire around one end of this coil, connect the link to the output terminals of the transmitter, and with the amplifier tuned to resonance and operating at full plate voltage, tune the auxiliary condenser until a sharp upward kick in plate current is noticed, indicating resonance. Then tap the lamp load across a few turns of the auxiliary coil and tune for maximum plate current in the amplifier. Try tapping the lamp across different numbers of turns until it is possible to load the amplifier to full input. If the 5514 is used, you can load it to 160 ma. The output, as shown by the brightness of the lamps, should be 125 watts or better at the full input of 200 watts.

Once the amplifier is operating properly you are all set to go. As this is being written the band has not yet actually been opened, so all testing was done on a dummy antenna in the laboratory. Antennas for the 160-meter band are described fully in the *ARRL Antenna Book*, to which reference is made for ideas on utilizing the space you have available to the fullest advantage.

## HAMFEST CALENDAR

**CALIFORNIA** — The Helix Amateur Radio Club is sponsoring a hamfest on Saturday, April 30th, to be held at the Imig Manor Hotel, San Diego, Calif. Technical talks, demonstrations and contests in the afternoon will be followed by a banquet and entertainment in the evening. Hams are invited to bring their YL or XYL. Admission will be by ticket only, at \$4.25 per person. Further information and tickets may be obtained from Secretary E. Soltez, W6NQG, 350 Gavin St., San Diego 2, Calif. Hotel reservations may be obtained by giving ten days' notice in writing to Glenn C. Sheppard, Imig Manor Hotel, 2223 El Cajon Ave., San Diego 3, Calif.

**NEW YORK** — The North Shore Radio Club of Long Island is staging its Fourth Annual Hamfest on Tuesday, April 19th, at Lost Battalion Hall, 9329 Queens Blvd., Elmhurst, L. I. (take Independent subway to Woodhaven Boulevard station). Starting at 8:30 P.M., the program includes entertainment, technical forums, and addresses by ARRL President George Bailey, W2KH, Hudson Division Director Joseph M. Johnston, W2SOX, Larry LeKashman, W2IOP, editor of *CQ*, and William Kiser of FCC. Arrangements are in charge of President Russell Valentine, W2GX, Hamfest Chairman John DiBlasi, W2FX, and Committeemen Anthony Kinney, W2KYX, Leon Hansen, W2FIT, and Ted Long, W2PYY. Hams and those interested in amateur radio are cordially invited to attend. Tickets, \$1.50, will be available at New York-area equipment dealers, through the committee, or at the door.

**TEXAS** — Amateurs in New Mexico, Oklahoma and Western Texas are invited to attend the South Plains Amateur Radio Club Hamfest at Lubbock, Texas, on Saturday and Sunday, April 23rd-24th. Registration will begin at 1 P.M. on the 23rd. The dates have been chosen to coincide with the annual Electrical Engineering Show to be held at Texas Technological College. Coöperating with SPARC to make the get-together a banner one are the Tech Radio Club of TTC and the Lubbock XYL Club. Chairman of the meeting is T. Bruce Craig, W5JQD, and he is being assisted by SPARC Secretary Rogers Orr, W5NIC. Reservations should be addressed to the latter at 2501 23rd St., Lubbock, Texas. A special invitation has been extended to YLs and XYLs.

## 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.

(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 25th 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 takes 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.

(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., 719 World Bldg., New York City.

**QSLs**, 100, \$1.50 up. Stamp for samples. Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore 29, Md.

**AMATEUR** radio licenses. Complete theory preparation for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

**QSLs**, SWLS. For distinctive cards, write to McEachron, 1408 Brentwood, Austin, Texas.

**QSL'S** SWLS? What's your desire? Large variety of samples, 10¢. QSL Printer Sakkers, W3DED, Holland, Michigan. Made-to-order QSL cards!

**CRYSTALS**: Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plug in one octal socket. Plus or minus 5 Kc. One dollar each. Exact frequency. \$1.95 ea. Rex Bassett, Inc., Ft. Lauderdale, Fla.

**10-METER** Beams, \$19.50. Send card for free information. Riverside Tool Co., Box 87, Riverside, Illinois.

**QSLs**. Samples. Albertson, W4HJD, Box 322, High Point, N. C.

**SURPLUS**: Deluxe crystal finishing kits containing holders, quartz blanks, abrasive, etching fluid, complete instructions. \$2.00 each postpaid. Formerly sold \$8.75. Vestco Company, Parkville, Missouri.

**QSLs** Quality cards priced right. Samples. Ferris, W9UTL, 1768 Fruitdale, Indianapolis, Ind.

**QSLs** Kromtek cards at a fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

**QSL'S**, SWLS. Finest stock. Fairest prices. Fastest service. Dossett, W9BHV QSL Factory, 857 Burlington, Frankfort, Ind.

**LAPEL** pins: your ham call letters engraved in white on black plastic, 1 1/2" by 3/4" with white border. 35¢ each, postpaid. G. Lange, W2IVQ, 34 Union Ave., Belleville 9, N. J.

**BEAM** control cable, new material. Two #16; six #20 rubber insulated, coded, tinned conductors. Weatherproof rubber jacket. Heavy armor shield. 1/4" diameter. Price 10¢ foot. F.o.b. Chicago. Trans-World Radio-Television Corporation, 6639 S. Aberdeen St., Chicago 21, Illinois.

**WANTED**: Wireless equipment and literature prior to 1925; List ARRL Member Stations. Pink Sheet Supplement "Ban off" Oct. 1919 QST. Franklin Wingard, Rock Island, Illinois.

**PERSONALIZED** book matches. Call letters or name and address. Samples with prices. Miss Amanda Martin, Box 1123, Rochester 3, N. Y.

**WANTED**: Teletype 1/40TH HP synchronous motor. W6ITH, Moraga, Calif.

**PE103** Dynamotor wanted. Will pay \$12.95 if it works and is complete. W7MKL, 2110 Park Place, Cheyenne, Wyoming.

**CRYSTALS**: 100 Kc. Guaranteed perfect. Manufactured by nationally known company. Complete with holders. 1/2" pin spacing. \$2.95, postpaid. Art A. Johnson (W9HGQ), 1117 Charles St., Rockford, Ill.

**QSLs**, SWLS, quality cards, Jaggi, W5FAV, 6117 Golind, Dallas, Texas.

**THREE** element ten-meter beams, \$10.95. Mark Products, Box 814, Evanston, Illinois.

**COLLINS** for sale: no time to operate. Collins 32V-1, \$400.00. Collins 75-A receiver, \$300.00. Also, VHF 7152-A for \$65.00. Dr. M. L. Redman, W0ENK, Fargo, North Dakota.

**SUBSCRIPTIONS** Radio publications a specialty. Earl Mead, Huntley, Montana. W7LCM.

**DON'S** QSL's. "The finest". Samples. 2106 South Sixteenth Avenue, Maywood, Illinois.

**OREGON** only. Our radiotelegraph code practice machines, model RCM-1, now available on monthly rental basis. Tapes designed for FCC preparation. Advanced, Beginners. Oswego 2-5011 or write Ultradyne Electronics, Oswego, Oregon.

**QSLs**: Enamel finish cards, priced reasonably. Samples sent by return mail. The Rainbow Press, 816 Maple Ave., New Philadelphia, Ohio.

**CHANGING** frequency? Fine commercial units for ARC-3's, SCR-522's, police, taxi, aircraft, marine, geophysical, and other services, except amateur. Commercial regrinding; many crystals can be economically reground to new frequencies. Inquire. Over twenty years of satisfaction and fast service! Try us first. Eldson Electronic Company, 1802 North Third St., P.O. Box 31, Temple, Texas.

**SELL** NC100X, just factory realigned. Retuned. In perfect condition. Dr. DeMarco, 344 Bushkill, Easton, Penna.

**MUST** sell my 120 watt plate mod. phone/CW xmitter, 3-foot open rack, dual highvoltage power supplies, separate supplies in exciter and speech amplifier, all stages metered. In good order. First \$125.00 plus freight gets it. W3KMA, 4202 Woodstock Ave., Baltimore, Md.

**NEW** HRO-7T, with 7 coils, reasonable. Ross Thorp, 313 Delia, Flint 5, Mich.

**SELL** or trade new 522, power supply, single knob tuner, \$50. Workshop 10-meter beam, Munger rotator, \$50. Meisner 150B factory converted 90 through 10, VFO, buffer doubler, \$195. Leica 35mm Elmar 3.5 lens, \$225; with Summar lens, \$250; with coated Summar lens, \$295. Focomat #1 enlarger, \$100. Omega D2 enlarger, color head, holders, cover \$165.00. Kodak master projector, leather case, extra lamps, Dalite 60 x 60 Challenger screen, \$175.00; Bauch & Lomb 4.5 Tessar coated lens, \$40. All the above new or like new. W5Collins 32V or 30K. W1RMS, S. Oser, 198 Euclid, Waterbury 30, Conn.

**NC183** with matching speaker and NBFM adapter, \$200.00. New BC-221 AK frequency meter. Make offer. W6AJN, 7927 Terrace Dr., El Cerrito, Calif. LANScape 6-1178.

**FOR** Sale: BC-348Q with AC power supply. In excellent condition, new when purchased. Shock-mounted, \$90.00. Satisfaction guaranteed. Brand new 500-watt 75TL final. Fully tested. Mounted on grey panel, excellent appearance and performance. Individual plate and grid meters. No surplus, \$80.00 or \$150.00 for both. Polk Closs, W5OTE, Port Texaco, #1, Houma, La.

**FOR** Sale: Most issues of QST back to 1924. Best offer. Condenser microphone with amplifier \$5.00. D-104 mike \$2.50. BC-223 VFO and crystal control with 3-4.5 Mc tuner, \$12.00. Must ell. W8BXU, 118 Eighth St., Calumet, Mich.

**SWAP**: FB stamp collection for one used ham receiver in good condition 80 thru 10; stamps were collected by SM5WI, Sweden. W1RKG, Joseph Nicatara, 176 Water St., Lawrence, Mass.

**SELL**: HQ-129X receiver with speaker in perfect condition—\$115.00. W5MCK, Black, Route 4, Box 468, Corpus Christi, Texas.

**COLLINS** 30K, Super-Pro SP-400-X. Both same as brand new. 6-element Workshop beam with rotator. Complete Deluxe station, cost \$2125.00. Condition guaranteed perfect. VFO and Super Pro in streamlined grey cabinet, speaker to match. A beautiful station. Sacrifice for \$1200.00. H. E. Hightower, Blakely, Ga.

**FOR** Sale: Thordarson multi-match modulation trans. 75-watt type 1M175, \$12.00; driver trans. type 67D78, \$2.00; both for \$13.00. Miller R-9er coils for 10-20, \$18.00. Above are brand new. Also other miscellaneous equipment. A. Martinka, 1253 Grace St., Chicago, Ill.

**TRANSMITTER** receiver Mark II with supply unit, antenna, control boxes, cables, new tubes, spare parts, head gear, \$40.00. Special brand new tubes, metal case: 807, E1148, (2) 6K8G, (5) 6K7G, 11L148, 018G, 6H6, (2) 6V6G, EF50, \$15.00. Aerial variometer, \$5.00. B. Golder, 638 Montgomery St., Brooklyn, New York. Pr. 8-0887.

**BAY** area and vicinity Hams! Sell BC-610-D. In good condition. Best offer over \$400.00. Write Charles E. Reed, W6FHB 716-B Eagle Ave., Alameda, Calif., or Phone LA 3-8232.

**CHICAGO**land Hams! SX-42 and speaker, \$200.00. Tullar, 1522 Race St., Western Springs, Illinois.

**COLLINS** AN/ART-13 transmitter nearly new condition, with tubes, plugs, dynamotor, manual. \$250.00. J. M. Hetland, 385 7th Ave., South, Fargo, N. Dakota.

**QSLs**, SWLS. Meade. W9KXL, 1507 Central Ave., Kansas City, Kans.

**REVOLUTIONARY** copyrighted principle. "Rhythmic Sound Sending". Relieve strain, increase speed, develop tape-like fist. \$1.00 postpaid. Richard D. Thayer, 32 Merrick Street, Worcester, Mass.

**QSLs**. Varicolor cards, new designs, all A-1. Samples free. Varicolor Press. Box 265, Dover, Ohio.

**FOR** Sale: SX-28, excellent, \$95; SX-28A, excellent, \$115; Miller "R9er", 10 and 20 mtr coils, \$16; SP44 Panadaptor, extra tube, excellent, \$28; Brush Soundmirror tape recorder, BK401—with 10 reels tape, \$110; BC221AK frequency meter, A.C., new condition, \$60; Hotosun, FM #18; 250TH Elmac, new \$15; 810's RCA, new, \$7.50, W3IVQ, Box 6000 Torressdale, Fla. 14, Penna.

**BC348-Q**, BC348-O with tubes, \$45.00 each. BC453B (Q5'er), \$12.00. BC457, \$6.00. 25% with order. W5NW, Box 586, Odessa, Texas.

**SELL** QSTs: Complete 1916 except for May and June. Excellent condition with covers. Sell complete for best offer. No individual copies. W0BBL.

**FOR** Sale: HT6, 1946 model, \$125.00. W0PSPD.

**CONTACT** Carl Evans, W1BFT, for your requirements in new and used amateur receivers, transmitters, and test equipment. Evans Radio, Concord, N. H.

**SWAP**: For pair 250TH tubes, Box 100 silver mica condensers .006 mfd 300 volts. W8OYP, 2085 Random Rd., Cleveland 6, Ohio.

**RCA** 348Q receiver never been in ship. Complete in case, plug, Lord mounts, tech manual. AC power supply mounted on rear only alterations. \$70.00 plus shipping. W5MLR, 207 °C ° NW, Ardmore Okla.

FOR Sale: Slightly used receivers: RME-45 with spkr. \$124.50. Hammarlund SP400X with spkr and pwr. supply, \$249.50; HQ-129X with spkr, \$129.95; HQ-129 with spkr, \$89.50; National NC-240D with spkr, \$189.50; VHF 152A, like new, \$75.00; VHF 152, \$59.95. Time payments or cash. Write to: Lew Bonn Co., 1211 La-Salle Ave., Minneapolis, Minn.

**COLORSTONE QSL's!** Snappy! Bright! Different! Looking for something new? Something different? See our samples. They're free! No junk! Colorstone Press, Tupelo, Miss.

**SEND** for my rock-bottom list. Tubes, power supplies, transmitter. Edsel Malmstrom, Melvin, Texas.

**METER:** RCP 446A, never used, \$14.00; Brush BA-106 mike, new, \$13.00. Ray Bohmert, Medford, Wisconsin.

**SELL:** Abbott TR4 transmitter-receiver; power supply, mike and extras. Converted for 2-meters. In good condition. \$30.00. WIPWF, 29 Day Ave., Northampton, Mass.

**ALUMINUM** tubing, angles, channels and pipe. Write for list. Willard Radcliff, Fostoria, Ohio.

**SELL:** First money-order over \$15.00 takes Silvertone 3-way portable. In good condition. Kenneth Jellison, Wilson, Kansas.

**SELLING** out! Hallicrafters S-38 \$29.50 (cost \$49.50); S-58 (AM-FM), \$35.00 (cost \$60); Garod 45D5 3-way portable \$19.50 (cost \$42.50). All are guaranteed to be in good condition. R. Bruce, 1171 Union St., Manchester, N. H.

**TUNE** in to "Practical Wireless", Britain's best radio monthly! Supplies enthusiastic "hams" with latest British-European radio-television developments. Exclusive articles by leading experts, special television features, newest transmitters and receivers fully analyzed, etc. Annual subscription (12 consecutive issues direct to your address from London) only \$2.00, from George Newnes, Ltd., U. S. Subscription Office (PW, 32), 342 Madison Avenue, New York City 17, N. Y. Two years, \$3.75.

**QSLs.** Distinctive designs by hams for hams and priced to meet the ham's pocketbook. Best quality material and workmanship. This is worth investigating. Stamp for samples. Leonard's Print Shop, 854 View, Hagerstown, Md.

**HQ-129X** receiver, like new. Best offer over \$130.00 takes it. WBOG, 3818 Pleasant St., Des Moines, Iowa.

**BARGAINS:** New and reconditioned Collins, National, Hallicrafters, Hammarlund, RME, Millen, Sonar, Meissner, Meck receivers, transmitters, etc. Reconditioned S-38, \$35.00; S40A, \$69.00; SX42, \$199.00; HQ-129X, \$139.00; NC-173, \$149.00; NC-240D, \$149.00; DB22A, \$49.00; VHF 152, \$59.00; HE-10-20, \$59.00; RME-45, \$99.00; VFX 680, \$49.00; MB611, \$39.00; NC46, NC183, HRO, 220R, SX25, SX28, SX62, SX28A, S36, S53, HT9, HT18, BC610, Super-Pro, other receivers, transmitters, VFOs. Easy terms. Shipped to you on trial. List free. Henry Radio, Butler, Missouri.

**SUPER-PRO SP120X:** 1.2-40 Mc. Very clean. At your own price. R. S. Enabnit, 2045 12th St., Cuyahoga Falls, Ohio.

**FOR Sale:** Replacement power transformer with instructions for PE-104-A power pack as used in SCR-284-A or BC-654-A sets. \$4.48. E. D. Kellogg, 1833 Armacost Avenue, West Los Angeles 25, Calif.

**BC-221,** 3-tube amplifier, regulated power supply. All enclosed in grey cabinet. Calibration book included. Take it away for \$65.00. WIQMO, SO. 6-2311, Somerville, Mass. 51 Simpson Avenue, Somerville, 44.

**ONE RCA** Model 10M transmitter complete to operate on 75 meters. Set includes remote speech amp, and ECO. Runs a cool KW. Grey cabinet finish, 6 ft. high, 3 ft. wide by 2 ft. deep for the RF section. Power supplies and modulator section in same size cabinet. A steal at \$800.00 F.o.b. southern Jersey. Set like new, 50 hours operating time. This set cost the government \$8,500. P. C. Sherman, RFD 1, Box 220, Belmar, N. J.

**TRANSMITTER,** 50-watt AM receiver and power supplies on rack and panel 150-162 Mc. remote control monitor. All crystal-controlled. New, complete, FCC approved. Ready for taxi use. \$500.00. Industrial Radio, East 9 Riverside Ave., Spokane 8, Wash.

**WANTED:** AN/ART-13, BC-348, RTA-1B, AN/APN-9, R5A/ARN-7, AN/ARC-1, AN/ARC-3, BC-788-C, I-152, MN-26, Test sets with TS- or J-prefix, Dynamotors, control boxes, transmitters, receivers, Power Supplies, etc. State quantity, condition and best price, first letter. Hi-Mu Electronics, Box 105, New Haven, Conn.

**FOR Sale:** BC610E transmitter with tubes, coils and tuning units, Thordarson speech amplifier, Model 30W30 with Astatic microphone type DN-HZ, 20-meter Gordon Specialties rotary beam, complete; Hammarlund Super-Pro receiver, type BC1004 with complete spare parts for power supply; Howard communications receiver, type 490; frequency meter type BC-221-AJ (new); test set type I-56-C less Model 102 voltohmmeter, and test unit I-176 voltohmmeter. Sell complete to highest offer or will break up. Capt. Richard R. Murray, Squier Signal Laboratory, Ft. Monmouth, N. J.

**HRO5** Rack and panel, 4 sets of coils. Highest bid over \$175.00. W2IXY.

**QSLs, SWLs.** Free samples. Cushing, WIHJI, QSL SHOP, Box 32, Manchester, N. H.

**FOR Sale:** 500-watts phone/cw 4 stage 10-20 meters, transmitter and HRO, \$450.00 for all. W9GVI, Crawfordsville, Ind.

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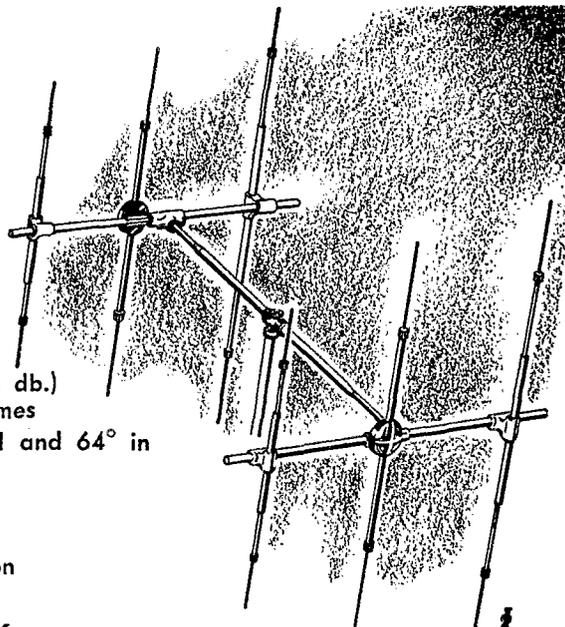
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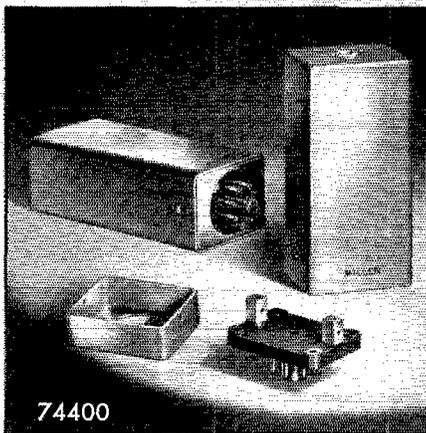
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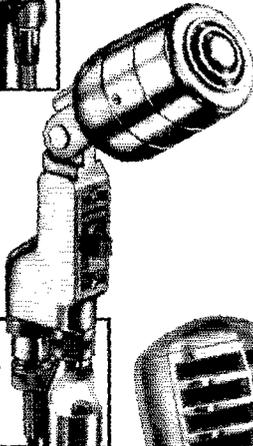
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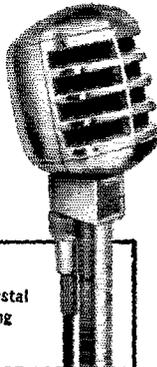
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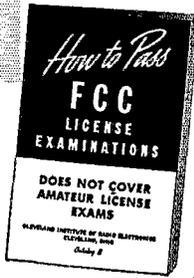
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