

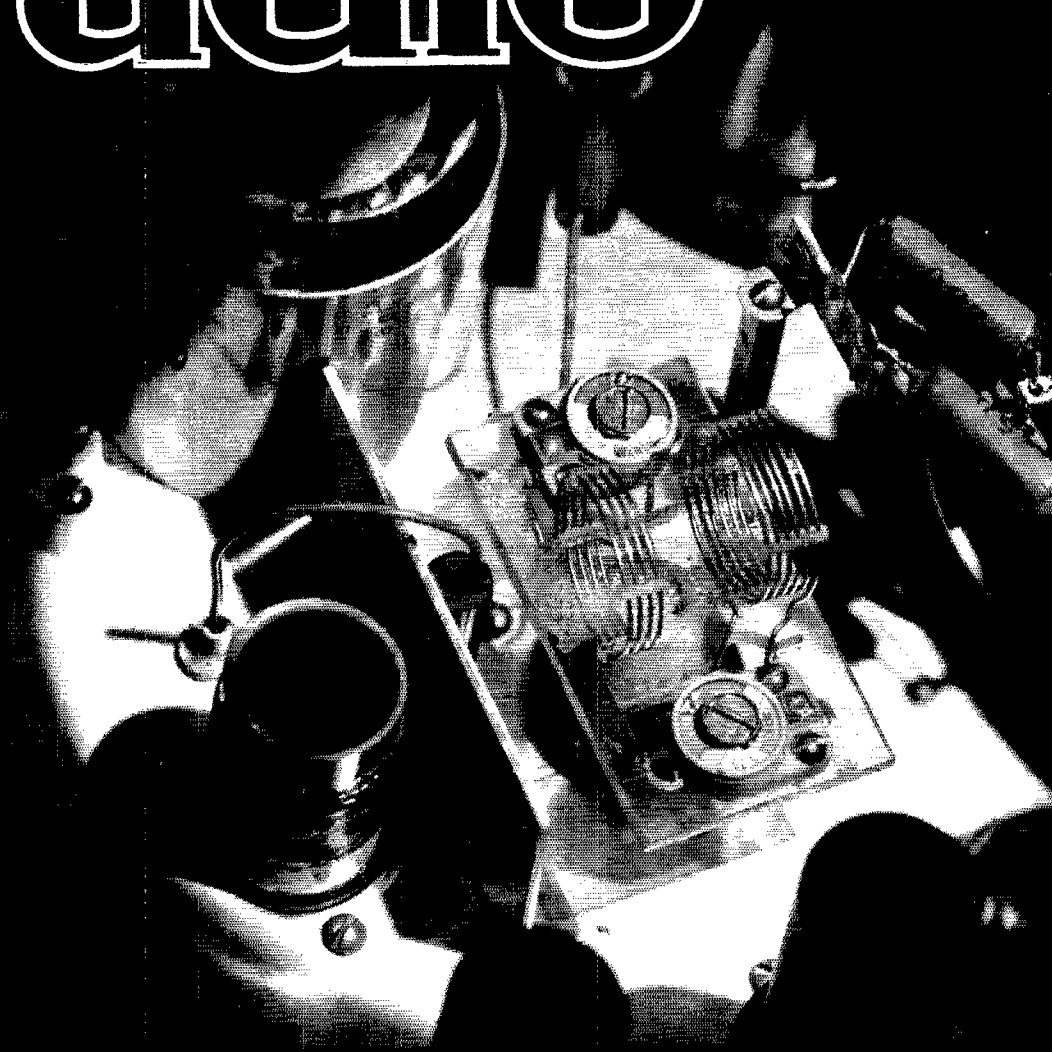
May, 1949

40 Cents

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# amateur radio



NOW YOU CAN ENJOY TOUCH-TO-TALK OPERATION WITH YOUR FAVORITE MICROPHONE



# Touch-to-Talk

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Never before such ease, such versatility!  
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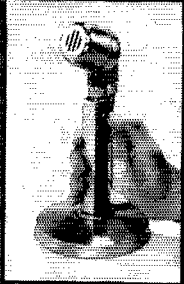
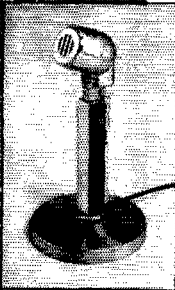
**Model 328.** Touch-to-Talk Switch only. SPDT. List Price. . . . \$9.50

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**Model 629.** Complete with E-V 606-8 Hi-Z patented Differential Dynamic Mike, 8 ft. cable. List Price. . . . \$49.00

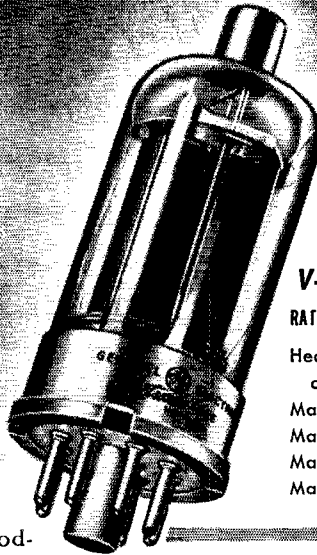
(Double Pole, Double Throw available on special order at \$1.00 list extra.)

- Press lever lightly for "On". Switch closes.
- Release pressure for "ON" Switch opens.
- To lock in "talk" position, press red locking button.
- To release lock, touch lever lightly; switch returns to "ON" position.



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Only three years in ham use, yet already a high-frequency favorite!



**GL-2E26**

**V-h-f beam power tube**

RATINGS, CLASS C TELEGRAPHY, ICAS

Heater voltage	6.3 v
current	0.8 amp
Max plate voltage	600 v
Max screen voltage	200 v
Max plate input	40 w
Max plate dissipation	13.5 w

TOP 30 mc in ham discussions, and Type GL-2E26 takes a bow. This modernly engineered addition to the ham's tube list is ideal for work in 2- and 6-meter rigs. There's a reassuring record of hard commercial service in FM. And the price of the tube is low: *three* GL-2E26's, one for driver and a pair for push-pull final, cost less than one standard "50-watter!"

Even a single GL-2E26 as final will handle an input of approximately 27 watts phone, which often is all you need on 2 or 6 meters. Powerwise the tube pulls its weight.

Shielding—frequently a problem at the higher frequencies—is handled neatly by a short metal sleeve, which surrounds the input of the tube so completely that no external shield is required.

Get further design facts and the low price from your G-E tube distributor. Or write *Electronics Department, General Electric Company, Schenectady 5, New York.*

Series 3 in a listing, by areas, of tube distributors who can supply you with Ham News, G. E.'s bi-monthly magazine:

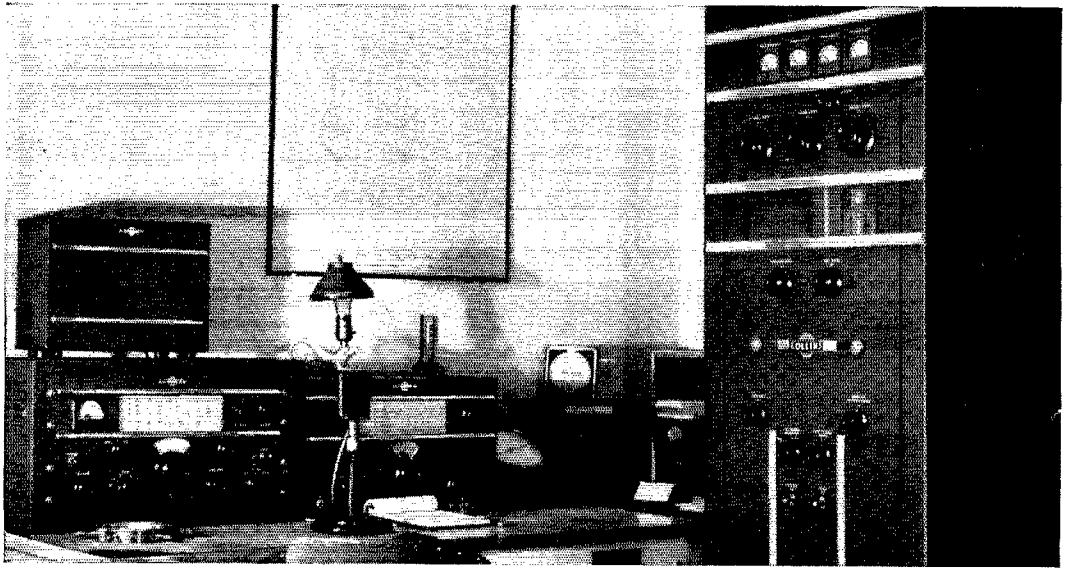
- Allentown, Pa.: Federated Purchaser; General Electric Supply Corp.; Radio Electric Service Co.
- Altoona, Pa.: Hollenbeck's Radio Supply.
- Baltimore, Md.: General Electric Supply Corp.; Wholesale Radio Parts Co.
- Bethlehem, Pa.: Buss Radio Electric Supply Co.
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- Erie, Pa.: Warren Radio Co.; Jordan Electronic Co.
- Kingston, Pa.: Stull Brothers.
- Norfolk, Va.: Ashman Dist. Co.
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- Reading, Pa.: A. G. Radio Parts Co.; Geo. D. Barbey Co.
- Roanoke, Va.: Leonard Electronics.
- Salisbury, Md.: Standard Electronic Supply Co.
- Scranton, Pa.: Mr. Fred B. Pursell; Scranton Radio and Telv. Supply.
- Washington, D. C.: Electronic Wholesalers; General Electric Supply Corp.; Kenyon Radio Supply Co.
- Wilmington, Del.: Radio Electric Service Co.
- York, Pa.: Mr. C. R. Minnich.

(List as of Feb. 25, 1949)

GE-152 GE-156 GE-160 GE-102174525A GE-351 GE-10011 GE-21K5 GE-111 GE-307  
 GE-307 GE-308 GE-305 GE-306 GE-307 GE-310 GE-311 GE-312 GE-313 GE-314 GE-315  
 GE-316 GE-318 GE-319 GE-320 GE-321 GE-322 GE-323 GE-324 GE-325 GE-326 GE-327  
 \* ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR  
 GE-1524 GE-1525 GE-3000 GE-3005 GE-3012A GE-3012B GE-3013 GE-3014 GE-3015  
 GE-3016 GE-3017 GE-3018 GE-3019 GE-3020 GE-3021 GE-3022 GE-3023 GE-3024  
 GE-152 GE-156 GE-160 GE-310 GE-311 GE-312 GE-313 GE-314 GE-315 GE-316

**GENERAL**  **ELECTRIC**

180-HA3



## Thanks, W6OKQ, for proving the point

• When H. P. Westler, W6OKQ, bought his 30K-1 he was dubious. Read what he says in a recent letter:

"Ever since Eimac tubes have been available I have been running fairly high power—never less than 650 watts. A few months ago, when I made my decision to purchase a Collins 30K-1 with a phone input power of 375 watts, I was quite concerned in my own mind as to whether I would ever be happy and whether I would get results comparable to those I had been accomplishing. As you know, I am strictly a phone man and I think the following results which have been accomplished during the last few months since I purchased this new Collins transmitter speak for themselves. These contacts have all been made on 20-meter phone:

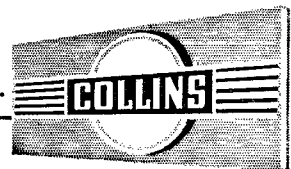
VK2AJX	5-9
J9ACB	5-8
I1RC	5-8
ZS1CJ	5-9
G2PU	5-9+
SM4KP	5-9+
GW4CZ	5-8-9
OH6NS	5-8
PAØBM	5-6
OZ7FL	5-9
HK1DZ	5-9+
GM3BN	5-7-9
ZL1DL	5-9
KA1AI	5-9
CT1PR	5-8-9
VP3TY	5-8-9
ZE2JQ	5-9
CR7BC	5-8
ZC6XY	5-8-9
FQ8SN	5-8
VU2ET	5-9+

"I thought perhaps others might have had the same idea I had and that possibly you could use my past experience in proving the point that a well designed piece of equipment, such as this Collins 30K-1, does and will compete with the kilowatt rigs. Of course I have had many, many more contacts and lots of duplications of the same, but to receive reports like the above in the crowded 20-meter phone band shows that your equipment definitely can compete."

\* \* \*

• Footnote to amateurs who are also professionals: You can expect the same high performance from Collins broadcast equipment and Collins airborne and ground station communication and navigation gear.

IN RADIO COMMUNICATIONS, IT'S . . .



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MAY 1949

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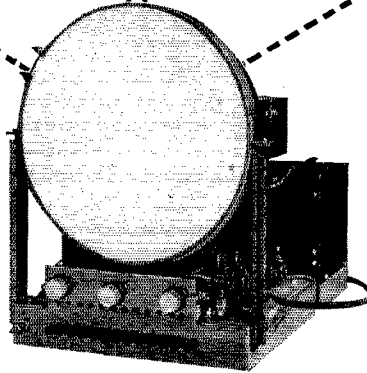
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and **KNOW WHERE** you are!



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## Section Communications Managers of the ARRL Communications Department

**Reports Invited.** All amateurs, especially League members, are invited to report station activities on the first of each month (or 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, OBS, 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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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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



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LEONARD COLLETT, . . . . . W0DEA  
Civil Aeronautics Administration  
Box 776, Joplin, Mo.  
*Alternate:* Alvin G. Keyes, . . . . . W0KTQ  
1201 Merchants Nat'l Bank Bldg., Cedar Rapids, Ia.

*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*  
R. REX ROBERTS, . . . . . W7CPY  
110 W. Brennan St., Glendive, Mont.  
*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. BATTERY, . . . . . W4IA  
2008 N. Cleveland St., Arlington, Va.  
*Alternate:* J. Frank Key, . . . . . W4ZA  
Box 707, Buena Vista, Va.

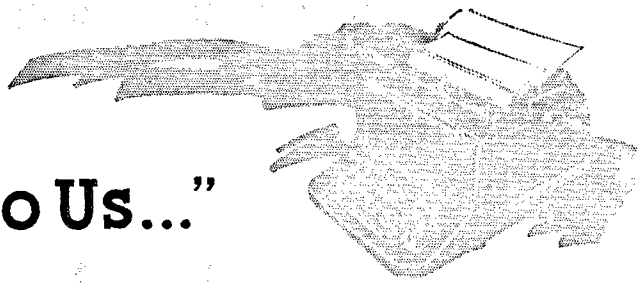
*Rocky Mountain Division*  
FRANKLIN K. MATEJKA, . . . . . W0DD  
P. O. Box 212, Estes Park, Colo.  
*Alternate:* William E. White, . . . . . W0PDA  
1263 Pearl St., Denver 3, Colo.

*Southeastern Division*  
WILLIAM C. SHELTON, . . . . . W4ASR  
527 Beville Blvd., Daytona Beach, Fla.  
*Alternate:* William P. Sides, . . . . . W4AUP  
Fleming Road, Montgomery, Ala.

*Southwestern Division*  
JOHN R. GRIGGS, . . . . . W6KW  
3212 Grape St., San Diego 2, Calif.  
*Alternate:* John E. Blekel, . . . . . W8NY  
1834 Whittier Blvd., Whittier, Calif.

*West Gulf Division*  
WAYLAND M. GROVES, . . . . . W5NW  
P. O. Box 288, Odessa, Texas  
(W5NW at Humble Pipe Line Camp, Odessa)  
*Alternate:* David H. Calk, . . . . . W5BHO  
730 Joplin St., Houston 17, Texas

# "It Seems to Us..."



## POWER

Spring is here and our thoughts this month ought to be all sweetness and light, but they aren't going to be. We'll wager a blown 30-amp. fuse that a few of the gang won't like us for airing some of ham radio's dirty linen on this page, but it seems to us about time we in American amateur radio took a long, critical look at our complacency in tolerating in our ranks those who violate all the standards of good sportsmanship in our game and who flaunt, more or less openly, intentional disregard of our amateur regulations.

We're talking about power. Not 250 watts or 500 watts or even a "full gallon," but the 2, 3 and 5 kilowatts that some stations are using today here and there around the country, to a very large extent with the knowledge of their fellows in the law-abiding category. We all used to make facetious reference, before the war, to the "California kilowatt" that a very few stations were pretty generally known to operate. There was a little grumbling in the background about these super-power stations, but the feeling seemed to be that they had simply elected themselves into another league that few decent hams would want to sign up with even if the opportunity offered.

Well, the postwar surplus market has changed all that. It seems that in a number of cases we were guilty of mistaking lack of opportunity for sportsmanship and a respect for the laws of the land. Surplus gear has put a lot of fellows on the air who might never have had a chance otherwise, and we're all for that. But surplus has also made it temptingly easy to put stations on the air with more power than the law allows, and the way some of the unscrupulous are going for it has got a lot of folks wondering if it isn't about time to do something about it. There have always been a few fellows whose philosophy was that "2 is better than 1, and 4 is better than 2" and there probably always will be. But today, some operators who apparently can't stand having to take a back seat to some super-wattted surplus-silly local are thinking in terms of push-pull parallel 304TTLs and what they will take. Don't let's kid ourselves -- that is ex-

actly what happens. It shows up mostly in the more competitive activities, like certain contests and everyday DX chasing, or in the crowded 'phone bands where layers of signals peel off like an onion, but even the newcomers are catching on. After all, it isn't hard to imagine the effect on some of our present crop of young squirts of those 1.5- and 2-kw. bargain combinations that can be bought for practically a song. And it's only natural that their normal sense of fair play becomes slightly dulled when they find that most of us hams, who should be actively reading the lawbreakers out of decent company, do nothing more than exhibit a slightly unhappy attitude about it all.

What's the answer?

One suggested solution that has been kicked around a little is, "Remove the power limit" — presumably on the theory that you make people honest by not giving them a chance to be dishonest. To that extent the idea has merit, but we can't imagine such things as rules of League contests providing, instead of power multipliers, entries in classes such as "under \$3000 income," "under \$10,000 income," and the like. Too many hams would take up photography and pigeon breeding.

Dozens of law-abiding amateurs who've written to us or talked to us on field trips during the past year, and who are concerned over the general trend to higher power (not necessarily above 1 kw.) have suggested lowering the power limit from 1 kilowatt to 100 or 200 watts. Not a solution to the problem we're discussing, to our way of thinking; the type of fellow who exceeds the limit now would certainly exceed it then.

Another possibility that has been suggested seriously in recent months would be to restrict the tube types in one's final amplifier (and driver, in case you're thinking about grounded-grid amplifiers). All available tubes would carry an FCC rating and installation of tubes with higher ratings would be *prima facie* evidence of violation of the power clause in our regulations, and basis for suspension or cancellation of licenses. While at first glance this may seem like a partial solution to the prob-



lem, it puts a terrific strain on the sane individual who likes his rig to last beyond the first twelve seconds of operation and it would penalize anyone interested in using high-quality linear amplifiers for harmonic reduction. In addition, because it would specify equipment in our regulations, ARRL would have to oppose it in principle, as discouraging experimentation and development.

Better enforcement? We'd like nothing better than to see some of these deliberate lawbreakers laid low by FCC and barred from the amateur air permanently, as we hope they will be. Continuous supervision and regular inspection of all amateur stations would be an expensive business, however, and, we suspect, would be accompanied by proposals of a stiff licensing fee to pay the costs. We'd deplore such a tax on the law-abiding majority merely to clear our ranks of a relatively few heels.

Is there, then, no immediate solution?

We think there is. We think the solution is in the adoption of a healthy contempt, openly expressed, on the part of the real amateurs in the game to those in our bands whose tactics in this respect are not only ruining the game for the rest of us but also — and make no mistake about it — will, unless checked at the start, threaten the solid foundations of amateur radio itself. Amateurs of today probably do not realize that in the beginning the rest of the radio world regarded us with suspicion, as likely to prove too irresponsible to be permitted to operate at all. The respect we have earned with the regulatory agencies of this country, with the military and with the citizenry and with the governments of other countries, was earned the hard way. It was earned because from the beginning organized amateur radio was characterized by intense technical interest, and insistence on principles of cooperation, keen but honest competition — and strict observance of our regulations. It has been retained and enhanced over the years only after we demonstrated that we could continue to operate on those principles, that we do so because of pride in our game and in our accomplishments, and that we have proved our ability to keep our house in order without the necessity for constant supervision and government intervention. But only the constant practice of such principles will keep it for us; it won't take much complacency on our part to the complete disrespect of ethics and law that these Dead-End characters of amateur radio are engaging in to undermine that respect to a serious degree.

The solution, therefore, is something we ourselves must achieve. We think it is high time to start, too. What is needed is an end to looking the other way and instead a cold

realization that this deliberate lawbreaking is not only a violation of all the rules of good sportsmanship but, if permitted to go unchecked, may constitute a threat to the continuation of the existing privileges of all of us. What is needed is the realization that the "friend" down the block or in our club who goes in for this sort of thing merits only our contempt for his demonstrated inability to compete on even terms with his fellows, and our condemnation for his wilful violation of one of the fundamental regulations laid down for our operation. What is needed is for the law-abiding majority to ostracize these guys who have forfeited the right to class themselves as amateurs. — A. L. B.

### **FLASH!**

#### **PORTIONS OF "160" OPENED**

On April 7th FCC released for amateur use portions of the band 1800–2000 kc. under provisions identical to those appearing on page 28 of March *QST*. The band segments are open to A-1 (c.w.) or A-3 (a.m. 'phone) use by all classes of amateur licensees. The authorization is subject to condition of no interference to the loran radionavigation service and any amateur causing interference must cease operation immediately if so notified by FCC.

This is an experiment by our Government to determine whether sharing of the loran bands by amateurs is a workable arrangement. Watch your frequency and power input with extreme care and observe closely the day-night changes in authorized power.

Canadian General Manager Reid announces that Canada on the same date released frequencies for amateur use as follows: In British Columbia, Alberta, Saskatchewan, Manitoba and the Mackenzie River District: 1900–1925 and 1975–2000 kc. In Ontario, Quebec, Maritime, Newfoundland and Labrador: 1800–1825 and 1875–1900 kc. Power limits are 250 watts day, 100 watts night. No operation in the Yukon.

#### **NATIONAL EMERGENCY FREQUENCIES**

<b>C.W.</b>	<b>'PHONE</b>
7100 kc. (day)	3875 kc.
3550 kc. (night)	

# Simple Gear for the 420-Mc. Beginner

## Using the 6J6 for Transmitting and Receiving

BY EDWARD P. TILTON,\* WIHDO

As we have gone higher into the radio-frequency spectrum, developing improved techniques for each new band, v.h.f. operation has taken on most of the characteristics of work on our lower frequencies, in that equipment is becoming increasingly complex and costly. Crystal control and superheterodyne receivers, both admittedly superior and highly-desirable techniques, have tended to remove 50, 144 and even 220 Mc. from the simple-equipment category.

If we are to have any simple-equipment territory left at all, 420 Mc. is it. The band is 30 Mc. wide, so it matters little whether the signals are sharp or broad, from the standpoint of interference potentialities, and we need to have little concern over the possibility of wandering outside the prescribed band limits. The use of crystal control and superheterodyne receivers is recommended for the skilled worker, even on 420 Mc., but the important point is that they are *not* necessary. You can have a lot of fun on 420 with simple gear, and here's how:

### The Circuits

Both the transmitter and receiver employ 6J6 tubes in their r.f. portions, the circuits being practically identical schematically. The tuned circuit in each is a half-wave line, with the tube plates at one end and the tuning condenser at the other. The plate voltage is fed into the line at the approximate middle, the exact point being determined by experiment. Two 100-ohm resistors,  $R_7$  and  $R_8$  in Fig. 1, are used at the feed point in the transmitter, as a precaution against loss of r.f. into the power-supply lead. The receiver uses a small center-tapped choke,  $RFC_1$  in Fig. 2, for this purpose, and a similar arrangement may be used in the transmitter, if desired. The only other oscillator circuit difference between the two units is the value of the

• Though more than 18 months have elapsed since they were described in *QST*, the little transmitter and receiver which were the subjects of our first article on simple low-cost gear for 420<sup>1</sup> still bring in many inquiries. Obviously, a lot of fellows are interested in getting started on 420 Mc. by other means than the surplus-conversion route. For them we present improved versions of the simple modulated-oscillator transmitter and superregenerative receiver.

grid leak, and the use in the receiver of the bypass condenser  $C_1$  in the grid lead, to induce superregeneration. The cathode and heater are maintained above ground potential in both units by small self-supporting r.f. chokes.

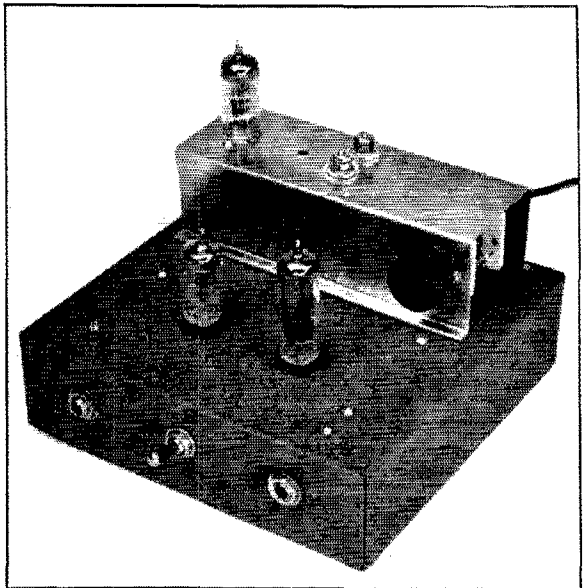
The audio portions of the receiver and transmitter are also quite similar circuitwise. In the transmitter a 6C4 speech amplifier is operated with the microphone transformer primary connected in its cathode lead, thus doing away with the necessity for a microphone battery. This drives a 6AQ5, providing more than enough output for modulating the 5 or 6 watts input to

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

<sup>1</sup> "Four-Twenty Is Fun!" Tilton, Nov., 1947, *QST*.



The 420-Mc. transmitter is built in two units. The modulator portion, on a 7 x 7 x 2-inch chassis, uses a 6C4 driving a 6AQ5 modulator. The oscillator uses a 6J6 and is assembled on a removable trough-shaped chassis.



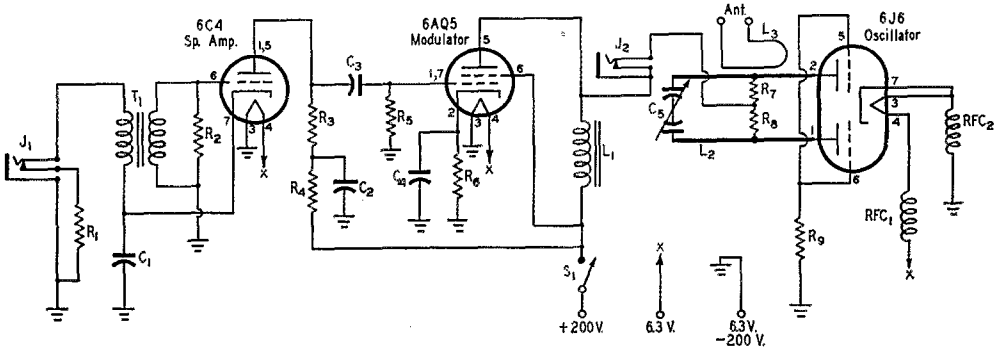


Fig. 1 — Schematic diagram of the 420-Mc. transmitter.

- C<sub>1</sub>, C<sub>4</sub> — 10- $\mu$ fd. 25-volt electrolytic.
- C<sub>2</sub> — 8- $\mu$ fd. 450-volt electrolytic.
- C<sub>3</sub> — 0.01- $\mu$ fd. tubular.
- C<sub>5</sub> — Miniature split-stator variable, 4  $\mu$ fd. per section. (Millen 21912D, with one rotor plate removed from each section.)
- R<sub>1</sub> — 470 ohms, 1 watt.
- R<sub>2</sub> — 0.33 megohm,  $\frac{1}{2}$  watt.
- R<sub>3</sub>, R<sub>4</sub> — 5000 ohms, 5 watts.
- R<sub>5</sub> — 0.47 megohm,  $\frac{1}{2}$  watt.
- R<sub>6</sub> — 680 ohms, 1 watt.
- R<sub>7</sub>, R<sub>8</sub> — 100 ohms,  $\frac{1}{2}$  watt, carbon.

- R<sub>9</sub> — 2700 ohms,  $\frac{1}{2}$  watt.
- L<sub>1</sub> — Midget filter choke.
- L<sub>2</sub> — Plate line made of two pieces of No. 12 wire, 4 $\frac{1}{4}$  inches long,  $\frac{3}{8}$  inch apart, center to center.
- L<sub>3</sub> — Hairpin of No. 18 wire. Portion which couples to L<sub>2</sub> is about  $\frac{3}{8}$  inch long. Position should be adjusted for maximum transfer of power to antenna.
- J<sub>1</sub>, J<sub>2</sub> — Closed-circuit jack.
- RFC<sub>1</sub>, RFC<sub>2</sub> — 12 turns No. 20 enameled wire,  $\frac{3}{16}$ -inch diam.,  $\frac{3}{4}$  inch long.
- T<sub>1</sub> — Single-button microphone transformer.

the 6J6 oscillator. The receiver audio system uses a 6J5 and a 6F6.

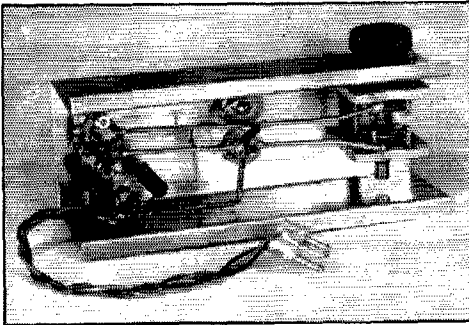
### Mechanical Details

The secret of success in getting the 6J6 tubes to operate satisfactorily at 420 Mc. lies in the elimination of all "leads" in the radio-frequency circuits. The plate line, L<sub>2</sub>, is connected directly to the socket pins, as are the grid resistors and the heater chokes. Use of the half-wave line, in place of the more common capacitance-loaded quarter-wave arrangement, permits the use of a standard readily-obtainable tuning condenser, yet leaves a line of appreciable length. Using half-wave lines in the manner shown the 6J6

can be made to oscillate up to 700 Mc. or more with ease.

The oscillator portion of the transmitter is built inside a trough made of flashing copper, which is easy to work with simple tools and ideal from the standpoint of conductivity and shielding qualities. It is inexpensive and may be obtained from building-supply houses everywhere. The trough is fitted to a copper clip fastened to the main chassis. Power connections are made with a small plug and socket, the latter being mounted on the rear wall of the main chassis. This permits experimentation with the oscillator portion, or even substitution of r.f. sections for other bands, without the necessity for making changes in the modulator unit. This trough construction also helps prevent direct radiation from the tank circuit. The useful output with this type of assembly is nearly twice that obtainable with open construction.

Readers of the article referred to earlier<sup>1</sup> will recognize the receiver as a revamped version of the acorn job described therein. It also appeared in the 1948 and '49 editions of the *Handbook*. Some constructors of the original design reported difficulty in getting 955s to oscillate at 420 Mc., and it has been found that only a few of the acorns one usually finds in the surplus bins can be made to work satisfactorily at this frequency. The receiver version shown here was made by substituting the 6J6 push-pull circuit for the 955, leaving the rest of the receiver intact. It utilizes the same dial and antenna coupling adjustment, and is shown in this form in order to permit builders of the original receiver to make the substitu-



Bottom view of the oscillator assembly. The trough in which the components are mounted is made of flashing copper. It is 6 inches long, 1 $\frac{3}{8}$  inches high, and 2 $\frac{1}{4}$  inches wide, with  $\frac{1}{4}$ -in. edges folded over for sliding into a clip attached to the main chassis.

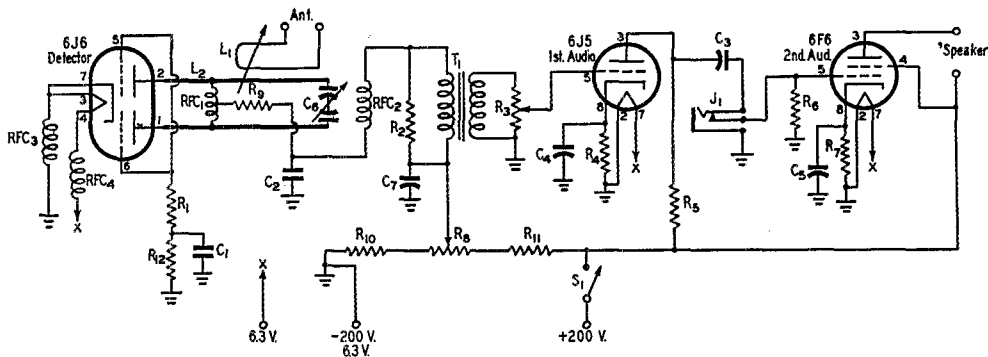


Fig. 2 — Schematic diagram of the 420-Mc. superregenerative receiver.

- C<sub>1</sub> — 470- $\mu$ fd. mica.
- C<sub>2</sub> — 0.0033- $\mu$ fd. mica.
- C<sub>3</sub> — 0.01- $\mu$ fd. tubular.
- C<sub>4</sub>, C<sub>5</sub> — 10- $\mu$ fd. 25-volt electrolytic.
- C<sub>6</sub> — Miniature split-stator variable, about 4  $\mu$ fd. per section. (Millen 21912D, with one rotor plate removed from each section. See text and photograph.)
- C<sub>7</sub> — 0.1- $\mu$ fd. tubular.
- R<sub>1</sub> — 3800 ohms,  $\frac{1}{2}$  watt.
- R<sub>2</sub> — 47,000 ohms,  $\frac{1}{2}$  watt.
- R<sub>3</sub> — 0.5-megohm potentiometer.
- R<sub>4</sub> — 2200 ohms, 1 watt.
- R<sub>5</sub>, R<sub>6</sub> — 0.1 megohm,  $\frac{1}{2}$  watt.
- R<sub>7</sub> — 470 ohms, 1 watt.
- R<sub>8</sub> — 50,000-ohm potentiometer.

- R<sub>9</sub> — 2200 ohms, 1 watt.
- R<sub>10</sub>, R<sub>11</sub> — 47,000 ohms, 1 watt.
- L<sub>1</sub> — Hairpin loop, No. 14 enameled wire, same spacing as L<sub>2</sub>. Connect to antenna terminals by means of 300-ohm line.
- L<sub>2</sub> — Half-wave line No. 12 wire, each side 3 $\frac{1}{2}$  inches long, spaced  $\frac{3}{8}$  inch center to center. (See text and photographs for other details of L<sub>1</sub> and L<sub>2</sub>.)
- J<sub>1</sub> — Closed-circuit jack.
- RFC<sub>1</sub> — 19 turns No. 20 enameled wire,  $\frac{3}{16}$ -inch inside diameter,  $\frac{7}{8}$  inch long, center-tapped.
- RFC<sub>2</sub> — 10-mh. r.f. choke.
- RFC<sub>3</sub>, RFC<sub>4</sub> — 12 turns No. 20 enameled wire,  $\frac{3}{16}$ -inch inside diameter,  $\frac{3}{4}$  inch long.
- S<sub>1</sub> — S.p.s.t. toggle switch.
- T<sub>1</sub> — Interstage audio transformer.

tion. If a completely new receiver were being built the components would, of course, have been arranged somewhat differently. The numbering of the parts in Fig. 2 retains the original designations on all parts which remained unchanged.

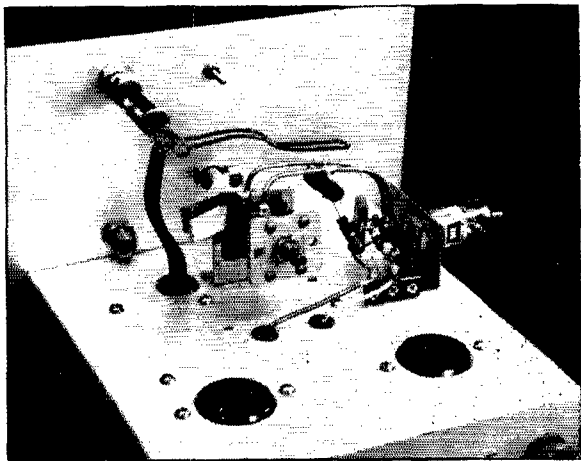
The 6J6 plate line in the receiver is bent in the shape of an inverted "U," with the tube socket mounted on a small bracket near the edge of the chassis. A padder adjustment is added in the form of two copper plates soldered to the stator terminals of C<sub>6</sub>. These are approximately  $\frac{1}{2}$  by 1 inch in size, and are bent toward one another until the desired setting of the band is obtained.

The antenna coupling loop should be shaped so that it may be placed parallel to the plane of the line at a position about  $\frac{1}{8}$  to  $\frac{1}{4}$  of an inch above it. As the frequency range to be covered is, considerable, the degree of loading by the antenna varies widely over the band, and some form of adjustable antenna

coupling is an absolute necessity. Don't try to do without it — the detector cannot be made to operate at maximum sensitivity unless the coupling is adjusted with extreme care.

### Firing Up

Unless you have worked on 420 Mc. before, you'll need a set of Lecher Wires. Information on the construction and use of Lecher Wires may be found in the "Instruments and Measurements" chapters of recent *Handbooks*. Once the frequency is established by this method, an



Detail view of the 420-Mc. superregenerative receiver. Note the method of varying the antenna coupling. Copper plates attached to the tuning-condenser stators provide a handset adjustment.

absorption-type wavemeter can be made and calibrated for use in most work thereafter. Such a device may be made by bending 6 inches of No. 12 wire into a "U"  $1\frac{1}{8}$  inches across, and soldering its ends to the two stator terminals of a Cardwell Trim-Aire, the stator plate of which has been sawed down the middle. Only one rotor plate is used with this split stator plate. With a spacing of  $\frac{1}{6}$  inch between rotor and stator, the band will cover approximately three-quarters of the tuning range.

Many checks on the transmitter can best be made by measuring the grid current. This may be done by inserting a meter between  $R_9$  and ground. Grid current, with 200 volts on the plate, should run about 5 or 6 ma. with a load connected to the antenna terminals. This load may be a 6-8 volt 150-ma. pilot lamp, which will light to about full brilliance with 200 volts on the 6J6 plates and an input of about 30 ma. The adjustment of the antenna coupling will probably be different with the lamp load than when an antenna is connected, however, so the setting of the position of the antenna coupling loop,  $L_3$ , should be made with the aid of some sort of field-strength indicating device. A simple indicator may be made by connecting a 60-ma. pilot lamp in the center of a folded dipole made of No. 12 wire, as shown in Fig. 3. The antenna coupling loop can be adjusted with a fiber crochet hook, through the hole near the antenna terminals.

For most efficient operation, the point of connection of the two resistors,  $R_7$  and  $R_8$ , on the plate line should be adjusted carefully. First the

connection should be made at approximately the middle of the line. Now, while watching the grid-current meter, touch the point of a lead pencil along the line either way from the spot where the resistors are connected. A point will be found where there is little or no change in grid current when this is done. The plate-voltage connection should be moved to that point. The frequency of the oscillator should be checked again after this adjustment.

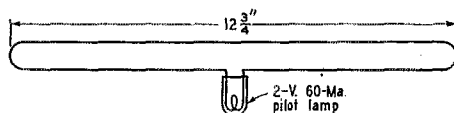


Fig. 3—A simple field-strength indicator for 420 Mc. is made by connecting a 60-ma. pilot lamp at the center of a folded dipole made of No. 12 wire.

In using the transmitter for communication it will often be found necessary to adjust the percentage of modulation according to the receiver in use at the other end. A considerable amount of frequency change is unavoidable when a rig of this type is modulated, and the selectivity of the receiver being used will determine the most desirable degree of modulation. No gain control was included, but the modulation can be controlled within the necessary limits by talking nearer or farther from the microphone.

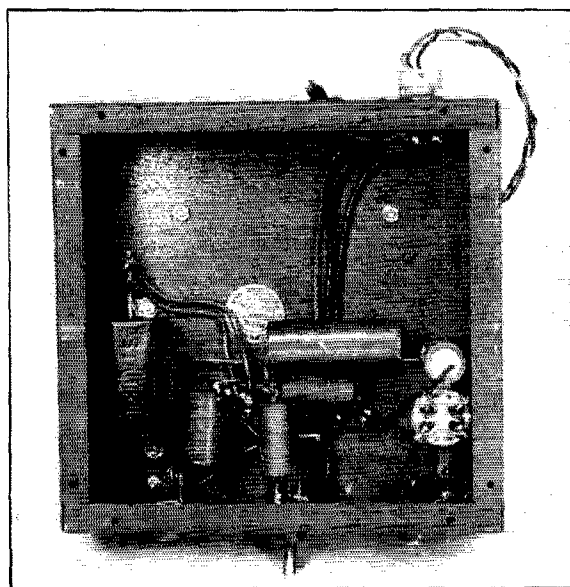
The first check on the receiver should be for superregeneration, as evidenced by the familiar loud rush. If several 6J6s are available they should all be tried and the one used which oscillates at

the lowest plate voltage. With no antenna connected, the rush should be heard with the potentiometer,  $R_8$ , well back from its maximum position. With the antenna on, the control will have to be advanced, increasing the detector plate voltage, as the antenna coupling loop is moved nearer to the plate line. It will be necessary to check the tuning range of the detector with the antenna connected, and the coupling loop adjusted to approximately the position in which it will be used for reception, as the degree of antenna coupling and the setting of  $R_8$  both affect the frequency considerably.

The frequency range of the receiver can be changed slightly, to bring the band to the desired settings on the tuning condenser, by adjusting the copper plates attached to the stator plates, and by changing the spacing of the line. The tuning range with the condenser recommended in the parts list (one plate removed from each rotor section) is about 40 Mc.

The point of attachment of the center-

(Continued on page 94)



Bottom view of the main chassis of the 420-Mc. transmitter, showing audio components.

# Linear R.F. Amplifiers

## *Their Design and Adjustment*

BY STYRK G. REQUE,\* W2FZW

• Linear r.f. power amplifiers have been neglected by amateurs because of their alleged inefficiency and difficulty of adjustment. However, they are the amplifiers one uses in single-sideband transmitters, and they are far from inefficient in this application. Also, they are far from difficult to adjust, as this article clearly demonstrates. Here is a basic technique everyone should have tucked away in his noggin.

A LITTLE over a year ago a few hardy experimenters in the amateur ranks began describing their experiences with a new (amateur-wise) system of communication, single sideband. In general, the techniques they used had little resemblance to the conventional a.m. 'phone technique or, for that matter, to the newer technique of n.f.m. So it is not surprising to find a new jargon to describe these techniques, and one now hears such things discussed as "balanced modulators," "sideband suppression," "phase-shift networks," and "linear r.f. power amplifiers." This article concerns the last of these for, although the linear r.f. power amplifier is an old technique of broadcast-station design, it has had practically no use in amateur radio stations. Yet almost without exception the pioneers who are introducing us to single-sideband transmission are using this type of power amplifier.

### *Linear Amplifiers*

A linear amplifier is one in which the output voltage is proportional to the input voltage. All of our audio amplifiers are of this type, or we get very objectionable distortions. Similarly the r.f. and i.f. amplifiers of our receivers are linear r.f. amplifiers, for if there were any serious distortion of the modulation envelope the detector would give us a distorted output signal. In fact, any amplification of a signal with a modulation envelope must be linear if we are to be able to recover the modulation in a detector system without severe distortion.<sup>1</sup>

\* % Research Laboratory, General Electric Co., Schenectady, N. Y.

<sup>1</sup> N.f.m. is not subject to this rule, because true f.m. or p.m. has no envelope which must be preserved. This is the same feature that gives f.m. its advantage in reducing certain types of BCI

<sup>2</sup> Modulation takes place because of the action of the Class C amplifier. The so-called modulator simply supplies audio power for the process.

The simplest form of linear amplifier (r.f. or audio) is the Class A amplifier, which is used almost without exception throughout our receivers and our low-level speech equipment. While its linearity can be made phenomenally good, it is unfortunately quite inefficient. The theoretical limit of efficiency in this case is 50 per cent, while most practical amplifiers run 25-35 per cent efficient at full output. At low levels this is not worth worrying about, but when we exceed the 2- to 10-watt level something else must be done to improve this efficiency and reduce tube, power-supply and operating costs.

The use of Class B amplifiers for high-level audio amplifiers (commonly mis-called modulators<sup>2</sup>) is now well known and common amateur practice. Class B amplifiers are theoretically cap-

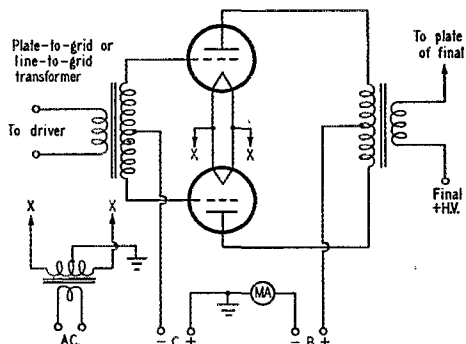


Fig. 1—A circuit diagram of the familiar Class B modulator.

able of 78.5 per cent efficiency at full output, and practical amplifiers run at 60-70 per cent efficiency at full output. The same amplifier tubes, with suitable tank circuits substituted for the driver and output transformers, will make good linear r.f. power amplifiers of the same power rating and efficiency. In fact, we can even generalize this and make the following statement: Any reasonably distortion-free audio amplifier may be converted to a linear r.f. amplifier by replacing the input and output transformers with properly designed and loaded r.f. tank circuits, provided, of course, that the tubes are suitable for use at the desired frequency. In r.f. circuits running Class B, only one tube need be used if only half the power is wanted, because the flywheel action of the tank circuits will smooth out the missing half cycle.

One side issue is well worth considering at this

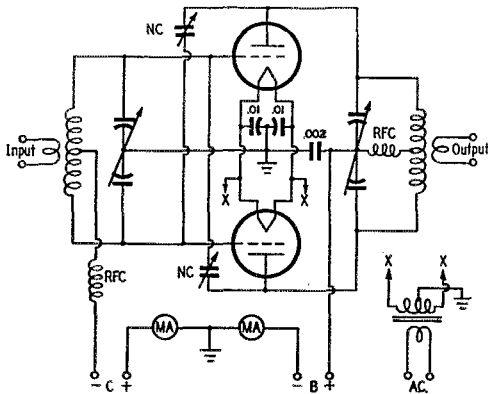


Fig. 2 — A Class B linear r.f. amplifier circuit resembles Fig. 1 but uses r.f. instead of audio components.

moment. If you look up the Class B r.f. amplifier ratings of a given tube, you will undoubtedly be shocked to see that the efficiency given is in the order of 33 per cent and not the 60-70 per cent quoted above. The discrepancy arises because the figures given are for a conventional a.m. system. The efficiency of a Class B amplifier is proportional to the signal voltage; i.e., at full output it is 60-70 per cent and at half voltage it is 30-35 per cent. In a conventional a.m. system the carrier is always at half voltage, and so when no modulation is applied the efficiency of a properly-adjusted Class B r.f. amplifier will be in the order of 33 per cent. This need not concern the amateur running a single-sideband system with suppressed carrier, since his resting or no-modulation condition corresponds to zero signal input to the amplifier and he observes only the small resting d.c. input to the amplifier.

### Amplifier Design

In a large majority of cases the design of a Class B linear amplifier will be rather simple, since most of the common power-amplifier tubes are rated for Class B audio work. In a case of this sort the proper plate voltage, bias voltage, load resistance and power output are given, and the sole job is to provide proper tank circuits and drive for the tubes. As an example, let us choose a tube of good reputation as a Class B audio amplifier, such as the GL-805. Typical operating conditions are given in Table I.

Fig. 1 is a schematic diagram of the usual Class B audio amplifier. Fig. 2 is a diagram of the amplifier changed over for use as a linear r.f. amplifier. Our first concern will be the design of the proper tank circuits for the grid and plate circuits. The subject of proper loading will be discussed under the section on practical adjustment.

Let us design the proper plate-tank circuits first. As in all r.f. amplifiers, this tank circuit should have a loaded  $Q$  of at least 12, if we want to have reasonable efficiency and low harmonic

output. The loaded  $Q$  is defined in terms of the tank-capacitor reactance (equal to the tank-inductance reactance at resonance) and the load resistance by the equation

$$Q = R_L/X_C \quad (1)$$

Rearranging, and substituting in the figures,

$$X_C = R_L/Q \quad (2)$$

$$= 6700/12 = 560 \text{ ohms}$$

But we also know that

$$X_C = 1/2\pi fC \quad (3)$$

If we choose the 75-meter 'phone band as our example of design, and hence substitute 4 Mc. for  $f$  and 560 ohms for  $X_C$  in (3), we will find the value for  $C$  to be approximately 70  $\mu\text{fd.}$  This is the value of the capacity across the tank, and we must double it to find the value for each section of our split-stator condenser, or 140  $\mu\text{fd.}$  per section. Note that this is the value of the capacity actually in use, and that for proper adjustment a capacitor with a rating of at least 150 (and preferably 200)  $\mu\text{fd.}$  per section would be clearly indicated. The coils should be chosen or pruned until the proper amount of capacity is required to tune them to resonance, with the error if any on the low-inductance (high-capacity) side where it can do little harm. Many troubles in amateur transmitters can be traced to the use of too little capacity in the r.f. tank circuits. This is not a peculiarity of the Class B linear amplifier, but is equally true of the Class C, perhaps to an even greater degree.<sup>3</sup>

The calculation of the grid tank circuit is performed in just the same way as we calculated the plate tank. However, the loading of the grids, which must be substituted for  $R_L$ , is not given. Our present example, GL-805s, involves a pair of zero-bias tubes. Tubes in this class draw grid current even when very small signals are applied, and the equivalent loading of the grid tank is very nearly constant regardless of signal level. This will mean that a very nearly constant load will be reflected to the driving stage and only a small

<sup>3</sup> If you are having trouble with harmonics, TVI, or a touchy amplifier that won't take load properly, you might take a quick look at the chart on page 157, *AERL Handbook*, 1949 edition. See if the  $L/C$  ratio is correct.

TABLE I  
Class B Audio-Amplifier Data  
GL-805 Tubes  
(Values given for two tubes)

D.c. plate voltage	1250 volts
D.c. grid voltage	0 volts
Peak grid-to-grid voltage	235 volts
Zero-signal plate current	148 ma.
Max.-signal plate current	400 ma.
Max.-signal driving power	6 watts
Max.-signal plate input	500 watts
Effective load plate-to-plate	6700 ohms
Max.-signal power output	300 watts



amount of loading or "swamping" will be necessary to insure that the driving signal is not distorted.

If, on the other hand, we choose tubes that operate at a normal bias of 50-60 volts (such as GL-810s) it is apparent that the grids will not draw any current at all until the driving signal exceeds this bias. In a case of this sort the grids load the grid tank circuit, and hence the driving stage, in a variable manner. Unless some further step is taken, this will result in distortion of the driving signal, and our amplifier system is not linear. This can be avoided if sufficient fixed loading is supplied for the driver stage, and if suitable impedance matching is done so that the variable grid loading is negligible. In any case, this will require that the driver be capable of supplying several times the listed value of grid driving power. A full discussion of the possible ways of impedance matching and controlling this variable grid loading is unfortunately far beyond the scope of this article. However, as a guide to those who care to delve into the subject, we can state that the necessary conditions which must be satisfied are two in number:

- a) The load presented to the driving stage must be constant.
- b) The voltage at the grids must have good regulation.

Returning now to our original example, the GL-805s, we can calculate the loading effect of the grids from the known grid-driving power and known peak grid-to-grid voltage by means of the simple formula,<sup>4</sup>

$$R_{EQ} = E^2 C / 2Pg \quad (4)$$

Substituting the proper values of grid-to-grid voltage and grid driving power from the data in Table I gives an equivalent grid loading of 4600 ohms. To be conservative, we might well put a 5000-ohm damping resistor across the tank, so that the net effective resistance across the tank will be approximately 2400 ohms. Substituting this value in Equation (2), and the resultant value of reactance in (3), we find the necessary value of  $C$  to be 200  $\mu\text{fd.}$  across the tank or a split-stator capacitor of 400  $\mu\text{fd.}$  per section. A broadcast-receiver condenser of 420  $\mu\text{fd.}$  per section is readily available and will easily stand the low peak voltage on the grids.

Sometimes the value of capacity as calculated above will be so large as to be unreasonable for the frequency involved. In a case of this type the solution must be obtained in another way, as indicated when we spoke of variable grid loads. The same network rules will apply to the matching

<sup>4</sup> The factor 2 in the denominator appears because we are using peak and not r.m.s. values.

network in this case as applied in the case where the grids do not draw current over the entire cycle of excitation (use of negative bias).

Here again it may not be amiss to mention that the large value of capacity indicated is not a result of Class B operation, but in this case is purely a function of the tube chosen. For linear amplifiers it is necessary that the tanks be properly designed. If the Class C stage seems to be tolerant of errors in tank design, it is because few of us have given full consideration to the proper handling of our amplifiers and have been content to operate with the efficiency and the harmonic output accident has provided.

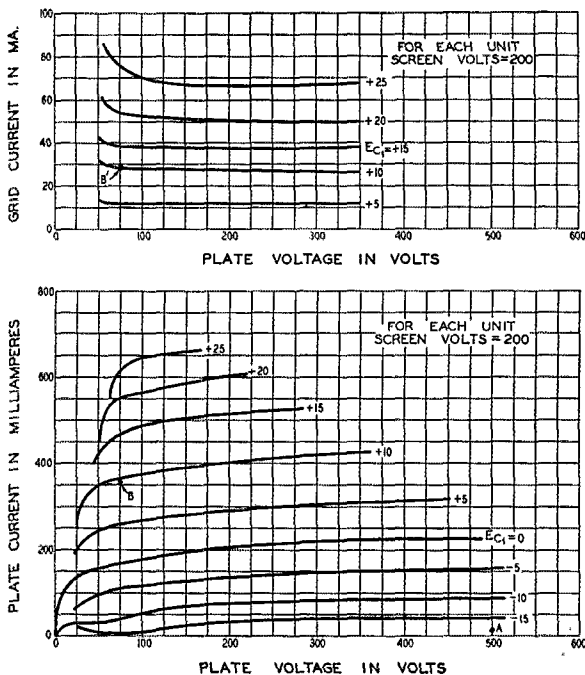


Fig. 3 — Average grid and plate characteristics of the GL-829-B.

#### Design from Tube Curves

There are actually very few power tubes which we might choose to use as linear amplifiers that do not carry a Class B audio rating. However, there are a few tubes, designed for v.h.f. use, which are not so rated. Such a tube is the GL-829-B, a compact tube roughly equivalent to a pair of GL-807s. This tube has recently been popular with the gang running 100 watts or less because it is so well shielded and so compact. If we care to use a tube of this sort we must determine the quantities equivalent to those given in Table I from the characteristic curves and a few formulae which have been worked out by the engineers. Fig. 3 shows the grid and plate characteristics of the GL-829-B.

As a first assumption, let us suppose that the plate-supply voltage is 500 volts. The proper bias is our next consideration, and one good rule of thumb in determining this is to choose the bias such that the resting plate current will produce approximately  $\frac{1}{3}$  rated plate dissipation. Bias determined in this way will usually allow better linearity (less distortion) than a bias chosen closer to complete cut-off. Since our GL-829-B has a rated dissipation of 20 watts per section, the proper bias will allow 6.7 watts resting dissipation per section. At 500 volts plate supply this means a resting plate current of 13.3 ma. per section. From the characteristic curves of Fig. 3 it will be seen that approximately 18 volts of bias will be required. The resting point is marked "A" in Fig. 3.

Since the maximum signal efficiency is going to be in the order of 65 per cent, we can now determine the maximum input power. The 35 per cent power loss must equal the maximum plate dissipation, which is 40 watts (both sections) for our GL-829-B. Therefore, the total power input (100 per cent) must be 115 watts maximum, or 57.5 watts per section.

Dividing the maximum power input by the plate voltage will give the maximum signal plate current. In this case the total current will be  $115/500 = 0.230$  amp. = 230 ma. This is 115 ma. per section d.c. plate current at maximum signal.

The plate-current pulses of each tube of our Class B linear amplifier are half sections of a sine wave, such as might have been produced by a half-wave rectifier. In such a waveform, the peak current is 3.14 times the value read by a d.c. meter, and this permits us to find the peak current flowing through the tube. Since the d.c. input per section is 115 ma., we know then that the peak current through each section should be  $115 \times 3.14 = 360$  ma.

Returning to Fig. 3, we see that 360 ma. will flow on the crest of the cycle if the grid is driven up to +10 volts on the peak and the plate is not allowed to swing lower than 75 volts. Since the grid starts from -18 volts (the bias), this will be a peak r.f. grid swing of 28 volts, or a peak grid-to-grid voltage of 56 volts.

The grid driving power may be calculated from the peak grid-to-grid voltage and the grid current that will flow at the operating point "B." This is marked as B' on the grid current curves in Fig. 3. The grid driving power is one-quarter<sup>5</sup> of the product of this peak grid current and the peak grid-to-grid voltage, or 0.39 watt in this case.

The power output of this amplifier may now be calculated by the aid of the formula

$$P = 0.78 (E_B - E_{Pmin}) I_{d.c. max} \quad (5)$$

Substituting the value of minimum plate voltage, the plate-supply voltage and the maximum-signal d.c. current we find the output power to be  $0.78 (500-75) 0.23 = 76$  watts.

<sup>5</sup> Approximate value commonly used for design purposes.

**TABLE II**  
**Class B Audio or Linear R.F. Amplifier**  
**Data—GL-829-B**

(Values given for both sections)

D.c. plate voltage	500 volts
D.c. grid voltage	-18 volts
Peak grid-to-grid voltage	56 volts
Zero-signal plate current	27 ma.
Max.-signal plate current	230 ma.
Max.-signal driving power	0.39 watts
Max.-signal plate input	115 watts
Effective load plate-to-plate	4800 ohms
Max.-signal power output (audio or peak r.f.)	76 watts

As a double check we subtract this from the power input of 115 watts and find 39 watts plate dissipation for both sections. The actual efficiency is 66 per cent, a bit higher than assumed at first.

The plate-to-plate load resistance is readily obtained from the formula:

$$R = 2.6 (E_B - E_{Pmin}) / I_{d.c. max} \quad (6)$$

Substituting the same values used with Equation (5), we find the plate-to-plate load resistance to be  $2.6 (500-75)/0.23 = 4800$  ohms.

Collecting all the values calculated, we can now make up a table similar to the one given for the GL-805s which will apply to the GL-829-B. This is shown in Table II.

The calculation of the specific amplifier will now be the same as the case of the GL-805s, since we have determined all the significant values.

### General Considerations

Before going into detail on the adjustment and loading of the Class B linear amplifier, a few general considerations should be kept in mind. If proper operation is expected, it is essential that the amplifier be so constructed, wired and neutralized that no trace of regeneration or parasitic instability remains. Needless to say, this also applies to the stages driving it.

The bias supply to the Class B linear amplifier should be quite stiff. The Class C stage thrives on grid-leak bias, but for really good operation the Class B should be supplied from a very stiff source, such as batteries or some form of voltage regulator. If nonlinearity is noticed when testing the unit, the bias supply may be checked by means of a large electrolytic capacitor. Simply shunt the supply with 100  $\mu$ fd. or so of capacity and see if the linearity improves. If so, rebuild the bias supply for better regulation. *Do not rely on a large condenser alone.*

### Adjustment of Amplifiers

The two critical adjustments for obtaining proper operation from the linear amplifier that has been correctly designed are the plate loading

and the grid drive. Since these adjustments are preferably made with power on, it is a matter of practical convenience to have both controls readily available, at least during initial tune-up.

All adjustment procedures will be described in terms of oscilloscope pictures. The 'scope can show misadjustment at a glance and will greatly facilitate all adjustments. In addition, it is the most reliable instrument for observing modulation amplitude and, once used, is likely to become the most nearly essential instrument in the shack. Nothing elaborate is needed. One manufacturer regularly advertises a suitable instrument complete and ready to run in an attractive case for \$24.95. If you prefer, build a unit such as shown on page 477 of the *ARRL Handbook*, 1949 edition, or the unit described by J. L. Hollis, WØJET, in the Sept., 1948, *QST*. Using one of the small war-surplus cathode-ray tubes, the cost will be less than a good multimeter.

The proper adjustment procedure for the linear amplifier used with an a.m. system can be covered very briefly. First of all, the driver stage, which will very likely be the modulated stage, may be checked by observing the modulation pattern on the oscilloscope when the driver is loaded by a dummy load (which simulates the input circuit of the linear amplifier). Pages 290-295, Chapter 9, *ARRL Handbook*, 1949 edition, gives the story on the use of the oscilloscope so well that it need not be repeated here. After the driver has been adjusted for proper operation into the dummy load, it may be coupled to the linear amplifier. The linear amplifier should now be coupled to a suitable dummy load (not the antenna). With no modulation applied to the driver, the drive and the output loading of the linear amplifier should be adjusted so that plate current is approximately one-half of the maximum signal plate current. Then 100 per cent modulation should be applied and the output of the linear amplifier observed on the 'scope. If the positive peaks of modulation are flattened, the loading of the linear amplifier is too light, or the driver is limiting. If the flattening of the positive peaks is caused by the amplifier load being

too light, it will be possible to clear up the pattern by temporarily detuning the amplifier plate circuit. In this case, tighter output coupling and probably looser coupling to the driver are indicated. Always maintain the initial plate current by balancing the drive and output coupling. On the other hand, driver overload will usually mean that the driver is undercoupled and the linear amplifier is too heavily loaded. The object of the whole loading procedure will be to adjust the amplifier to a point where, with normal input, the output circuit is just on the verge of flattening the positive peaks at 100 per cent modulation. In an ideal system, the adjustment finally reached will give simultaneous overload on the driver stage and the linear amplifier. In the practical case it is probably better to have the linear amplifier overload first. If the output-coupling and grid-drive adjustments are available as suggested, this procedure can be followed in less time than it takes to tell, with a few glances at the plate current thrown in as a double check. The antenna may now be coupled and checked.

#### Single-Sideband Procedure

If the amplifier is to be used with single-sideband transmitters, a modification of the above test procedure is helpful. With single sideband, 100 per cent modulation with a single tone is a pure r.f. output with no modulation envelope, and the point of flattening is difficult to observe. However, if the input signal consists of two sine waves of different frequencies (for example, 1000 c.p.s. difference) but equal amplitudes, the output of the single-sideband transmitter should have the envelope shown in Fig. 4. We have called this a "two-tone" test signal to distinguish it from other test signals. Its first advantage lies in the fact that any flattening of the positive peaks is readily discernible, which makes the adjustment of the linear-amplifier drive and output coupling as simple a procedure as that described for a.m. systems. Indeed, the procedure will be the same, except that there is no carrier-level adjustment to be made initially.

Those experimenters using the filter method for obtaining single-sideband signals can obtain such a test signal by mixing the output of two audio oscillators of good waveform. The experimenters using the phasing method of single-sideband signal generation will recognize the pattern as that obtained when a single test tone is applied to one of their balanced modulators. For this latter group a two-tone test signal may be readily obtained by disabling one of the balanced modulators in the exciter and applying a single input tone. Other variations are possible in different exciters, and the final choice of any one operator will be dictated by convenience.

Let us suppose that the linear amplifier has been coupled to a dummy load and the single-sideband exciter has been connected to its input.

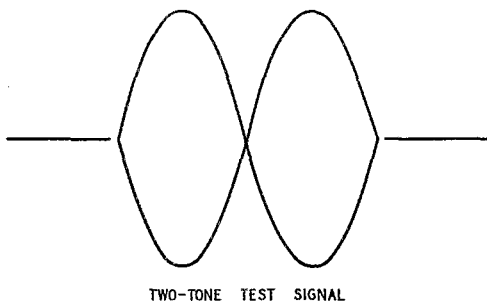
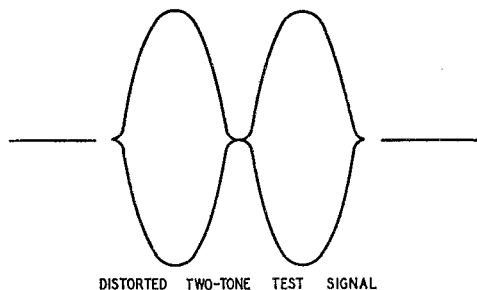


Fig. 4—Oscilloscope pattern obtained with a two-tone test signal through a correctly-adjusted linear amplifier.

## HAMFEST CALENDAR

By observing the oscilloscope coupled to the amplifier output, it will be possible to adjust the drive and output coupling so that the peaks of the two-tone test signal waveform are on the verge of flattening. The peak input power may now be checked. This is readily possible, for with the two-tone test-signal applied, the peak input power will be 1.57 times the d.c. power input to the linear amplifier. Should this be different from the design value for the particular linear amplifier, the drive and loading adjustments can be quickly changed in the proper direction (always adjusting the loading so that the peaks of the envelope are on the verge of flattening) and the proper design value reached.



DISTORTED TWO-TONE TEST SIGNAL

Fig. 5—The distorted two-tone test-signal pattern obtained when the bias voltage is incorrect.

As a final check, before coupling the linear amplifier to the antenna, the single-sideband operator will do well to check the linearity of the system, since distortion in the linear amplifier (for that matter, in any of the r.f. amplifiers) probably will result in the generation of sidebands on the side that was suppressed in the exciter. Here again the two-tone test signal will be of great help, since distortion of the signal will be readily recognized. A check of the bias supply has already been recommended. The next most likely form of distortion will be caused by curvature of the tube characteristic near cut-off, and will be recognizable from a two-tone test pattern that looks like Fig. 5. A slight readjustment of bias (or applying a few volts of positive or negative bias, in the case of zero-bias tubes) will usually straighten out the kink that exists where the pattern crosses the zero axis. Make this adjustment with special care, however, because the dissipation of the tubes with no input signal will be very sensitive to this adjustment. There are a few tubes that will not permit this adjustment to be carried to the point where the kink is entirely eliminated without exceeding the rated plate dissipation.

The antenna may now be coupled to the linear amplifier until the plate input with the excitation as determined above is the same as that obtained with the dummy load. The operator can now feel

(Continued on page 84)

**CALIFORNIA** — The San Joaquin Valley Radio Club is staging its Seventh Annual Hamfest on Saturday, May 7th, at the Belmont Inn, ten minutes from downtown Fresno. The program starts promptly at 9 A.M., and includes entertainment, contests, speakers and an evening banquet. The ladies will have their own activities during the afternoon under the direction of W6QVK. There will also be a breakfast for DX men on Sunday morning, with W6KUT officiating. Registration is \$3.75 per person, and can be made through Ken Woodyatt, W6JWK, 3044 Thorne Ave., Fresno, Calif.

**ILLINOIS** — The Annual Hamfest of the Peoria Amateur Radio Assn. will be held on Sunday, June 12th, at Woodland Knolls, which is located east of Peoria on Route 116, about 4½ miles from McCluggage Bridge. Contests, entertainment and a good time for all are promised. Bring your own lunch. For particulars address Secy. H. E. Callander, PARA, 211 E. McClure, Peoria, Ill.

**MISSISSIPPI** — All amateurs, XYLs and YLs are cordially invited to the Jackson Amateur Radio Club Hamfest, being held in that city on Saturday and Sunday, May 28th and 29th. A gala program has been arranged, and further particulars may be obtained by writing to President J. P. Brown, JARA, 1103 Central St., Jackson, Miss.

**NEW YORK** — A bang-up time is assured hams who attend the Rochester Amateur Radio Association Hamfest on Saturday, May 14th, at the Powers Hotel, Rochester. A special program has been arranged for the ladies, so bring the YF or YL. Tickets are \$3.50 in advance, \$3.75 at the door.

**NEW YORK** — The Annual Dinner and Hamfest of the Westchester Amateur Radio Association will be held on Friday, May 6th, at the Scarsdale Casino, Central Ave., Scarsdale, N. Y., starting at 7:30 P.M. Bill Leonard, W2SKE, CBS commentator, will be master of ceremonies. Tickets will be \$3.75 per person at the door, or may be obtained in advance for \$3.50 from David Bulkeley, W2QUJ, 405 Weaver Street, Larchmont, N. Y.

**TEXAS** — The Annual Convention of the South Texas Emergency Net — "largest emergency net in the world" — will be held in Cuero, Texas again this year, on May 28th and 29th. Each year the convention has become a more important event, with the attendance last year numbering between 400 and 500. It is a real hamfest with emphasis on emergency and net operation. All amateurs, XYLs and interested parties are invited to attend. On Saturday, May 28th, there will be a special mobile contest on the way to the convention beginning at 7 A.M. Work as many stations as you can. Registration will begin at the Legion Hall in Cuero at 9 A.M. and programs will begin at 1 P.M. On both days there will be good entertainment as well as technical information interspersed with lively contests. The YLs and XYLs will enjoy special programs arranged for them. The FCC inspector will be present and those who wish to take the examination for their amateur license may do so on Saturday. A Sunday-noon highlight will be the barbecue in the city park especially prepared by Police Chief Taylor. Tickets may be obtained in advance from B. B. Thorn, W5CIX, Cuero, Texas; price \$2.50 each.

**WISCONSIN** — Presently celebrating 30 years of affiliation with ARRL, the Milwaukee Radio Amateurs' Club, sponsors of last year's ARRL National Convention, is resuming its series of famous QSO Parties. The next affair will be held in the Elizabethan Room of the Milwaukee Athletic Club on Saturday evening, May 28th. Dinner will start promptly at 6:30, and will be followed by top-notch entertainment, technical talks and free beer. Since May 28th begins the Memorial Day week end, make up a party and have a real good time. Advance registrations at \$5.00 per person will be accepted if letters are postmarked prior to midnight, May 21st. Registration at the door will be \$6.00. Send only the short ticket, with cash, or check or money order payable to Milwaukee QSO Party, to H. F. Saxton, 709 East Sylvan Ave., Milwaukee 11, Wis. Bring the long ticket with you.

# Bandpass Circuits in a Multiband Transmitter

## Fewer Tuning Controls Without Gang Tuning

BY C. VERNON CHAMBERS,\* WIJEQ

• All the operating conveniences of gang tuning are obtained through the use of simple bandpass filters and self-resonant circuits in low-level stages. This 75-watt-input VFO-controlled transmitter also has been treated to reduce TVI.

PRESENT-DAY operating practices demand the ability to change frequency quickly, with little or no retuning. On the other hand, multistage transmitters are the rule rather than the exception, and more stages mean more tuning controls. The two things can be reconciled by a number of methods, probably the best of which is the use of gang-tuned circuits. However, many of us do not care to struggle with the mechanical problems of that system, which leaves us with the alternative of using stages that tune broadly enough to make retuning unnecessary anywhere within an amateur band.

It is quite possible to get the necessary broad tuning by using low-*C* tanks, heavily loaded, in coupling circuits of ordinary design. The outstanding disadvantage of such circuits is that, being broad, they do not discriminate against unwanted harmonics generated in the low-frequency stages. The result is that these harmonics only too frequently ride through the amplifiers along with the desired frequency, eventually appearing on the air as out-of-band radiations. With such circuits, too, conditions are only too favorable for the generation and radiation of harmonics in the v.h.f. region where they will interfere with television reception.

It has previously been pointed out<sup>1</sup> that spurious radiation can be reduced by using bandpass

\* Technical Assistant, QST.

<sup>1</sup> Silver, "A Pretuned Bandpass Frequency Multiplier," QST, October, 1947.

The only tuning controls on this 50-watt output transmitter are those for the VFO and final plate tank. The VFO tuning dial and the amplifier tuning-condenser control are at the left and right ends of the panel. Switches for the metering circuit and for control of the multiplier heater circuit are at the center of the panel just below the meter. The circuit includes several means for reducing harmonic radiation at v.h.f.

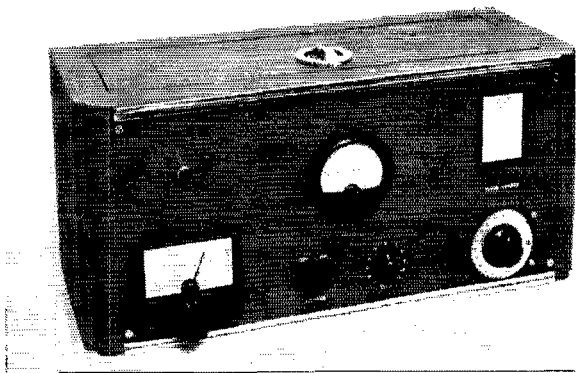
circuits between stages. Bandpass circuits will have fairly uniform response over the desired band, but their response drops sharply once the band limits are passed. The transmitter to be described combines bandpass and simple tank circuits in such a way that no retuning is required in any of the intermediate stages when the frequency is changed inside a band, and spurious radiations are effectively suppressed. It is a low-power set using an 807 final amplifier, with a built-in VFO and two frequency-multiplier stages. The only tuning controls are those for the VFO and the final plate circuit.

### The Transmitter Circuit

The circuit diagram of the transmitter is given in Fig. 1. A series-tuned VFO operates across the 1.685- to 2.0-Mc. range to provide the proper harmonic relation for the amateur bands from 3.5 through 30 Mc., including the 27-Mc. band. The VFO frequency is doubled in the plate circuit of the 6AG7 oscillator tube and is fed through a simple bandpass circuit to the grid of a 6AG7 buffer-doubler. The bandpass circuit attenuates all frequencies outside of the 3.37- to 4.0-Mc. range, thereby suppressing harmonics other than the second, and is wired in permanently because it is in use on all bands.

A "self-resonant" coil is used in the plate circuit of the buffer-doubler. To prevent a tuned-grid tuned-plate oscillation that occurred when the stage was working straight through, the circuit is made slightly degenerative by omitting the by-pass capacitor customarily connected across the cathode resistor, *R<sub>g</sub>*. The buffer-doubler furnishes excitation for the amplifier tube at 3.5 and 7 Mc. As a doubler, it may also be capacity-coupled to a third 6AG7, which drives the final amplifier at 14 Mc. and above.

The last frequency multiplier uses a fixed-tune plate circuit and is capacity-coupled to the 807



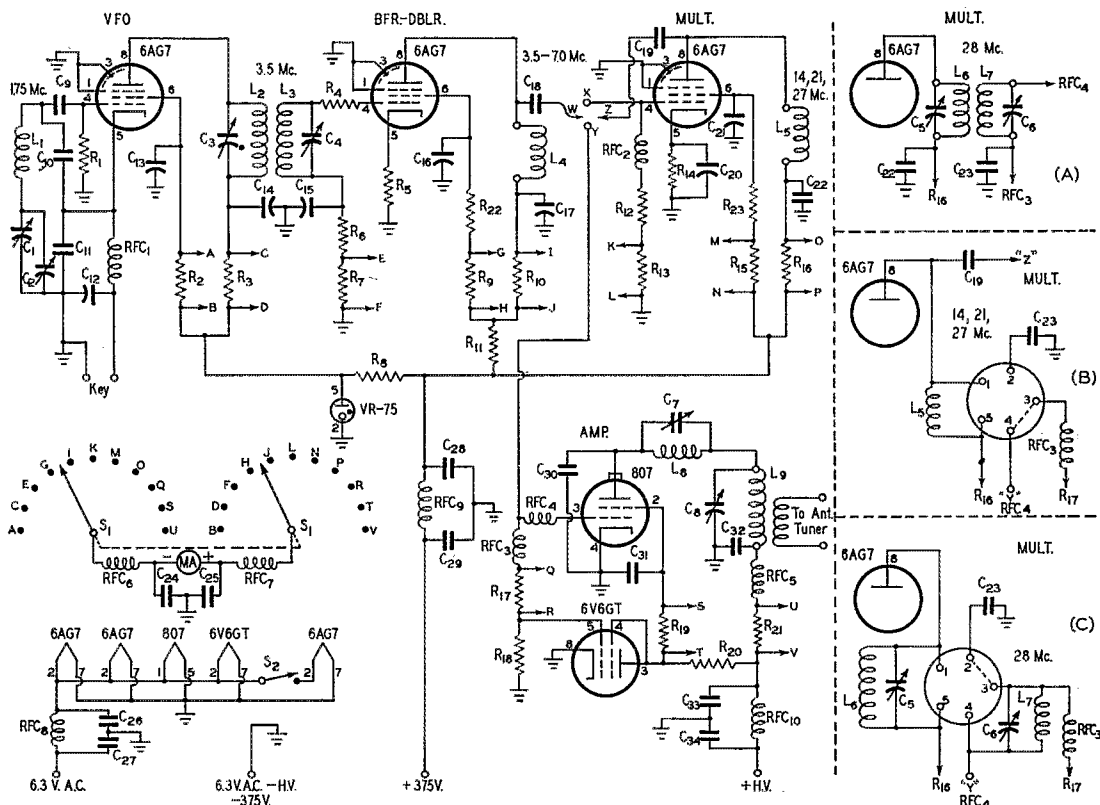


Fig. 1 — Circuit diagram of the broad-band exciter.

- C<sub>1</sub> — 50- $\mu$ fd. variable (Millen 19050).  
 C<sub>2</sub> — 100- $\mu$ fd. variable (Millen 20100).  
 C<sub>3</sub>, C<sub>4</sub>, C<sub>5</sub>, C<sub>6</sub> — 5-20  $\mu$ fd. ceramic trimmer (Centralab 820B).  
 C<sub>7</sub> — 100- $\mu$ fd. air trimmer (Millen 26100).  
 C<sub>8</sub> — 250- $\mu$ fd. variable (National TMS-250).  
 C<sub>9</sub>, C<sub>18</sub> — 100- $\mu$ fd. mica.  
 C<sub>10</sub>, C<sub>11</sub> — 680- $\mu$ fd. silver mica.  
 C<sub>12</sub>, C<sub>13</sub>, C<sub>14</sub>, C<sub>15</sub>, C<sub>16</sub>, C<sub>17</sub>, C<sub>20</sub>, C<sub>21</sub> — 0.01- $\mu$ fd. paper, 400 volts.  
 C<sub>19</sub> — 15- $\mu$ fd. mica.  
 C<sub>22</sub>, C<sub>31</sub> — 0.001- $\mu$ fd. mica.  
 C<sub>23</sub> — 680- $\mu$ fd. mica.  
 C<sub>24</sub>, C<sub>25</sub>, C<sub>26</sub>, C<sub>27</sub>, C<sub>28</sub>, C<sub>29</sub> — 470- $\mu$ fd. mica.  
 C<sub>30</sub> — 12  $\mu$ fd. (Millen 15015).  
 C<sub>32</sub> — 0.01- $\mu$ fd. mica, 1200 volts.  
 C<sub>33</sub>, C<sub>34</sub> — 340- $\mu$ fd. mica (two 680- $\mu$ fd. units in series).  
 R<sub>1</sub> — 47,000 ohms,  $\frac{1}{2}$  watt.  
 R<sub>2</sub>, R<sub>3</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>10</sub>, R<sub>13</sub>, R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>19</sub> — 100 ohms,  $\frac{1}{2}$  watt.  
 R<sub>4</sub> — 47 ohms,  $\frac{1}{2}$  watt.

- R<sub>5</sub>, R<sub>14</sub> — 330 ohms, 1 watt.  
 R<sub>6</sub>, R<sub>13</sub> — 22,000 ohms,  $\frac{1}{2}$  watt.  
 R<sub>8</sub>, R<sub>11</sub> — 10,000 ohms, 10 watts.  
 R<sub>12</sub> — 0.1 megohm,  $\frac{1}{2}$  watt.  
 R<sub>20</sub> — 75,000 ohms, 20 watts (two 10-watt resistors in series).  
 R<sub>21</sub> — Meter shunt: 51 inches No. 28 wire wound on a high-resistance  $\frac{1}{2}$ -watt resistor.  
 R<sub>22</sub> — 33,000 ohms, 1 watt.  
 R<sub>23</sub> — 16,500 ohms (two 33,000-ohm 1-watt in parallel).  
 L<sub>1</sub> to L<sub>9</sub>, inc. — See coil table.  
 MA — 0-50 d.c. milliammeter.  
 RFC<sub>1</sub>, RFC<sub>2</sub>, RFC<sub>3</sub>, RFC<sub>5</sub> — 2.5-mh. r.f. choke.  
 RFC<sub>4</sub> — 1- $\mu$ h. r.f. choke (National R33).  
 RFC<sub>6</sub>, RFC<sub>7</sub>, RFC<sub>9</sub>, RFC<sub>10</sub> — 7- $\mu$ h. r.f. choke (Ohmite Z-50).  
 RFC<sub>8</sub> — 36 turns No. 18 enam.,  $\frac{3}{8}$ -inch diam., close-wound on National PRE-3 form.  
 S<sub>1</sub> — 2-pole 2-section 11-position selector switch (Centralab Type 1413).  
 S<sub>2</sub> — S.p.s.t. rotary toggle switch.

amplifier at 14, 21 and 27 Mc. At 28 Mc. a band-pass filter is used between the driver and the 807. The filter, a plug-in affair which replaces the self-resonant circuit, aids in attenuating TV-range harmonics generated by the frequency multiplier. This last driver tube is made either active or inactive by means of the heater switch, S<sub>2</sub>.

In the final amplifier, parasitic oscillation is

prevented by the combination of RFC<sub>4</sub> in the grid circuit and C<sub>30</sub> in the plate circuit.<sup>2</sup> C<sub>30</sub> also helps in reducing v.h.f. harmonics, but in addition a parallel-tuned trap, C<sub>7</sub>L<sub>8</sub>, is connected in the plate lead of the 807. The trap constants permit tuning to harmonics between 54 and 88

<sup>2</sup> Grammer, "Pointers on Harmonic Reduction," *QST*, April, 1949.

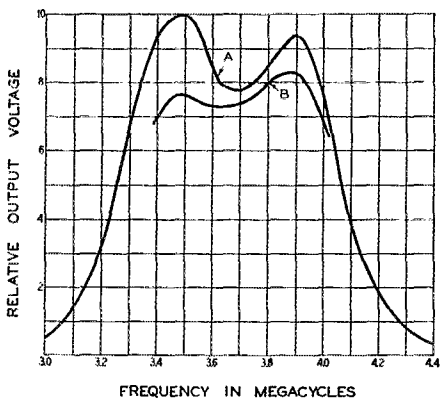


Fig. 2 — Output voltage vs. frequency, 3.5-Mc. bandpass filter. *A* shows the frequency response of the filter with a 1-volt signal applied to the oscillator-tube grid. *B* shows the voltage at the grid of the buffer-doubler tube with the VFO operating.

Mc. Also, harmonic filters are installed in the power-wiring leads, while the metal cabinet provides shielding as a further precaution against TVI.

A 6V6GT "clammer" tube is included in the final-amplifier circuit to hold the d.c. input to the amplifier tube to a value well below the dissipation rating whenever excitation is removed, as in keying the oscillator.

### The Plate Circuits

Two resonant circuits, independently tuned to the same frequency and then closely coupled, have a double-humped frequency response curve, the separation between the humps depending upon the degree of coupling and the  $Q$ s of the two circuits.<sup>3</sup> By proper choice of loading and coupling such a circuit will pass a desired group of frequencies with little or no attenuation, but will discriminate against frequencies on either side of the passband. It is, in effect, a simple form of bandpass filter.

This type of bandpass filter is used for coupling between the first two tubes in Fig. 1. When the coupling between  $L_2C_3$  and  $L_3C_4$  is adjusted past the critical point a curve such as *A* in Fig. 2 can be obtained. This curve was taken with constant-voltage input to the 6AG7 grid. When the 6AG7 is operated as an oscillator the output tends to level off, as shown by curve *B*, because the oscillator output peaks at the center of the tuning range, thus tending to fill in the valley at the center of curve *A*. This simple bandpass system has the advantages that the coupling system need not be retuned as the oscillator frequency is varied, the grid drive for the second tube remains reasonably constant over the range, and the sharp cut-off characteristics of the filter permit only

<sup>3</sup>For further description of the operation of coupled resonant circuits see Chapter 2 of *The Radio Amateur's Handbook* — p. 52 in the 25th and 26th editions.

the second harmonic to reach the second tube with appreciable amplitude. This selectivity is important, when it is remembered that the oscillator harmonics are less than 2 Mc. apart; it is wise to get rid of them before they can be built up in later stages.

Simple plug-in coils, tuned by the circuit and tube capacitance, are used in the plate circuit of the buffer-doubler stage. Four are required. Two of these are used for driving the 807 on 3.5 and 7 Mc., respectively. The other two are for coupling to the 6AG7 multiplier when that tube is used. One has the proper inductance to drive the 6AG7 to optimum output over the 14-, 21- and 28-Mc. bands. The coil inductance is adjusted so that the amplification is greatest at a harmonic of the frequency at which the response curve of the preceding bandpass circuit (Fig. 2) has a dip; this makes the excitation to the following tube as uniform as possible over the band. However, a coil so adjusted does not result in good performance from the 6AG7 in the 27-Mc. band because, as shown by curve *B* in Fig. 3, the circuit does not tune broadly enough. Consequently a separate coil is provided for 27-Mc. operation only.

The third 6AG7 is used to double to 14 Mc., triple to 21 Mc., or to quadruple to 27 or 28 Mc., so that the final amplifier can work straight through on all these frequencies. Self-resonant

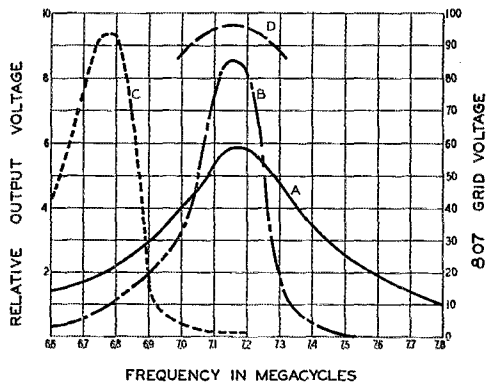


Fig. 3 — Output voltage vs. frequency, plate circuit of buffer-doubler. *A* shows the frequency response with the 6AG7 loaded by the 807 grid. *B* and *C* show the frequency response working into the 6AG7 multiplier. These curves are for constant input to the oscillator grid. *D* shows a typical 807 grid-current curve with the VFO in operation.

plate coils, peaked at 14.3, 21.2 and 27.1 Mc., approximately, are used for the first three bands, but a bandpass circuit is used for the 28-Mc. band. The primary reason is that it is difficult to obtain sufficiently-broad frequency response with a simple coil at this frequency, because even when it is tuned only by the tube and stray capacitances the circuit is fairly high- $Q$ . This raises the  $Q$  to the point where it becomes difficult to cover a 1.9-Mc. band without retuning. In addition, the bandpass



circuit does a better job of suppressing v.h.f. harmonics generated in the multiplier stage than would be the case with a self-resonant circuit and capacitive coupling.<sup>4</sup>

The frequency response of the 28-Mc. bandpass filter is shown by Fig. 4. Although the output is somewhat irregular within the band limits, the excitation voltage for the 807 stays close to the optimum value over the whole band.

### Transmitter Layout

The transmitter shown in the photographs was built primarily to try out a number of ideas for broad-band circuit operation, so to facilitate the many soldering and replacement operations associated with experimental work the components were mounted on a piece of  $\frac{1}{16}$ -inch aluminum measuring 7 by 17 inches. A regular chassis, 3 inches deep, serves as a mounting for the aluminum plate and acts as a shield for the components mounted below the actual "chassis." The whole assembly is then installed in a No. CA-303 Par-Metal cabinet — one of the few cabinets that will accommodate a  $7 \times 17 \times 3$ -inch chassis.

The rear view shows the oscillator tube at the right-hand end of the chassis with the low-frequency bandpass assembly to the left. A slot,  $1\frac{1}{4}$  by  $2\frac{1}{2}$  inches, is cut in the aluminum plate to allow clearance for the filter components. The buffer-doubler tube, the frequency-multiplier tube and the VR-75 form a line from rear to front just to the left of the filter. The oscillator band-set condenser,  $C_2$ , is to the right of the VR-75. Coils for the driver tubes, and a crystal socket (contacts *X* and *Y* in the circuit diagram) are next in line to the left. The 807 amplifier tube, the tubular bypass capacitor,  $C_{30}$ , the harmonic trap, and the tank coil are at the left end of the chassis. Connections to points *W* and *Z* in the circuit diagram go through feed-through bushings mounted be-

<sup>4</sup> Although bandwidth requirements do not make them necessary on other frequencies, bandpass circuits can also be used on 14, 21 and 27 Mc. with beneficial results with respect to v.h.f. harmonics that may appear at the 807 grid. They would consist simply of inductively-coupled resonant circuits, tuned to the center of the band, with the coupling adjusted to give uniform excitation to the 807 inside the band limits.

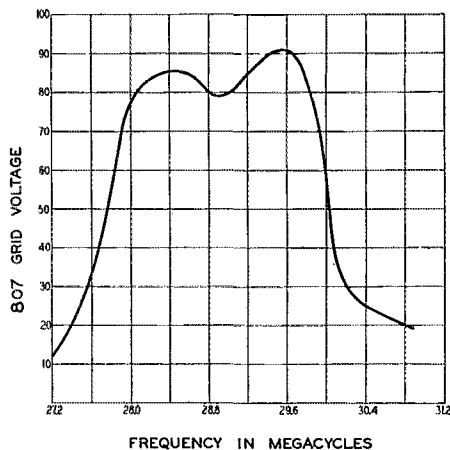


Fig. 4 — Rectified voltage (bias) at the 807 grid, 28-Mc. band. This represents the over-all performance of the transmitter, including the VFO.

tween the 807 and the driver-coil sockets. The stand-off insulator mounted in front of  $C_3$  is used as a low-capacity holder for terminal *Z* when inductive coupling from the multiplier tube is used. The antenna terminals are to the rear of the tank coil and the power-cable terminals are to the rear of the oscillator tube. The set of terminals behind the 807 is for an external meter and need not be included if a meter is mounted on the panel.

The bottom view shows how the components are laid out around the various tube sockets. The meter switch is mounted on a small aluminum bracket and the heater switch,  $S_2$ , is equipped with long leads so that the switch may be mounted on the front panel prior to final assembly of the unit. The power-wiring filters are closely grouped around the power terminal strip.

### Coil and Filter Construction

When winding the self-resonant plate coils, it is advisable to make provision for varying the spacing between the last one or two turns of the windings. It takes only a small change in inductance to make an appreciable change in the resonant frequency when the shunting capaci-



The 28-Mc. bandpass filter is in place in this rear view of the transmitter.

**Coil Table**

Coil	L in $\mu$ h.	Wire	Turns	Diam., in.	Length, in.	Coil. Type
L <sub>1</sub>	92	30 s.s.c.	68	1	Close-wound	On Millen 45000 form
L <sub>2</sub> , L <sub>3</sub>	57	30 enam.	44	1	Close-wound	On Millen 45000 form
L <sub>4</sub> (A)	51	28 enam.	50	1	Close-wound	On Millen 45004 form
(B)	14.3	22 enam.	26	1*	Close-wound	On Millen 45004 form
(C)	13.6	22 enam.	25	1*	Close-wound	On Millen 45004 form
(D)	16	22 enam.	28	1	Close-wound	On Millen 45004 form
L <sub>5</sub> (E)	5.3	22 enam.	13	1	Close-wound	On Millen 45005 form
(F)	2.45	22 enam.	9	1	$\frac{7}{16}$	On Millen 45005 form
(G)	1.1	22 enam.	6	1	$\frac{3}{8}$	On Millen 45005 form
L <sub>6</sub> } (H)	1.27	22 tinned	6	1	$\frac{3}{8}$	B&W Miniductor
L <sub>7</sub> }	0.76	22 tinned	4	1	$\frac{1}{4}$	B&W Miniductor
L <sub>8</sub>		16 enam.	4	$\frac{7}{16}$	$\frac{3}{4}$	
L <sub>9</sub> (J)	11	16 tinned	22 (8)	1 $\frac{1}{2}$	2	Millen 43042
(K)	6.1	16 tinned	13 (8)	1 $\frac{1}{2}$	1 $\frac{1}{4}$	Millen 43042 with 9 turns removed
(L)	2.55	14 tinned	9 (2)	1 $\frac{1}{2}$	1 $\frac{1}{2}$	Millen 43022
(M)		14 tinned	4 (2)	1 $\frac{1}{2}$	1 $\frac{3}{8}$	Millen 43012

\* End turns adjustable — see text.

NOTE: Figures in parentheses after turns for L<sub>9</sub> are link turns. Links wound over L<sub>9</sub> at ground end of coil. Adjust as necessary.

**Coil Set-Up for Various Bands**

Band	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub> L <sub>7</sub>	L <sub>9</sub>
3.5	A	—	—	J
7	C	—	—	K
14	B	E	—	L
21	B	F	—	M
27	D	G	—	M
28	B	—	H	M

tance is small, and there are times when adding or subtracting a single turn will make a winding useless. Inasmuch as the plate coils require careful pruning, it is wise to make any necessary adjustment by varying the spacing between turns.

The low-frequency bandpass circuit (L<sub>2</sub>C<sub>3</sub> and L<sub>3</sub>C<sub>4</sub>) is mounted on a 2 × 2 $\frac{1}{2}$ -inch piece of polystyrene. The spacing between windings preferably should be variable so the coupling can be adjusted to the optimum value. This can be accomplished by winding one coil on a piece of paper wound around the coil form, the assembly being held in place by Scotch Tape. The paper and wire should be wound just loosely enough to permit sliding the coil on the form.

The 28-Mc. filter components are mounted on a piece of polystyrene measuring 1 $\frac{1}{2}$  by 2 $\frac{3}{4}$  inches. Leads from the coils go through slots to the con-

denser terminals, and once the proper spacing between coils has been determined the windings can be cemented in place with Duco cement. To complete the assembly, the filter plate is mounted on a small stand-off insulator which is in turn mounted on a five-prong plug, so that the entire unit may be plugged into the socket which takes the other five-prong plug-in coils.

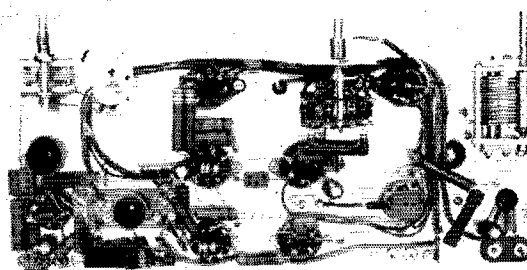
#### Plug-in Coil Wiring

The main section of Fig. 1 shows the basic circuit of the transmitter. The small diagram at A, Fig. 1, shows the circuit of the high-frequency multiplier stage when the 28-Mc. bandpass filter is being used, while B and C show the wiring of the five-prong tube socket which accommodates either the filter unit or the self-resonant coils. The dotted lines shown between prongs 2 and 3 and prongs 3 and 4 of the socket diagram indicate connections made in the coil forms rather than at the socket.

#### Power Supplies

Two power supplies are required, one capable of delivering approximately 375 volts at 75 ma. for the 6AC7s, and one delivering 750 volts at 110 ma. for the 807. (The 807, of course, may be operated at 600 volts if lower input is sufficient.) The regulation of the low-voltage supply need not be exceptionally good because the frequency-

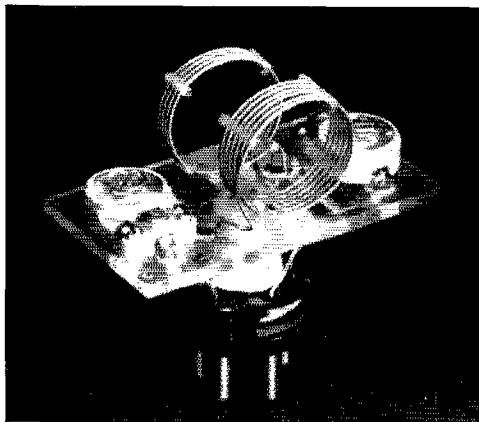
Construction and wiring is made easier if the components are laid out on a flat aluminum sheet as shown in this bottom view. The oscillator coil is at the left end of the base plate and the low-frequency bandpass filter is to the right of the oscillator-tube socket.



control stage of the transmitter is protected against any reasonable variation in supply voltage by a VR-75 regulator tube included as part of the transmitter proper.

### Testing & Operation

Alignment is not difficult even though the bandpass filters do require fairly careful adjustment. Before attempting to adjust any of the coupling circuits the oscillator tuning range should be adjusted to cover 1.685 to 2.0 Mc. by means of the oscillator band-set capacitor,  $C_2$ .



Close-up of the 28-Mc. bandpass filter.

A low-range vacuum-tube voltmeter, connected across the buffer-doubler grid leak,  $R_6$ , provides an excellent means for checking the performance of the low-frequency bandpass filter. If the filter is a reasonable facsimile of the one described here it should be possible to duplicate either one of the curves shown in Fig. 2. The simplest method of aligning the filter is to adjust  $C_3$  and  $C_4$  to make the 6AG7 buffer-doubler grid voltage peak up at 3.5 and 3.9 Mc.

If a vacuum-tube voltmeter is not available, it is possible to use the 807 grid-current readings instead. Output from the buffer-doubler stage is fed to the amplifier tube by inserting output plug  $W$  in position  $Y$  of the crystal socket, and the frequency-multiplier circuit is made inactive by opening the heater switch,  $S_2$ . If the 3.5-Mc. buffer-doubler plate coil is resonated at about 3.7 Mc., the 807 grid-current curve should resemble curve  $B$  of Fig. 2. The peaks at 3.5 and 3.9 Mc. should reach a value of 4 ma. and the grid voltage, if measured across  $R_{13}$  with a high-resistance voltmeter, should average 90 volts as the oscillator tuning is swept across the 3.5-Mc. band.

Alignment at 7, 14, 21 and 27 Mc. is similar, but the higher-frequency plate coils require more careful pruning than does the 3.5-Mc. coil. The r.f. connections at 7 Mc. are identical with those

used at 3.5 Mc. At 14 Mc. and above the frequency multiplier is made active by closing the heater switch and by changing the r.f. output plugs,  $W$  and  $Z$ , to socket positions  $X$  and  $Y$ , respectively. In aligning each band the oscillator frequency should be varied to give complete coverage of the band under test. In each case the 807 grid current should average 4 ma. over the band, but when the band edges are passed the current should fall rapidly. If initial tests show a pronounced grid-current peak at either end of a band, it is an indication that the self-resonant plate coils need further adjustment.

Fig. 4 shows the frequency response of the 28-Mc. bandpass filter. The filter tuning capacitors,  $C_5$  and  $C_6$ , should be adjusted to give peaks at 28.4 and 29.6 Mc. It is essential that the r.f. output plug, terminal  $Z$ , be mounted in the insulated jack whenever the multiplier stage is being used at 28 Mc. Otherwise, the operation of the filter will be affected by the stray capacity resulting when the plug is allowed to lie at random on the chassis.

The plate tank of the power amplifier is tuned in the normal way. The harmonic trap does require critical adjustment, however. Where necessary and possible, this circuit can be tuned to trap out an offending harmonic by observing the effect on the screen of a TV receiver. A second method is to use a rectifier-type wavemeter link coupled to the amplifier plate coil.<sup>2</sup> Using an instrument having a 200- $\mu$ a. meter as the indicator we were able, with the amplifier running at 75 watts input at 28 Mc. and with maximum coupling between the amplifier and the wavemeter, to eliminate every indication of r.f. at either the second or third harmonics.

### Current and Voltage Data

The plate and screen circuits of the oscillator should each draw approximately 3 ma. when the supply voltage is held at 75 volts by a regulator tube. The grid current for the next two 6AG7s should average 1 ma. Screen and plate currents of the buffer-doubler tube should be about 4 and 10 ma., respectively, and the screen and plate voltages should measure approximately 110 and 220 volts. Operating conditions for the screen of the frequency-multiplier tube are 7 ma. at 230 volts and the plate should draw about 20 ma. These figures can be expected to vary as the operating frequency of the transmitter is varied, because the self-resonant plate circuits will perform most efficiently over only a small band of frequencies. However, the readings should remain within a few per cent of the values listed above.

The screen of the 807 amplifier tube draws 5 to 6 ma. with an applied potential of approximately 300 volts. Normal full-load plate current for the 807 is 100 ma. and, with excitation removed, the 6V6GT clamper tube should hold the d.c. input to less than 15 watts.

# • Technical Topics —

## Antennas for 160 Meters

A LOT of the new blood (and the old, too) in amateur radio has been getting excited over the imminent availability of portions of the 160-meter band. Attracted by the complete coverage possible up to a hundred miles or so, they anticipate correctly that the band will open up new areas for QSO that are available now on 10 and 6 only under unusual conditions or with superb antennas. The old timers know about antennas for the band but some of the newcomers don't. This article is a brief résumé of 160-meter antennas.

First off, you have to realize that 160 isn't like 10 meters — in fact, it isn't even like 80. On 10 you can build a compact rotatable beam and squirt most of your power in the direction you want. If your antenna has gain and is high, you can work over ground ranges that the fellow with the dipole can't touch. On 80 you can put up a horizontal antenna not too high off the ground — 30 or 40 feet will do the trick — and work over

would be about 125 feet high, so how does one get a good signal on 160?

One way, of course, is to use a 125- or 250-foot vertical, but you may guess that a lot of prewar 160-meter signals didn't get any such luxurious start. They did almost as well by the simple expedient of running the *high-current* portions of the antenna vertically, and stretching the rest out in some way to resonate the antenna and make it easy to feed. Here, then, is your basic principle in 160-meter antenna design: Keep the high-current portions of your antenna as close to vertical as you can.

Fig. 1 shows how this can be done reasonably. If the over-all length of wire is about a quarter wavelength, as in Fig. 1A, a series-tuned circuit can be used to couple to the transmitter. As much as possible of the high-current portion of the antenna should be run vertically — 62 feet is shown in the sketch, but less than this can be used, with a corresponding increase in the length of the flat-top portion. A good low-resistance ground connection is important, since high current flows in this circuit, and the ground should be the cold-water system in the house, a buried radial network or a counterpoise. The coupling network  $L_1C_1$  should resonate to the operating frequency. A 250- $\mu\text{fd}$ . condenser and a coil that will resonate with about 200  $\mu\text{mf}$ . will do the trick. If you can't load the transmitter easily with this arrangement, try a larger inductance at  $L_1$ .

The system at Fig. 1B uses a half-wavelength antenna, with the high-current portion at the high point in the antenna. The horizontal 62-foot portion can be run 6 or 8 feet above the ground, since the radiation from it is not too important. The height does not have to be as great as shown, of course, but it is wise to plan on having the center of the antenna wire come at the right-angle bend at the top of the antenna. Thus if the vertical run were reduced to 42 feet, the lower horizontal run should be increased to 82 feet. None of these dimensions is critical in the sense that they are at 29 Mc., and many liberties can be taken with the design to fit it best into available room and supports. The antenna coupling circuit,  $L_2C_2$ , should be one that will resonate to the operating frequency, with constants similar to  $L_1C_1$ . If adequate coupling cannot be obtained, reduce the number of turns of  $L_2$  and increase  $C_2$  accordingly. The ground connection in this system is not as critical as that in Fig. 1A, and generally any water pipe will be adequate.

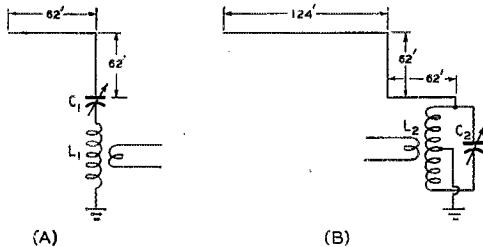


Fig. 1 — Simple antennas for 160-meter operation. The vertical portions are the parts useful in generating a ground wave, and the objective in all designs is to keep the current high in these sections.

good ranges at night because your signal shoots almost straight up from such an antenna and gets bounced back to earth at a distance. A vertical antenna on 80 will give you a better ground wave and is generally superior for great distances, but you can do right well most of the time with a horizontal job. In the case of DX with the vertical, it isn't the ground wave that does the trick but the low-angle radiation — the ground wave is attenuated fairly fast and doesn't have much range.

But on 160 the ground wave isn't absorbed too fast, and so what you want for that consistent coverage is a good ground wave. However, a ground wave can only be a vertically-polarized one, and such signals are obtained from vertical radiators. A quarter-wavelength vertical for 160

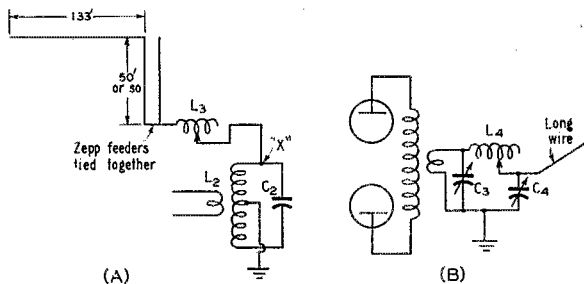


Fig. 2 — The old reliable 80-meter Zepp can be used on 160, as shown in A, by tying the feeders together and using a loading coil. A —  $\pi$  coupling. B may be used for coupling a long wire to the transmitter on 160 meters.

### Smaller Antennas

The previous discussion will show you what a straightforward system looks like, but everyone isn't going to have room for such systems. Don't worry — there are still a few dodges that you can use. Probably your first thought will be to use whatever long wire you have around the shack: an 80-meter Zepp, a long receiving antenna, or a 40-meter Zepp. The 40-meter Zepp resembles the antenna of Fig. 1A if the feeders are long enough, and all you have to do is to tie the two feeders together and couple the thing to your transmitter. If the antenna is high and the feeders are long enough, you will do fairly well. The 80-meter Zepp with feeders tied together will be a little better, because the current loop will show up at the junction of feed line and antenna. If the feeders are short, however, you may have to experiment with the coupling, trying both series- and parallel-tuned circuits, until you find a suitable combination. One possibility is the series loading coil shown in Fig. 2A — this system resembles that of Fig. 1B, except that the lower horizontal run of wire has been replaced by a loading coil. This loading coil,  $L_3$ , should be adjusted until  $C_2L_2$  resonates to the operating frequency with the antenna system either connected or disconnected at "X." Some of the adjustable inductors found in surplus should be ideal for this use, since the roller contact makes them very easy to adjust. The ARC-5 series of transmitters uses such coils in the antenna circuit, and similar coils have been available as separate units. The long-wire receiving antenna can be coupled through series- or parallel-tuned circuits, depending upon its length, or a so-called "Collins coupler" or  $\pi$  network can be used. This will work best when the over-all length of the wire is more than 75 feet and less than 175 feet. It is shown in Fig. 2B. Constants will vary with the antenna, of course, and considerable experimentation may be necessary to find the proper values. If the wire length is close to a quarter wavelength (125 feet),  $C_4$  may be fairly large, and may require connecting several fixed mica con-

densers in parallel with  $C_4$ .  $C_3$  and  $C_4$  can be 250- $\mu$ fd. variable condensers, and  $L_4$  a surplus adjustable loading coil.

If one doesn't have the room for the antennas just described, but has a high mast or tree available, a "top-loaded" vertical antenna is a good one to use. Such a system is shown in Fig. 3. The top-loading capacity can be a 4-foot diameter circle of  $\frac{1}{4}$ -inch copper tubing supported by two crossed sticks and connected to the center with six or eight vertical radials of No. 12 wire. The two wires making up the antenna proper can be the usual No. 12 enameled, spaced 6

inches by ceramic feeder spacers. If the available length (height) of the antenna is between 105 and 62 feet, the system of Fig. 3A should be used. Little or no inductance will be required at  $L_5$  if the loading "hat" is 4 feet in diameter and the antenna length is 100 feet, and the inductance required at  $L_5$  will increase as the height is decreased. A  $\frac{1}{8}$ -wavelength antenna (62 feet long) loaded with the 4-foot diameter hat will require about 120  $\mu$ h. at  $L_5$ . Such a coil resonates at 1900 kc. with 57  $\mu$ fd., and represents a  $5\frac{1}{2}$ -inch close-spaced winding of No. 12 d.c.c. on a 3-inch diameter form, to give you a rough idea of the size. For antenna lengths shorter than 62 feet, the system of Fig. 3B is

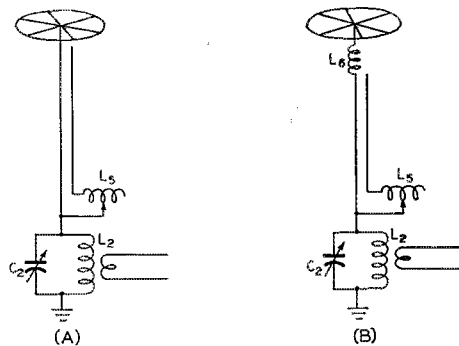


Fig. 3 — "Top-loaded" vertical antennas work well on 160 meters. The type shown at A should be used when the height is between 105 and 62 feet — that at B will work for antennas between 62 and 40 feet long.

recommended. The value of coil  $L_5$  will run around 120  $\mu$ fd. as mentioned above, while  $L_6$  would be 20  $\mu$ h. for a 40-foot antenna and 10  $\mu$ h. for a 50-foot skywire. In any case,  $L_5$  should be adjusted for maximum signal at a distance of a quarter mile or so. The coil  $L_6$  should be made weather-proof and of at least No. 12 wire. The variable inductor  $L_5$  can most conveniently be one of the surplus adjustable loading coils described for use at  $L_3$  and  $L_4$  in Fig. 2. The coupling circuit to the top-loaded verticals,  $C_2L_2$ , is similar to that shown in Figs. 1 and 2. The top-loaded vertical

is an excellent radiator and has the additional advantage that the ground current is low and hence the losses are kept down. While an excellent ground will work better than a mediocre one, generally a good connection to the water system or to three or four 4-foot metal stakes driven in the ground will be sufficient.

### Fading

Needless to say, the first antenna most newcomers to 160 will try will be something they already have, loaded in some weird and wonderful way until it takes power. There is nothing wrong with this, of course, but such stations are likely to find that they can do little or nothing during the daytime unless they have a good ground wave. This good ground wave will be obtained only from the vertical portions of the antenna. In many compromise antennas, such as those of Figs. 1B and 2A, where there will be both low-angle vertically-polarized and high-angle horizontally-polarized components, there is a good chance that the signal will show many distant regions of bad fading during the evening, when the direct and reflected (from the ionosphere) waves will meet out of phase. One solution is to overlook it and not let it bother you — the other is to decrease the sky wave and increase the ground wave by using one of the antennas of Fig. 3.



RECENTLY returned from Europe, President R. Maxim reports in May, 1924, *QST* on the Paris meetings leading to the formation of the new International Amateur Radio Union. Amateurs in France, Great Britain, Belgium, Switzerland, Italy, Denmark, Spain, Luxembourg, Canada and the United States were represented at the sessions, which named Mr. Maxim president and Dr. Pierre Corret of France secretary of the new world organization. A congress to effect a permanent union is scheduled for 1925.

"The Navy's Work on Short Waves" is an inspiring feature article by Dr. A. Hoyt Taylor, physicist, USN. Amateur investigations below 200 meters have much in common with those of the Navy, Dr. Taylor points out, and our stations will be depended upon to report reception of the 100-meter rig of the dirigible *Shenandoah*.

Amateur radio continues to be the lone lifeline of communication with the MacMillan Arctic Expedition, though adverse radio conditions during February and March have made two-way work impossible. At press time, 7AIB reports copying a brief "all's well" from Operator Don Mix. "The Eastward Voyage of the *Tahiti*" (Sydney, Australia, to San Francisco) was a more successful demonstration of amateur communication, as long lists of calls heard and worked would evidence. Aussies C. D. Maclurcan, 2CD, and Jack Davis, 2DS, were operators of the temporary amateur station installation on the ship.

Timely technical offerings in this issue include J. L. A. McLaughlin's description of a two-range low-loss tuner, I. V. Iverson's (7ADQ) how-to-build-it discussion of the Meissner transmitting circuit, C. E. Dengler's (8KS) pointers on erecting a gutter-pipe mast, and Frank Reid Stansel's practical methods for measuring inductance and capacity.

Hoover Cup winner for 1923, Don C. Wallace, 9ZT, Minneapolis, describes the gear that won him the coveted Department of Commerce award. A 250-watt Hartley transmitter, 124-jar electrolytic rectifier, low-loss tuner, and 6-wire flat top with 23-wire radial counterpoise are the equipment of this outstanding American station.

*Gleanings*: L. W. Hatry, 5XV, and Maurice G. Goldberg, 9APW-9ZG, both well known for their excellent *QST* articles, are introduced in the "Who's Who" section. . . . Porter H. Quinby has succeeded George Turner as Midwest Division manager. . . . 5NW has worked all districts and Canada with his 5-watter. . . . 6AXD and 2ADM have QSOed transcon in broad daylight. . . . Black and gold have been adopted by the Board as the official ARRL colors.

### Silent Keys

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

W1GGF, Burney J. Jones, Rockland, Me.  
W2HQ5, Roger C. Carlton, Fair Lawn, N. J.

W2MSZ, Dexter M. Moody, Haynerville, N. Y.

W2OUP, Albert A. Kaplin, New York City  
W2WCD, Albert L. Vanderbilt, William-son, N. Y.

Ex-3XC, Mrs. Hester R. Chambers, Philadelphia, Pa.

W4LJS, Robert L. Rhinehart, Lake Worth, Fla.

W5KXH, Allan L. Marek, Kilgore, Texas  
W7DRY, Arvid E. Peterson, Tacoma, Wash.

W8FG, Charles L. Ross, Melvindale, Mich.  
Ex-HK3AS, T/Sgt. Linwood E. Stanton, USAF, Mobile, Ala.

SM5RF, Sten Rudkvist, Stockholm  
VE3BFJ, John H. Clarke, Peterborough, Ont.

VE3BRU, Robert J. Hawke, Toronto, Ont.



# Happenings of the Month

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## BOARD AGENDA

As indicated in the previous issue of *QST*, the annual meeting of the League's Board of Directors is being held later in the month of May than usual because of the Inter-American Conference, the first day of the meeting to be May 27th.

One of the first matters to come to the attention of the Board this year will be the report of its Building Committee, appointed last year to make a thorough study of the whole question of the location of League headquarters, desirability of owning our own building, and examination of the effectiveness of WIAW in getting information to the membership. This committee, under the chairmanship of Vice-President McCargar, has worked long and hard during the past year, has had meetings in both Milwaukee and New York City, and will submit a voluminous and detailed report to the Board on every phase of the matters referred to it.

Perhaps because the Federal Communications Commission has not yet taken any action (as we write, at least) on the Board's recommendations last year with respect to 'phone suballocations, there have not been as many advance proposals for discussion on the 'phone-c.w. question as usual. However, Director Groves, of the West Gulf Division, who last year made a fruitless attempt to promote a recommendation for daylight operation of 'phone in a substantial portion of the 7-Mc. band, has served notice that he will resubmit his proposal this year; he suggests 100 or 150 kc. for Class A and B operation between the hours of 10 A.M. and 4 or 5 P.M. CST. Director Collett, of the Midwest Division, has suggested that the Board reexamine the "formula" approach to the 'phone question advanced by former League Secretary Warner in 1946, where under 'phone operation would be permitted in each band in terms of the ratio of total 'phone interest among amateurs modified by a "k" factor to be determined by the Board; Atlantic Division Director Martin has suggested to his brother directors that they study the merits of a straight 50-50 division of all bands between 'phone and c.w.

Organizationwise, one of the tasks before the Board this year will be the designation of a successor to former Secretary and General Manager Warner. In this connection, Director Collett has proposed the appointment to three separate positions of three separate individuals, each reporting to the Board annually, to be known as secretary, general manager, and *QST* editor, respectively, and Hudson Division Director Johns-

ton has given formal notice of his intention to propose an additional officer of the League, with duties and responsibilities yet to be specified. The Communications Manager proposes that the Philippine Islands be dropped from the operating organization of the League, in view of the fact the Philippines now have independent status; that the Board examine the desirability of making a recommendation for an additional maritime-mobile band, possibly at 21 Mc. when that band becomes available; and that the travel allowance for SCMs and SECs in connection with organizational activities be reduced from the present 10 cents per mile to 5 cents per mile.

Directors Collett and Canfield join in notifying the Board of their intent to offer a resolution to the effect that whenever a poll of amateur radio operators has been taken on any question, the majority opinion shall be binding on the Board to take proper action to give effect to such majority opinion.

While directors will undoubtedly have numerous proposals by the time of the meeting, the only others known to the Headquarters at this writing are those of Director Collett. He will propose an amendment to By-Law 20, of the League's Constitution and By-Laws, to provide that all eligible candidates for director and alternate director be notified of their eligibility by commercial telegraph on the day the Executive Committee has acted; that a copy of the Constitution and By-Laws of the League be sent to all full members as of July 1, 1949, and to all new full members thereafter; that a period of at least 21 days and no more than 28 days shall elapse between the meeting of the Executive Committee for the purpose of determining the eligibility of candidates for director and alternate director and the mailing of election ballots; and that the Headquarters be directed to compile and publish and make available to the membership, at cost, the past minutes of Board meetings dating from 1925. He also proposes that suitable amendment of the By-Laws be made to provide that no director and/or alternate shall be eligible to serve more than two terms of two years duration, and that the standing orders of the Board provide that discussion and voting rights on frequency suballocation matters, on which a *QST* poll has been conducted in which only the votes of U. S. licensed radio operators are tabulated and recorded, shall be limited to those directors who hold a current license issued by the Federal Communications Commission. He proposes further that a duly-authorized representative of the



League shall be directed to request of the U. S. House of Representatives Committee on Post Office and Civil Service the issuance of a commemorative stamp, preferably of 1¢ denomination, depicting the American radio amateur's contribution to the electronic science and its part of our public service and national defense. Finally, he proposes complete reexamination of his motion last year to study a plan for the formation of five supervisory committees to supervise various departments of the League.

Directors desire membership comments and suggestions on these or any other subjects, prior to the annual meeting on May 27th. Your director's name and address appear in the directory in the front pages (page 8 this month) of every issue of *QST*.

#### FOURTH INTER-AMERICAN CONFERENCE

With further delays in the wind-up of the Mexico City High-Frequency Broadcasting Conference necessitating consequent postponement of the original opening date of April 1st for the Fourth Inter-American/Region 2 Conference at Washington, the prospect as we go to press at the end of March was that the Inter-American affair would probably open April 25th. Preparatory work for the United States was largely completed by the end of March, principally as a result of almost continuous meetings of the allocations group from mid-February on; League representatives were constantly present at all these meetings, the only amateur representatives on the committee. Principal conference agenda item of amateur interest will be in connection with the 3500-4000 kc. band, which under Atlantic City (as under all previous world regulations since 1927) is assigned jointly to the amateur, fixed and mobile services; it is at these regional conferences that disposition of the band among the three services is arranged. Traditionally, the U. S. has always proposed the band exclusively for amateurs, in line with its domestic policy. We are pleased to report that, as one result of the allocations committee meetings, our Government is proposing the band exclusively as amateur at the Fourth Inter-American as well; advance indications, however, are that some of the other American countries, principally in South America, may wish to make somewhat different disposition of the band in their countries, a situation not helped by the fact that the amateurs of some South American countries have never had any particular interest in this low-frequency band.

#### CANADIAN REGS

Canada issues amateur licenses on a one-year basis, the anniversary date being April 1st, and such changes in regulations as are contemplated are put into force at that time. From

Canadian General Manager Reid, who had had conferences with the Controller of Radio at Ottawa during March, we learn that the only change in Canada's amateur regulations this year will be to permit n.f.m. on all frequencies open to 'phone, effective April 1st.

### DANGER!

By now, most of our readers are probably familiar with the discovery, in mid-March, that certain war-surplus radio gear being sold in the open market still contained the explosive devices installed in them during wartime to wreck them in the event of forced landing of Allied planes in enemy territory. ARRL immediately got out warning bulletins via W1AW and our Official Bulletin Stations pending consultation with Washington to determine what equipments may contain the destructors and what amateurs should do in the event they have purchased such equipment. We quote the latest word from the War Assets Administration on the subject:

Upon reports that certain surplus radio equipment contained explosives designed for its destruction in military emergency, the WAA and the Armed Services joined today in an investigation to determine the extent to which such equipment had found its way into private hands.

Although only a handful of sets sold is known to have contained this explosive device, the Agencies acknowledged the possibility that more of those sold had not been deactivated before sale to private individuals. The Armed Services as well as WAA have disposed of some thousands of sets.

The radio sets which possibly may contain the explosive device were identified as:

ABK-1	ABE	SCR-595
ABD	SCR-535	SCR-695

AN/APX 1-2-3-8 and 13

Owners of sets carrying these designations were urged to take them to the nearest Naval or Army District Headquarters for examination by qualified Ordnance Disposal Experts to determine whether they have been deactivated.

WAA and the Armed Services are tracing disposals of all such equipment in order that purchasers may be warned of potential danger in handling these sets.

Play safe! *Don't attempt to remove the destructors yourself under any circumstances!* If you own any of the listed equipments, get them to your nearest Naval or Army District Headquarters for examination. If you don't know where the nearest establishment is, write a letter to the Office of the Chief of Naval Communications, Room 2733, Department of the Navy, Washington 25, D. C., and they'll tell you.

# The Additive Frequency Meter

## An Improved System of Heterodyne Frequency Measurement

BY GEORGE GRAMMER,\* WIDF

At one time or another most of us have had need for some means for measuring frequency to a reasonable degree of accuracy. What constitutes "reasonable" accuracy is no doubt a matter of opinion; however, most of us would agree that since we deal in kilocycles rather than percentages the ideal frequency meter would have about the same accuracy in kilocycles at 30 Mc. as it does at 3.5. Most of us also would agree that a frequency meter should be directly calibrated, to avoid the bother of having to look up calibration charts.

The heterodyne frequency meter, which is the instrument usually employed for such measurements, does not meet the requirements very satisfactorily. As ordinarily constructed, it covers a fundamental range such as 2.5-4 Mc. and uses harmonics for the higher-frequency ranges. Although the percentage accuracy is the same on all bands, the error in kilocycles goes up in direct proportion to the harmonic used. Also, with direct calibration the dial itself puts a ceiling on the accuracy obtainable.

Of the available dials that can be directly calibrated, the National ACN has about the greatest scale length, approximately 10 inches. Ordinarily only about 90 per cent of the scale is usable, since the extremes of the tuning condenser range do not offer a useful capacitance variation. If the frequency range chosen is 3500-4000 kc., 500 kc. is spread over about 9 inches of scale. The width of calibration lines and the accuracy of drawing is such that calibration points cannot be located to better than about 0.01 inch, so there is a basic uncertainty of something more than 500 cycles before

calibration errors and oscillator frequency variations are even considered. Since this uncertainty is multiplied by the order of the harmonic used, the unavoidable error, even at directly-calibrated points, increases to over 4 kc. at 28 Mc. When oscillator drift and other errors are added, the uncertainty increases to 10 to 20 kc. at 28 Mc. — even with quite stable oscillators — at the directly-calibrated points. In between such points the error may of course be considerably greater.

The over-all result is that while the instrument is useful for approximate frequency measurement, it cannot be trusted for band-edge measurements without spot checking against some such device as the 100-kc. oscillator.

There are ways to reduce the dial errors, such as switching to restrict the range on the higher frequencies; also, the direct calibration can be abandoned and a long-scale dial such as the PW mechanism substituted, together with a calibration chart. These, however, do not effect any improvement in the inherent oscillator stability. Furthermore, it is frequently desirable to make measurements outside the

amateur bands, and wide range does not go hand in hand with precise calibration.

### The Interpolation System

The measurement system to be described provides practically all of the advantages of the 100-kc. standard and the directly-calibrated heterodyne frequency meter, with almost none of the disadvantages of the latter.<sup>1</sup> It is quite simple in principle. As shown in Fig. 1, the harmonic output of a 100-kc. oscillator is fed to a mixer. The output of a variable oscillator covering a 50-kc. range (100-150 kc. is convenient, but by no means the only range that can be used) is fed to the same mixer so that its output modulates



A frequency meter incorporating the principles described in the accompanying article. The hand-calibrated scale of the National ACN dial covers a range of 50 kc., with individually-calibrated points at each 1000-cycle interval. The instrument may be used for measuring frequency in any part of the spectrum where the harmonics of its 100-kc. crystal oscillator can be heard.

\* Technical Director, ARRL.

<sup>1</sup> After building an experimental model, the writer learned that a similar principle is used in a system developed at the Bureau of Standards for s.h.f. frequency measurement.

each 100-kc. harmonic. The sidebands so generated supply a series of signals that can be used in the same way as the signal from an ordinary heterodyne meter.

The operation of the system can be understood from Fig. 2, where each pair of sidebands associated with a particular harmonic is identified by being drawn the same (solid, dashed, etc.) as the harmonic. Considering the spectrum between 7000 and 7100 kc., the upper drawing shows that with the variable oscillator set at 115 kc., the upper sideband produced by the beat between 6900 and 115 kc. gives a signal at 7015 kc., while the lower sideband resulting from the beat between 7200 and 115 kc., gives a signal at 7085 kc. As the VFO frequency is increased these two sidebands move closer together, as shown by the lower drawings.

At 150 kc. the two sidebands coincide and there is only one signal, exactly halfway between 7000 and 7100 kc. When the two sidebands are in zero beat with each other, the VFO acts as a precise frequency divider. Consequently, the accuracy with which a multiple of 50 kc. can be determined anywhere in the frequency spectrum depends solely on the accuracy of the 100-kc. oscillator, and is completely independent of the VFO calibration.

The advantages of this system are numerous. Because the tuning range is only 50 kc. the dial errors are only of the order of 50 cycles and are independent of the frequency being measured. The bandwidth and tuning rate are exactly the same anywhere in the spectrum, so the instrument tunes just as noncritically at 30 Mc. as it does at 3.5 Mc. The errors caused by instability of the VFO are likewise the same anywhere in the spectrum, and are measured in cycles rather than percentage. Since the oscillator operates at a very low frequency, the drift is quite small, even without taking any special precautions in construction. The accuracy is tied directly to the accuracy of the 100-kc. fixed oscillator, and can be quite high if a 100-kc. crystal is used. Furthermore, measurements can be made in any part of the spectrum in which the 100-kc. harmonics can be heard, not just in a restricted range such as an amateur band. In addition, the instrument has within itself the means for direct calibration at intervals of 1000 cycles.

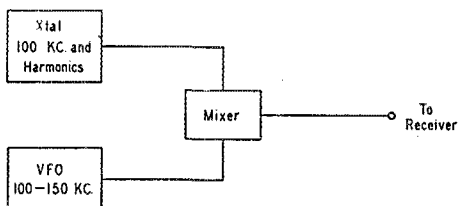


Fig. 1 — Basic elements of the frequency-measuring system discussed.

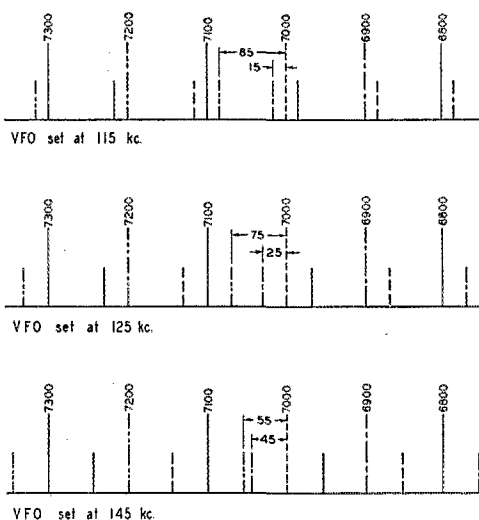


Fig. 2 — Partial representation of crystal harmonics and sidebands. The situation depicted between 7000 and 7100 kc. is repeated throughout the spectrum between each pair of 100-kc. harmonics.

There are two disadvantages, if they can be called that, to the system. The dial does not supply the complete frequency reading directly; the proper hundred must be supplied from prior knowledge, after which the tens, units, and fractions may be added on. This is no great disadvantage, particularly in the amateur bands, since one usually has a fairly good idea of which 100-kc. harmonic is which. The other is that at frequencies near the even 100-kc. points the 100-kc. harmonics and the sidebands come within audible beat range of each other, and a similar situation occurs at the 50-kc. points where the two sidebands approach each other. In both cases more than one signal is heard, and it becomes necessary to choose the right one. This is easily done, but requires a little preliminary practice.

The dial of the instrument shown in the photographs is calibrated from 0 to 50 kc. in the counterclockwise direction, and from 50 to 100 kc. in the clockwise direction. The upper sideband is used in the former case and the lower sideband in the latter; the reason for the reversal of calibration will be clear from inspection of Fig. 2. Unless the receiver is capable of distinguishing between the upper and lower sidebands, it will be necessary, in measuring the frequency of a signal, to determine whether it lies above or below a 50-kc. point. For example, suppose the signal to be measured lies between 7000 and 7100 kc., and that when it is heterodyned to zero beat the dial reading is 34 kc. on the counterclockwise scale and 66 kc. on the clockwise scale. To determine the proper reading, set the dial to 50 kc. and note whether the signal is above or below the 50-kc. point.

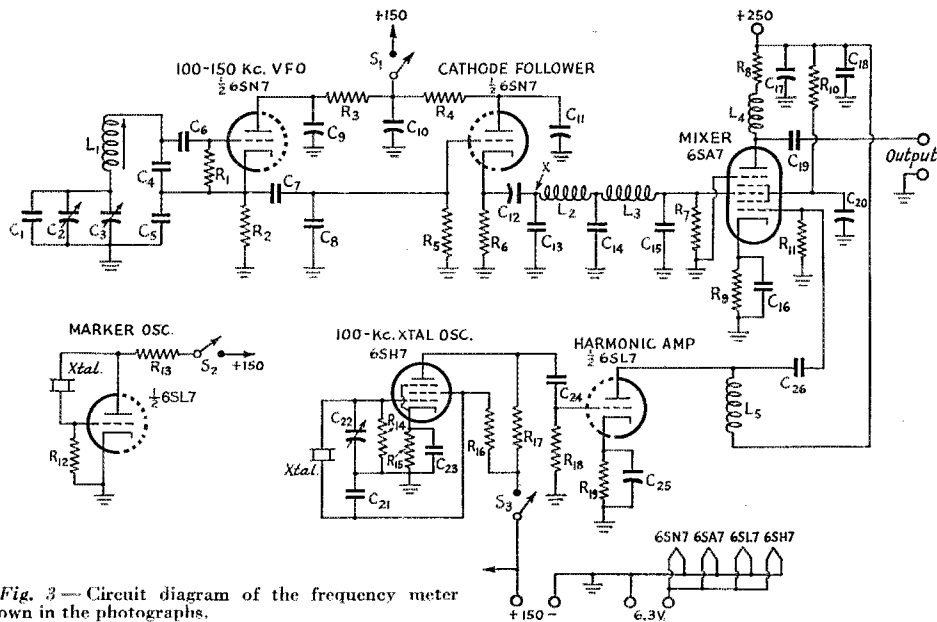


Fig. 3—Circuit diagram of the frequency meter shown in the photographs.

C<sub>1</sub> — 22- $\mu$ fd. ceramic (see text).  
 C<sub>2</sub> — 100- $\mu$ fd. variable (Millen 26100).  
 C<sub>3</sub> — 250- $\mu$ fd. variable (Hammarlund MC-250-M).  
 C<sub>4</sub>, C<sub>6</sub>, C<sub>23</sub> — 0.0022- $\mu$ fd. mica.  
 C<sub>6</sub>, C<sub>7</sub>, C<sub>19</sub> — 470- $\mu$ fd. mica.  
 C<sub>8</sub>, C<sub>16</sub>, C<sub>18</sub> — 0.001- $\mu$ fd. mica.  
 C<sub>9</sub>, C<sub>11</sub>, C<sub>20</sub> — 0.1- $\mu$ fd. paper.  
 C<sub>10</sub>, C<sub>12</sub>, C<sub>17</sub>, C<sub>25</sub> — 0.01- $\mu$ fd. paper.  
 C<sub>13</sub>, C<sub>15</sub> — 680- $\mu$ fd. mica.  
 C<sub>14</sub> — 1360- $\mu$ fd. mica (two 680- $\mu$ fd. units in parallel).  
 C<sub>21</sub> — 150- $\mu$ fd. mica.  
 C<sub>22</sub> — 50- $\mu$ fd. variable (Millen 26050).  
 C<sub>24</sub> — 22- $\mu$ fd. mica.  
 C<sub>26</sub> — 100- $\mu$ fd. mica.  
 R<sub>1</sub> — 47,000 ohms,  $\frac{1}{2}$  watt.  
 R<sub>2</sub>, R<sub>10</sub> — 22,000 ohms, 1 watt.

R<sub>3</sub> — 3300 ohms,  $\frac{1}{2}$  watt.  
 R<sub>4</sub> — 2200 ohms,  $\frac{1}{2}$  watt.  
 R<sub>5</sub>, R<sub>12</sub>, R<sub>14</sub>, R<sub>18</sub> — 0.47 megohm,  $\frac{1}{2}$  watt.  
 R<sub>6</sub>, R<sub>15</sub>, R<sub>19</sub> — 1000 ohms,  $\frac{1}{2}$  watt.  
 R<sub>7</sub> — 1500 ohms,  $\frac{1}{2}$  watt.  
 R<sub>8</sub>, R<sub>9</sub> — 220 ohms,  $\frac{1}{2}$  watt.  
 R<sub>11</sub> — 0.22 megohm,  $\frac{1}{2}$  watt.  
 R<sub>13</sub> — 0.1 megohm, 1 watt.  
 R<sub>16</sub> — 0.1 megohm,  $\frac{1}{2}$  watt.  
 R<sub>17</sub> — 0.15 megohm,  $\frac{1}{2}$  watt.  
 L<sub>1</sub> — Oscillator coil, variable from app. 8 to 11 mh. (Millen 65000-35).  
 L<sub>2</sub>, L<sub>3</sub> — 2.5 mh. (National R-100S).  
 L<sub>4</sub> — 4  $\mu$ h. (National R-60).  
 L<sub>5</sub> — 2  $\mu$ h. (National R-60).  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> — S.p.s.t. toggle.

When single-signal reception is used the two sidebands can readily be distinguished. As the frequency-meter dial pointer is moved continuously in one direction the two sidebands approach the receiver setting from opposite directions. One approaches from the "right" side of zero beat, the other from the "wrong" side. For example, if the receiver b.f.o. is set so that the "other side of zero beat" occurs at a higher frequency (on the receiver dial) than the desired side, rotating the frequency-meter pointer counterclockwise will cause the upper sideband (counterclockwise scale) to pass through the weak side of zero beat first, while the lower sideband (clockwise scale) will approach from the strong side. The opposite will be true if the pointer is rotated clockwise, and both will be reversed if the receiver b.f.o. is shifted to the other side of the signal. Since most of us habitually use the b.f.o. on the same side, in single-signal reception, it is a simple matter to determine once and for all

the tuning characteristics that distinguish the two sidebands, and thus know automatically which scale to use in making a measurement. It should be emphasized that this peculiarity occurs only when tuning the frequency meter, not when tuning the receiver.

### Circuit Design

Fig. 3 shows a practical circuit for an instrument of this type. There is only one design point of major consequence, and that is the elimination of all harmonics and spurious beats, excepting only the 100-ke. harmonics from the fixed oscillator. If harmonics of the VFO frequency reach the mixer they will modulate the 100-ke. harmonics along with the VFO fundamental, giving rise to "birdies" that, depending on their strength, can be confused with the main signal. In addition, harmonics generated in the mixer circuit at relatively low frequencies will not only be heard at higher frequencies but also will mix

with all other frequencies present to produce what, in bad cases, can only be described as a mess. Both types of trouble are readily overcome by exercising reasonable care in design and adjustment.

The series-tuned oscillator circuit shown in Fig. 3 is a good one for the purpose, not only because it is convenient to dispense with a feedback tap on the coil, but also because the large shunting capacitances tend to discourage harmonics. In this case one triode section of a 6SN7 is used as the oscillator and the second section as a cathode follower. The oscillator frequency is practically unaffected by anything that is done at point X in this circuit. The coupling circuit,  $C_7C_8$ , between the oscillator and follower prevents overloading the latter and also provides some additional harmonic suppression. Finally, the remaining harmonic content is, for all practical purposes, completely eliminated by the low-pass filter consisting of  $L_2, L_3, C_{13}, C_{14}$  and  $C_{15}$ , together with the terminating resistor,  $R_7$ .

To prevent harmonic generation in the mixer circuit it is necessary to keep the signals applied to the Nos. 1 and 3 grids small enough so that the tube operation is substantially linear. There should be little or no trouble from excess VFO signal with the constants given, but the harmonics of the 100-kc. crystal oscillator will cause trouble if something is not done to reduce the amplitude at the lower-frequency end of the spectrum. The 6SL7 "harmonic amplifier" in the diagram is, in fact, an attenuator at the lower frequencies. Its plate circuit is self-resonant in the 20-30 Mc. region, and the over-all effect is a

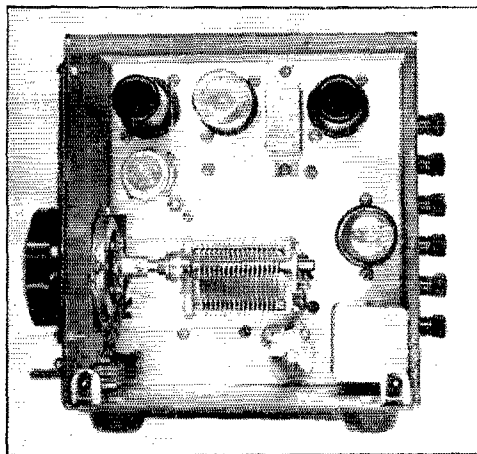
leveling-off such that the 100-kc. harmonics throughout the 3-30 Mc. range are substantially of the same strength. From an operating standpoint this is a most desirable feature; it is neither necessary to search for almost inaudible harmonics at 28 Mc. nor to cringe from powerhouse blasts at 3.5 Mc. But most important, in combination with the harmonic filtering in the oscillator, it results in the reduction of spurious signals to the point where they are undetectable under ordinary circumstances.

The plate circuit of the 6SA7 mixer is likewise adjusted to peak the output at the high-frequency end of the 3-30 Mc. spectrum. If the lower-frequency harmonics are allowed to become too strong in the mixer plate circuit spurious beats will appear. The amount of low-frequency amplification is controlled by  $R_8$ , which should be no larger than is necessary for adequate signal strength. Since the output requirements will vary with the type of input circuit in the receiver as well as the antenna used, some experimenting may be necessary to secure an output circuit for the 6SA7 that will give signals of the desired strength throughout the spectrum. For example, a 50- $\mu$ h. coil substituted for  $R_8$  will considerably increase the output at 7 Mc. and below.

The spare section of the 6SL7 double triode is used as a marker oscillator, for determination of 100-kc. points in case the calibration of the station receiver is not good enough. The marker crystal can be any convenient frequency; a spare amateur-band unit can be used. One in the vicinity of 2 Mc. is rather suitable, since it will give markers spaced 2 Mc. apart. The principal requirement, however, is that the crystal frequency be known fairly accurately; the frequency meter itself provides a means for measuring it.

No special pains need be taken in construction to make the VFO exceptionally stable, although of course no good purpose is served by being careless. The oscillator shown in the photographs uses components of standard design, including ordinary mica condensers.  $C_1$ , a ceramic having a negative coefficient of 220 p.p.m., provides a small amount of temperature compensation. The maximum drift observed so far is about 200 cycles at the 150-kc. end of the range. In both this and in an earlier experimental model it was found that the drift at the 100-kc. end is almost negligible. From a percentage standpoint the oscillator stability is not especially high, but in this case it is only the drift in cycles that counts. Such frequency variations as occur are almost wholly in the circuit components, since other tubes can be substituted in the oscillator without causing a frequency change of more than a few cycles.

The frequency meter shown in the photographs was built primarily to fit in a box from some surplus gear, and not especially as something to



The chassis arrangement places the tubes above the crystal and tuned circuits so that heat will flow away from the frequency-determining elements. The VFO coil is in the shield at the lower right. Just above it is the VFO tube, and at the top right the mixer tube. The crystal oscillator is at the upper left and the double-triode harmonic amplifier and marker oscillator is at its right.

be copied. It illustrates the few constructional points that need to be kept in mind. One is that the circuit components should be placed so that they will not be in the direct path of heat convection from the tubes. The other is that the VFO should be placed as far from the other circuits as the chassis space will allow, simply for the purpose of reducing stray coupling. If these two points are observed the layout can be anything you please.

### Preliminary Testing

Most of the preliminary testing should be done with the 6SL7 and 6SA7 out of their sockets. On any receiver capable of tuning to 600 kc., tune in the 6th harmonic of the 100-kc. crystal oscillator. Connect a wire from point X to the antenna post of the receiver. Turn the VFO condenser over its whole range and note the number of harmonics heard at 600 kc.,  $C_2$  being at about 75 per cent of full scale. Adjust  $L_1$ , and  $C_2$  if necessary, until there are just three such harmonics, one at each end of the scale and one between. If the tuning condenser and dial specified are used, set the two outer ones to zero beat at about 95 and 5, respectively, and the third should occur at about 60. This adjusts the oscillator to the proper range, by making the 4th harmonic of the high end and the 6th harmonic of the low end fall at 600 kc.

After noting the strength of the oscillator harmonics, shut off the 100-kc. crystal oscillator and move the receiver antenna connection from X to the No. 3 grid connection (output of the harmonic filter) on the 6SA7 socket. It should be impossible to hear any harmonic output from the oscillator when the tuning is varied. Then insert the 6SA7 in its socket, allow it to warm up, and again tune the VFO over its range. If harmonics now become audible the oscillator signal is too strong. It may be reduced by increasing the capacitance at  $C_3$  as much as is necessary to make the harmonics disappear.

Next, check the operation of the unit, with all tubes installed, throughout the h.f. spectrum. The operation should be as described earlier, with fairly-uniform signal strength at all frequencies and with no birdies or spurious beats of any

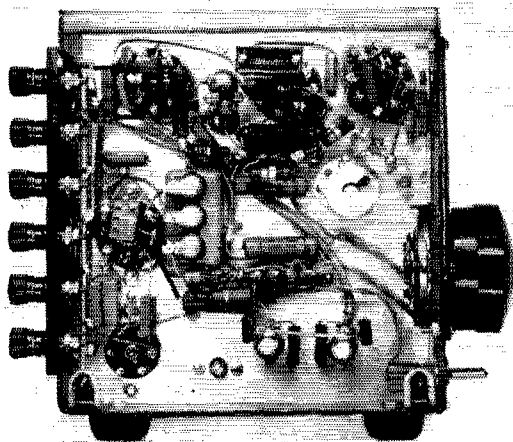
consequence. Since the output of the unit is intentionally low, it will be necessary to connect the output terminals to the receiver antenna post and not depend on stray coupling. After this check the meter is ready for calibration.

### Calibration

Calibration is best carried out in a series of steps. Remove the 6SA7 and 6SL7, connect the receiver antenna post to point X, and tune in the 2000-kc. harmonic from the 100-kc. crystal oscillator. Set the VFO at 100 kc., and bring its harmonic to zero beat with the crystal harmonic. Mark this point "0" on the dial. Then tune the receiver to the 21st crystal harmonic (2100 kc.) and slowly tune the VFO higher in frequency until its harmonic is at zero beat with the crystal harmonic. At this point the 20th harmonic of the VFO coincides with the 21st harmonic of the crystal, and so the VFO frequency is  $2100/20 = 105$  kc. Mark this point "5" on the scale, move the receiver to 2200 kc., and increase the VFO frequency until its 20th harmonic coincides with 2200 kc., giving the 10-kc. point. Continue until the scale is calibrated at each 5-kc. point up to 50 kc.

The next step is to calibrate at 2-kc. intervals, and for this purpose it is necessary to increase the strength of the harmonics. The marker oscillator can be used as an amplifier, by removing the crystal and making the connections shown in Fig. 4A. Clip leads are satisfactory. It is necessary to replace the 6SL7, of course, but do not put the 6SA7 in its socket. Tune in the 5000-kc. harmonic of the 100-kc. crystal oscillator, set the VFO to 100 kc. by beating its 50th harmonic with the 5000-kc. harmonic of the crystal, and proceed up through the spectrum one 100-kc. point at a time, using the same procedure as before. The VFO harmonics will tune quite rapidly, and the previously-determined 5-kc. marks will ensure that the calibration points do not get out of proper order.

The impromptu harmonic amplifier alone will not usually give enough output to repeat this process with the 100th harmonic, by means of which 1-kc. points are obtained. The necessary harmonics can be generated by using a crystal



A view from the other side of the chassis. The harmonic filter occupies the space at the lower edge of the chassis, and its output runs in a shielded lead to the mixer tube. The socket for the marker crystal is mounted simply by soldering its terminals to the grid and plate terminals on the 6SL7 socket. The fixed condensers in the VFO circuit are at the lower left in this view.

rectifier as shown in Fig. 4B. In this case the lead from the receiver antenna should be brought near, but not connected to, the harmonic amplifier. The crystal acts as a mixer and introduces many secondary beats, but if the coupling to the receiver is loose enough the desired harmonics will be the strongest and can easily be identified, particularly since the 2-kc. points already plotted will practically show where they should fall. There should also be no trouble in hearing the

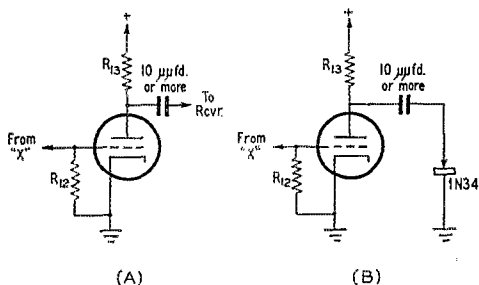


Fig. 4 — Temporary connections for amplifying VFO harmonics when calibrating. The marker-oscillator tube is used with the crystal removed.

100-kc. crystal harmonics from 10 to 15 Mc. if the receiver antenna lead is near the crystal oscillator.

The calibration points should be plotted on the scale as accurately as possible. It should be noted that any errors in setting to zero beat during this process are divided by the order of the harmonic used. Thus if a particular harmonic is off zero beat by as much as 500 cycles, when calibrating the 1-kc. points, the actual error is only 5 cycles, which is inconsequential. The principal source of error in calibration, aside from getting the wrong harmonics, is the simple one of getting the pencil to go where you want it to go on the scale. It may also be noted that the 100-kc. crystal introduces almost no error, for a similar reason, even though it may be a couple of hundred cycles off WWV at 10 Mc. In fact, the only electrical precaution to take is to make sure that the VFO is thoroughly warmed up before the calibration is started.

### Accuracy

The accuracy of measurement with an instrument of this sort depends considerably on the way it is used. A number of test runs of 6 to 8 hours, made in room temperatures varying between 70 and 80 degrees, have shown that the maximum VFO deviation (starting cold) is about 200 cycles in the unit pictured. The crystal-oscillator deviation amounts to about 200 cycles at 10 Mc. over an 8-hour period, after a 15-minute warm-up, when the instrument is not near other heat-producing apparatus. (This drift is just about doubled when it is placed on top of a re-

ceiver, because of the additional heat from the latter.) The power dissipated is about 15 watts, and the case is not ventilated.

It is evident that the over-all accuracy is determined principally by the crystal oscillator. If the instrument is to be used without checking against WWV, it would be well to make some drift runs on the crystal oscillator to determine the variations likely to be encountered. The maximum deviation so determined, plus the VFO deviation, plus the calibration and reading error, gives an accuracy rating for the instrument. Using the figures given above, the crystal-oscillator error amounts to 600 cycles at 30 Mc. and to 70 cycles at 3.5 Mc. The dial error at the calibrated points should not exceed 50 cycles. The 1-kc. divisions average a little under 0.2 inch in width; this makes it possible to interpolate to about 1/10 division, particularly if the 1-kc. divisions are divided in half to give approximate 500-cycle divisions as is done on the scale shown in the photograph. Such interpolation will introduce an error of 50 to 100 cycles, plus or minus. The possible error is therefore  $600 + 200 + 100 = 900$  cycles at 30 Mc., and  $70 + 200 + 100 = 370$  cycles at 3.5 Mc.

On the other hand, if the crystal is adjusted to zero beat with WWV and the VFO is warmed up so that its calibration is exact (or if a small compensating condenser is provided for adjustment to exact frequency at the 50-kc. point) the principal source of error is that of marking and reading the scale. Under these conditions a skillful interpolator can make readings that are accurate to plus or minus 100 cycles at any frequency up to 30 Mc.

The average, of course, is between these two extremes. In any event, the status of the calibration can be determined in an instant or two. The crystal can be checked against WWV to determine the percentage error. The VFO error can be determined by checking the scale at the "0" end against the crystal harmonic, and at the "50" end by zero-beating the two sidebands as previously described.

It is obvious that the system can be extended to give higher accuracy, if desired. One method is to make the basic frequency lower than 100 kc. and restrict the VFO tuning range accordingly. Another is to discard the direct calibration and use a dial having several hundred divisions, in conjunction with a calibration chart. For most requirements these refinements are not necessary. In any event, the attempt to attain higher accuracy will require increasing precision in the components used. One of the chief advantages of the arrangement described is that it achieves a degree of accuracy considerably higher than is ordinarily required, without costing any more than the usual 100-kc. marker and heterodyne frequency-meter combination, and with less care in construction.



# Military Amateur Radio System



**T**HE MARS Advisory Committee, composed of eight military and three civilian members, held its first meeting at the Pentagon, Washington, D. C., in February. In addition to the eleven advisors, seven observers were present. The Committee discussed reserve credits for participation in the MARS program (one point



Committee members (*m*) and invited observers at first meeting of the MARS Advisory Committee. Seated, *l. to r.*: Lt. Col. W. O. Jefferson, SigP&D (*m*); G. K. Rollins, W3GA, chief, Radio Operator and Amateur Division, FCC (*m*); Lt. Col. Stephen S. Cerwin, SigP&O, W4ITY (*m*); Capt. E. L. Nielsen, chief, MARS-Army, W4ODI (*m*); Col. K. B. Lawton, OCSigO; Maj. Gen. F. L. Ankenbrandt, director of communications, USAF; Col. H. F. Gregory, USAF, W3CO (*m*); Capt. T. Biggs, USAF, W3KNZ (*m*); Maj. L. A. Mason, USAF, W4OHI (*m*). Standing, *l. to r.*: Col. A. B. Pitts, OCD, W5AZ (*m*); I. Brownstein, Legal Division, FCC; Maj. B. B. Dales, SigP&T (*m*); Maj. C. F. Welch, USMC (Navy), ex-W6BBK; Col. L. H. Stanford, OCD; F. E. Handy, WIBDI, communications manager, ARRL (*m*); R. W. Percy, W4IQR, chief, Amateur Radio Service Section, FCC; Maj. R. H. Halls, chief, MARS-USAF, W4RB (*m*); Lt. Col. D. W. Eddy, Army Communications Service Division. USAF committeemen or alternates not present were Lt. Colonel L. C. Sheetz, W4LEK, Lt. Colonel H. H. Moreland, ex-W5BYE, and Lt. Colonel M. E. Willson, W4LDX. The radio amateurs in this group have held ham tickets for a grand total of 288 years!

for three hours of participation — not necessarily consecutive), additional MARS frequencies for v.h.f., and participation of civilians in MARS activities. Further information on the subjects considered will be disseminated as soon as decisions are reached.

## MARS Opens Overseas

To mark the 86th anniversary of the establishment of the Signal Corps, KH6USA, at Fort Shafter, Oahu, T.H., was dedicated on 3 March and officially designated as headquarters station for the Military Amateur Radio System (Army) in the Pacific Ocean area. KH6USA is the Army's first overseas MARS station.

As part of the dedication ceremonies a QSO was effected between KH6USA and K4USA-WAR, the Signal Corps amateur station in the Pentagon. Colonel C. H. Hatch, KH6SC, signal officer of USARPAC, acted as master of ceremonies at Oahu and introduced Maj. General F. L. Parks, USARPAC commanding general, and other notable guests.

At the Pentagon end of the QSO Lt. General H. S. Aurand, director of the Logistics Division of the Army General Staff, Brig. General C. H. Arnold, chief, Procurement and Distribution Division of the Office of the Chief Signal Officer, and Lt. Colonel D. W. Eddy, assistant chief, Army Communications Service, Division of the Office of the Chief Signal Officer, all extended their congratulations to the MARS station in Hawaii.



Maj. Gen. F. L. Parks, commanding general, USARPAC, operating KH6USA, Fort Shafter, Oahu, T.H., during dedication of the first overseas MARS amateur station. Standing by is Colonel C. H. Hatch, KH6SC, signal officer, USARPAC.





# United States Naval Reserve



**T**HE following Naval Reserve amateur call signs have been assigned since the last list appearing on this page:

K1NRJ Gardiner, Maine	K6NAS Arbutle, Calif.
K2NRA Addison, N. Y.	K6NAT Merced, Calif.
K2NRM Elizabeth, N. J.	K6NAU Huntington Park, Calif.
K3NAR Anacostia, D. C.	K6NAV Tulare, Calif.
K3NMC Washington, D. C.	K7NAD Kingman, Ariz.
K3NRA Allentown, Pa.	K7NAF Cedar City, Utah
K4NAY Portsmouth, Va.	K7NAG Clifton, Ariz.
K4NAZ Davella, Ky.	K9NRC Kokomo, Ind.
K5NBB Conway, Ark.	K9NRI Charleston, Ill.
K5NBC Wewoka, Okla.	K9NAU Salem, Mo.
K5NBD Ruston, La.	K9NAV Ft. Dodge, Iowa
K6NAP Martinez, Calif.	K9NAW Cortez, Colo.
K6NAQ San Francisco, Calif.	K9NAY Winona, Minn.

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The 1st ND now has eighteen Naval Reserve Training Center radio stations licensed for amateur operation.

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Radio amateurs in the Taunton, Mass., area interested in the formation of an Electronic Warfare company should contact Ens. Francis T. Coughlin, 26 Adams St., Taunton.

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Volunteer Electronic Warfare Company 1-2, under the command of Comdr. R. W. Hart, USNR (W1RH), has complete Electronic Warfare facilities installed in the Malden, Mass., City Hall Annex.

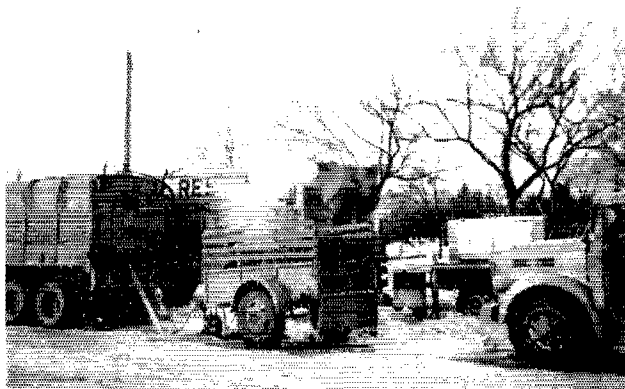
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A new station has been licensed in the 1st ND under the trusteeship of Comdr. Gil Countryman, W1RBK, ex-W3HH. The station, W1USN,

is available both for Naval Reserve use and for general amateur service by the many hams working in the Boston Naval Shipyard. W1USN is located in the Electronics Exhibit quarters, Building 202, Boston Naval Shipyard.

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The severe winter of 1948-49 found Naval Reserve Electronic Warfare units providing emergency communications on many fronts. When snow and sleet felled commercial telephone and telegraph lines between San Angelo and Dallas, Texas, NR radio circuits were activated and 150 messages handled. During the now-famous "Operation Snowbound," NR units at Omaha and Lincoln, Neb., cooperated with the Army, National Guard, U. S. Engineers, amateurs and civil authorities to handle over 1000 emergency messages. Similar reports of outstanding work done in traditional Naval thoroughness have been received from Electronic Warfare units in Harrison, Little Rock and Camden, Ark., Enid, Okla., and McKinney, Abilene and Lubbock, Texas.

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An Army-Navy radio net has been successfully established in the Eighth Naval District, involving radio communications using joint Army-Navy procedure between the 4th Army station, ACG, Ft. Sam Houston, Texas, and 8th ND NR stations (of the Organized and Volunteer Reserve) located in Arkansas, Louisiana, Oklahoma and Texas. The net utilizes Army frequencies, which are guarded 24 hours daily by operators at ACG.

◆  
Tractors and trailers of the emergency communications set-up of the Omaha (Neb.) Naval Reserve Brigade during "Operation Snowbound" (p. 38, April QST). Forty-foot snowdrifts and subzero temperatures were no obstacles to the Reservists, who were directed by Captain Porter H. Quinby, USNR (K9NRO, W0AY, ex-9AY), commanding officer, Omaha Naval Reserve units. Other Reservists-amateurs assisting during the emergency were Warrant Radio Electrician Dale Moudy, W0DKC, RMC W. T. Schurkamp, W0DKV, RM3c C. R. Morris, W0JJS, and SA R. E. Rohrig, W0EHD.



## Preview of High C.W. Scores— 1949 DX Contest

*Hmmm. What's this — 4X4CZ? Sounds like the dimensions for an antenna mast. He's standing by. [spla-a-att] Holy smokes, listen to that racket. My receiver's busted . . . [click] . . . the b.f.o. ain't working . . . no difference with it on or off! [moan] This would happen to me right in the middle of things! [groan] Maybe I ought to change my way of living. No more swiping DX from the gang, so help me. Eh, what's this? It's gone, the racket is gone. Oh me, an intermittent. I'll never find it! Whoops, there's a signal. It's that 4 by 4 guy again. He's coming back to W8BHW . . . "589445" . . . located in Israel, he says. He's standing by. Jeepers, what a sock that guy Lindy has! Hey, 4 by 4 says "R SK." Boy oh boy, here's for me — a new one. Yipes! — that racket again! [????] Whaddiyuh know, those are signals! What a clamor. Oh well, I'll give him a call . . . he came back . . . to W6GRL. If Doc can do it, so can I — or can I? Now's my chance: 4X4CZ 4X4CZ DE W4WOF W4WOF AR. He came back — to me! Man, wotta contest! . . .*

THOSE who took part will agree: "Wotta contest!" Activity was at fever pitch. Even during the wee hours of the fray pile-ups occurred that produced sounds in receivers unlike anything ever heard. Old hands at the DX game were in there breaking records by the hatful and even less experienced amateurs and those with low power often found luck and conditions with them as distant countries, both rare and common, replied through the QRM. There were some cases of poor operating practices on the part of overzealous DXers, but clean, courteous operating was the general rule. Propagation conditions for long-distance work were favorable during both week-end periods. Stations outside W and VE were on in fairly large numbers on all bands from 3.5 through 28 Mc. Three-, four- and five-band contacts were not uncommon. It was a DX test to outshine all previous DX tests.

Among the individual claimed scores in W and VE, that of W8BHW is outstanding. With a tremendous lead on all his competitors, "Lindy" reports the staggering total of 390,450 points. He claims 479 QSOs, a multiplier of 274 and a "different countries worked" total of 113! The second-highest reported score, 368,538 (multiplier 257), was made by W2IOP, who was followed closely by W4KFC with 365,160 points and a 255 multiplier. Reports are still arriving in large batches as this issue goes to press, but it is doubtful whether a "dark horse" with a score higher than any of the above will appear.

Just short of the 350-grand mark, and a fairly certain fourth place, is the 349,263-point score of W8JIN. Other contestants who claim more than 150,000: W3BES 343,000, W2SAI 336,000, W2AQW 331,000, W3LOE 279,210, W6GRL 278,640, W2BXA 263,648, W6RM 253,890, W6LDJ 253,022, W1BPX 246,000, W8FGX 234,498, W9IU 224,220, VE7HC 214,200, W6CEM 204,000, W6HZT 201,696, W9GA 200,718, W8EWS 193,068, VE4RO 191,922, W6MIVQ 189,317, W2DSB 185,556, W0SQO 183,768, W5ENE 180,726, W0DAE 179,400, W9PSR 177,970, W6TT 177,018, W7VY 177,000, W9FJB 176,420, W4BRB 175,000, VE3QD 173,570, W4JFE 167,338, W1BIH 167,067, W8LEC 161,775.

Top claimed score in the multioperator class was submitted by W2IQG, who with his assistants chalked up 525 contacts and a multiplier of 257 for 395,752. Other high reported scores in this category are those of W4DHz 301,300, W0AIW 230,202, W6GHU 227,919.

Outside the W0VE area, the highest score comes from KV4AA — 491,222 points, 79 multiplier, 2085 contacts. Other high totals: KP6AB 247,452, KP4DV 235,440, VO6J 230,885, EL3A 200,304, KH6MG 188,182, KP4KD 168,773, KG6DI 167,832, VO2RF 129,144, G2FC 127,948, KZ5PA 116,580, KH6NE 107,236, KL7CZ 103,066. The score of XF1A, top foreign contestant in each DX competition since 1938, has not been received at this writing. If his past performance and his activity during this contest are any indication, however, XF1A's '49 score will be a whopper!

There you have a preview of attainments in the c.w. section of the 15th Annual ARRL DX Competition. It should be emphasized that all figures quoted above represent claimed scores, which are subject to intensive checking before final results can be announced.

See June QST for the highest claimed scores in the 'phone section of the contest. — J. M.

### AMATEUR TWO-WAY TELETYPE SPANS PACIFIC PATH!

• The first amateur transoceanic radioteletype QSOs of record were achieved on March 25th when W6ITH, and later W7JCU, worked JA3RO, Nagoya, Japan, operated by Lt. W. C. "Doc" Wiley of the U. S. Occupation Forces. On the 26th and 27th W6ITH QSOd JA3RO again, and on these dates several hundred words of GI and congratulatory message traffic were "printed." All stations taking part in this pioneer work used true f.s.k. on either 10 or 11 meters. During the same period JA3RO was heard and printed by W6DOU, W3ODF, W2QGH, W2BFD and W2BDA.

# How's DX?

CONDUCTED BY ROD NEWKIRK, \* W9BRD

## How:

With the balmy breezes and the birds and bees having taken over, we find the rebuilding season in full swing. While ourselves contemplating a revamping after a fashion (Jeeves wants to ditch our 24As in favor of something up-to-date, like, say, 6D6s) we'd like to see the brains get busy and hit the market with a few items like these:

— Gadgets that filter r.a.c. signals in the receiver.

— Beams with such sharp vertical angles that Ws are only rarely audible the long way around.

— The allocation of an auto-ignition band other than 14 and 28 Mc.

— Persuasive pamphlets convincing TVLs that too much TV may lead to cataracts.

Perhaps we expect too much from our engineering geni but there's a lot of surface left to be scratched along this line. Of course, the climactic triumph would be the perfection of a DX Hog eliminator but perhaps we shouldn't set our hopes *too* high.

Even if you are engaged in some remodeling of sorts, don't fail to get something on the air for May 14th and 15th if you're on the DXCC roster. All of the best people will be there, you know, it being DXCC Round-up time.

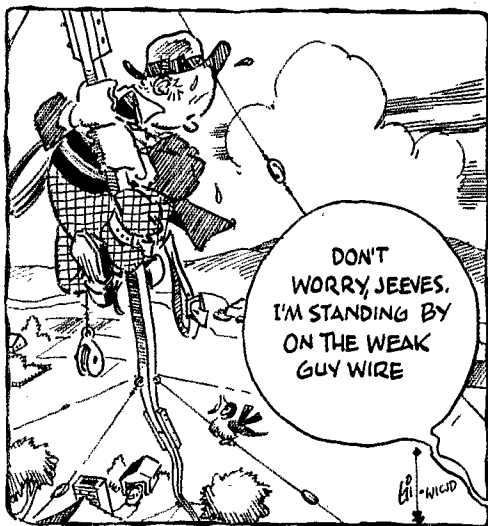
And so to work. . . .

## What:

The QRN may be closing in fast but ere this development we hear via W4BRB that W4JQ completed his postwar 3.35-Mc. 'phone WAC upon nailing down JA2AT (3870), plus chats with KP6AA (3990), KS4AD (3855), KH6HV (3890) and KH6UA (3860). Gene, himself, crossed off the wanted list ZB1AR (3527), HA5B, HP1BR and ZS6DW to make it 60 even on the band. . . . People awaiting ZS3D's QSL had better untwiddle their thumbs, says W2QHH. A letter to Howy from ZS3D asserts that the latter knows of no past S.W.A. activity on 80 for some time past, least of all himself. W2QHH recently had his WAS endorsed for four bands and his 6L6 now has accounted for 50 3.5-Mc. countries. . . . FA8BG presented VE7HC with that last continent for another West Coast WAC. FA8BG, by the way, looks for contacts on voice during week ends, using 3600 kc. . . . Among other catches, W4ONX worked TG9JK, ZSs 2G, 6DW and YV4AW while W4CVM adds

KV4AA, HC1JB, KP6AB, TI2FG, ZLs 1CI, 1HM and VK5KO. . . . JA2KG, KG6DI, LU3EL, G2EC, OX3BC and an FA8 netted W0CFB a fast WAC during the Test. Other victims: KW6AP, TI2KP, VK2s EO, QL, RA and ZL2ACV. . . . W9AND made it a Big Six through JA3AA (3606) and also KW6AP (3505), VO6A, VP2LX (3518) plus others.

Forty has simmered down a bit but W6ZGY wrapped up WILBW/C1 (7040), UA0FB (7032), W8SIR/KG6 (7030), HR1AT (7095), YV5AL (7023), ZS1M (7053), ZS2G (7033) and SM2AWG. . . . W2YZG's 50-watter crept onto KV4AA, HK6CR, VP2AA, VP9CC, GD3UB, EA5CG and ZL2MM while W2WWP recommends IS1AHK, HK3CT, TI2EXO, ZC8PM, FA8BA, FT4BA and SU1CR, all close to the low edge. . . . KS4AD (7282), VP6CDI (7038) and TI2AM (7023) wound up in W8YGR's log and VE3OY scored with EL7A (7090). . . . 25 watts at W7MGO knocked off the ZL/VK gang with ease, interspersed with folks like VR2AM, HC1JB, UA0FB and JA2AZ. . . . W2RDK passes by the easy ones for CR7IZ (7036), UQ2AB (7020), UR2KAE (7012), VP3ACS (7050), ZC6UNJ (7001), VS6AZ (7015), EL3A (7080), KG6DI (7040), CP1AQ (7004) and CR9AG (7010). This makes Charlie's whopping 7-Mc. total 126 countries! The V86 appeared out of nowhere around midnight and has him somewhat dubious. . . . W4MPF must remember his high-school Spanish since his latest novel



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

twist is the working of Cuban 'phones COSWM, CO5FL and CO8CA as well as HA4SA, FMSAD, PZ1WX, PZ1OY, ZS2A, FASIH, TI2DL and OX3BC. . . . . A tip from W4BRB states that a new VP5 is ready to open up on 7010 kc. So what? Nothing much; he's just in the Caymans, that's all!

*Twenty*, hangout of the original Pyramid Club [Guess who's on the bottom. — *Jeeves*], has been turning out its usual quota of eye-poppers. W2GUR clipped HZ1HZ (14,000), PK4DA (14,071), YK1AF (VFO), TA3GVU (14,094), ZC1CL (14,094), FF8GP (14,058), VU2CR (14,060), ZS3B (14,110), W0MCF/C3 (VFO) and U8KAA (14,038 t7). . . . . W9TJ slapped the bug around for W6YNK/HS1 (14,061), VK9NR (14,017), VS9AL (14,071), ZC4AB (14,034), HZ1AB (14,064), VK1VU (14,016) and VS1CX (14,182) while W4IUO lists CN8MZ (14,047), EL3A (14,060), FESAB (14,020), HA5B (14,100), OE1FF (14,058), OQ5QF (14,070), TF3SF (14,055) and W8SIR/KG6 (14,012). . . . . W2TXB forsook A3 for a while and came up with ZC4AC (14,080 t7) and three 4X4s, and W2EMW hooked UO5AC (14,000), W0HWI/KS6 (14,020), MI3ZZ (14,115), KC6EA (14,110), YK1AB (14,030), 4X4BX (14,105) and FK8AB (14,005). . . . . Hooking his 7-watt VFO to a half-wave vertical enabled W4IYT to raise VP1AA, KV4AA, HE3L, PZ1FM, VP4TT, YS1ZG, TI2DL and umpteen VK/ZLs. . . . . W4MR managed VR5PL, ZM6AF, FO8AC, CP1AQ and the questionable ZA5AC, and W9AND collared JA3AA, VR51P, GC5OU, YK9WL, C4RK, C1JH, UA9KOG, UA9KCA, UA0VB, VR2BH and CT3AV. . . . . Needing 10 more cards for the honor roll, W6BIL dallied with OQ5s BQ, QF, RA, CR7AY, VU2DF, KM6AJ and UA9CC. George writes of an additional Swedish prefix as used by SK5EC and is busily stalking YU7RO (14,001). . . . .

W5VT employs a "haywire" Windom job with a 200-foot feeder, yet chats amiably with UA3AC, OE1AD, GD3-UB, FO8AC and PZ1WX. . . . . Lamenting the difficulties of QRP in this modern era, W7WEN owns up to W6ZNT/KW6, HP1LP (14,030), KX6-AF (14,039), VR2BD (14,074), CR7BC (14,070) and more juicys besides; not bad for 40 watts. . . . . Local-competitor W9DGA awaits QSLs from CR7AP (14,140), CT1JS (14,090), VK9GW (14,000), FT4AJ (14,080), GM3ANO/-VP5 (14,022), UC2CB (14,090), UB5BK (14,045), EA6AZ in the Balearics (14,075) and HA4SA (14,060).

In the A3 department, W9TJ spent a little time down by the station early in the morning with AC4RF (14,022.5) whose 10-watter is powered by a vibrator supply. AC4RF's operating hours — as

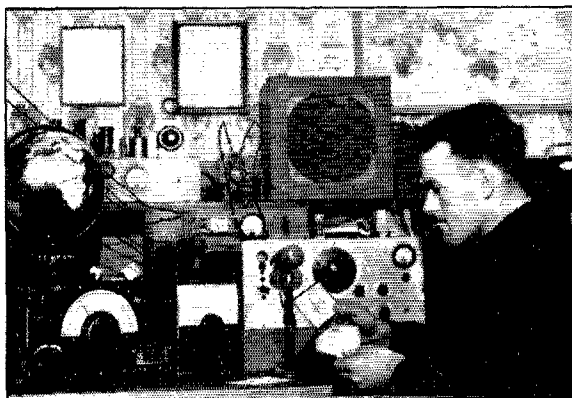
concluded in by W9GA — are usually between 1200 to 1500 GCT. Other W9TJ 'phone items: VU7AF (14,304), AP2F (14,142), EA8CO (14,196), ZM6AF (14,315), ZK1AE (14,136), CIDH (14,322), VS7NX (14,396), XZ2KN (14,352), MD4BPC (14,064), PK4DA (14,309), VR3A on Fanning and YK1AB (14,346). . . . . W9RBI adds VR3C and PY4RJ denotes communication with EA2BL, HC1PZ, ZS5FN, KG6AD and a J for a fast WAC. . . . . At W4IUO we find GD6IA (14,370), HP1ME (14,300), HH2MF (14,140), MI3SC (14,305) and VE8RD (14,320). . . . . XE1AC's quality choices feature EA9AI (14,400), YK1AA (14,350), ZC1AZ (14,349), UB5KAG (14,230), FT4AT (14,375), AR8BC (14,348), FQ8SN (14,396), VU2CU (14,185), ZD4AB (14,332), ZD1PW (14,345) and CR9AG (14,186).

So far as *ten* is concerned, W9AND satisfied himself with ZD2S, ZA4F (28,050), I1DI/Trieste, VQ8AD, GD3UB, IS1AFM, ZD4AU, LX1AC, OQ5CH, HA5B, UR2KAE and a helping of JAs. Wes hit 27 Mc. for TA3GVU, too. . . . . W3MDE found TA3GVU on 28,000, plus TF3SF (28,035) and CP5FB (28,440 f). . . . . VR3A (28,092), FO8AB (28,192) and KJ6AF (29,384) were located by W9TJ on voice while W1DYV's microphone manipulating resulted in KR6AD, MB9BN, MF2AA, MT2E, EL6A, VP2KM, OQ5TP, VQ4SC, PZ1M and JA2s AN, AZ, BO and RO.

**Where:**

Add Spanish bureaus: EA5, Box 3, Valencia. . . . . W2NFR/W2CAA have been doing an excellent job handling cards for some of the OE gang as have other Ws who volunteered their services. When in doubt as to where to send *any* OE QSL ship same to ARRL Hq. for handling.

(Continued on page 96)



J. "Mac" Ferrier, VK3MC, needs no introduction to most of the DX gang. He's liable to be found on almost any band, 'phone or c.w. At this particular moment he can be seen in the envious occupation of inspecting a QSL from AC1YN.

# V.H.F. QSO Party

June 4th-5th

## Certificates for Leaders

ARRL is pleased to announce another of its popular V.H.F. QSO Parties. This is an invitation to all amateurs who can work any or all v.h.f. bands (50 Mc. or above) to use 'phone, m.c.w. or c.w. between 2 P.M. local standard time (EST, CST, MST, PST) Saturday, June 4th, and midnight local standard time Sunday, June 5th. Give it a fair try; see what stations *can* be worked, what v.h.f. DX is possible. States for WAS, a test for new antennas and gear, and a renewal of friendships in the v.h.f. circle are all possible through participation. Don't miss out. Mark your calendar today.

### How To Take Part

Use "CQ contest" to get in touch with other contestants. Exchanging signal-strength and readability reports is suggested but not required. When you work another v.h.f. amateur, you must give him the name of your ARRL section. Page 6 of this issue is a register of the League field-organization set-up, and serves as a convenient section check-off list. You compete only with amateurs in your own ARRL section for the certificate award. ARRL staff members are not eligible for awards.

Count 1 point for successfully-confirmed two-way exchanges of section information on 2 or 6 meters. A one-way exchange, confirmed, does *not* count. When two-way exchanges are accomplished with your transmitter on the 220-, 420-, 1215-Mc. or higher band, you may record 5 points per QSO.

### Multiplier

The sum of station points earned is multiplied by a section multiplier. Each time a new section is worked two-way it adds one to the multiplier. *The multiplier grows by one if you rework this same section on another band.* This scoring differs from other kinds of League competitions to encourage everyone to make use of *as many* v.h.f. bands as possible. A simple tabulation with points is all that is required. *QST* of one year ago shows a sample form or drop a card to Headquarters for a mimeographed form.

### Rules

- 1) Name-of-section exchanges must be acknowledged by both operators before either may claim the point(s).
- 2) All claimed contacts must fall in the contest period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation.
- 3) Contest score must represent points earned from operation exclusively within a given ARRL section.
- 4) Fixed-, portable- or mobile-station operation under one call and by one operator is permitted.

(Continued on page 100)

# TVI Patterns

On the next two pages you will find a series of photographs showing what happens on a television screen when a near-by amateur 28-Mc. transmitter opens up — and what *doesn't* happen when adequate preventive measures are taken. These pictures, taken by Phil Rand, WIDBM, are arranged in four columns of six each. Each column shows, in order, the effect on the six New York TV channels (2, 4, 5, 7, 11, 13). The ham transmitter was a 50-watt affair on 28.5 Mc., installed in the same building as the TV receiver.

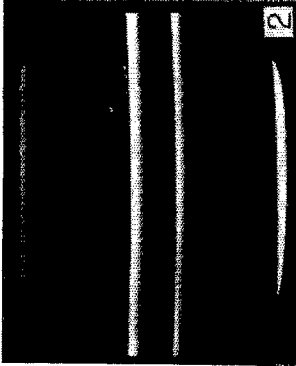
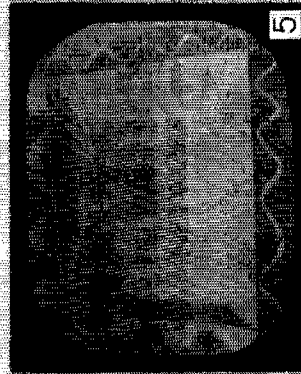
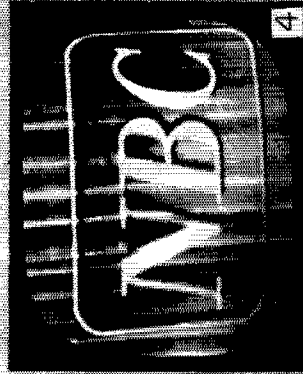
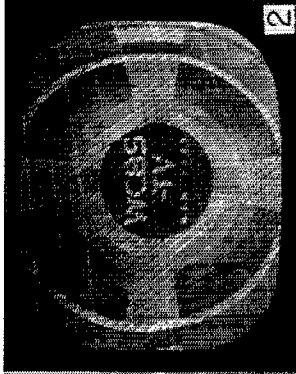
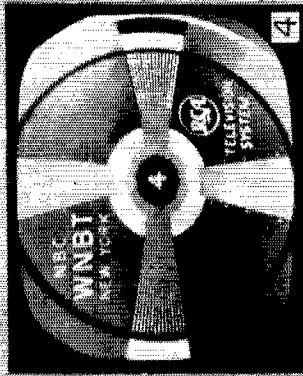
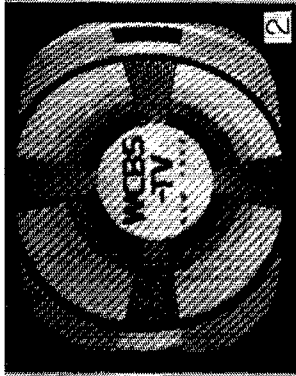
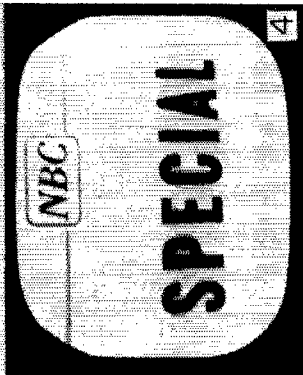
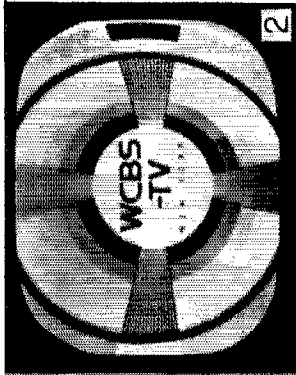
In the first column, nothing had been done to either the transmitter or receiver to prevent interference. Both transmitter harmonics and receiver overloading are responsible for these patterns. The heavy black-and-white horizontal bars are "modulation bars" caused by amplitude modulation of the transmitter. In some of the pictures it is possible to see "cross-hatching," caused by a beat between the TV carrier and a radio frequency — usually a harmonic.

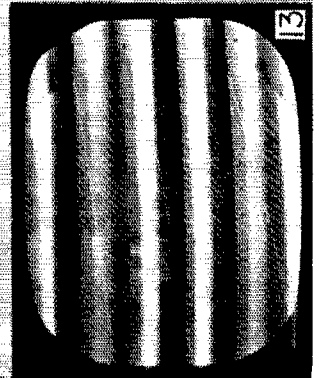
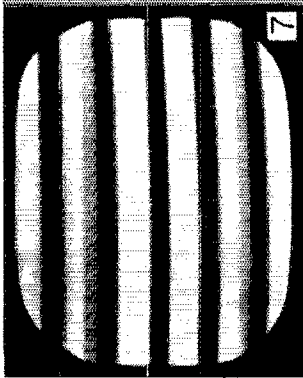
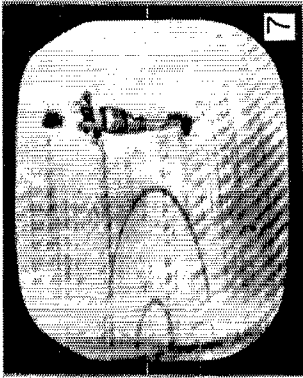
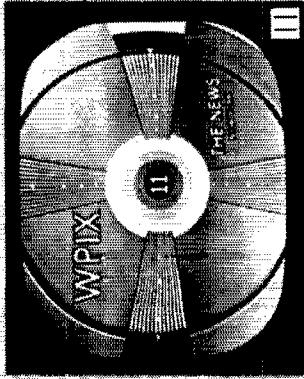
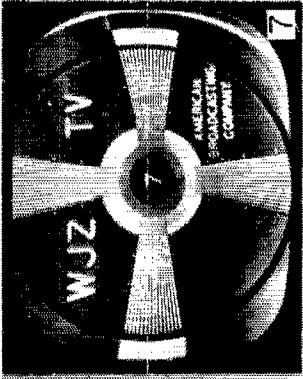
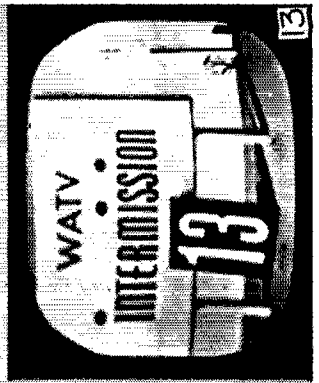
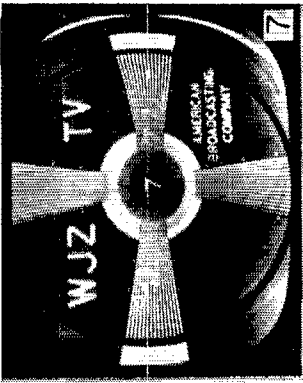
In the second column a high-pass filter had been installed in the TV receiver's antenna lead-in to prevent overloading and a filter had been connected in the a.c. line to the receiver. The remaining interference is caused principally by transmitter harmonics. The second harmonic, falling in Channel 2, is naturally the worst. A rather faint cross-hatching is visible in Channel 11 (the only other channel in which a harmonic actually falls) in the original photograph, but probably will not be discernible in the reproduction. Two other channels, 5 and 7, do show interference, but in these cases it is chargeable to the receiver as well as the transmitter.

The third column shows the result of installing an antenna coupler, harmonic traps in the plate circuit, some shielding around the transmitter, and harmonic filters in the supply leads. Channel 2 is the only one in which there is any visible interference, and in this channel it has been reduced to the point where the cross-hatching is simply superimposed on the transmitted picture without affecting the picture quality. The transmitter was modulated with narrow-band f.m. in this case; with this type of modulation the modulation bars do not appear.

The pictures in the fourth column show the effect of further cleaning up in the transmitter. Additional shielding and lead filtering, plus harmonic traps in the plate circuits of the buffer amplifier and last doubler, have reduced the harmonic radiation to the point where there is no longer any interference in Channel 2. The transmitter was amplitude-modulated while the pictures in this column were being taken.

Show these pictures, particularly the first two columns, to your neighboring TV set owner if he insists that TVI is entirely your fault. — G. G.





## High-Pass Filters for TVI Reduction

WHEN the television receiver and amateur transmitter are quite close to each other, the most serious cause of TVI may be simple overloading of the receiver's front end by the fundamental output of the transmitter. There is nothing that can be done about this at the transmitter, but something can be done at the receiver to prevent so much fundamental from getting into it. Trap circuits tuned to the fundamental, inserted in the antenna leads at the receiver, usually will do the trick. However, traps are selective devices and so cease to be effective when operations are shifted to another band, or even to a new frequency in the same band.

A more generally-useful fundamental suppressor is a high-pass filter. If the cut-off frequency is chosen somewhere below the lowest TV frequency, but higher than 30 Mc., an ideal filter would pass all the TV signals without attenuation but would greatly reduce the strength of signals below the cut-off frequency. The filters shown in the accompanying diagrams have been found from experience to do just that. They can be made up in a few minutes from parts that, if not already in the junk box, cost very little.

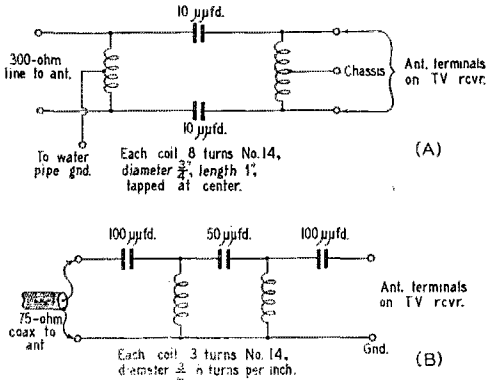


Fig. 1 — High-pass filters for installation at the TV receiver antenna terminals. A — balanced filter for 300-ohm line, B — for 75-ohm coaxial line. **Important:** Do not use a direct ground on an a.c.-d.c. chassis. Ground through a 0.001- $\mu$ fd. mica condenser.

Fig. 1 shows two filter circuits used successfully by Robert M. Morris, W2LV. The circuit at A is for receiver installations using 300-ohm Twin-Lead; that at B is for 75-ohm coax. In both types the cut-off frequency is approximately 50 Mc. W2LV writes: "The coils and condensers can be mounted on two small three-lug mountings of the type used as terminal strips inside a chassis. The only thing particularly critical in the use of the filter is to mount it very close to or on the television-receiver chassis and to use a very short

connection between the coil center-tap and the chassis of the set. This gadget was devised as a result of a complaint from one of my neighbors which indicated that he was getting cross-modulation from my kilowatt on 4 Mc. There was no interference so long as the transmitter was not modulated, but modulation caused horizontal lines similar to a variable-density sound track on a motion-picture film, and also could be heard in the sound channel. Application of the filter to

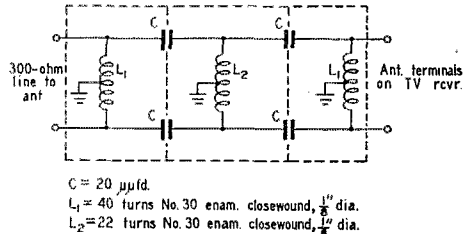


Fig. 2 — Another type of high-pass filter for 300-ohm line. The coils may be wound on  $\frac{1}{8}$ -inch diameter plastic knitting needles. **Important:** Do not use a direct ground on an a.c.-d.c. chassis. Ground through a 0.001- $\mu$ fd. mica condenser.

the receiver completely eliminated the interference. It also reduced some interference visible on all channels which apparently was coming into the receiver as intermediate-frequency radiation in the 21–27 Mc. band from other television receivers.

"This unit was also tried by W2BZR on a receiver in his 40-family apartment house. The result was complete elimination of interference on all channels except Channel 2, from his 10-meter transmitter.

"I have not measured the attenuation of this filter, but based on S-meter readings in a communications receiver I believe it has approximately 40 db. attenuation at 4 Mc. and 12 to 14 db. attenuation at 30 Mc."

The filter shown in Fig. 2, devised by Stanley P. Bird, W2JHE, is a two-section arrangement designed for balanced 300-ohm input. It should also be installed as close as possible to the receiver input terminals. W2JHE's filter is built in a box  $1\frac{1}{2}$  inches square at the end and 3 inches long, formed from thin copper sheet. The box is divided into three sections by two  $1\frac{1}{2}$ -inch-square copper partitions. Each coil is in a separate section, with its center-tap soldered to the copper wall. The condensers, 20- $\mu$ fd. ceramic units, are mounted in holes of slightly larger diameter in each partition so that the leads at one end connect to the coil in one section and the leads at the other end connect to the coil in the next. The box should be connected to the receiver chassis. Information on W2JHE's filter came to us via W1DBM, who built one according to these specifications and found it to work very well.

(Continued on page 100)





# The World Above 50 Mc.



CONDUCTED BY E. P. TILTON,\* W1HDQ

**T**HE month of March, blustery interval between winter and spring, always carries at least a hint of better things to come, whether one is interested in the turn of the weather or v.h.f. propagation. After months of creeping along close to the minimum of operating ranges, we get a big lift out of the extended coverage which comes along coincidentally with the first mild weather. The refreshing smell of spring in the air and the thrill of hearing those signals begin to roll in from 200 miles and more are companion pleasures for the v.h.f. enthusiast.

This March seemed to outdo its predecessors in stirring the v.h.f. urge in the minds of those who had deserted 6 and 2 for lower frequencies during the winter months, and it rewarded the faithful richly for having stuck by their guns. Spring and the sporadic-E season arrived almost simultaneously for the 50-Mc. men, an opening the 20th being one of the best ever experienced at this season of the year. In the mild weather that followed in the next few days the 144-Mc. gang had their innings, tropospheric propagation bringing in signals that had been heard all too seldom during the colder weather.

The generally poor quality of the 50-Mc. sporadic-E openings during the 1948 season had many of us wondering whether we were not in for a period of infrequent and erratic skip sessions this year too. The spring and summer of 1947, just before the solar-activity peak, had been extraordinarily good, and the big drop right after the passing of the top of the cycle, in 1948, looked bad. The 1949 season appears promising, however; the 50-Mc. openings so far have been fairly frequent and widespread; more so than in any corresponding period in our experience. Maybe it was just that there are more fellows active in the right places, but the fact remains that a lot of 50-Mc. DX was worked during March.

Quite a few fellows boosted their states-worked totals, and the advent of two stations, W4CPZ and W4KYW, in South Carolina put W9QUV, Moline, Illinois, into the exclusive group who have worked all 48 states on 50 Mc. If Ivan gets his cards in before someone else makes it he's in line for 50-Mc. WAS Award No. 2, W9ZHB never having submitted a claim. This South Carolina activity also enabled W0QIN, W0BJV and W0DZM to climb into the 47-worked spot.

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

They now need only Nevada, Nebraska and Montana respectively for the Grand Slam.

## Here and There on 6 and 2

*Clacton, Essex, England* — Amateur operation in the region between 29.7 and 145 Mc. was scheduled to cease on March 31st, when the Atlantic City assignments became effective. This did not keep G6DH from taking advantage of a fine 50-Mc. opening to South Africa on the 30th and 31st. ZS1P and ZS1AX were worked on both days in openings of nearly four hours duration.

*West Palm Beach, Fla.* — The prize for the most elements in a 50-Mc. array goes to W4IUJ, who is using four half waves in phase, with reflectors, and two sets of directors; count 'em — 16! It must be doing all right, too, for Glenn had the 6-meter band all to himself for a couple of hours on the morning of March 19th, during which he worked just about every station that was on the band in the northeastern part of the country.

*Minneapolis, Minn.* — This low-end business is being carried too far, according to W0TKX. Bob says that he was able to make contacts with his 51.066-Mc. frequency only when W0QIN asked DX stations to look for him. Let's tune the band and give those courageous souls who operate above 51 Mc. a break!

*Heard Island, South Indian Ocean* — VK1FE (see this department in April QST) reports reception of the 50-Mc. signals of VK4BT, Brisbane, Australia, a distance of some 4500 miles, in early February. Unfortunately, no 50-Mc. rig was on the air at the time. This information comes by way of VK3UM and W1ME.

*Wauwatosa, Wis.* — Aurora contacts were plentiful during March, if the log of W9IZQ is any indication. George had contacts on c.w. by means of aurora reflection on the 6th, 13th and 21st, and worked a flock of W4s and 5s during the E<sub>s</sub> opening of the 20th. On the 21st W2, 3, 4, VE2, VE3, W8, 9 and 0 were heard via aurora.

*Guayaquil, Ecuador* — March was the best month so far for HC2OT. Steve got in 64 contacts on 50 Mc. up to the 26th. The band was open to U.S.A. on the 20th, 21st and 26th, when W5s SM, VY, EEX, HVP, OTU, BAJ, JTI, VY, W6AMD and W0UEL were worked. The latter two, California and Colorado, were new states, bringing Steve's total to 15, and they leave him with only

W3 needed for WACA. Not bad for a fellow whose nearest point in the States is more than 2000 miles distant! Mexico was worked 14 nights between the 5th and 25th, the XE list now including 1KE, 1QE, 1GE, 1FU, 1A, 1PA, 2C and 2FC. YV5AC, Caracas, Venezuela, was contacted 10 times from the 4th to the 25th. The band was open to Argentina on the 4th, 7th and 25th, contacts being made with LUs 9DJU, 4BJ, 5DJH, 5CK, 6DO and 9MA. CE1AH was also worked on the 25th.

*Lakeview, Ontario* — The 50-Mc. band was open from 8:45 to 1 A.M. the night of the 20th for VE3ANY, with W5s in Oklahoma, Louisiana and Mississippi holding the center of the stage. XE2C, Monterrey, Mexico, was heard and called, but no contact was made. Would this have been the first XE-VE 50-Mc. QSO? It was aurora the next night, from 8:45 to 11 P.M., and WØNFM, W1CLS, W1CGY, W2MEU, W2AMJ and W8LHV were worked. Three of these contacts were made on voice.

*Atlanta, Ga.* — The opening of the 20th was unusual in that the sporadic-E cloud seemed to be almost stationary for the 3½ hours that the band was open for W4LNG. Wisconsin, Minnesota, North and South Dakota, Illinois, Michigan and Tennessee were worked, with little change in area noticeable from opening to closing.

This same effect was noticeable in W1-land. We were hearing Oklahoma, Missouri and Kansas steadily throughout the whole period, though it seemed that New England was on the far edge of it all, and the W2s and 3s were doing better than we were.

*Horsham, Australia* — Reception of the 50-Mc. signals of W5VY and W7QAP is reported by VK3TA, via W2IQQ. No details are yet available, so this remains in the unconfirmed category for the present.

*Oakland, Calif.* — Though he has 600 watts and a 3-element array, W6VDG finds it difficult to make DX contacts on 50 Mc. Can this be because he is using only c.w.? We hate to believe it, but we've had some trouble making contacts on c.w. here, too. Actually it should be the other way around, as it has been proven that c.w. has a 17-db. advantage over voice. If more fellows would dig down for weak c.w. sigs, and more of us would use c.w. when the band is open (or suspected to be), the full DX potentialities of 50 Mc. would be much better realized. Let's use that control marked "BFO" — it's a mighty handy accessory! The same goes for 144 Mc., too — and perhaps even more so.

*Oil City, La.* — M.u.f. checks were run daily by W5ML during March. Most days it didn't get much over 42 Mc., but on the 18th it looked good. Signals were heard up to 48 Mc. as early as 8:45 A.M., and commercial harmonics and diathermy were heard up to 50.8 Mc. around 9:20. The band was apparently open until after 10 A.M., but no

contacts were made. The evening openings of the 19th and 20th produced results, however. Art reports that W5s DXB, NXM, GRY, LAX and ML are now equipped for 144-Mc. work, and will be in there if and when the band opens for long-haul work.

*Brownsville, Texas* — W5KSW reports 50 Mc. open on the 9th, 19th, 20th, 21st, 22nd, 26th and 27th. HC2OT and HC1JW were worked on the 20th. W5BAJ and W5CXS also worked HC2OT, and the band was open to various points in the States at the same time. HC2OT was heard by W5PKX on the 21st, and by W5KSW on the 22nd. The 26th provided QSOs with OA4AE, HC1JW, HC2OT and LU9EV, and YV5AC was heard. LU9MA was worked on the 27th, and HC2OT, LU9EV and YV5AC were heard. All these South American openings except the one to OA4AE were evening affairs, mostly between 8 and 9 P.M. CST, though HC2OT has been heard as late as 11:10. The OA4AE contacts were made in early afternoon.

*Jackson, Miss.* — A v.h.f. program is being planned for the Jackson Amateur Radio Club Hamfest on May 28th and 29th, according to W5JTI. Tim says that W5s NLP, ITL, EYY, FFF and NYH are now on 2. W5NYH is on both 6 and 2, and is consistently workable over the 50 miles from Lexington to Jackson. Signals are best on 2. W5JTI has 200 watts and a 16-element horizontal array on 2, and knowing how he has gone to town on 50 Mc. we freely predict 2-meter DX contacts with Mississippi in the near future.

*Jacksonville, Fla.* — If anyone has any good dope on noise generators for 6- and 2-meter work, W4EID would like to hear about it. Miles has been trying to measure noise figures on 6- and 2-meter converters, but without too much success to date. He is still hoping to work some real DX on 144 Mc., and will be in there trying until July, when he will be leaving Florida.

*Rochester, N. Y.* — W2NES advises that W1, 3 and 9 signals have been heard on 144 Mc. recently in this area, and he asks that fellows aim in that direction when conditions are good. Horizontally-polarized stations are asked to look for western W2 and VE3 signals between 7 and 8 P.M. Fridays.

*Red Bank, N. J.* — The Monmouth County Radio Amateur Emergency Corps has 31 stations in its 2-meter net. Drills are held each Monday night at 9 P.M. Coördinator is Lloyd Manamon, W2VQR. A station maintained at the County Red Cross Headquarters at Shrewsbury is in operation each drill night, manned by a different pair of operators each time. Once a month the net has a personal get-together. The control channel for the drills is 146 Mc., and three other frequencies, 145.31, 145.8 and 145.92 Mc., are employed.

*Columbus, Ohio* — The Franklin County Emergency Net is now in full swing, operating each

Monday and Saturday at 8 P.M., on 148.34 Mc. Members of the net include W8s WXM, ICV, UZ, BAX, LQK, CDA, KVV, VHO, ABO and WRN.

*Chicago, Ill.* — The Midwest V.H.F. Club is now laying plans for its 2nd Annual Picnic, to be held Sunday, July 31st, at Thatcher Woods, on the outskirts of Chicago. There will be transmitters in operation on 10, 6, 2 and 1¼ meters, and activities are being scheduled for the whole family. Admission is one dollar for adults, with children under 12 admitted free. It is hoped to make this the biggest v.h.f. gathering ever held. Further information can be obtained from Melvin Mendelsohn, W9OBW, 4644 W. Adams St., Chicago. The club now has a permanent meeting place at Humbolt Park, with facilities for station and antennas now under construction, and they will soon be on the air with a club call.

### The Polarization Argument — Our Last Word!

"Let's get this polarization situation straightened out — but soon!" This is the substance of scores of letters recently received at Headquarters. It was also the comment this writer heard most frequently on a four-day trip in W2-land, during which we had an opportunity to talk with hundreds of hams in one of the country's hottest v.h.f. areas. Swell idea — but unfortunately "straightening out" the polarization situation means different things to different people. To what is undoubtedly a major portion of the 2-meter operators presently active, it means standardization on vertical antennas; but to equally determined groups in the Middle West and elsewhere a shift to horizontal is the only answer. Both parties seem to think that all that is needed is for ARRL to take a stand one way or the other — but each feels that it should be according to his personal preference!

At the risk of being repetitious, let's go back over the arguments for each once more, to see if either side carries more weight in logic. For horizontal, it may be said that: (1) It has a lower response to most forms of man-made noise. (2) Simple parasitic arrays are more effective in a horizontal position. (3) High-gain horizontal arrays are generally simpler mechanically. (4) Horizontal arrays look better, especially when combined with other horizontal systems for lower frequencies on the same rotating structure. (5) General use of horizontal permits use of multi-band antennas (rhombics, Vs, long wires, etc.) designed for lower bands.

The following arguments for vertical may be accepted as valid: (1) Because a dipole has two nulls, off its ends, a vertical dipole is as effective in all directions as a horizontal one is in its two best directions. (2) Nondirectional qualities of the vertical dipole are useful in heavily-populated areas, and in station locations where remotely-controlled rotary arrays are not practical. (3) Vertical favors the mobile station. (4) Gain, without directivity, is readily obtainable. (5) A fixed radiator may be employed, rotating only the parasitic elements. (6) Vertical polarization offers a 20-db. headstart in licking TVI (and FMI) in instances where interference is caused by the fundamental radiation, as picked up by the TV (or f.m.) antenna.

The big question, which up to now has never been satisfactorily answered, has been whether either polarization offers any real advantage in working over the long indirect paths in which amateurs are most interested. It has been in the hope of finding the answer that we have urged Eastern stations to try horizontal experimentally. Up to recent months a provable answer to that one would have swung the balance one way or

(Continued on page 100)

### 2-Meter Standings

	States	Call Areas	Miles
W8UKS	14	7	
W8WJC	14	6	
W2NGA	13	5 plus VE1	
W8WXV	13	-	
W8CYE	12	6	
W8NFM	12	6	
W3KUX	12	5	575
W1BCN	12	4 plus VE1	
W1PIV	12	4 plus VE1	
W2NLY	12	4 plus VE1	515
W4FBJ	11	5	500
W3PGV	11	5	
W3RUE	11	5	
W2DPB	11	5	
W2QNZ	11	5	
W2BAV	11	4 plus VE1	400
W2WLY	11	4 plus VE1	400
W9JMS	10	5	
W3GV	9	6	660
W8IFB	9	6	
W3BLF	9	5	
W3HB	9	5	
W9AB	9	6	
W8WRN	9	5	
W2PJA	9	4	
W1BDF/1	9	3 plus VE1	
W1HDQ	9	3 plus VE1	480
W1CTW	9	3 plus VE1	
W1JMU	9	3	
W1OOP	9	3	
W4AJA	8	4	
W3KWU	8	4	
W8HAQ	8	-	
W1QXE	8	2	
W8WGG	7	4	660
W9NFK	7	4	
W8DIV	6	4 plus VE3	
W8RDZ	6	4 plus VE3	330
W8BZE	6	3	
W8GOK	6	-	
VE3AIB	5	4 plus VE3	
W4KKG	5	-	
W9OBW	5	2	
W8HXY	5	2	
W8JHS	4	2	
W8KPK	3	2	
W5JLY	1	1	275



# Correspondence From Members -

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

## WRITE YOUR DIRECTOR

[The following letters touch upon subjects which may be among those discussed at the annual meeting of the Board of Directors. As only the Board may establish League policy in such matters, you are urged to write to your division director concerning these or similar topics pertaining to amateur radio. He will appreciate your comments, criticisms and suggestions. The Board meeting will be held May 27th, so don't delay — write your director today. You'll find his address on page 8. — Ed.]

Blackhawk Park, Chicago 39, Illinois

Editor, *QST*:

With the possibility of the 160-meter band reopening, it has been decided that our club go on record to limit our power voluntarily to a 50-watt maximum in congested areas, due to the limited frequency bands allowed, and also to cut BCI.

In prewar days on the old 160-meter band both coasts could be worked from Chicago with low power, when conditions were good. And with the equipment that has been developed since those prewar days, low-power operation will give a few more hams a chance to operate the good old 160-meter band.

Any old timer will tell you how 3 or 4 half-kw. rigs could take out the whole prewar band so with the 25-ke. segments that are now proposed to us, it is only logical that we cut our power to a bare minimum for the survival of the 160-meter band and ham radio.

— Arnold H. Müller, W9KXD, Secretary  
Chicago Amateur Radio Club

3 Stadium Place, Allston 34, Mass.

Editor, *QST*:

In the spirit of true ham radio, "for the advancement of the radio art and of public welfare, etc.," I think the 160-meter band should be restricted to the use of single sideband. Otherwise it will revert to its prewar days of overmodulation, etc.; much of this exists on the 75-meter 'phone band today. Why repeat?

— Sidney V. Stadig, W1IVI

411 Court St., Janesville, Wis.

Editor, *QST*:

I have heard rumors that the ARRL is requesting the 160-meter band to be limited to Class A operators only. I hope this is not so [T'aint so. — Ed.], but if it is true I hereby enter a very loud and long yell of rebellion.

It seems to me that the Class B boys have been shoved around long enough and that it is about time they were getting the break they deserve. Also, in the interest of lessened TVI it would seem to me to be most expedient to allow some form of 'phone operation for the majority of hams away from the TVI-infested bands of 10 and 6 which are the only heavily-populated bands open to Class B ops. . . .

— Edward B. Harmon, W9SGG

Stanton, Nebr.

Editor, *QST*:

Let's have our proposed 160-meter band for an emergency system with a power limitation of 50 watts. Let's give our portable equipment a chance and furnish an incentive for a larger number of hams to build low-powered rigs so that in the advent of an emergency more outlets will be available.

— Willis B. Hoehne, W9ZUT

2366 Caspian Ave., Long Beach, Calif.

Editor, *QST*:

. . . TVI can be eliminated.

We are running too much power. I think the best thing that could happen to the amateurs is for the FCC to cut the maximum power allowable to 200 watts. I use 500 watts to override the QRM consisting of key clicks, lousy signals, and the boys having parallel-push-pull 250TH finals with a bandwidth five times wider than necessary. If everyone would cut down on power the QRM would be less, and we wouldn't need that gallon final. Power is no substitute for good engineering practices, even though a lot of fellows think so. . . .

— J. R. Gardner, W6DLC

Greenwood, S. C.

Editor, *QST*:

. . . I believe the one big and which may well become a fatal mistake is that no proposal has been offered to the Federal Communications Commission by the League to reduce the power limit of amateur stations. The congestion on all amateur bands has reached the point where a 100% QSO is almost a thing of the past, becoming a dog-eat-dog affair with high power bucking high power. A power limit of 100 watts would hurt no one and certainly help reduce QRM, give every amateur a more equal chance, reduce BCI, TVI, harmonic radiation, and would have an untold number of other advantages. . . .

— Charles M. Sparks, W4KEI

Box 157, Custer, Mont.

Editor, *QST*:

Possibly the most pressing problem confronting the W/VE ham on the frequencies below 30 Mc. is adjacent-signal QRM. It seems to me that single sideband and c.w. could compete on more or less equal footing. I therefore propose that the new 21-Mc. band be opened, on an experimental basis, to W/VE stations and to band-edge-to-band-edge single sideband and c.w. If this does not prove practical, the band could of course be split to segregate the two types of emission. In any case, I do not believe either n.f.m. or carrier-emitted A3 should be allowed in the new 15-meter band.

— A. H. Mehner, W7DOS

335 No. 2nd St., Tipp City, Ohio

Editor, *QST*:

. . . When radio was first founded, code transmission was about all that was practical. But as science progressed, 'phone transmissions became so easy that c.w. is about like riding in a one-horse buggy. It is slow and very uninteresting to the average individual of this modern era.

Can you picture airplanes and the control tower using telegraph code and trying to get a number of planes landed? Some of the planes would run out of gas before the control tower could get to them.

I want someone to cite just one good reason why a ham who is going to operate 'phone and "chew the fat" should be compelled to pass even a code test so he can operate. . . .

— G. D. Bettelon, W8MFV

315 Air Div., APO 929, % PM, San Francisco, Calif.

Editor, *QST*:

During the last war, while flying on a bombing mission, I turned my jack box to the long-range radio receiver and listened to the traffic. The mass of QRM from the Jerry-

(Continued on page 104)



# Operating News



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

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

**On Our Use of the Ability To Communicate.** We could have labeled this paragraph "Against the Formula QSO" or "About DX vs. Friendships." It is laudable to know formulas, it is praiseworthy to work DX and to be able to boast about our contest score or countries in amateur gatherings. But these things can become less than desirable if permitted to become a sole, selfish, and all-consuming aim in any amateur life. Amateur radio and the individual too will suffer when any narrow phase of our hobby becomes an obsession so that we do not have enough casual friendly contact with one's own radio neighbors. Such contact, buttressed by traffic handling and local cooperation between hams, has for years maintained the wonderful spirit of amateur radio. QSOs can be most potent in perpetuating amateur fellowship! Or they can mark you as a cut-and-dried operator who is unable to get *beyond* a formula.

It is cold and inhuman to make *every* QSO a "formula." A name or nickname added to an old formula does not keep it from being a formula. Our QSOs are a mirror of ourselves. We can, of course, operate altogether by formula but that is neither the way to cultivate friendships nor progress in knowledge of the technique of amateur radio nor cultivate an appreciation for other bands and other people. Talking a radio-political formula is just as dreary to the average amateur as to limit one's exchange to a swap of RST reports. Soap-box oratory and "broadcasting" are usually narrow perversions of amateur radio and when carried beyond a few chance remarks these things tend to create in many listeners an apathy and distaste. To talk a little about a lot of subjects is a good way to arrive at interesting common interests in amateur radio. Our amateur radio should not be allowed to become less enjoyable or less human than it used to be and it is a personal view that it should not be marred by a lot of talk by people with axes to grind, like unto "commercial" radio. FCC's Sec. 12.106 can help protect us from such!

We have it in our power to make amateur radio anything we wish. By c.w. or voice, let us learn to talk and convey friendly information and ideas; let us make our QSOs more than mere short formulas. More precious than any QSL cards or DX is the ability to communicate. Let our QSOs reflect the helpful attitude toward our

fellow amateurs. All of us ought to be willing to exchange data on our hobbies, families, aims, failures, plans and successes. If opportunity to handle a message or assist in an emergency comes along, cultivate the knowledge that will help us to grasp it. Let us operate well, with correct and uniform procedure and with signals that are self-monitored to suppress thumps, clicks, and spurious radiation that may bother fellow radio workers. It's also time we found out about the whole field of amateur opportunities instead of letting formula QSOs and limited subject matter curtail the richer opportunities for fraternal contact that may benefit our whole amateur lives.

**An Official Observer Observes.** An interesting analysis was recently completed by one official observer on all cooperative notices and responses received in 1948. Mr. Henry Spillner, W2NCY, notes that in *all* instances in which he sent a citation, the amateur concerned was in the process of receiving *from others* both a Readability 5 and Strength 9 report! This, he says, makes *two* parties who are lacking . . . one without ability or sense to monitor his own signal, the other open to indictment for not recognizing or giving data on a poor signal.

W2NCY writes:

There are enough good signals around to establish a yardstick in the minds of the gang as to what should constitute a good 1949-model signal. FCC regs state that emitted signals shall be as free from spurious radiation as the state of the art permits. Section 12.133 identifies spurious radiations as including key clicks, modulation products, transient effects and parasitic oscillation and further states that the frequency of emitted signals shall be as constant as the state of the art permits.

To recognize a bad signal and then *not* let the other fellow know he has it is a bonehead practice, surely not in the amateur spirit. Any fellow *would like to know* if you or others think he has a poor signal. Many articles are now being presented on the elimination of television interference, mostly directed to 'phone transmitters. Class C stages, r.f. drivers and associated gear, self-oscillation, parasitics, etc., are mentioned. Too many pass this up as part of "the 'phone man's headache." *Pellas, this goes for the brass-pounders, too.*

Re "local" clicks: The theory advanced by certain amateurs that clicks get out in near-by localities *only* has no true engineering basis. If one has a click he has a *click*, local or DX. FCC requires that you shall operate your station in a manner that does not interfere on reasonably-selective receiving equipment in other stations. *About chirp*, the trade name for a frequency shift. FCC requires frequency stability and believe me, we have not tried to split hairs in OO work. We have cited only "chirpers" that you have to follow with the VFO all the time, and their numbers seem to be legion. To say they cause additional QRM on adjacent

channels goes without saying. All amateurs can do much to help cure this condition, also showing others they have the ham spirit simply by telling the fellows that have defects in their signal about it.

The parasites crew are as numerous as the rest. A few operators you tell about this would like to indicate this an exclusive trouble of 'phone rigs. Not so! Where a rig is keyed with cut-off stages following a driver some amateurs have never checked for parasites. Some do not know what to look for. When a VFO is moved too far off the amplifier tuning and conditions for spurious oscillation exist, these parasites will start and cause a heck of a racket on adjacent channels. Many times two receivers are required to track down that "squoshy" stuff you hear. One may have to tune hundreds of kilocycles away before the parasite can be matched to the keyed signal.

All amateurs, please let all these fellows you hear know what you observe. I can prove, in every case, that the amateur would much rather hear the worst from you than to hear from the FCC. You yourself decry inaccurate reports and value honest helpful reports; give frank, honest reports to all amateurs.

**Voice-Operating Technique.** In using voice, as in c.w. communication, fills and repeats are a necessary evil. The necessity for repeats can be minimized by putting into effect some of the precepts set down on the reverse of CD Operating Aid No. 1. To communicate intelligence requires some concentration by the receiving operator, more than is involved in listening to a musical-broadcast background. When you are on the air you owe it to the person taking time to talk to you to concentrate on what he has to say. A scratch pad is useful for note taking, especially on long contacts.

As transmitting operator you can do much to put over your subject by using good phraseology, complete but concise thoughts, by speaking slowly, and by developing points systematically instead of jumping around to different disconnected ideas. Voice contacts are capable of conveying intelligence speedily, excelling other modes in speed for conference purposes. But to vie with c.w. for handling record traffic, as in emergencies for example, more systematic practice in daily record communication work by a greater number of 'phone operators would be advantageous. Another factor, not named in our Operating Aid, becomes important in handling messages (record traffic). That is, the procedure or order of the parts of a message should always be sent in the same sequence. Number identification (put on by originator), call (of originating station), check (NR words in text), city of origin, date, address (full), text and signature are copied most easily without error when always sent in the same order of parts, so we don't have to hop all around on the message blank to get them down. Accuracy is improved by watching the check to see that no words are lost. Use of a standard phonetic word list, not a liberal but an "as-required" use, will also help approach the accuracy standards of our c.w. friends! A message in proper form to W1AW will bring any amateur voice operator a copy of our phonetic word list.

— F. E. H.

## CODE-PROFICIENCY PROGRAM

The next qualifying run from W1AW/WØTQD will be made on May 20th at 2200 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW 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 May 6th 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 W1AW and WØTQD, but copy will be handled in exactly the same way as the transmission from W1AW 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 W1AW 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 March QST
May 2nd:	Parasitic-Array Patterns, p. 11
May 4th:	An Arizona Kilowatt, p. 16
May 6th:	Qualifying Run, 2100 PST, from W6OWP only
May 10th:	An Inexpensive Sideband Filter, p. 21
May 12th:	The Inter-American Regional Radio Conference, p. 27
May 16th:	Using the "Cascode" on 50 Mc., p. 29
May 18th:	Reducing Key Clicks, p. 30
May 20th:	Qualifying Run, 2200 EST, from W1AW and WØTQD
May 24th:	A High-Power VFO Unit, p. 31
May 27th:	The "Capital X" Array for 28 Mc., p. 45

## AIR.R.L. ACTIVITIES CALENDAR

- May 6th: CP Qualifying Run — W6OWP
- May 20th: CP Qualifying Run — W1AW, WØTQD
- June 3rd: CP Qualifying Run — W6OWP
- June 4th-5th: V.H.F. Contest
- June 15th: CP Qualifying Run — W1AW, WØTQD
- June 18th-19th: ARRL Field Day
- July 2nd: CP Qualifying Run — W6OWP
- July 19th: CP Qualifying Run — W1AW, WØTQD
- July 23rd-24th: CD QSO Party
- Aug. 1st: CP Qualifying Run — W6OWP
- Aug. 18th: CP Qualifying Run — W1AW, WØTQD
- Sept. 6th: CP Qualifying Run — W6OWP
- Sept. 16th: Frequency-Measuring Test
- Sept. 19th: CP Qualifying Run — W1AW, WØTQD
- Sept. 24th-25th: V.H.F. Contest

— . . . —

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

## BRASS POUNDERS LEAGUE

Winners of BPL certificates for February traffic:

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W4DUG	2517	0	0	0	2517
W4PL	2	69	1776	58	1905
W6CE	22	32	1028	24	1106
W5LSN	15	23	1042	23	1103
W4CFL	19	62	978	43	1102
W7CZY	40	101	789	1	931
W4NNJ	19	9	892	7	927
W7CKT	2	5	892	5	904
W2TYU	38	98	610	86	832
W0HMM	15	12	744	0	771
W8NOH	47	428	152	139	766
W9EBX	2	9	676	9	696
W2UZX	9	1	668	0	678
W5GZU	16	12	636	5	669
W6REB	47	18	584	12	661
KG6DI	101	402	54	103	660
W0QXO	12	7	602	6	627
W4IQV	32	71	442	71	616
W6FDR	31	98	386	94	609
W0HFF	22	69	448	63	602
W1CRW	23	28	486	61	598
W4DQW	0	16	566	16	598
W9KQL	5	35	522	25	587
W2RTZ/4	23	31	498	22	574
W9QLL	7	62	433	62	564
W0TQD	5	4	545	0	554
W3VMF	12	6	528	3	549
W3OPG	13	6	482	6	507

The following made the BPL for deliveries:

W1RWS 228	W8UUS 145	W2RUF 110
W6DDE 219	W1ILN 117	W4APC 110
W6CZF 218	W2PGT 117	W0JLD 109
W4KYD 158	W8TRN 117	W2WPU 108
W8RJC 158	W2TYC 113	W7ZU 108
W9SYZ 154	W3ECP 113	W3KKA 106
W9ESJ 152	W6OT 111	W8UKV 100
W2VOS 145	W7KCU 111	W9NH 100

A traffic count of 500 or more points, or a total of delivery and extra delivery points of 100 or more, will put you in line for a place in the BPL.

## TRAINING AIDS

We are glad to announce that at long last the film F25, "Rhythm, Speed and Accuracy in Hand Sending," has been received and is now available for use of affiliated clubs. Several clubs who have previously requested this film have been turned down because of the long delay in receiving it. We believe that F24, "The Techniques of Hand Sending," and F25 will make a valuable addition to any beginners' code class. Judging by some of the fists we hear on the air, a lot of us could use some pointers.

ARRL Training Aids are still being used extensively by ARRL-affiliated clubs. At present the Training Aids available include 25 motion picture films, 16 film strips, one slide collection, two albums of code records, inked tape recorders, inked tape keyers, inked tapes, quizzes and reviews. New projects are in the works and will be completed just as soon as possible, but the pres-

ent Training Aids list has been static for about six months. Not so the Training Aids themselves. They have been moving around aplenty, and many clubs have commented on their value. In general, they cater to the beginner, both in code and theory, and are of the greatest value in beginner training programs. A few old-time amateurs, however, have commented that even for them something was to be gleaned from the elementary material presented.

ARRL Training Aids quizzes are not quite so elementary, for they were designed for the practicing amateur rather than the beginner. A mark of 100% has been scored by very few club members on any of these quizzes. You *think* you can answer any question on any certain phase of amateur radio? Get your club to try the quiz (if any) on that subject.

Motion picture films are probably the most popular of the Training Aids; much more so than the film strips. Yet, if the truth be known, the film strips are the more educational of the two because the motion can be stopped and there can be discussion and explanation before you go on to the next frame. If you want to, you can easily refer back to a previous frame. We supply some of the material for discussion in the lecture outline that accompanies each film strip. Since film strips have not been used much, we are making them available to *all* clubs, whether or not they are affiliated. This applies also to quizzes. Requests from affiliated clubs will continue to receive priority, however.

## SUPPLEMENT TO DIRECTORY OF ACTIVE NETS

The following additions and changes have been made to the directory as published in November, 1948, *QST*, and the supplements in January and March, 1949, *QST's*, pages 68 and 63 respectively:

Net	Freq.	Time and Days
Delaware Emergency Net	3890	1000 EST Sun.
Eastern Teen-agers Net (ETN)	7118	1800 EST Mon.-Fri.
Ga. Slow Speed*	3582	2100 EST Mon., Wed., Fri.
Golden State Net (Calif.)	3965	1930 PST Mon.-Fri.
Ill. Slow Speed*	3765	2000 CST Tue., Wed., Thu.
Kentucky Blue Grass 'Phone Net (KYB)	3890	2000 CST Mon., Wed., Fri.
Kentucky Experimental Net (KYX)	148,500	2000 CST Mon., Wed., Fri.
Ky. 'Phone Net (KYP)*	3955	0700 CST daily
Ky. Slow Speed (KYW)*	3600	2000 CST Mon., Wed., Fri.
Ky. Traffic Net (KYN)*	3600	1900 CST daily
Md.-Del.-D. C. Net*	3650	1930 EST Mon.-Fri.
Mont. 'Phone Net	3995	1930 MST Mon., Wed., Fri.
Ohio Slow Speed	3730	1830 EST Mon.-Fri.
Palmetto State Net (S. C.)	3935	0900 and 1530 EST, Sun. 1930 EST Wed.
S. Dak. 'Phone Net	3875	2230 CST Sun.
Suffolk County (N. Y.)	3600	1900 EST Mon.
Emergency Nets	3995	1430 EST Sun.
	146,250	2100 EST Mon.
Trunk Line K*	3650	2030 CST Mon.-Fri.
Trunk Line S**	3545	2000 EST Mon.-Fri.

\* Change from previous listing.

\*\* Ariz., Ark., Calif., Colo., Ill., Ind., Kans., Mich., Mo., Nev., N. M., N. Y., Ohio, Okla., Ont., Pa., Utah.

## TRAFFIC TOPICS

We have a new trunk line, gents. After months of having W8UKV, the champion of the slow-speed traffic handler, figuratively pounding on our desk and shaking his finger under our nose, we have broken down and recognized the Slow Speed Trunk Line as ARRL Trunk Line S. This trunk, although operating at slow code speed, will perform the same functions as all other ARRL trunk lines. It runs from New York City to California with outlets along the way in Ontario, New York State, Pennsylvania, Michigan, Ohio, Indiana, Illinois, Missouri, Arkansas, Kansas, Oklahoma, Colorado, New Mexico, and prospective outlets in Utah, Arizona, Nevada and California. TLS meets on 3545 kc. at 2000 EST, Monday through Friday. Slow-speed traffic handlers in the above states should contact W8UKV regarding the possibility of openings.

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W2TUK, in the NYC-LI Net Bulletin, points out that when delivering messages by postcard a return address should be included with the notation "return postage guaranteed" under it. If you do not do this, and the card cannot be delivered, it will *not* be returned to you, and you will never know for sure whether it actually reached the addressee.

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There are a few points which seem to be commonly misunderstood, or not understood, among many traffic handlers. Do *you*, for example, know the following?

(1) "Extra" check is *included* in the complete check. That is, a message with "CK 10/6 EXTRA" is a message with a text of *four* words and *six extra words* added to the signature. Thus, "CK 10/6 EXTRA" does *not* mean that the check is ten *plus* six extra, but that it is ten of *which* six are extra.

(2) The station of origin is *always* the station from which the message originated *by radio*. If W5XYZ down the street calls you on the telephone and gives you a message he was supposed to have originated but couldn't because his transmitter went bust, the station of origin, as you send the message, is *your* station, not his, and the number assigned is *your* number, not his.

(3) Relayed messages do not *always* count two

points. If the message in the above example had been one which W5XYZ had previously *received for relay* instead of one he was to originate, you would get only *one relay point* when you sent it on toward its destination.

(4) It is possible to get an "extra delivery credit" without also having a "delivery" credit. If, in (3) above, having taken the message from W5XYZ over the telephone you subsequently find you cannot relay it and you *mail* it, you then get one "extra delivery credit" but no "delivery" credit, since you did not receive the message by radio.

(5) Other common faults: failure to include the signal  $\overline{AA}$  to separate the parts of the address; using the word "SIG" instead of the signal  $\overline{BT}$  to indicate the end of the text and the beginning of the signature; failure to send  $\overline{AR}$  at the end of the signature; misuse or nonuse of the letter "B" to indicate that there is more to follow, or "N" to indicate that there is *no* more to follow.

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Traffic for American personnel in Germany can now be handled via K4USA at the Pentagon Building. W3ECP has indicated he will be glad to handle such traffic.

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The Eastern Teen-agers Net (ETN) operates at 1800 EST Monday through Friday on 7118 kc. W2VJN writes that they want more members. The net will accept traffic for anywhere but can handle only eastern traffic direct.

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W8HOX is organizing a slow-speed net in Ohio. Slow-speed traffickers with traffic for Ohio might report into this net, which meets at 1830 EST Monday through Friday on 3730 kc. Interested parties should contact W8HOX, or write him at Box 30, Wilmington, Ohio.

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Each month we try to publish a picture of an outstanding traffic station in conjunction with this column. How about yours? We like to have a big backlog of snapshots for use on these pages, or for use with the "Family Album" supplement to the ARRL CD Bulletin. Why be modest? Send us a snapshot or photograph of yourself at your operating position, along with some material for the caption. We would much appreciate it.

◆  
Gordon Walter, W3EYX, says, "I'm proud of my station and my ARRL appointments." Gordon holds appointments as official observer and official relay station, as well as a Code Proficiency certificate. He also belongs to the Rag Chewers Club. Active in amateur radio circles for many years, Gordon is a past vice-president and past treasurer of the Washington Radio Club.

QST for





## DX CENTURY CLUB AWARDS

### HONOR ROLL

W1FH.....213	W2BXA.....196
W6VFR.....207	W4BPD.....190
W3BES.....200	W2AQW.....187
W8HGW.....199	W3GAU.....186
G2PL.....197	W1CH.....184

### RADIOTELEPHONE

W1FH.....174	W8HGW.....143
W6DI.....150	XELAC.....142
W4CYU.....147	W2AFQ.....141
G2PL.....144	W2BXA.....139
W1JCX.....143	VQ4ERR.....137

From February 15 to March 15, 1949, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below.

### NEW MEMBERS

W0UOX.....117	W2GVZ.....103
TF3EA.....115	W0AZT.....103
W5KUC.....113	G3ATU.....103
W2FBA.....113	W8KPL.....103
W1HA.....113	W6UHA.....102
W1OJM.....112	OK1AW.....102
G16TK.....112	W2EMW.....102
W6EAK.....111	HB9BX.....101
G4AR.....111	W4LZF.....101
W5ACL.....111	W4LHQ.....101
OK1VW.....110	W2TXB.....101
M13AB.....108	KL7IT.....101
W8SYC.....107	VQ8AD.....101
G2MI.....107	W8GLK.....100
W6UCX.....107	W9FKH.....100
W6DFY.....106	VE1FN.....100
W1VG.....106	ZL3AB.....100
W1BGW.....104	VE3AGC.....100
PY2OE.....104	W6LDD.....100

### RADIOTELEPHONE

W9RNX.....103	W6CHV.....101
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### ENDORSEMENTS

W6VFR.....207	W8SDR.....137
W3BES.....200	HB9X.....134
W8HGW.....199	KH6IJ.....131
G2PL.....197	W7BE.....131
W4BPD.....190	W1LOP.....131
W1TW.....184	W2QCP.....130
W6MEK.....172	11IR.....130
W0YXO.....170	W21MU.....130
W5KC.....170	W3HOX.....130
W6ZCY.....160	W8UAS.....129
W1ENE.....160	W9FJB.....127
W2NSZ.....160	W8BGP.....127
W4MR.....157	W9CIA.....121
W2LJR.....151	W2DKF.....120
W1BIH.....150	W6PZ.....120
VE7HC.....141	VE3IJ.....120
G4CP.....141	W6IBD.....120

### RADIOTELEPHONE

W1FH.....174	VQ4ERR.....137
W4CYU.....147	W1FJN.....125
G2PL.....144	W1ENE.....122
W8HGW.....143	W4EWY.....121
XELAC.....142	W8BGP.....120
W2AFQ.....141	G6AY.....114

## COUNTRIES-LIST ADDITION

Since the adoption of the ARRL Postwar Countries List, the official standard used in connection with the annual DX Competition and the DX Century Club, several changes have been reported in this department. See page 40 of March, 1949, *QST* for the latest revised list. We are pleased to announce the addition of one more country to the list: Heard Island, VK1. Make this change on your list and watch the Operating News department for further changes and additions.

### WITH THE A.E.C.

The following, taken from the Western Massachusetts Route Manager's Bulletin, should be of interest to every member of the ARRL Emergency Corps.

"Ham radio exists because our government thinks that it is in the Public Interest, Convenience, and Necessity. That means that at least some of our hams must so operate their stations! That means to me operating in such a manner that when an emergency strikes our community we are able to do something about it. Oh, yes, you say; you are perfectly willing to help with your rig during an emergency. Being willing and being able are two different things! Whom would you work? Would it be haphazard or would it be definite—that is, into a regularly established net? You know the answer as to which would be the more efficient. Could you operate under a control station? Maybe, but I think your presence in the net would be confusing if you'd never worked in a directed net before. Don't you? During emergencies, many messages are sent by officials and thus require signature. These are not sent just to "another station." They must be written down by the receiving operator, accurately. There is a very definite form for message traffic. Do you know it? It could be that an operator in an isolated section had just been able to rig up a simple c.w. transmitter. You might be the only station near enough to hear him. Is your code good enough so that you could copy him, even at a slow speed? In my opinion, if you can't qualify under every point mentioned, you are not operating your station in the Public Interest. Maybe this is rather blunt, but think it over."

— W1BVR, RM, West. Mass.

Last February, when the western plains of Canada were hit hard by a series of blizzards, VE6KU and VE6TA, located near Hussar, Alberta, and VE6MP and VE6HZ, near Chancellor, were instrumental in obtaining the swift restoration of power to their communities when the power lines had failed, unknown to the power company, as a result of the fury of the storm. The outage at Hussar and Chancellor was less than 36 hours instead of the several weeks which would have been the case had amateur radio not been avail-

able. VE5JS at Moose Jaw and VE6OD of Calgary were of great assistance in this relief undertaking.

When it appeared, in early February, that the Pacific Northwest might again this year be devastated by flood waters, the Pioneer Net (the Pacific Coast's prime traffic instrument) was placed on a stand-by basis by net manager W6REB — just in case. Fortunately the Pioneers didn't have to go to work on this one, but they once again proved their willingness to serve in the public interest.

The Heart of America Radio Club has been assigned the call W0RVG for the club station installed in the Red Cross Headquarters in Kansas City. Less than 36 hours after the station had been licensed it was in emergency communication work associated with flood waters on the Missouri River north of Kansas City. The club's portable units, W0NNU/Ø and W0ICD/Ø, were sent into the field to maintain communications between Red Cross relief workers and the K.C. Headquarters. The operation occurred on February 5th and 6th, and fortunately no great damage was recorded.

#### INTERCITY RIFLE MATCH

The Amateur Transmitters Association, Pittsburgh, Pa., and the Pole Cat Net, in cooperation with the Detroit Amateur Radio Association and the Carnegie Tech Radio Club, were responsible for the success of a rifle match held between Pittsburgh and Detroit. At Pittsburgh a Stancor 60P and an S-20R were set up at W3NKI, the C.T.R.C. station, and contact with the Carnegie Tech range maintained by an army field telephone. W8IHR operated his home station at Detroit with a private wire connecting him to the Vickers Range there. All match scoring and information was handled on 3.5-Mc. c.w. Exactly one hour after the last shot was fired, Pittsburgh was declared the winner. Under normal match procedure, targets must be exchanged by mail and the final result is not reached for several days.

The following are those known to have participated in this activity: W3s CEO, YDJ, KSR, NUG, KVG, LFK, MTA, OZT, John Miller and Bill Kail of C.T.R.C., W8IHR, W8SCW.

### HAMS AT HEADQUARTERS W1AW, ARRL Headquarters Station

The following calls and personal sines belong to members of the Headquarters gang:

W1BAW	R. T. Beaudin, "rb"
W1BDI	F. E. Handy, "fh"
W1BUD	A. L. Budlong, "bud"
W1CEG	H. M. McKean, "mac"
W1DF	George Grammer, "gg"
W1DX	Byron Goodman, "by"
W1FTX	R. M. Smith, "rs"
W1FWH	W. E. Bradley, "wb"
W1GS	F. C. Beekley, "beek"
W1HDQ	E. P. Tilton, "ed"
W1ILN	Albert E. Hayes, jr., "rax"
W1IKE	Richard L. Baldwin, "ike"
W1JEQ	C. V. Chambers, "vo"
W1JMY	J. A. Moskey, "joe"
W1LVQ	John Huntoon, "jh"
W1MFA	H. K. Isham, "hk"
W1NJM	George Hart, "geo"
W1PEK	L. T. Waggoner, "roy"
W1QIS	Murray Powell, "mp"
W1QVF	T. F. McMullen, jr., "fm"
W1RNT	E. H. Lyder, "hy"
W1RUP	R. N. Eidel, "re"
W1RWS	John E. Cann, "je"
W1RXL	R. E. Morrison, "lr"
W1TS	D. H. Mix, "don"
W1VG	I. A. Morrow, "pete"

#### ARIZONA FIELD DAY

The Radio Clubs of Arizona invite the radio amateurs in the United States to participate in Arizona Field Day on May 14-15th. Operating hours will be 2-12 P.M. MST on May 14th and 7 A.M. to 3 P.M. MST on May 15th. A certificate of award will be given to the amateur in each call area who scores the most points. Two points will be given for every Arizona station worked. Either field day or home stations may be worked. The same station may be worked on different bands. The number of Arizona field stations worked is to be used as a multiplier in computing final score, which will be two points for each Arizona station worked, times the number of Arizona Field Day stations worked. Scores are to be sent to Gladden Elliott, SCM, 39 North Melwood, Tucson, Arizona, not later than June 1, 1949. Rules for Arizona amateurs can be secured from the above address or from any Arizona radio club.

Here is a view of W5LUX in operation during the Harrison, Arkansas, ice-storm emergency reported in April QST. John Saxon, W5OCY, is on the landline, J. A. Patterson, W5FIV, is busily pounding the key, while the chief op, W5LUX himself, W5OXU, and C. Rushing are observing from the sidelines. Operating solely on battery power when their town was cut off from all communications with the outside world, W5LUX's traffic total speaks for itself.

QST for



6CM AEC ORS CP SEC OBS TLS OO  
**Station Activities**  
 OES AIOPR EC DXCG CLUBS RM OPS RCC

• 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 — After six months of work ELI finally has a VFO that operates to his satisfaction. AQN has the AEC doing yeoman duty in the York area. VMF has a fine BPL total this month. GQC uses 20 watts on 7155 kc. and lacks only a card from Utah for his WAS. He also has worked many DX stations with his flea power. FBI The Harrisburg Club has an emergency net on 3500 kc. and also is getting set for Field Day. The York Road Radio Club's bulletin, QUA, has a very fine write-up on the VHF Sweepstakes. The editors of the YRRCC QUA must do a prodigious amount of work to get their sheet into print and they deserve the support of all their members, but it would appear from the editorial comment that such support is sadly lacking. DWA informs us that the Northeast Radio Club meetings are well attended. There is no news this month from most of the clubs. Presumably they were too engrossed in the DX Contest. It is interesting to hear many of the regular 'phone performers plugging along on the key for the name and fame of their radio club. EQA worked out very well in the contest with a 2¼-element beam. The high winds have wrecked general havoc on the antennas of the nearby brethren. QV has the only rig I ever heard of calibrated in nets. Brad is building a kw. rig which will be T.V.I. proof. (?) Traffic: W3VMF 549, CUL 272, NHI 250, DZ 160, QEW 97, EU 64, ELI 62, WTS 50, ADE 48, AQN 26, OML 22, AXA 16, NNV 6.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA** — SCM, Eppa W. Darne, W3BWT — Subject for the first February meeting of the Washington Radio Club was a demonstration and discussion of an automatic call system used by members of the Washington Mobile Radio Club for mobile units calling into fixed stations. The talk was presented by NL, assisted by CDL. The Club's second February meeting featured a talk on 144-Mc. converters by GKP. The Baltimore Amateur Radio Communications Society now has 15 mobile units in its Emergency Corps. A net control station will be set up in Baltimore Red Cross Headquarters, and also will serve as the club station. The first March meeting of the BCARS featured a talk by AFR and a demonstration of C.&P. mobile equipment. The SCM wishes to express his thanks to those who nominated him for a second two-year term. He was declared elected since no other nominating petition was received. With the continued effort of the entire section membership and the same splendid spirit of cooperation as already demonstrated, we shall make our section even better in the next two years than in the past two in all phases of our amateur activities. LFG has been perfecting frequency measurement methods for the ranges 5500-6000 Mc. and 10,000-10,500 Mc. Paul also is active on 3.5- and 7-Mc. c.w. BDU now is active on 144 Mc. KUH recently visited LAW. KBE is active on 28 Mc., and also on 144 Mc. with a three-element vertical beam. AHQ, AFR, and FPQ recently visited 4BCT in Reliance, Va., and staged a regular hamfest at the latter's QTH. MPI now is 5OYD and is attending Tulane University. He is on 7- and 14-Mc. c.w. KKB is studying at Vanderbilt University. KAL is at R.P.I. in Troy, N. Y. NFC made the Magazine Section of the *Baltimore Sunday Sun* with pictures and a nice article on her station and activities. JMA uses a prop motor and Selyna on his rotary 14- and 28-Mc. beam. PV schedules ZC6XY on 28 Mc. OZG, newly on in Baltimore, has been chasing DX and has three-element beam. EQK is active on 14-Mc. 'phone, and has nearly completed his "Club Cellar" radio shack. Art has two new prospective hams in the same block; also

JLX, already in operation 12 houses away. MJQ lost his antenna in a sleet storm. NB schedules ZL3AB on 14-Mc. c.w. LVJ still is chasing DX. JHW needs only Asia for WAC on 3.5 Mc. MYM keeps busy with school, the new baby, the Section Net, and the building of a new 100-watt rig and VFO. EYX has worked some good DX recently. JZY has been working lots of DX on 3.5 Mc. and has been appointed PAM for the northern area of Maryland. IZ has a new mobile unit on 28 Mc. OWN has a new four-element rotary beam. EQK and NST have new BC-221s. EVK is on 3.85-Mc. 'phone. JCL is on 14- and 28-Mc. 'phone. ASE is now at Grand Island, Nebr., with the F.C.C. MCG is on 7 Mc., and also works with MDD Net on 3650 kc. FWP is on 7 and 14 Mc. Traffic: W3OPG 507, ECP 377, GZH 325, AKB 174, UF 111, MJQ 105, QL 73, JZY 63, FWP 38, BWT 37, CIQ 26, PV 18, EQK 14, MYM 12, JHW 9, NB 6, MCG 6, EYX 2.

**SOUTHERN NEW JERSEY** — SCM, G. W. (Bill) Tunnell, W2OXX — Our new Section Emergency Coördinator is 2ORS, in Riverside. Your whole-hearted support for Charlie is solicited. RLY is chairman of the Field Day activities for the Hamilton Township Club. RFF, at Fort Dix, has received his ORS appointment. 2ZVW, 3NF/2, now is Emergency Coördinator for Hunterdon and Warren Counties. Get behind him, boys. Traffic honors go to ZI this month. RPH has 58 countries on 7 Mc. ZNB is the most recent addition to the 420-Mc. Net. K2BG has 41 states using fifteen watts input. The New Jersey 75 Meter Amateur Emergency Net is carefully organizing for action. PIN and RDK were knee deep in equipment difficulties during the first week end of the DX Contest. Atlantic City's most recent additions to the Emergency Corps are CYI and YSP. UCV was hospitalized under the care of "Doc" ASG. The South Jersey Radio Assn. had IHDQ at its March meeting. PEN fell through the floor of his shack. Could it be that he was using the floor boards for his mast? QCM is going to try portable mobile. Traffic: (Feb.) W2ZI 99, ZVW 63, SXX 51, RG 40, RPH 27, BAY 23, RFF 20, ORS 5. (Jan.) W2QUH 22.

**WESTERN NEW YORK** — SCM, Harding A. Clark, W2PGT — SEC: SJV. RM: FCG. New appointments: TEX as OBS; TF, WZQ, and YRF as ECs. WOE renewed ORS appointment. Three of the gang, PGT, RUF, and WFU, made BPL. Congrats to BLP, who hooked JA2AT for his 3.85-Mc. 'phone WAC. This is the first one we have heard of being made. QCP is experimenting with long-wire beams. IRCQ/2 is having good success working 3.5-Mc. c.w. DX with 35 watts. KVI has returned to Syracuse after two years in New Jersey. RSL ran up a nice traffic total on 7 Mc. The Syracuse University Amateur Radio Club now has 700 watts on 3.5-, 7-, and 14-Mc. c.w. and 'phone and holds the call ZTM. The Club also holds regular code classes for many prospective hams. The February simulated emergency drill held by the Rochester Amateur Radio Club was a big success with nets operating on 3.5, 3.85, 7, and 144 Mc., with several outside stations reporting to take any outgoing traffic. Regular drills are held on the third Sunday each month. Nice going, gang, keep up the good work. KBT recently heard talks on electronic organs by PVL; and production of colored comics by OSK and QEE showed films on jet propulsion. LRT also gave a talk on the multiple use of coaxial cables. Congrats to HQB on the new harmonic. FBA has a schedule with JA2AZ on 3.5 and 3.85 Mc. but no contact yet. DS and MA are now DXCC. Congrats. WPJ now works at WHAM. The Rochester DX Association puts out a fine bulletin through the efforts of QCP and PHT. The SCM would like to hear from all club secretaries regarding activities in his section. The Northern Emergency Net is off to a good start and is holding regular drills with WZQ as NCS. All amateurs in Northern New York are invited to participate. Contact VCY, WZQ, or YRF for details. Traffic: W2RUP 458, WFU 328, PGT 320, WZQ 203, VIQ 152, QHH 125, FCG 110, RSL 106, SJV 69, WOE 68, YGW 65, BLO 35, UYG 22, RZP 16, PZC 11, USC 9.

**WESTERN PENNSYLVANIA** — SCM, Ernest J. Hinsky, W3KWL — Only two clubs reported this month. Does your club have the ideal set-up, swell meeting place, good officers? If so, what keeps you from letting others know what you are doing? C'mon, fellers, I know you'll enjoy seeing your names in this column as much as I enjoy writing it up for you. From the *ATA News* we learn that the

(Continued on page 68)

Polecat Net has been rolling along in high gear. On Jan. 31st 13 out-of-town messages were handled, including a record-breaker 450-word text fed by CEO to NUG for Illinois. The Polecaters meet Sundays at 11:30 A.M. on 3665 kc. The newly-organized Ohio River Valley Net is working in conjunction with the Weather Bureau during high-water periods. NUG and UPB may be contacted if you are interested in participating. The WX Net finds itself commencing t.v. at 9 p.m. each evening. District amateurs please note, the annual hamfest given by the South Hills Brass Pounders and Modulators will be held at South Park Aug. 13th. It is with deep regret that we learn of the passing of another real amateur radio operator, UG. The Allegheny Kiski Valley Amateur Assn. of New Kensington meets the 3rd Fri. of each month in the City Hall. An invitation is extended to all to attend its meetings. LFK sends out QRR for new QTH. USM finds use for his new "Q" meter; now some of those 84 signals are showing improvement. MJK reports regularly in W. Pa. Traffic Net using new VFO. MPO is busy organizing a 'phone net for the WX Bureau. UVD, OO, is seriously thinking of giving VNE competition. VNE is one of the Nation's leading Official Observers. AER says that installing harmonic wave traps and Faraday shield helps a lot for T.V.I. NCJ is trying for the WAVE Certificate. NGB is a member of the RCC. NFR is trying out 28-Mc. 'phone. YA, at Pennsylvania State College, is getting things in shape again. The Mercer County Radio Assn. has become a full-fledged affiliate of ARRL. GEG, LNA, CJF, and KQA have been named on a committee to work out details for club contest for v.h.f. ODB and DKL have Class A tickets now. Traffic: W3RKA 202, GEG 168, KWL 68, NCJ 61, MJK 46, NUG 30, YA 28, NOD 25, LIW 13, AER 7.

### CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — Traffic hit its season peak this month with EBX, KQL, and QLL leading the way. BKA is new EC for Sangamon County. LQP is new OPS. DNX plans to tie the knot soon. GNT is awaiting Collins 75GA receiver. SM5LKL was the guest of the PWR and visited the shacks of AND, AWA, and GNU. The Rock River Radio Club entertained him at the Galt Hotel in Sterling. CKM has Sonar n.f.m. going. CBZ is experimenting with carrier current. JVC worked FA8BG, VP2LA and ZL2BD on 3.5 Mc. with ARC-5 rig. FLQ had a great start toward a big traffic total when his working hours were changed and spoiled it. EVJ still is fighting local power leaks, but finally made WAS. QBI reports from Tokyo that he now is on 7 Mc. using the call JA2BH. IQC is having beam trouble and is working on a new rig. PBY finds screen grid modulation causing him no end of trouble. DIO has spring fever and is sharpening his plow. OBB can't get the rig to work on 28 Mc. YBY burned out transformer, trying to put too much in the ether on 144 Mc. The Illinois Valley Radio Assn. made plans for Field Day and reports NPT as a new member. TZQ was quite active on ILN during the past month. LIN sent in a nice story about ham radio which appeared in the local paper. BRX is spending time with new t.v. set and says EVJ forgot to report his visit to the Wheaton Club. AUU expects to have 3.85- and 28-Mc. mobile jobs going shortly. BON is on 14-Mc. 'phone and is experimenting on 450 Mc. The Chicago Area Radio Club Council had a booth at the World Hobby Show in Chicago. SYZ tried hard to make BPL but fell short. BRD suggests that those troubled with T.V.I. try a vertical fed with flat line on either 14 or 28 Mc. Rod claims that 100 watts input to it and two tavern antennas within fifty feet that the interference is negligible. NN, with the assistance of WEA, cured T.V.I. in the next apartment with receiver only 25 feet from 300-watt rig. It can be done, boys! BLD completed 150-watt bandswitching rig. EEP was blessed with a jr. operator. FOL is new on 28-Mc. 'phone. HKA had his beam motor freeze up. WEA got new Collins 32V-1 rig and new antenna. BIN is trying out 14 Mc. KMN has new rig with 813 final on 7, 14, and 28 Mc. NON is doing a swell job as EC for his county and is building 150-watt final. NIU is getting in shape to climb trees for Field Day. BRY reports local hams working on 60-Mc. equipment. FED was in the hospital for treatment. The Midwest VHF Club has obtained quarters to house its proposed club station and voted to affiliate with ARRL. The Club also participated in the Hobby Show in Chicago. The Starved Rock Radio Club plans to sponsor a hamfest this year and also will be active as usual on Field Day. The Weldon Springs Radio Club will hold its annual picnic Sunday, June 26th, at Weldon Springs Park near Clinton. AWA's brother just received his ticket and is GOJ. Traffic: (Feb.) W9BEX 696, KOL 587, QIL 564, SYZ 344, EVJ 333, FLQ 235, LQP 121, RSM 103, ZPC 93, SXL 52, CBA 40, LNK 36, FRP 33, CMC 29, DUA 24, NON 21, PEK 20, HPG 16, QKL 16, TZQ 15, MRQ 13, NIU 9, BRY 8, HON 3, BIN 5, BLD 4, VOA 4, HKA 3. (Jan./Feb.) W9BRD 47. (Jan.) W9BIN 4, AND 3, AUU 1.

INDIANA — SCM, Charles H. Conway, W9FSG — The Indiana Radio Club Council is searching for the outstanding amateur in Indiana. Clubs are urged to consider the activities of their members and select at least one member as their nominee for the award. Detailed reasons why the se-

lected member should be considered should be submitted in writing to Chuck Reberg, W9MVZ, 3900 West 10th, Gary, Indiana. Indiana amateurs who are not members of a radio club are invited to send their recommendations to the SCM. Judging will be done by an impartial committee and the award is a plaque. NH again makes the Brass Pounders League. AB retired his 203A after long and faithful service. A pair of 809s replaced it. DHJ keeps Crown Pernt represented on QIN. EQN likes traffic handling. UTA is Indiana's old faithful QES. DGA received 1187 QSL cards and Carly Cartright 921 to win and place in the Tri States Amateur Radio Society QSL Contest. CVN burned up his receiver with r.f. NZZ spends what little time he has on 14 and 28 Mc. GFO is putting a pair of 810s on 7, 14, and 28 Mc. GFS is a member of the Ohio River Emergency Net. EUC is running code practice Monday, Wednesday, and Friday on 28 Mc. FJL and BOC joined the Emergency Corps. Traffic: W9NH 410, TT 255, DKV 96, HUV 92, ENB 41, BKF 39, DHJ 33, EQN 29, QLW 11, EUC 4, DGA 3.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — RSR joined MARS. WJH has a new three-element beam for 28 Mc. DNB, Barron EC, will have a half-kw. on 4-Mc. 'phone. MNG is building carrier equipment for local power plant. DX at WEN is up to 74 countries. Through the efforts of LZU, the SEC, and RUF, Milwaukee EC, a complete station was set up in Red Cross Headquarters at Milwaukee. Newly-appointed ECs are: OGT, LaCrosse; IQW, Port Edwards-Wisconsin Rapids. CIH checked your SCM's frequency at 14000.597 kc. during the DX fray. FXA worked 35 states with 20 watts in 2 months. VHA finished a four-element beam for 144 Mc. PMS has an SCR-522 on 28-Mc. 'phone. Coax feed has been replaced with open wire line on HEE's beam. FZC is trying to devise a quickly demountable mobile to slip into the new Chevrolts he will be driving. FCF, a regular on the WIN from Wausau, has 33 states worked. The final at KXK went soft at 77 countries. The Milwaukee School of Engineering organized a club under the guidance of JWT, with the following officers: YCV, pres.; CJO, vice-pres.; IWT, secy.; GEG, treas. Among the members are OA4BL and VU2VJ. BDQ has a kw. into his three-element beam on 14 Mc. WLZ is off to a flying start as Green Bay EC. GKZ is new call at Green Bay. NTD is on 28 Mc. with low power. ART and VOW are back on the air. WLZ, WJH, JBF, HEE, FBU, and VHA are working 144 Mc. BWZ is 28-Mc. mobile. Green Bay has local 28-Mc. net at 7:30 p.m. Mondays. CIH, BQM, MDG, WEN, OVO, and WJH were active in January FMT. New officers of Eau Claire Club are MUM, pres.; ZRZ, vice-pres.; ZGL, secy.; VSG, treas.; and ASQ, act. mgr. BEW is working 7 Mc. ZGW is chasing DX with a pair of 811s. ARJ has 75 watts on 4-Mc. 'phone. The WVA banquet featured GPI as guest speaker. Traffic: (Feb.) W9ESJ 285, SIZ 129, SZL 129, CWZ 109, IQW 106, DND 38, RQM 32, MUM 20, TOA 14, FCF 12, FXA 12, VHA 5, BZU 3. (Jan.) W9UFX 11.

### DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Bossoletti, W0GZD — UGM and PUJ are new calls in Fargo. PUJ is 15 years old! ZCM was snowbound for a month. RNS is building new VFO exciter. HSM took down the 14-Mc. beam and put up 7-Mc. Zepp. DAO has new Sonar XE-10. ELX went n.f.m. on 28 Mc. TSN is planning on a pair of 810s modulators for the kw. BAE is on 3.85 Mc. from Bismarck. ILO entered the Fargo Hobby Show. HKM is giving 28-Mc. 'phone a whirl. BIH uses his prewar rig on 3.85-Mc. 'phone. Hank is looking for the OTs around the State. CDO is building new rig for high frequencies. What's cooking in Valley City? Director TSN addressed the Cendak Club via radio. TUO has vicious signal from Wahpeton. EKZ joined the 3.85-Mc. 'phone net. YTX is another in the process of building new exciter. VPE is planning 144 Mc. KHG, WFO, and LHB keep Park River on the map. We all plan on seeing you at the North Dakota Hambore picnic to be held at Mayville. Traffic: W0ZCM 13, GZD 8, CAQ 2.

SOUTH DAKOTA — SCM, J. S. Fosberg, W0NGM — The Sioux Falls Amateur Radio Club, with the USNR, has been holding mock emergency conditions in the surrounding towns with the control at Sioux Falls. K0NRU. Equipment consists of two fixed transmitters and four fixed portable transmitters and receivers. All the fixed portable equipment is supplied with independent power units. Operators are available at all times and are under the commanding officer and ZRA, the EC. RWE fell off his roof while working on his antenna and cracked some bones in his foot. CJS, the PAM, has the South Dakota 'Phone Net going in fine shape with a good turnout each meeting on 3875 kc., Sundays at 10:30. The Weather Bureau requests the cooperation of amateurs in crop reporting and a plan is being worked out to use the c.w. net on Friday to get a report for the week's weather to the office at Huron. Traffic: (Feb.) W0OLB 42, PRR 33, ILL 32, NCM 27, FJS 7, WUU 5, GCP 4, HDO 1. (Jan.) W0PBR 41.

MINNESOTA — SCM, John B. Morgan, W0RA. Asst. SCM, Jean E. Walter, W0YE. SEC: BOL. HFF wins

(Continued on page 80)

## Pot- pourri

THIS MONTH we want to touch briefly upon several subjects which we hope will be of interest to you, so forgive us if we seem to ramble.

Recently we were called to task by an enthusiastic HRO-7 owner. It all came about because the HRO-7 had been in service for over a year and the operator unaware of the "bandsread only" 10-11-meter coil. (We are referring to type 7AA coil, developed some time ago, and first mentioned in our catalog last year.) Our friend wrote us after procuring and using a 7AA coil for a few days. Our crime, according to our critic, was in not proclaiming this development in bold-face type.

Probably the most noteworthy feature of the 7AA coil set is the fact that it affords a signal/image ratio of about 50db. It also has a little more gain than the dual purpose general coverage-bandsread coil set. The improved performance is, of course, due principally to the fact that the restricted frequency coverage allows us to use a more efficient coupling arrangement.

Yes, others have "discovered" this coil and likewise seem entirely satisfied with its operation. Now, wait a minute! Before you dash out to order an HRO-7AA coil set from your distributor, we want you to realize that it cannot provide the performance outlined above unless it is aligned in the receiver with which it is to be used. If you have the gear and the know-how to lick this problem yourself, all well and good. If not, we will be glad to give you the name of your nearest authorized National Service representative upon request. Incidentally, these coils can be used in all previous models of the HRO except the HRO Jr. It should be noted, however, that the increased gain may result in oscillation in some of the military models. Please do not ask us to furnish HRO-7AA coil sets equipped with handles of type used on earlier models.

Since introduction of our line of Narrow Band FM Adaptors for the NC-173, NC-183, and HRO-7, we have received several complaints that the HRO-7 suffered a loss of gain when the NFM-07 Adaptor was plugged in. Investigation of the matter revealed that these complaints were almost invariably due to the purchaser having discarded the instruction sheet along with the package in which the NFM-07 was received, a stunt which most of us have pulled at one time or another! It is not necessary to make any adjustment to the NC-173 and NC-183 Receivers when the appropriate NFM Adaptor is plugged in, but the primary of the last IF Transformer in the HRO-7 must be retuned when the NFM-07 is plugged in. This means readjustment of trimming capacitor Number 22 shown in Figure 5 on Page 11 of the HRO-7 manual.

A great many amateurs these days are building new rigs or revamping the old one to take advantage of the band changing convenience afforded by the National MB-150 Multi-Band Tank, and every mail brings a new crop of requests for further information about it. Some inquire as to the possibility of using the MB-150 as an antenna tuner; our answer is that it was not designed for this job, but experiments are now going on and we may have more to say on the subject at a later date. In the meantime, do not overlook the fact that the MB-150 is a natural for the grid circuit of that high power final.

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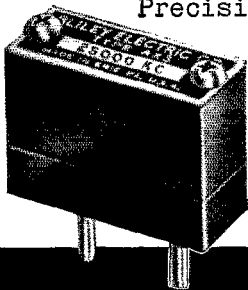
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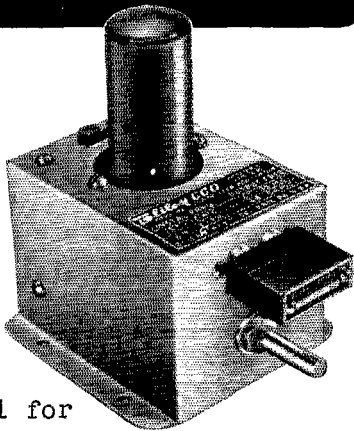
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the first RPL Certificate and is QNI on six nets. BOL and HTD have their new Stancoor-Gonnet mobile rigs working well. GCR is St. Paul Radio Club Field Day chairman. BGY has his new bug under control. Duluth gang please note: KYE has agreed to carry on as Asst. SCM. Please keep in touch with him. RXL is Duluth outlet for MSN. TKX has new Collins PTO. HQW would like to contact anyone with dope on Geiger counters. GKO worked St. Cloud on 144 Mc. Feb. 13th. and BBN was heard by the Minneapolis msg. RXL credits his new Clapp oscillator with DXCC approach. PMN has his new 28-Mc. beam working, and gave KYE and QNI some hydrofluoric acid for etching glass and crystals. Want some? Bring your wax bottle. QXI has new 10 converter using only one by-pass condenser and one resistor. GKP is back on 3.5-Mc. c.w. CZO initiated six club members including himself; the others gave him the works. CZO had BC-457 on 3.5 Mc. and is Duluth TLL contact. BOL is going after everybody to sign up in the Emergency Corps. Portable gear is improving fast locally. The hidden transmitter hunt held Feb. 18th by the St. Paul Radio Club brought out MXC, RV8, QIN, MFR, WJA, SMT, LNN, HKF, TOZ, Ralph Barr, and Warren Harrison, who found two hidden rigs. BMX is doing a job with six daily trans-Pacific schedules keeping local families in touch with their overseas relatives. ZSC is at CREI, Washington, D. C. JRI was married on Feb. 18th to Genevieve Christgau. TLE addressed the St. Paul Club meeting March 4th on s.s.s.c. Judging by questions asked, we will hear more of this locally. DYH is on the Coast for several months. Same for JRI, who wants St. Paul stations to look for him on 14,100 kc. For net checking, RA can give you time to one second and frequency to 100 cycles. Thanks for the vote, fellows. I'm sorry CWB could not continue, but I will try to give you as good service. Traffic: W6HFF 602, ITQ 67, ANU 46, BGY 43, BOL 43, ORJ 39, CWB 35, MXC 32, IXR 26, RA 26, LPJ 21, RQT 19, UCV 9, CZO 8, FTJ 7, TKX 5.

## DELTA DIVISION

ARKANSAS — SCM, Marshall Riggs, W5JIC — BJH's main rig is down and he is using a BC-654 for schedules. LUY, just turned sixteen, says, "Ain't girls nice!" ASC is building up 304TL rig. PCA is on with high power of 50 watts. LUX is working on new trunk line. OGY is on 28 Mc. with 300 watts to 813. FIV is setting 28 Mc. on fire. ZD4AU visited KBEL, DRW and MRD are new ORS. LUX received first Arkansas BPL Certificate. EA is building high frequency VFOs for summer use. ONL has just finished WAS and is with Ozark Net. The Texarkana Club has new 2.5-k.v.a. generator and is getting set up for good emergency organization. JXO is on with the big rig in Albuquerque and gets a nice signal back into Arkansas with folded dipole. IRY has new antenna rig on 14 Mc. with p.p.807. AQD has off-center antenna for good DX on 14 Mc. DI dismantled three-element beam on 28 Mc. Thanks for all the news. Traffic: W5FMT 155, LUX 148.

LOUISIANA — SCM, W. J. Wilkinson, jr. W5VT — CEW, the PAM, is knocking off the DX. KTE, our SEC, still is on the Rebel Net. LQO has low power on 28 Mc. MKP worked New Orleans on 144 Mc. from Baton Rouge. KYK was on 7 Mc. mostly during February. NBK has a new antenna. JPI was active during the recent ice storm. JET is active with Naval Reserve on Sunday mornings. OXQ is new in Bastrop. POB and PLY are on 28-Mc. phone from Monroe. IYF schedules Tokyo and Guam. IUW hooked EL4K for a new country. EM was New Orleans end of the 144-Mc. BR-NO QSO. OQW and GIX joined in the hour-long gabfest. CGC is getting his share of the DX on 14 Mc. NM takes c.w. from 5 to 40 w.p.m. HR has enjoyed having some of the Brothers of the Sacred Heart, from 2VYU, speak to their relatives in New Orleans. LVG sends lots of dope on the 28-Mc. gang. QJ schedules DL4 almost daily. Karl, jr. is in Heidelberg and ham radio keeps father and son in contact. GTB is back on after a year's layoff. GXO has been getting groundwave QSO to Jackson, Miss., on 28 Mc. KTB has completed a super shack for his 600 watts to a pair of V70Ds. PDP is using 813s with good results. ORX works lot of 10/20 crossband. PCM is on 28 Mc. JFZ is getting his share of DX. OVM, MXP, NBK, NKE, and OWF work groundwave into Baton Rouge and Hattiesburg. 6MET/PM is operating in New Orleans. PFE is outshining her OM. NNH. OFO is back at sea as 5OFO/MM. UK is on 3.85, 14, and 28 Mc. W1, 2, 8, 5, EI, and GM were all in round table with LVG. Traffic: W5JPJ 33, KYK 6, IUW 5.

TENNESSEE — SCM, Ward Buhman, W4QT — CZL has his new kw. on the air and is scouting around for rotary beam material. BAQ replaces IY as EC for Memphis. DIY has new OES appointment. CVM and ONX have good country totals on 3.5 Mc. and lack only Asia for WAC. HOJ has a more relaxed work schedule and has moved back into traffic circles. He acquired an n.f.m. unit for his birthday. LCB is giving 144 Mc. a break with nightly operation. The Nashville boys are forming a 144-Mc. net. NNJ has new skywire; he works 'phone and c.w. on all major bands. FLW is building new modulator for his 50-Mc.

(Continued on page 62)

# Eleven

## NEW MODELS



### FIVE NEW 7" MODELS

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	3565		3765
PLUG-IN LINK COILS			
1 turn	3551	1 turn	3751
3 turns	3553	3 turns	3753
6 turns	3556	6 turns	3756
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rig. The Florida State Fair proved to be a strong source of traffic for PL. Traffic: W4PL 1905, NNJ 927, ETN 277, APC 125, CVM 102, BAQ 99, LCB 57, DIY 51, CZL 23, HOJ 18, ONX 13.

**GREAT LAKES DIVISION**

**KENTUCKY**—SCM, W. C. Alcock, W4CDA—February was another good month of activity-reporting with 714 messages handled. BA Z added p.p. 807a on 7 Mc., is building p.p. 175a on 14 Mc. and now uses p.p. T200s on 28 Mc. and p.p. T150s on 3.5 Mc. YPR was second best in traffic. MWX tries slow-speed net (KYW) at 6:15 a.m. This net also works at 8 p.m. CST. NWQ and VD graduated to KY Net, with OEY, OET, and LEI building up code speed. FKM still is active on both nets. JQY reports on night 'phone net (KYB), 8 p.m. on 3890 kc. (M-W-F). CDA is planning one more final to make it 3.5, 7, and 14 Mc. by throwing switches. JCN makes work for himself by metering each pentode in push-pull rig. TXC says the KYP Net is going fine. MSC is active in Ohio River Valley Net. KWO is new Official Phone Station. VP is new Official Observer. CRI is new Official Bulletin Station on 3.85-Mc. 'phone. ØZZW/4, engineer for G.E. at Owensboro until Apr. 15, says LTQ is the proud papa of twin girls. FBJ worked 111 countries postwar and now is sweating out QSLs for DXCC. He takes traffic from KX6AF. EDV is active on KYP Net. KKG experiments 90 per cent of the time at "Harmonic Acres," his new QTH. HAV is working Ohio River Net and KYN Net. The Blue Grass Amateur Club reports in its club paper that PJC has plenty of audio. NCQ is active in Lexington club work. VD is a new-comer to the KYN Net. Traffic: W4BAZ 240, YPR 187, MWX 49, FKM 47, JQY 43, CDA 25, JCN 24, TXC 19, MSC 17, VD 17, KWO 15, CRI 12 ØZZW/4 7, W4EDV 6, FBJ 6.

**MICHIGAN**—SCM, Robert B. Cooper, W8AQA—SEC: GJH. RMs: GSJ, NOH, PVB, and UKV. EC Certificates have been issued to CNN, FJJ, and UGD. BPL cards go to NOH, and on delivery totals to RJC, TRN, UUS, and UKV. A TLS Manager Certificate has been issued to UKV. This slow-speed transcontinental net is expanding rapidly. The success of the Mid-Winter Hamfest held in Grand Rapids has given the officers of the Grand Rapids Club the assurance necessary to make this event a part of the Club's permanent calendar. The Grand Rapids Emergency Net, operating on 29,188 kc. with a transmitter at the Red Cross Headquarters under the call ØZZW/8, has had very fine turnouts during net drills on Monday nights. WAO states that the code class sponsored by the Genesee County Radio Club has 30 members who meet once a week and have code practice twice per week on 144 Mc. YNG is testing a portable 'phone rig with a single 304TL for use during his vacation. TBP is having transmitter troubles but still furnishes an outlet on QMN for CNN and his Hawaiian and South Pacific traffic. CUP is getting DX traffic from Okinawa. KOS has a 50-ft. utility pole supporting a "JK" wire beam and reports plenty of DX on 7 Mc. FX is busy converting Command equipment for ZZ to use on Field Day. Z HB is back in Michigan and reports from Lewiston that he is working on an emergency set-up. URM is NCS for ESN on Saturday and Sunday mornings on 7 Mc. MGQ takes time out from work on DARA Bulletin and hamfesting to give details of wind-storm damage to his 28-Mc. beam. TNO is building a new VFO for c.w. rig using TZ-40 in final. MEV and VE3JH won the prize offered by the Twin Sault Radio Club for the first international 144-Mc. QSO in that area. I wish to extend my thanks to the former SCM for very fine work in transferring the records to me. The condition of those records deserves nothing but high commendation. My sincere thanks also to all who have been kind enough to express their congratulations. Traffic: (Feb.) W8NOH 766, TRN 479, RJC 427, UUS 398, UKV 184, TBP 171, WXO 128, SCW 72, YMO 59, YNG 48, GSJ 47, IV 47, URM 47, DPE 42, CUP 36, QBO 35, DOI 27, UES 27, AQA 26, CPY 26, ATB 25, FX 20, JUQ 20, CRH 12, DWB 9, ZHB 7, ZKZ 6, GJH 4, TNO 3, OCC 2, MGQ 1. (Jan.) W8RTN 176, GSJ 83, YNG 68, FOV 18, BVY 14, ACW 12, AHV 11, YFI 11, URM 7, BXZ 5, DOI 2, GJH 2, TNO 2.

**OHIO**—SCM, Dr. Harold E. Stricker, W8WZ—Aust. SCM, Charles F. Lohner, RN, SEC: UPB, RM; PMJ, PAM; PUN. I believe some of you fellows are not taking the proper credit for a relayed message. A relayed message counts 2; 1 for receiving and 1 when sent on. Your SCM attended the meeting or the QSO Party held at Mansfield, Ohio, by the Club. UPB, the principal speaker, gave a very good talk on ARRL and EC work. Join the Emergency Corps, fellows, even if only in a supporting role as you may have a very necessary piece of equipment in case of an emergency. A state of emergency can happen at any place and at any time. Let's be prepared. New appointments are IOO as EC for Youngstown and vicinity and YFJ as ORS. AYS, BLI, BZK, LOT, OUR, and YFJ received BN Certificates. From the CORC News: TZI and LEH are trying out Quad antennas. OUR has moved to Athens. DVE is rebuilding his final. WZ worked 94 countries in the first half of the DX Contest. From the Cleveland Area Council of Amateur Radio Clubs:

(Continued on page 64)



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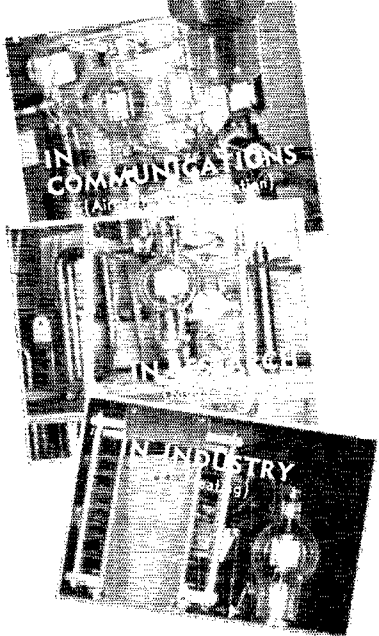
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Grid-plate	5.0 µufd.
Grid-filament	8.8 µufd.
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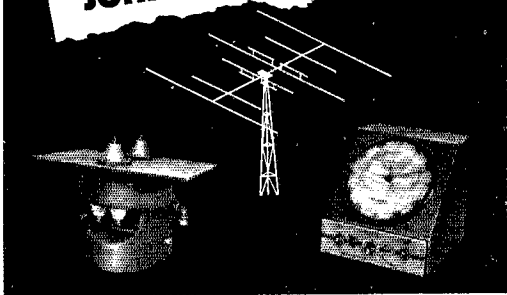
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WASEGA, MINN.

The Cuyahoga County 28-Mc. groundwave contest was held on March 19th. Certificates were awarded to the seven highest scoring stations, plus an extra certificate to the Cuyahoga County and other participating stations working the greatest groundwave distance. From the *Bulletin* of the Dayton Amateur Radio Association: The portable gang is working on 29,693 kc. HB won another clock for the most accurate readings in the ARRL Frequency Measuring Tests; the error being only 1.7 parts per million. DDL lost his rig when it was struck by lightning. DTR is a new ham. From the *Carascope* of the Columbus Amateur Radio Association: The Franklin County 144-Mc. Emergency Net is in full swing on 146.43 Mc. There are two periods of operating at present: 8 p.m. Monday and Saturday. The following stations have reported into the net: ABO, BAX, CDA, IVC, IQK, KVV, UZ, VHO, WRN, and WXM. WRN states that there were several good 144-Mc. openings during the month. Our sincere sympathies to WXM, whose mother passed away recently. EDW has Motorola 28-Mc. rig in his car. WAB still is portable from his Pittsburg hotel. A bulletin from TRX, who is director and temporary chairman of the Ohio Council of Amateur Radio Club, states that the 2nd annual meeting will be held in Columbus on March 19th. Trunk Line "S" is new slow-speed net. DVV is new ham in Portsmouth. LOT is using ARC-5 and NC-173. PIH worked HC, KZ, KH, and Xf on 3.5 Mc. with 80 watts input. BUM is having exciter trouble with chokes burning out. TZO got 30-w.p.m. Code Proficiency Certificate. PRS is back on 3.5 Mc. after two years' absence. VLW, YGS, and TZO plays checkers over 3.5 Mc. ROX is building electronic keyer. PUN worked JA and KP6 on 3.85-Mc. 'phone. ARP is working out new emergency plan with a new disaster chairman for the Red Cross. WE states that with the Florida Fair, travelers stalled in snow in Wyoming, and his XYL's class reunion, his traffic total was up. EBJ is experimenting with 144 Mc. DAE is using BC-457A. JFC worked 18 new countries in C.W. DX Contest and is now up to 80 postwar. LBH has new 50-Mc. layout; BC522-T55 final with 150 watts input. Class B TZ40s. FFK has new male modulator. FNX is going strong on 3.85 Mc. with 300 watts to a pair of 812As. UW got 1st-class commercial license. WYH is rebuilding transmitter. DGG is building 28-Mc. mobile with a 6AG7-2E26 and a 6AK5-6AK5 broadband converter. Traffic: W8RN 272, WE 223, CBI 215, HOX 209, UPB 190, PIH 137, AYS 117, PAJ 104, SJF 103, IVC 101, EBJ 94, EJU 80, TKS 73, DAE 70, YFJ 49, TAO 45, EQN 35, WZ 34, BZK 31, BLI 25, LJH 25, FFK 22, OUR 22, ZAU 20, BEW 16, PUN 16, UW 14, WXG 14, TIH 12, DZO 11, LOT 9, QBF 9, ROX 9, ARP 3, BUM 3, PNJ 3, EFW 1.

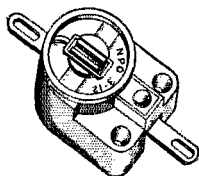
## HUDSON DIVISION

**E**ASTERN NEW YORK—SCM, Fred. Skinner, W2EQD—CLL is new SEC. All ECs are requested to send him reports on the first of the month for consolidation into the section report. FVP is new EC for Greene County. TYC is the second station in the section to receive new RPL card. Congratulations, Les. The Westchester AEC Net is very active, with more than twenty stations reporting regularly. The first combined Albany-Schenectady AEC drill showed ten stations reporting to BSH as control on 3.5 Mc. and seven stations reporting to GYV as control on 144 Mc. SARA has T.V.I. committee functioning with ACB as coordinator. KUJ worked EA4HK using 14-Mc. s.s.s.c. RMA has a gallon on 144 Mc. LRW uses 3.85-Mc. 'phone for clearing local traffic. Who said c.w. and 'phone can't get along together? A fellow in Stony Point wants to become a ham. Anyone near there who will give him some pointers, please send me a card. GYV wants more 50-Mc. activity. BSH cleared up some bad T.V.I. NHY is building 144-Mc. rig for car. CLL is an NCS in TLC. LRW is manager of TLC and was appointed an RM this month. On February 19th QGH made first copy of amateur frequency shift teletype from 7JCU on 27 Mc. LMH needs help in distributing traffic from DL4ON in Berlin. Call LMH on 7.05 Mc. at 11:30 p.m. EST. Traffic outlets are needed in Rockland, Dutchess, and Putnam Counties. This section needs a PAM to coordinate 'phone nets and extend traffic coverage. Any candidates? Traffic: W2RH 374, CLL 307, WIK 287, TYC 191, EQD 142, ITX 142, LRW 46, PHO 24, IN 19, QGH 13, BSH 12, REW 6, FO 3, OGN 2.

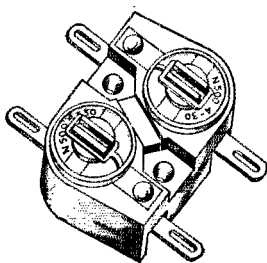
**NEW YORK CITY and LONG ISLAND**—SCM, Charles Ham, Jr., W2KDC—OHE, the new SEC, is so busy at Standard Parts in Hempstead that he had no time for a report this month. CJZ was very unhappy when ordered to move his job location into N.Y.C. Frank has been at Port Jefferson for a good many years. He reports eight full active members and three supporting; one in three have emergency power. BRV is Assistant EC. UNS, secretary of the Mid-Island Radio Club, reports an interesting program was held March 3rd. The Hudson Division Alternate Director, Gay Milins, spoke on the public relations aspect of T.V.I. K2AY showed a few magic tricks and OWP explained a Monitone, after which the gang QSYed to the local diner. ZLX is a new ham with 30 watts on 7 Mc. YSF finds 28-Mc. c.w. (FB during the day but very dull at night.

(Continued on page 66)

# MALLORY HAM BULLETIN



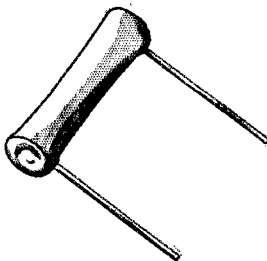
We devote this edition of the Mallory Ham Bulletin to an announcement of the greatest importance to the amateur designer and experimenter. The ham who builds his own equipment from the ground up, and who is exceptionally particular about its stability and efficiency, will be extremely interested in this announcement.



Your Mallory Distributor now has (or soon will have) available, for the first time to the amateur designer, the same styles of ceramic capacitors which in the past have been available only to commercial laboratories and other large buyers of these fine capacitors.

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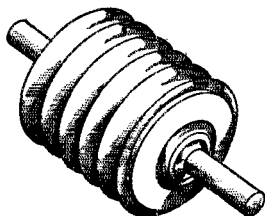
Included are *general purpose* fixed ceramics in values from 10 to 5000 Micro-microfarads, *zero temperature* coefficient fixed ceramics from 3 to 100 mmfd., and *negative temperature* coefficient types of  $-750$  parts/million/ $^{\circ}\text{C}$ . in nominal values from 5 to 100 mmfd. Here is every value you'll need for stabilizing that VFO.



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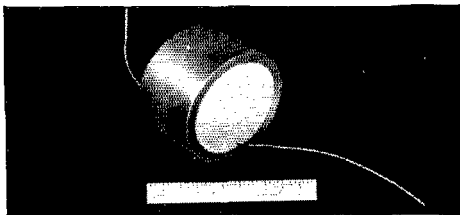
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Jerry is seeking an 18-w.p.m. group and welcomes correspondence. VSU has a BC-455 receiver converted for Field Day. Vic still is on ESN and has new VFO. BGO, after 18 years of solitude, now has two hams in new houses within a stone's throw of him. DBQ is very busy and spends only 1 per cent of his time in NLL. YDG celebrated his first year of hamming. Jack has 46 countries on 7 Mc. KV4AF/2 has joined MARS. TYU has the rig real fancy on relay rack. ZNI is very active with high school. NLI, 160-meter rig, and also wants ORS appointment. UFR had rig on 3.5 and 7 Mc, but Ralph made some changes and is now on 7 Mc. only. PF is a member of the Military Army Radio System with the call A2PF. EYS is using low power on 3.5-Mc. c.w. TUK temporarily retired from active participation with the NLI. QBS is preparing 3.5-Mc. mobile for AEC use. WHB is developing overseas schedule with Red Cross. PZE is on 28-Mc. 'phone, Cal's first activity since November. LWB-2 still is at Halloran V.A. Hospital making recordings for WHVA. RTZ ran up a terrific score scheduling 4DUC even though her coil socket was held together with Scotch tape. OHE was inadvertently promoted to president in our last issue. Sorry for the error. OM, Traffic: W2TYU 832, UZX 678, RTZ/4 574, VNJ 252, OBU 186, VOS 174, BO 115, QYZ 77, ZNI 73, EC 56, VSU 43, OUT 40, QBS 38, KV4AF/2 29, W2BGO 10, LWB/2 13, PF 10, DBQ 9, YDG 9, VAF 7, TUK 5.

**NORTHERN NEW JERSEY**—SCM, Thomas J. Lydon, W2ANW—SEC: IIN, RMs: CGG, LFR, and NKD, PAM; DRA. The N.N.J. C.W. Net meets daily except Sunday on 3630 kc. at 7 p.m. The JN 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. The 75-Meter 'Phone Net, which meets on Sunday at 9 a.m. on 3900 kc., handled 42 messages during the recent drill. EGM is Alternate NCS of the above net. He is recovering from a serious accident and is back on the air with BC-610. DME is operating mobile on 28 Mc. and is building a mobile rig for 3.85 and 14 Mc. BTZ, EC of Rahway, now is completely emergency-powered, using 500-watt generator. ZT has been busy logging stations out of the band during the DX Contest. YJC is building 144-Mc. station. 9SMC has moved to West Orange. NIY received a certificate for high c.w. score of VE/W 1948 contest. EWZ recently completed QSO Nr. 7000. The first edition of *N.N.J. Traffic Bulletin* has been mailed to all net members. Thanks to Tom Ryan, NKD, for the fine job. Anyone desiring this bulletin please send self-addressed stamped envelope to NKD. GFG has taken up 'phone and is active on 3.85 and 14 Mc. New OPS appointees include NCV, LMB, QHS, KPO, and BUX. BUX is EC for Union City. HHH is now ORS. VJN is on 28-Mc. c.w. AIW was elected president of the JSARA. CWK now has 34 countries on 3.5 Mc. Traffic: W2CGG 341, KUS 263, LFR 182, K2USA 172, W2NKD 137, ZCL 128, NCV 93, HHH 79, CQB 62, OXL 62, LMB 21, CJX 16, BRC 15, VJN 13, K2AO 11, W2EWZ 7, DME 5, GFG 4, COT 3, CWK 2, NIY 2.

### MIDWEST DIVISION

**IOWA**—SCM, William G. Davis, W0PP, —The Sioux City gang had a full page write-up in the Feb. 12th *Journal*. FZO has new rig built around a Hunter exciter. One of our real old-timers, Art Collins of Cedar Rapids, recently got back his old call, CXX. ANH is holding code classes for embryo hams. FKB has new HT-18. TKG is on Tall Corn Net. The Des Moines gang put its 28-Mc. boys through a simulated emergency drill which was recorded. Those taking part were: ATN, WSJ, LJJ, OLY, EVE, BBE, MCK, BAL, GBB, and HIB. The Davenport gang put on a public demonstration for the Red Cross and had the boys, the rigs, and a VL helper in a department store window. EPT has big traffic total because of emergency traffic. YNW has new Hunter exciter. EQN has 100TH, too much excitement for his smaller tubes. AHQ is on 14- and 28-Mc. 'phone and 14-Mc. c.w. with a pair of 813s. EMI and GWT are on 14-Mc. 'phone. POY is getting DX on 28 Mc. MBW remodeled his shack into ultra-de luxe class. GKE is happy with his 14- and 28-Mc. c.w. DX. QPZ sends in his OPS report. JRY will have 900 watts on 144 Mc. shortly. The Council Bluffs gang is working hard at 235 and 420 Mc. Is PTF using n.l.m.? The North Iowa groundwave net still is working. The Council Bluffs 'Club hamfest will be held July 17th. NCC is leaving 7 for 28 Mc. PDM's first DX was KX8BB. OM has a class of 17 new hams. Traffic: (Feb.) W0HMM 771, FP 208, EEF 205, SCA 103, AUI 88, NYX 43, YI 30, SEP 27, PTF 25, SCW 20, SQV 18, TTU 17, QVA 16, FKB 12, SOQ 10, Y14 (Jan.) W9QVA 55.

**KANSAS**—SCM, Earl N. Johnston, W0LCV —HVL reports interest in organizing a club in El Dorado. The WARC, Wichita, is sponsoring an emergency-rig-building contest and inviting competition among individual groups within the club for Field Day. The Central Kansas Radio Club of Salina holds emergency drills each Friday night. The Navy GCA Radio Club, Olathe, is initiating new hams with PUX and PWJ as new calls. Two others are awaiting tickets. All are products of BSP's high school class. DRB has completed new electronic keyer and is very active on

(Continued on page 68)

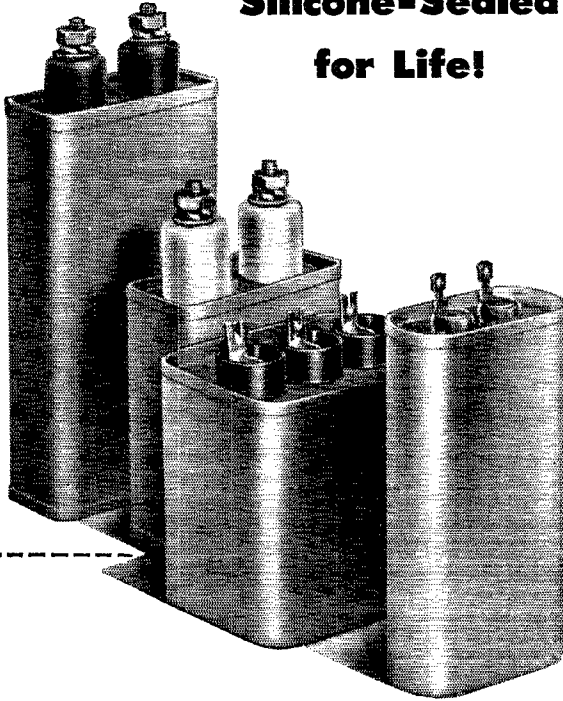
# Now...



## CAPACITORS

are

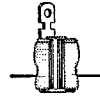
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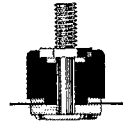
This exclusive G-E feature—with the use of highest grade materials, with strictest quality control and individual testing—make General Electric capacitors finer and more dependable than ever before. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*



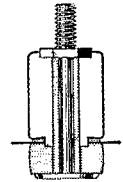
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Silicone bushings and plastic cups used with capacitors 660-v a-c, or 1500-v d-c and lower.



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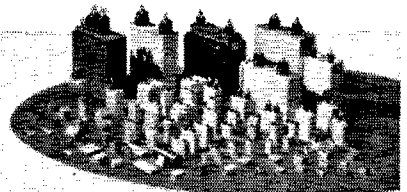
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Interstate Utility Net as Alternate NCS. KVRC, Topeka, with WGM at the helm, is making bigger and better Field Day plans. KVRC Emergency Net drills are held Sundays at 9 p.m. on 20.5 Mc. WGM, Net Control for QKS 88, reports thirty stations on the list. Ed also has new BC-221N. BPL, our OO, is doing you fellows a great service by watching out for you. GOV says the gang at AHA, the University Radio Club station, is building VFO for phone rig and the c.w. rig is being overhauled. 1ZJ, Emporia, is on 144 Mc. Emporia has a 28-Mc. phone net which meets every Wednesday night. Yours truly drove to Atchison recently and listened to the Kansas City boys on 3.85- and 29.173-Mc. phone mobile stations keep Red Cross officials in Kansas City posted as to river stage on ice jam flood. ITX, CAG, OOT, IWS, OAQ, BCD, SSG, ICF, RDR, UBR, JRJ, and PCY were on the job. Traffic: W0DRB 223, WGM 65, AHA 59, N1Y 47, OZG 33, EUZ 32, FER 26, CXP 24, BNU 18, F0J 10, AHW 9, ICV 8, LIX 6, BPL 4, AWP 2, KXL 1.

MISSOURI — SCM, Ben H. Wendt, W0ICD — QXO has been operating with a makeshift antenna but made BPL in spite of this handicap. GMI scored with an average error of only .0012 percent in a recent Frequency Measuring Test. KH0VZ, formerly W0LTI, is operating from Wahiwa, Hawaii, on 7.15- and 14.2-Mc. c.w. The Missouri Valley Radio Club of St. Joseph voted paid-up membership to its two blind members, LWF and PMQ. OOC is new ham in St. Joseph. EEE has been using a substitute antenna since the elements brought down the regular sky hook. GNX is experimenting with low power on 27.185 and 28.5 Mc. ANL, after an absence of about 15 years, is back on the air. GAG is a regular on the Missouri Emergency Net and is going for contests in a big way. KIK's new QTH is 4018 Tholozan Ave., St. Louis. If your city needs new charter QXO may be of some help. The Southwest Missouri Radio Club elected LUI, pres., UEL, vice-pres., CGZ, s.c.y.; GBJ, treas.; FUM, publicity; ERU, programs; HUG, and mgr. Springfield boasts 67 hams. The Show Me Net, 7272 kc, operates Sundays at 1600 CST. The Net needs outlets in Kansas City and north of the Missouri River. ARH reports good DX for the past month; 73 QSOs netted 35 countries. OQ5, HPI, ZBI, ZK4, KJ6, ILL, and KM6 brought his total of countries worked to 87. ARH didn't do so well in the DX Contest as ice put his beam out of commission. DEA snagged Gaubia and Sierra Leone on 14.2 Mc. UER is back on the air with 20 watts on 7.15 Mc. NNH is having no success in getting a 400-cycle motor to operate on 60 cycles. OUD handled traffic from the snowbound West. A 40-wire antenna with rubber-band strain insulators is working well for Letha. The HARC spring party was enjoyed by all who attended. Traffic: W0QXO 627, WAP 58, CGZ 45, IQY 45, ICD 35, OUD 31, GEP 28, EEE 25, NNH 14, DEA 12, SKA 8, GKT 6, IAC 6.

NEBRASKA — SCM, William T. Gemmer, W0RQK — Contact SEC MLB for EC appointments. If interested in a 7-Mc. net drop SSC at Lincoln a line. HYR is Lincoln EC. KDW is new ORS. BXJ built electronic key per Oct. QST. JCB is feeding a BC-610 into a folded dipole on 3.85 Mc. UFZ is driving a T740 to 90 watts with Meissner Signal Shifter. SAI built new Meissner Signal Shifter. SENRC members listened to a mobile 28-Mc. demonstration by LPU. VTO is SENRC's activities director. DNW is new NPARC vice-president. BBS is using separate 304TLs with 813 drivers on each band. QAN and RDN are new Lincoln hams. KAL has new 32V-1 transmitter. GFK is trying 144 Mc. with Millen high-frequency transmitter. JPI has a 28-Mc. mobile on shakedown cruise. KQX has new HT-19. NVE has new 304TL final. VQO, at Milford, has 100 watts to an 813. Meissner Signal Shifter, end-fed Zepp and an HRO on 3.85 Mc. DHO has dual T55 final for 3.85 and 14 Mc. NC FAM wishes to thank the c.w. net members for splendid cooperation during the '49 Blizzard. AZC talks to his son in the Canal Zone on schedule on 14 or 28 Mc. OED works 3.85-Mc. phone and 7-Mc. c.w. NVE has new K.w. K0NRG is Naval Reserve call at Fremont operated by AYO and EIE. RCH is building complete new rig. JJA works 7-Mc. c.w. FDG has new 3.5-Mc. phone-c.w. rig. Traffic: (Feb.) W0TQD 554, FAM 175, JLD 166, FQB 116, KON 95, BXJ 89, LWK 80, SAI 72, HSO 62, FAIW 61, DMY 31, IXL 25, VMP 23, WVE 21, DHO 12, KDW 11, LJO 9, RQK 9, OZC 8, JED 6, ZNI 6, DLX 4, VAA 4, AZH 3, RSN 2, (Jan.) W0TQD 340, HSO 251.

## NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — CLKF was appointed SEC, effective Mar. 1. It is hoped all the gang will give him their utmost cooperation in order to establish an AEC in this section second to none. Other current appointees in the section are ORP, Route Manager, and VV, Phone Activities Manager. The Yale University Club is completing repairs to its rig and expects to be on 3.85 Mc. with 300 watts. OTX, DJC, LJO, EJT, LAIK, QIX, and OAX are going mobile. QIS is working full time at Headquarters. BYB reports on the emergency set-up ground Waterford, which is FB. 0YBV has just moved to Bridgeport. RPQ is on 14 Mc. with 40 watts. QNV runs 20

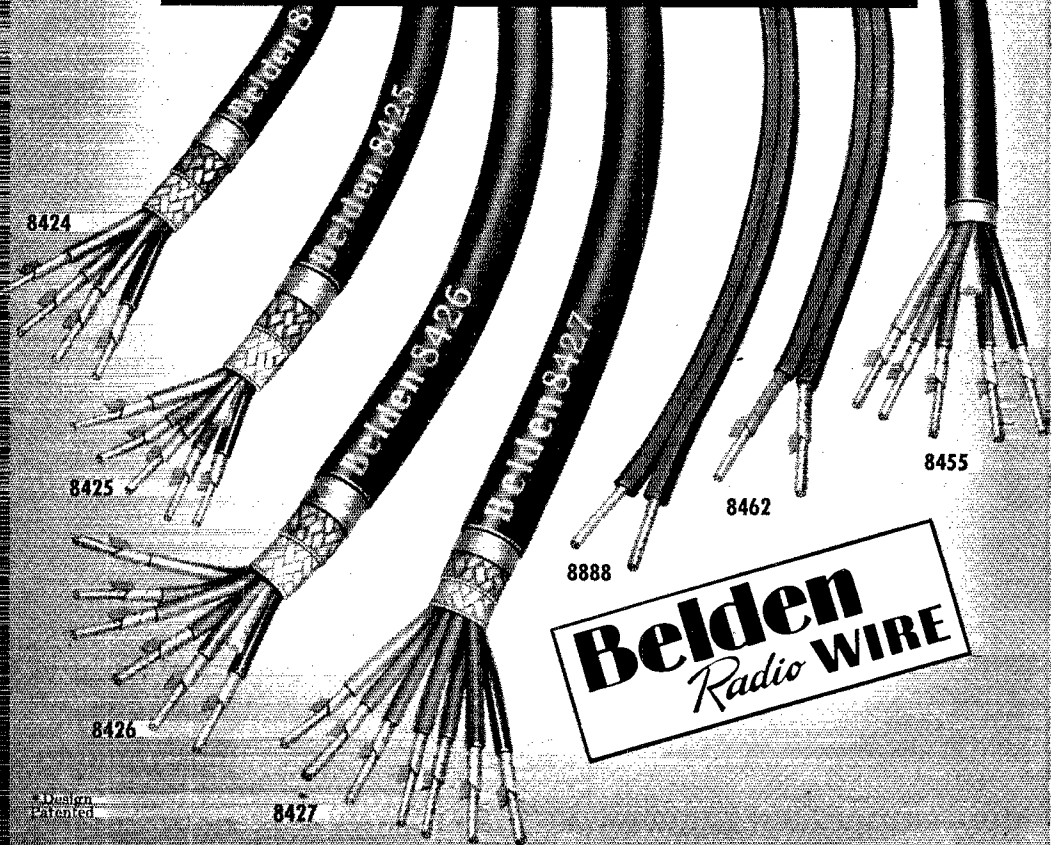
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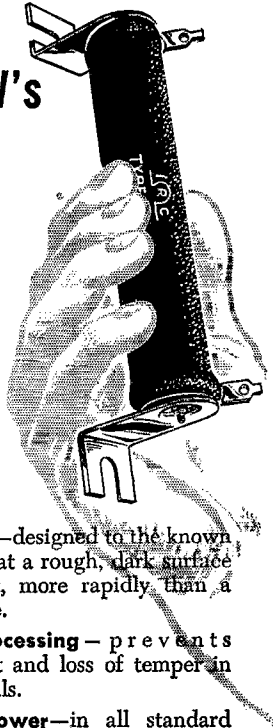
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## INTERNATIONAL RESISTANCE CO.

Wherever the Circuit Says

watts. NEK is getting set for 3.85-Mc. 'phone. DIT is building a kw. rig. The Radio Club of New London is getting ready with HQ-129X and new transmitter. RWS made BPL for the first time. DXP is on 7 Mc. with 500 watts. DWP's receiver went sour. TD is transmitting Official Bulletins on 146 Mc. EFW reports the CAP Net needs more stations. It meets every Tuesday. IKE blew the power transformer for his kw. rig, so he is getting married. New officers of the Meriden Club are FYG, pres.; QGX, vice-pres.; QPD, secy.; NRG, treas.; QMB, EC. The club expects to have its new station on the air shortly. Ex-3LRK has received his new call, RXL. UGX passed his 1st-class commercial 'phone exam. RUP blew his exciter power supply. KUO renewed his ORS appointment. LZR is back from the West. All the reports and letters are greatly appreciated, fellows. Keep them coming. Traffic: WIRWS 315, IIN 162, VB 115, CTI 103, BIH 87, DAV 83, LKF 83, JTD 42, BDI 41, HYF 40, KUO 33, ORP 28, EFW 20, BVB 19, NYC 14, BHM 6, RUP 6.

MAINE—SCM, F. Norman Davis, W1GKJ—New officers of the Eastern Maine Amateur Radio Club are LHK, pres.; BGG, PCD, and Levensalor, vice-pres.; QHR, treas.; and QEQ, secy. RJB is on 3.5 Mc. through 28 Mc. using 274N VFOs and an 807 in the final. PCD has Stancor mobile rig on 28 Mc. DFC and ROM are both using c.e.o.s. RWH is a new ham in Scarborough. Two new operators in Richmond are RWB and RXK. IOK and NGV are busy in the Naval Reserve unit. The Portland Amateur Wireless Association is sponsoring a hamfest in Portland on June 25th. Contact QHI for tickets. RSB has a new Collins receiver. QIQ is doing a fine job keeping YA, at the University of Maine, busy on both the Sea Gull Net and the Pine Tree Net. BOK has a 3.85-Mc. 'phone mobile rig. Field Day is approaching. Get your portable and emergency gear in readiness; it should be in readiness at all times anyway. Too many of us just throw something together for Field Day and have nothing ready for an emergency at any other time. Traffic: W1YA 103, NGV 86, LKP 85, NXX 50, JAS 47, FBJ 41, OIL 24, EFR 22, OHY 22, GKG 16, KYO 11, ROAI 11, RSB 10, ODA 5, PTL 4, AMR 2.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALP—LQQ is now an OBS. DMS applied for ORS appointment. DW renewed his EC appointment. ONZ renewed his OPS appointment. The following are on 144 Mc.: RBN in Walpole, OJJ in Hyde Park, QNH, WD, and EJU. KCP has a new YL jr. operator at his QTH. ILN moved to Seekonk, Mass., and is on the air on 3.5 Mc., after being off for ten years. JJJ is connected with the National Guard in New Bedford. The Guard has the call KIWAA. HWE has been on 28-Mc. 'phone. PLQ is on 3.5 Mc. MCR still has his gang reporting in each month. BGW got six new countries confirmed. MRQ is busy rebuilding two 7-ft. racks. ONZ joined the MARS. The T-9 Radio Club met at CVM's QTH. OEX gave a talk at the February meeting of the Quannapowitt Radio Assn. The Brockton Club had more films. Perry Ferrell, asst. editor of CQ, gave a talk at the Eastern Mass. ARA on radio propagation. Movies were shown also. The South Shore Radio Club had movies and a talk by MEV. MDU joined MARS. PU has BC-696 on 3.85-Mc. 'phone and gets on the Seagull Net, as does KJK. QJB still is playing chess on 7 Mc. ZR is on the SSN. RUJ is a new ham in Norwell. QMJ got 35-w.p.m. code proficiency endorsement. RUI is a new ham in Peabody. RXE has moved to Philadelphia. The Yankee Radio Club had an auction with AAT in charge. MCC is aboard the SS *American Jurist* as chief operator. LMP is back on the air on 28-Mc. 'phone. OMM needs Delaware for WAS on 28 Mc. LQQ has a new rig. The Southeastern Mass. ARA of New Bedford had a rig at the Hobby Show in that city and took messages. DFS has a direction finder on 3.5-Mc. band. KUD, RKS, and RHY are members of MARS. PUX/MIM writes from Panama. Canal Zone. OAI says he has very little time for radio right now. LOS worked the squadron leader of a plane over Germany and had the man's XYL at his QTH, all on 14 Mc. Correction March QST: HGJ has Quad antenna on 144 Mc. HGJ and HRF are on 28 Mc. also. ONZ relayed to @TTU the message which concerned a man ill with appendicitis during a severe storm when all electric lights were out. Upon receipt of the message @TTU started assistance to @NXJ immediately. Traffic: W1QMJ 269, LMI 187, WU 140, TY 105, EMG 98, ZR 78, PYM 42, QJB 40, DMS 39, KJK 34, PU 22, MDU 10, ILN 6, RAD 1.

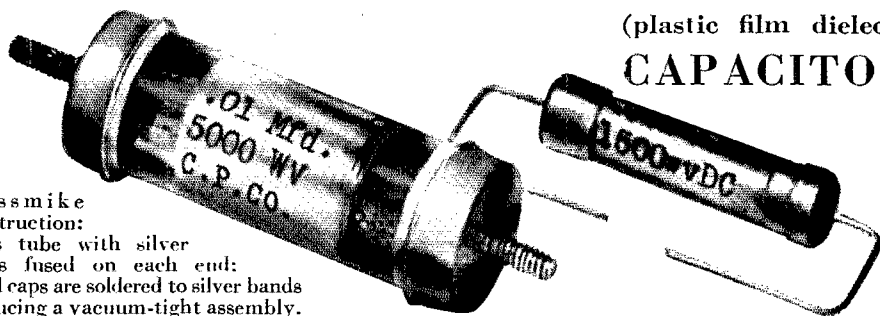
WESTERN MASSACHUSETTS—SCM, Prentiss M. Bailey, W1AZW—RM1: BVR, SEC: UD. The new *RM Bulletin*, which is issued to all Western Mass. by our RM1, BVR, is an inspiring little publication. We congratulate Perce and hope that it accomplishes its purpose. RIU, who really has been bitten by the traffic bug, gathers messages from teachers and pupils in school. BVR is working DX on 14 Mc. Recent ones are UA, ON, VK, FA, and EL. GZ recently celebrated his 35th anniversary of procuring his first ticket. IBZ schedules KZ5CG every Sunday. RLQ worked JA with 25 watts on 28 Mc. MUN and BKG, our OOs, are battling it out for accuracy in the FMT. In the last test BKG had only \$2 p.p.m. error but MUN edged him out with 2.1 p.p.m. ODU turned in a 15.5 p.p.m. error. COI took part in the DX Contest along with JYH, EOB, MUN, ODU, AZW, and JLT. JGY still is having trouble

(Continued on page 72)



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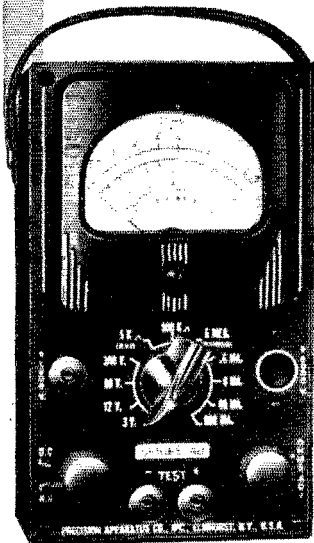
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with exciter. JE reports that work interferes with ham radio although his traffic total doesn't show it. BDV now has compact portable emergency job and plans to try it out on Field Day. Activities at school crowd radio activities at BDV. JYH has new two-element beam and his DX Contest score will show how good it is. The Hampden County Radio Club had a bang-up shindig on March 5th. QWJ, RFU, and NY are giving 50 Mc. a try. KFY added F08AC, CT3AA, and VQ5JTW to his growing list of countries. OJK and GBC are new members of HCRC. The Quinebaug Radio Club now is well organized. EFC is EC for Southbridge and vicinity. We are sorry to have to report that NY has relinquished the appointment as PAM. JLT missed the first half of the DX Contest because of transmitter troubles. RUX, in Lenox, is working DX on 28-Mc. c.w. ARA is back on the air after a few years of silence. ORV is on 28-Mc. phone using n.f.m. Traffic: W1GZ 127, JE 92, IHI 84, BVR 75, RHU 63, NY 44, AMI 43. AZW 36, GVJ 16, BDV 7.

NEW HAMPSHIRE - SCAL, Gilman K. Crowell. W1AQO - UVF 1 now is running 120 watts on c.w. and still needs Utah and South Dakota for WAS. ORN is attending the U. of Kansas. QJY reports on the Swing Shift Net regularly. LYS is ready to go on 3.5-Mc. c.w. ATJ has his 2nd-class commercial license. The Farmers Net (160) will be reactivated as soon as the go ahead signal is received. Q2SB/1 is operating from Suncook. LVG and QYT have their Class A tickets. RVG is a new ham in Tilton. BFT obtained an accuracy of 8 p.p.m. in the last FAIT with only a Collins receiver. KKT, BBH, and QVT are Net Controls for the 28-Mc. net. IP, LCD, JJB, and MAS can be heard on the Baby Sitters Net, 10 p.m. nightly. QVT has beams on 28, 50, and 144 Mc. Net Control Stations on the C.W. Net are as follows: Mon., CVK; Tues., QJY; Wed., BWR; Thurs., PFU; Fri., MXP. While operating 3.85-Mc. phone, MCS was reported to have been heard on the local theater's sound screen. Get your Field Day gear together, gang, and I'll be awaiting your messages at OC 1. The Manchester Club will sponsor the '49 hamfest. Traffic: W1CRW 598, HWR 124, QJY 99, NAB 29, MXP 24, CVK 22, ANS 21, PFU 17, QJX 5.

RHODE ISLAND - SCAL, Roy B. Fuller, W1CJH - The Cranston Radio Club has formed an Emergency Net and will drill on Monday evenings at 8:30 p.m. on a spot frequency of 147.5 Mc. The organizing efforts of MIJ, our SEC, are paying off. He reports six ECs now with four active nets and 26 active members. The Woonsocket Radio Club is conducting classes in ham radio. The NAARO held an auction, the proceeds going into the building fund. The club has announced it has obtained quarters in the East Greenwich Chapter of the American Red Cross Building, with facilities for the installation of a station provided. BTV handled the GPR Relay. Traffic: W1BTV 92.

VERMONT - SCMI, Burtis W. Dean, W1NLO - MEP is building a 420-Mc. square corner reflector antenna and VFO for 29 and 50 Mc. RLS has been operating portable with Collins 32V and 75A in Aldie. ETE visited KJG. KRV is handling NCS on c.w. net during PSD's absence, with MMN and RNZ assisting. ELJ is on 3.5 Mc. with BC-457 and 75 watts. QMM is operating from KL7AIR in Anchorage, Alaska, with BC-610 on 28.5 Mc. AYP's XYL, BD, and RNF have been under the weather, but are feeling OK now. OCD lost his father Feb. 26th. AC and ORO are sporting new 1949 sedans. The BARCH had an FB write-up in the Sunday News with pictures by QXU. QQN is using PM on 29-Mc. phone with FB results. QGF has a commission as 2nd lt. in the National Guard. QQN and RPR have speech clippers. AEA is using n.f.m. CAP could use some c.w. operators for their 2374-kc. net. For dope on CAP, contact AZV, PWX, and RMX. Traffic: (Feb.) W1KRV 75, AVP 10, NLO 2. (Jan.) W1KJG 1.

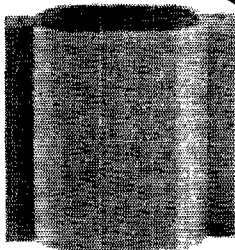
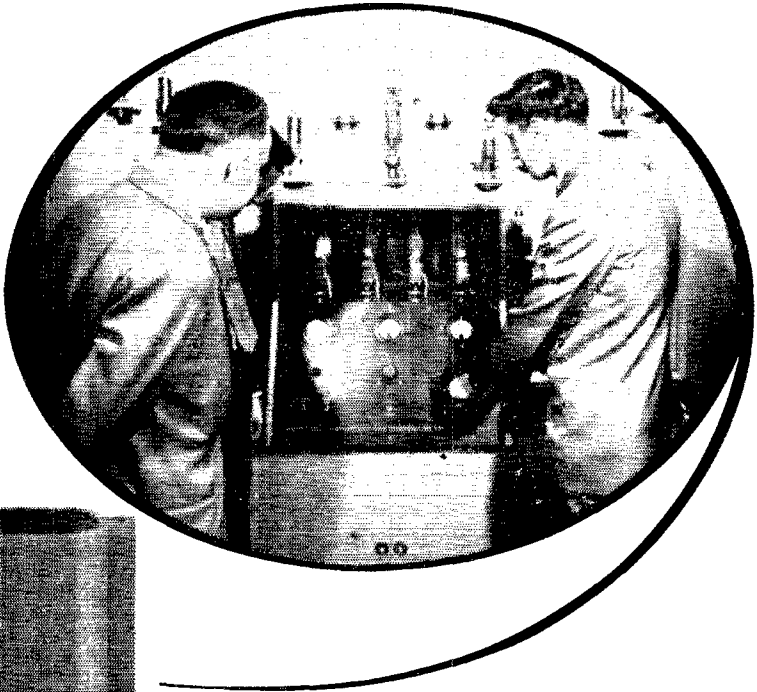
NORTHWESTERN DIVISION

ALASKA - SCM, Charles M. Gray, KL7IG - W7FTM AL has his KL7 call now. Hedrew VJ, and along with the new call is getting a new Collins exciter, the 150-watt job. No more fooling with homemade jobs. RI has transferred his OPS and ORS appointments from the seventh district and at the same time has taken over as OBS for the Ketchikan district. He is on phone, 3860 kc., from 7:00 to 7:15 p.m. and c.w., 3700 kc., from 7:00 to 7:30 p.m. His rig is using p.p. 811s and is modulated by the same. The receiver is an SX-43. OW has taken over the OBS activities in the Juneau area. He is using an 805 in the final and running 300 watts. AB has a new rig on the air with p.p. 811s in the final and 14-Mc. tank circuit soldered in. How about those reports from interior and out in the Islands? Traffic: KL7RI 9, GF 3.

IDAHO - SCM, Alan K. Ross, W7IWU - Twin Falls: A new ham in town is KH6LQ, KEK, HKJ, and MFC assisted the CAP in "Operation Snowbound." JMX meets with the Gem Net while planning to reactivate a "downed" beam. Hayden Lake: FIS, with the CAA at Coeur d'Alene Air Terminal, is on 14, 7 and 3.5 Mc. with three 274N transmitters and an SX-24 receiver. Moscow: MVA is now an ORS with the Gem Net. MKS is on 7 Mc. with a BC-458 while working on the main rig, bandswitching using a

(Continued on page 74)

# HERE'S MORE PROOF THAT TUBES WITH SPEER GRAPHITE ANODES CAN TAKE IT



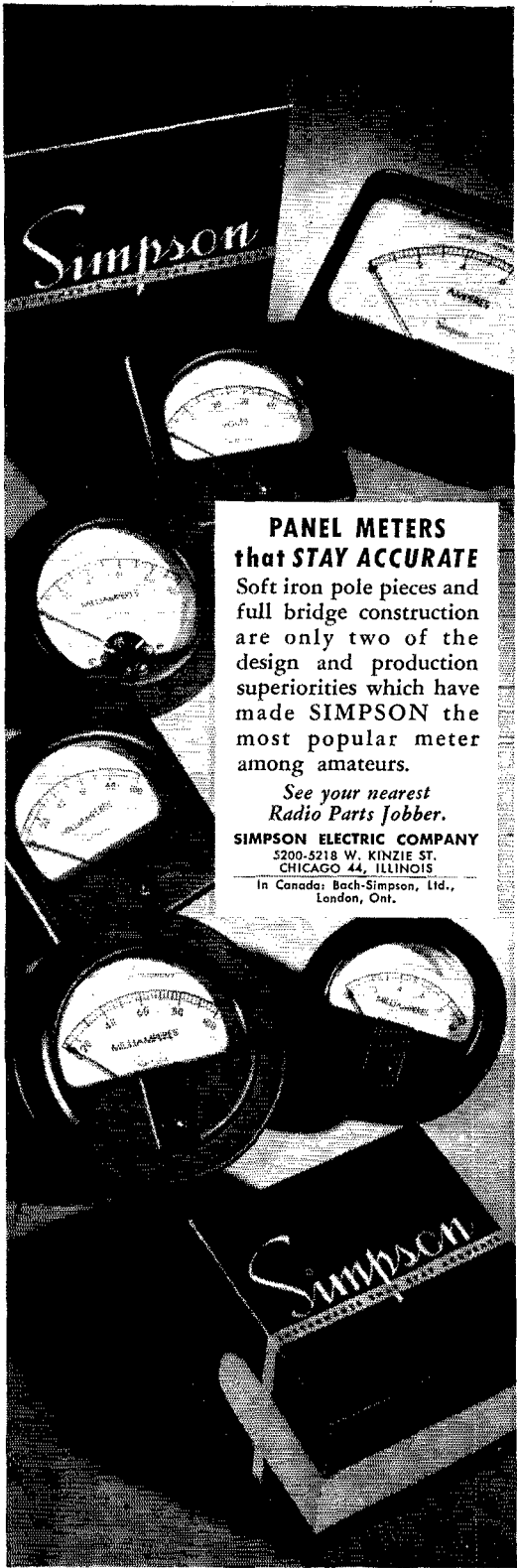
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pair of 5514s. Lewiston: FRM writes of formation of the Lewiston Clarkston Amateur Radio Club. Members have eight mobile rigs on 29.6 Mc., two mobiles on 3.85 Mc., and several fixed portables. Boise: IGK, of KIDO, gave a club talk on h.f. antenna design of KIDO-f.m. antenna. GTN and CUG handled some Western Union traffic for Stibnite and Cascade when the lines were down. Traffic: W7GTN 192, BZT 114, DMZ 111, EMT 44, IWU 44.

MONTEANA — SCM, Fred Tintinger, W7EGN — The Montana Phone Net now is operating on 3955 kc. every Monday, Wednesday, and Friday at 7:30 P.M. FTO is doing a nice job as NCS, and is looking for more members. CAL has constructed an electronic key. BYX is converting SCR-522. KVV was hospitalized because of injuries received in an auto mishap but is back pounding brass now. GBL has WAS on 3.5 Mc. FQA is conducting code class in the evenings on 28 Mc. BSU and KVV battle for contest honors. EWR has revived *Short Circuits*, the Electric City Radio Club paper, and hopes it will contribute to building up the Club as it was in the good old days. AFM and EGN supplied emergency communications between Big Mountain and Whitefish during the National Ski Championship Meet, and received some welcome help from 6ARB, a contestant with an injured ankle. The Glacier Radio Club's success in last year's Field Day competition has spurred them on to try for top place this year. Reports are that the Butte Amateur Radio Club also is going to get in there and dig. A new call in Kalispell is NCM, belonging to Ken Ricketts, the blind organist. EMF wants an antenna designed with nulls pointing toward all monitoring stations. Traffic: W7CT 143, FTO 77, EGN 52, KGJ 44, KVV 21, EWR 19, KTY 17, BXL 11, CBY 6.

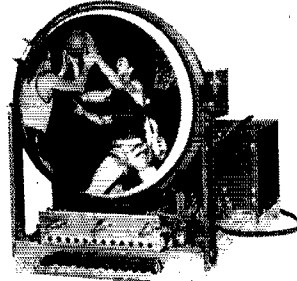
OREGON — SCM, Raleigh A. Munkres, W7HAZ — Astoria: COZ worked AYV1, who would like to contact other West Coast friends on 28.8 Mc. COU is buying parts for a comeback. The Astoria Club now has an attendance prize. Baker: The Baker club is about to graduate some 13-w.p.m. men. AMI and HAZ are ready to go on 160 meters. HAZ was elected communications liaison officer of Sheriff's Air Posse. LaGrande: HBO handed over the reporter's reins to CHN. KVG, snowed in most of the winter up Starkey way, has all the latest in Collins gear. JOD and IMI were busy all winter keeping the Union Pacific out of the snow banks. HBO moved up from the basement when the "unusual" weather finally became unusually unusual. Pendleton: A flash flood kept prey FLX from the club meeting. MQ checks in on Oregon Emergency Net. BDN is giving code lessons for the juniors. BEE is retiring from McKay Dam and moving to Everett, Wash. DQX has received a promotion and has been transferred to Miles City, Montana. Salem: AWE is building 81-Mc. rigs for the forest service. LBV is building a VFO for easier net operation. DZT checks in on OEN. LUZ received his Class A license and moved from Salem to Spokane, Wash. DIS, of Portland, has been appointed Regional Emergency Coordinator. River Forecasters Office, Columbia River Basin. Stations in Washington and Idaho adjacent to the Columbia River are urged to contact their SCMs for participation in this important work. Traffic: W7APF 198, HVD 107, JRU 72, GXO 69, PY 67, GNJ 34, HDN 32, LT 32, KL 22, HLF 20, ENU 19, EBO 16, GZW 13, HBO 12, MQ 8, WEN 4.

WASHINGTON — SCM, Clifford Cavanaugh, W7ACF — RM: CZY, SEC: GP-PAM: CKT. New ORS are MGG and DRA. The Valley Radio Club elected the following new officers: EBJ, pres.; JJK, vice-pres.; MTX, secy.; MPH, treas. and IVJ, trustee. DXF did the installing. The club is moving to new quarters at EBJ's place. LEC is installing mobile gear for a trip south. JJK and KHL are having fun on 144 Mc. IVJ still is building his kw. The Skagit Radio Club sponsored a television dance with great success. The Walla Walla Valley Radio Club's *Hi Mu Journal*, published weekly, is chock full of interesting doings of the gang. *The WSN News*, printed by FIX, breaks all records with 21 pages. FXD and JZR are new WSN outlets. DGN has new jr. operator. OM Russ says no more split watches as this is his third boy. It's four on and eight off from now on. GR is getting emergency gear ready for the flood season. BG says harmonics are driving him back to 3.5 Mc. KAA has a tough time pounding brass with bandaged hands. Ex-SCM WY is back on WSN after a long absence. JC and CZY are breaking their necks to see who works the most DX on 3.5 Mc. FRU is slaving on PN. Four stations made the BPL this month — ZU, CKT, CZY, and a very FB XYL operator at Colfax. KCU. FWD is letting FWR do the operating as he is QRL with the plowing. MGG keeps Mt. Vernon on the air. DXZ sends in a nice OO report. AMZ received 20-w.p.m. Code Proficiency Certificate and is waiting for endorsement sticker for 25 w.p.m. KTL is new mobile on 28 Mc. and reports NBL and NDB also are active on the same frequency in Vancouver. ETO is saving up for new Collins 32V-1. FXD and LVB handle traffic between states on two nets on 144 Mc. GP, SEC for Washington, has things going FB in the AEC. He states applications for membership are coming in every day. LJM put up new rotary beam but likes 3.5-Mc. c.w. best. JDC, a dyed-in-the-wool brasspounder, is after 35-w.p.m. Code Proficiency Certificate. CKT, the PAM, states WARTS Net traffic is getting heavy. Rylie has done a very FB job

(Continued on page 76)

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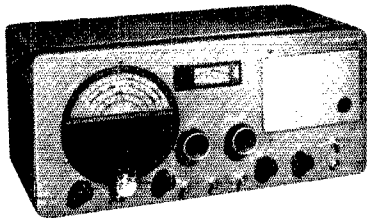
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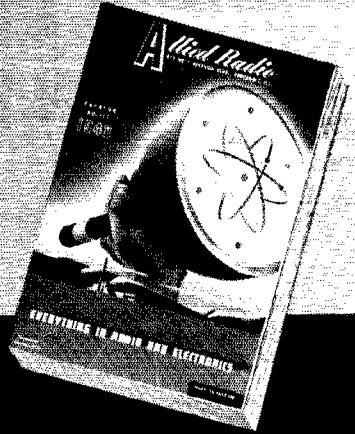
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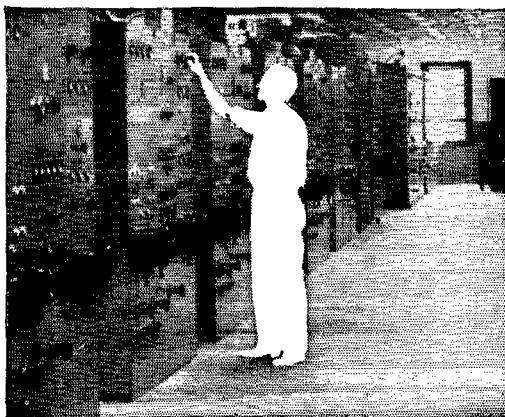
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building this traffic system, which is second to none. CZY is doing an FB job with his Alaskan schedules. FUL listens to WSN from the Hawaiian Islands. He says it makes him homesick. Traffic: W7CZY 931, CKT 904, ZU 247, FRU 219, KCU 212, LEC 93, LVB 92, FWD 64, DRA 55, KAA 54, FAX 51, AMZ 46, FXD 46, EHB 39, EAU 32, DGN 31, MGG 30, AFS 25, ACF 23, ETO 22, FWR 20, JJK 20, JZR 18, EVW 13, KTL 13, GR 10, LNW 10, BBK 8, JC 8, WY 6, CWN 2.

### PACIFIC DIVISION

**HAWAII** — SCM, Dr. Robert Katsuki, KH6HJ — At present the AEC is headed by GM. ECs are AS, AN, GM, BI, CL, and LD, all in Honolulu. AEC is associated with the disaster council of the Territory of Hawaii. The recently-opened ham school meets at the club house every Monday, Wednesday, and Friday nights. Present chief is PP, who has taken over since GF left for Greece. Assistants are GM and KS. At last reports the attendance was up around 40. BI is screen grid modulating with much better results than cathode modulation. Ham club membership now is up to 100. The club meets the second Monday of every month. AZ is 1949 president.

**NEVADA** — SCM, N. Arthur Sowle, W7CX — Asst. SCM, Carroll Short, jr., 7BVZ. SEC: JU. ECs: HJ, J.V.W. JLV, KSR, QYK, T.JY, ZT. KIO has new final. LVP is on 7 Mc. Nevada State Net stations are active on 3660 and 7225 kc. TKV is on 27 Mc. with f.m. SXD is on 28-Mc. mobile daily. TFF and KJQ are enjoying 28 Mc.-mobile. JVO was active in the DX Phone Contest. MAM is on 28 Mc. for local contacts. ONG moved next to TZZ1CTK is on at Whitney. LUV, KOH, and NCR are on 28 Mc. JTA, UTZ, JLV, W6AFK/7, IPD, and MAH have renewed interest in 144 Mc. around the Reno, Sparks area. JPI has a Quad on 28 Mc. LXF is stacking 3 over 3 on 28 Mc. MRN was portable on 7 Mc. at Sun Valley, Idaho. GC has n.f.m. on 3.85 Mc. KLIU has new rig and a 20 twin triplex. PST is on 3660 kc. almost every night. T.JY has 9 1/2 kw. of emergency power at the flip of a switch. QJH works the YLRL girls on 29,124 kc. Tuesdays. KLK rebuilt his antennas. BIC has 304TL final on n.f.m. ZLT is on 3.5, 3.85, 7, and 14 Mc.

**SANTA CLARA VALLEY** — SCM, Roy E. Pinkham, W6BPT — WGO checks into the Mission Trail Net on emergency power twice a month. HC gave a talk before the Palo Alto Radio Club. His subject was Class C amplifiers. HAN'S voice has been heard on 3.85-Mc. phone from ZRJ. Why not get on the band. Bob? QYN has new rig on 28 Mc. using 813. WJM reports that the Monterey Bay Radio Club is going strong, with new members joining each month. NOE spent several days in the hospital. Hope you are fully recovered. Bill, ZZ made WAC in six hours and fifty one minutes on Feb. 11th. Miles now has 109 countries worked with 99 confirmed. AVJ now is using new VFO, having built up a Meissner Kit. VHE now has his Class A ticket and expects to be on 14 Mc. as soon as he gets a new transmitter. ZIJ was a visitor in San Jose over a recent week end. ANR is back at his home QTH after having worked portable in Morgan Hill for several weeks. VIQ raised two 45-foot masts for his 3.85-Mc. antenna. Bu-k now is getting out in FB shape. HG is making plans for SCCARA activity in the coming Field Day in June. WNM is getting his rig in shape for the opening on the 160-meter band. Traffic: (Feb.) W6 ZGG 107, JSB 105, WGO 77, WJM 60, VZE 14, ZZ 6. (Jan.) W6JSB 127.

**EAST BAY** — SCM, Horace R. Greer, W6TI — Asst. SCM, C. P. Henry, 6EJA. SEC: OBJ. ECs: ARK, EHS, NNS, IT, IDY, QDE, WGM, ASL, EC u.h.f.: OJU, RM; FDR, ZAL, WAB, my u.h.f. information bureau, writes to say that he now is at college in San Luis Obispo which is why no news of late. However, he reports that VSV is working with television on 420 Mc. UHAM is building a t.v. receiver, and so is UOV. Bob goes on to say that he expects to work at Yosemite Park this summer and will be looking for 144-Mc. contacts. FDR is using only VFO with about seven watts of late but still reported a total of 609 messages for February. OT made the BPL for February. The gang at the Oakland Radio Club is a hard-working bunch and is keeping the station very active. EJA reports that the Richmond Radio Club is most active in emergency work. On March 4th the Mt. Diablo Radio Club held a special banquet and a good time was had by all who attended. From time to time I hear and talk to people who want to know how they made the grade in this report. Gang, all you have to do is to drop me the dope on a penny postal card so that I receive it by the 5th of the month, or phone Glenouret 1-2792. Club dope is particularly welcomed. The Mission Trail Net is doing a nice job of message handling. The Pioneer Net is keeping busy with traffic. Most of the East Bay clubs are planning big doings for this year's ARRL Field Day. OBJ can't wait for the nice weather so he can get out on week ends with the good old gear. The ORC is starting up another code class. All interested call BLW, sev. UPV is making plans for a new and better beam. IKQ is QRL the magic word DX. YMO really can speak English on phone. ZAI appreciates a few lines from the gang. PB is getting to be an all-band operator.

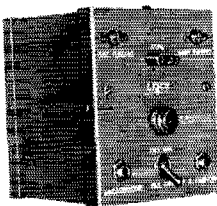
(Continued on page 78)

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## LYSCO 10 METER Mobile Transmitter

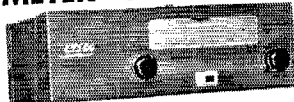
**MODEL 129**—Extremely compact size (4 x 5 x 5 1/2 inches) for easy under-dash mounting in your car. Delivers 8 watts A-3 emission on 27-29.7 Mc. Uses 7 or 9 Mc. crystal. Power requirements are 6.3 volts AC/DC @ 2 amps and 350 volts DC @ 110 Ma. Uses three type 6AG7 tubes for oscillator, amplifier and modulator. Antenna termination for 50 ohm coaxial line and antenna changeover relay. Microphone may be T-17 or any single button carbon type. Supplied less tubes and accessories. . . . . **23<sup>95</sup>**



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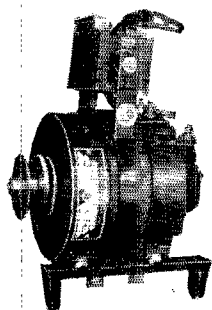


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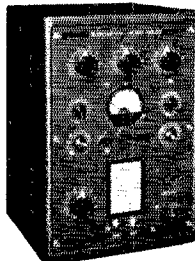
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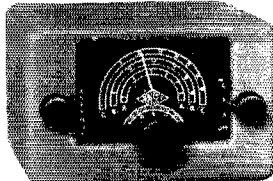
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## GONSET 3-30

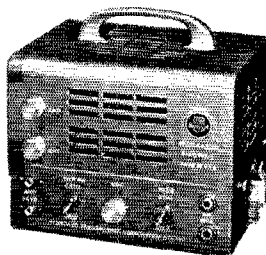
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### Mobile Transmitter

#### Kit

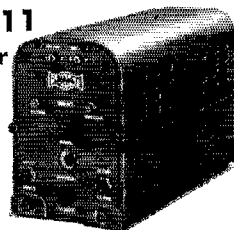


25 watt crystal controlled phone transmitter covering 27 to 32 Mc. Will give reliable service in your car or as fixed station. Requires 400-500 volts DC @ 200 Ma. and 6 volts AC/DC @ 2.8 amperes. Uses 6V6 harmonic oscillator working from 7 Mc. crystals, 2E26 class C amplifier, 6J5 grounded grid speech amplifier and push-pull 6V6 modulators. Press-to-talk mike switch operates transmitter. Front panel has all controls, including jacks for antenna, mike and meter. Will operate with any 1/4 wave vertical whip or conventional antenna. Accessories needed but not supplied are: tubes, crystals, single-button carbon microphone with switch, power supply and antenna. Furnished complete, all parts, assembly and operating instructions. **44<sup>70</sup>**

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## news

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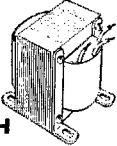
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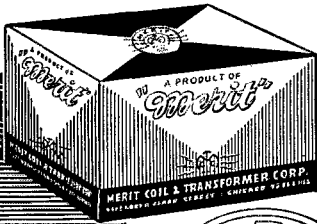


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EY would like to go to higher power, but oh my \$\$, GEA is on project Nr. 999A, SSN still is under the weather, LDD is chasing key clicks, MEK has a new steel tower and beam up. This time it is guyed. MFZ is up to 90 postwar countries. TTH is QRL business but gets on the air now and then. MVQ is getting out FB with low power, CDA is QRL. TT's lot looks like a broadcasting station with all the wires on a city lot. YI claims working DX is not what it used to be prewar, QLH puts out a mean signal, QXN is QRL net traffic; BUY is almost ready to get on the air. Trailie: (Feb.) W6FDR 809, W6OT 211, W6QXN 141, W6TT 8, (Jan.) W6DQL 60, W6BP 27.

SAN FRANCISCO — SCM, Samuel C. Van Liew, W6NL — Phone JU 7-6457, SEC: DOT, CEC: BYS. On the 5th and 20th of each month the MT Net will have a regular period for handling traffic from mobile and emergency power units. C'NO is acting MT Net Control for Saturday nights each week (operator, JWF), who invites new members to check in. VEJ and SP are doing some research on a one-tube complete rig, crystal oscillator, modulator, and all, the ideal mobile rig. Except for a receiver, IBQ is all set to get back on the air, ZOE soon will be heard as K6AIR, DZU is on 14 Mc. in Novato. UDF is making good use of his new beam and 1544 tubes. KAIAI soon may be back at Hamilton Field. DIX still is plugging for DNCC Certificate with 103 worked, 83 confirmed, after surprising everyone with a beautiful n.f.m. reactance modulator. TEL tore down the skywire and went overboard for t.v. PPL is another new convert to n.f.m. to minimize B.C.I. BCC is putting out an FB f.m. signal with a little Motorola mobile unit he won at one of the "Hamilton" raffles. Regardless of the power he has worked G and KP6. GPB isn't fooling about putting a gallon on the air on all bands. He has all the stuff to do it and already has finished a 3000-volt supply. LUM checks into the emergency net on 'phone with the use of a pogo stick. ZXD moved to Hayward and can be heard on 28-Mc. 'phone using a full gallon. DNY is putting a pair of 807s on 7-Mc. e.w. RSI is having great luck with his Clapp oscillator. VEJ is leading a busy life as chief at KTIM and is carrying a full course at College of Marin in addition to his ham activities. YME was introduced to B.C.I. through the aid of an ancient motorboating receiver. BYS was held up in construction of that gallon exhaler but he can be heard on 3.5- and 7-Mc. e.w. with a mighty sweet signal from a modified TCS. NL is making use of TCS as a VFO. RBQ is the proud possessor of a new Collins 30K transmitter; he is using an improved keying system. The Golden West High Frequency FM Club is backing up the local Red Cross Chapter with a large group of very fine mobile jobs on 28-Mc. 'phone f.m., and participated in a test drill with very gratifying results during February. The final organizing of personnel and schedules for both the NRC and the local chapter is progressing slowly but surely. Most of the gang have been so occupied with the DX Contest that little has been heard from them. Some very fine scores have been made but we're making no predictions as anything can happen. Various clubs already have done considerable planning for the coming Field Day, so we are looking for some hot competition. Report from Guam: KG6DI reports the following score for the first e.w. period of the DX Contest: 538 QSOs, 1674 points, 54 multiplier, 90,396 total score. He needs only 36 for a perfect total. At the Feb. 25th meeting of the San Francisco Radio Club TFZ gave a very interesting talk on "Mobile Radio Equipment." The San Francisco Naval Shipyard Club held its usual active monthly meeting at the local Red Cross Building at 450 Gough St., and the Emergency Corps work was pushed ahead. Plans for the coming Field Day program also were discussed in further detail. The Golden West High Frequency FM Club held its monthly meeting at the local Red Cross Building at which time plans to join the SFNY Club in its Field Day program also were discussed. Traffic: KG6DI 660, W6NL 62, JWF 46.

SACRAMENTO VALLEY — SCM, Ronald G. Martin, W6ZF — Asst. SCMs; Northern Area, Ray Jensen, 6REB; Central Area, Willie Van De Camp, 6CKV, SEC: KME, EC Metropolitan Sacramento Area: BVK, RM; REB. It is my sorrowful duty to announce the passing of PHX Feb. 20th. Northern Area: JDN is on Oregon Emergency and Mission Trail Nets consistently. The Mount Shasta Amateur Radio Club's new officers are HRF, pres.; YNI, vice-pres.; EWG, secy.-treas. BDU, act. mgr., JDN, CFU, ARR, directors. The club wishes to purchase or build a 150-watt transmitter for \$150. Can anybody help them? The club call is BALL and meetings are held the 1st and 3rd Wed. of each month at the City Park in Mt. Shasta City. Central Area: AF reports OBS going out on 14,100 kc. regularly. The GERC met Feb. 18th at Casey White's home. CIG says 400 watts on 144 Mc. has made a difference, especially with 75Ts and a 32-element beam! CKV and his dad lament the loss of their 60-ft. pole and 144-Mc. beam. ZNU cranks up kw. on 14 Mc. TSR joined the Mission Trail Net. Southern Area: BTY is new OPS and OBS. WTL moved to new QTH and worked KP6AA and KN6AK first off. RMT and AK hit it off in DX Contest with Collins 32V-1 transmitter. F'W is stuck on 3956 kc. with the Buzzards. SUB is sporting 600 watts on 3.5-Mc. e.w. YV and ASI have Collins 75A-1

(Continued on page 80)



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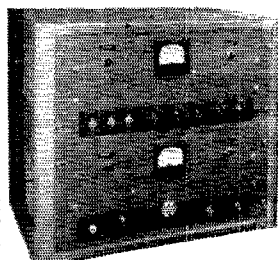
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receivers. MIW is knee deep in Field Day Committees. Ex-WST's new call is KH6VY and he is on 28-Mc. phone. MIWM has new Sonar f.m. unit on 28 Mc. CAS's 144-Mc. beam in the top of an 80-ft. tree has increased his DX. QKJ is playing with lighthouse grounded grid amplifiers on 144 Mc. NHA is showing off new transmitter with Faraday shielding between each stage. CQK is rebuilding 28- and 50-Mc. mobile receiver. OKZ has new 3.5-Mc. centered all-band antenna and is putting 522 in his plane. PIV visited PQS in Santa Maria and scheduled his homr nightly with traffic via ZP. KME added 35Ts on 3.5-Mc. c.w. QDT has n.f.m. on his GP-11 emergency rig. WRD is back on 28 Mc. Traffic: (Feb.) W6RFB 661, ZP 32, JDN 13, BTY 11, WTL 11, (Jan.) W6WTF 8.

PHILIPPINES — SCM, M Sgt. Stanley J. Gier, KA1AI — On Feb. 23rd a meeting was held at Clark Field for the purpose of organizing an amateur radio club. KA1AK was chairman. At the meeting, the sample constitution was read, corrected and approved, and the Clark Amateur Radio Club was formed. Officers are W5LPI, ex-KA1ABX, DU10B, pres.; W6CD, ex-KA-DU1CD, vice-pres.; Maj. N. O. E. Larham, secy.; M Sgt. C. M. Hermette, treas.; Capt. J. A. Treese, act. mgr. About twenty members were present at the meeting, mostly non-licensed men. The matter of affiliation with ARRL was discussed but it was decided to take up this subject at a later meeting. Your SCM will be on the air again as W7JKJ sometime in April or May and may be reached by mail at his home QTH, Phoenix, Oregon.

SAN JOAQUIN VALLEY — SCM, Ted R. Souza, W6FKL — Asst. SCM, James F. Wakefield, 6PSQ, SEC: JPS, ECS: KUT, PHL, WBZ. OHT is now OBS for Tulare. OHB and PHL were in town recently shopping for new gear. EJD is the proud possessor of a new scope and square-wave generator. JFU built a scope and JWK has one in the making. FKV is considering one. TW now has a permanent resident of Fresno, having moved down from the Bay Area. VKD and YGZ can be found on 50 Mc. DIE has a new jr. operator. CPT and WBZ are going mobile. INP and JIF have rearranged the shack. RFN is doing all right Pacific-ward. ONP is on 28-Mc. mobile. VPV is getting his mobile rig into shape. BHI has been working some fine DX on 3.5 Mc. — five countries in one night, no less. The SARC had a fine demonstration by the Eimac people at its last meeting. The wheels of the SJVRC are grinding with plans for the 7th annual hamfest on May 7th. SRU now works for Ala Bell. KAM is making a big noise on 3.85 Mc. with a surplus TCS. PXP is looking for a pig — pole pig, that is. DTI is busy on the Mission Trail Net. SUV is putting up a new 3.85-kc. antenna. VTZ is looking for some Fresno activity on 50 Mc. MGN is quite busy with fire department radio and signal system. BNP is planning a trip east with a small portable — 3 warts in fact. H1P and NDJ are skywire experts in their bailiwick. Let's keep the ole section on the msp, fellows. Don't forget those monthly reports.

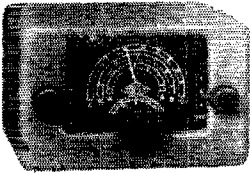
### ROANOKE DIVISION

NORTH CAROLINA — SCM, W. J. Wortman, W4CYB — Many thanks to JQO at State College and MR over in Greensboro for the news this month. It is hoped that the blank space appearing here last month was noted. The month's accumulation was only a couple of traffic reports, hence no column. GXB, CS, AIT, AJT, and GC were on in a big way during the DX Contest. GON, OIH, and HEB operated Greensboro Club station, GNF, the first week end of the phone section. GQU complained that the pace was too fast and lost interest after the first week end. AJT lost final amplifier bottles. Replacement will be 4-250As. GXB is giving his new rotary a workout. GC is losing the pine trees supporting his Lazy Hs. UA has difficulty with drive on 28 Mc. KYR can't move because of wet grounds and at the same time is cooking a deal on a 50' stick for a beam. HEB cured major B.C.I. problems by going to low power. ELW has added an XYL. MR has trouble with a prop pitch motor and needs a blow pot to warm her up before operating but the rasal still can work the DX. ORZ and NAP are new hams in Raleigh. NEA has 30YH under preparation for graduation. LYI is working low-power portable at State College. JGA keeps 28 Mc. hot over week ends. ILM likes to work short skip and has assisted in the construction of a seven-element job at LBV. MSO and MWF are rooming together working 3.5 and 14 Mc. JQO is active on NCN and handles the traffic end of the State College Club. OFG and NXS are new members of NCN. Traffic: W4CFL 1102, KJS 74, JQO 18.

SOUTH CAROLINA — Ted Ferguson, W4BQE/ANG — BSS reports of the good work done for the P.&N. Rwy. during the recent ice storm. Taking part in this work were KAK, AZT, CVQ, and BSS. We welcome to our midst OFH, who works 7-Mc. c.w. ANK is busy with TL "C" and the SC Net, in the Charleston Club DFC was selected president and ANK secretary and treasurer. AIRJ is rebuilding. CSP is now located in Charleston. BJE reports activity in the SC Net as well as his EC activity. To AVQ we are indebted for the fine report from Greenville. KEO keeps regular schedules with KZ5CD, KZ5FL, and VP5AS.

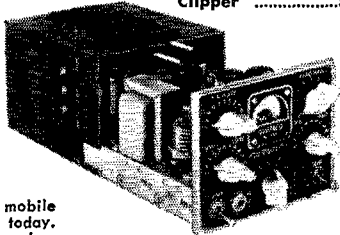
(Continued on page 82)

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The new converter which covers all bands from 3 to 30 mc. Same size as all Gonset mobile converters, Model 3-30 ..... **\$39.95**  
The still current, and highly popular, 10-11 or 6 meter models ..... **\$39.95**  
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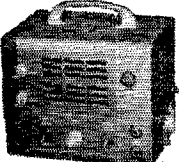
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(MT15X for 20 and 75 have same features as MT15X for 10-11)  
**Speech input.** Any of the MT15X can be ordered with high-gain speech input for either xtal or dynamic mikes at an additional cost of ..... **\$9.95**



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Dynamotor supply. 6 V. DC input, 400 V. at 175 ma. output. Complete with built-in control relays, filter, etc. .... **\$59.95**  
**AC Supply** for operation of any of above Subraco xmtrs indoors. Complete with rectifier and built-in control relay. .... **\$39.50**

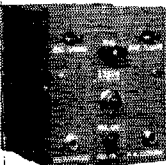


## STANCOR'S NEW ST-203-A

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Completely assembled, wired and tested, less tubes and accessories **\$58.90**

## MOBILE ANTENNAS

Auto receiving type, collapsible, 96" ..... **\$3.60**  
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Type NA bumper mount for antenna. .... **\$3.60**  
Type R mount with SA spring adapter. .... **\$14.40**



## LYSCO'S NEW MOBILE XMTR

Dimensions 4 x 5 x 5 1/2". Uses 6AG7 osc; 6AG7 amp; 6AG7 modulator for A3 emission. Available in either 10-11 or 80 meter models. Built-in antenna changeover relay. Power requirements 6 V. 2 A., 350 V., 110 ma. Either unit completely wired and tested, less tubes and accessories. .... **\$23.95**

LySCO model NX1 noise clipper ..... **\$7.50**  
LySCO grid dip meter, 3-150 mc range, calibrated dial, no plug-in coils, complete with power supply and tubes. .... **\$33.50**

All in stock for immediate delivery.

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Collins 75A-1 receiver.....	\$ 375.00
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Collins 310C-1 .....	85.00
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All Collins equipment in stock  
**160 METERS NOW OPEN**

Harvey has in stock a complete assortment of B&W coils in all types and ratings. Also 160 meter xtals made by Bliley, Petersen, etc.

## SPECIAL ANNOUNCEMENT

### NEW PRODUCT FROM LABS OF JAMES MILLEN

On or about May 10 we will have in stock the first shipment of Grid Dip Meters made by Millen. This is a completely designed unit along lines of Bill Scherer's W2AEF grid dip oscillator as described in Feb. CQ and the CQ-TV1 manual. Frequency range of this completely calibrated unit is 3 to 250 mc. It will sell for approximately \$49.50 with complete built-in AC power supply which will use complete AC line isolation. This unit has many uses around shack and shop. Invaluable in design and construction of new equipment, tuning antennas, chasing TVI harmonics, etc. Send your order in now as shipment will be made in rotation of orders as received. Be first in your neighborhood to own one of these fine instruments.

## NEW EZAZON COAXIAL CABLE CONNECTORS

Solid cast bronze machined to fit RG-8/U, 11/U and all other coaxial cables of same diameter. Available in four types: 4-way, model 4W; 3-way, model 3W; 2-way, model 2W; and a feed-through bushing, model FT, for running cable through chassis, cabinets, etc., without need for cutting cable. Prices: FT—\$1.50; 2W—\$2.40; 3W—\$3.00; 4W—\$3.60.



## NEW 1949 TECHMASTER TV KIT

Exactly the same as the RCA 630TS chassis, complete kit of parts, including 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 instructions. (Free circuit and parts list on request.) Shpg. Wt 85 lbs. .... **\$198.50**

Less kine..... **\$168.50**  
12" tube..... **69.75**  
15" tube..... **89.50**



## GE FM TUNER

Only a few left of this unusual buy. Covers 88-108 mc range, uses guillotine tuning. Designed for export and tropicalized, has power inputs for 110 to 250 volts 60 cyc. Shpg. Wt. 30 lbs  
**SPECIAL PRICE** ..... **\$49.50**

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*The American*  
**RADIO RELAY LEAGUE**  
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**WEST HARTFORD 7, CONNECTICUT**

KEC also has schedules with KG6DI, KZ5CD, and DL4PAN. DBT operates 7-Mc. c.w. and had a number of schedules. FNS works 14-Mc. 'phone and c.w. NVQ says, "How about some 50- and 144-Mc. work in South Carolina?" KMK works 3.85-Mc. 'phone and is active in South Carolina 'Phone Net. BSS reports that they are organizing a club in Greenwood. AUT reports activity in the 3.5-Mc. c.w. net. Thanks, DAW, for the traffic through HMG. Traffic: W4ANK 122, AUT 40, KEC 13, BSS 12, KED 10, BJE 6.

VIRGINIA — SCM, Victor C. Clark, W4KFC — KYD edged out FF for traffic honors this month, making BPL on deliveries. KSW is back on VN after raising new antenna CQW, FV, IWO, LIM, and OM were active in 'phone DX. Tests. LAP had the pleasure of receiving a QSL confirming his 100th country from the DX operator in person. The Ocean View Club is offering a special certificate to Hampton Roads area hams working 100 locals. IPS is installing mobile equipment in new station wagon. ITA qualified for 35 w.p.m. Code Proficiency Certificate. A QSL from KH6VP/VR4 makes it 114C confirmed at VE, OVV, new Falls Church ham, is ex-3EFZ. SU, erstwhile BTO of 3.5-Mc. DX, now sits hunched over a t.v. set on Saturday p.m.s. JFM has commissioned new 28-Mc. rig. FV is new OPS. KXN is moving to D. C. to resume operation as 3GRF. Dr. Jack Mengel, of Navy Research Labs, told the Arlington Club about V-2 rocket tests. JFE is new ORS. GWW is on 28 Mc. with 75 watts and a Quad. NBA is on 7- and 14-Mc. c.w. with a few watts. IPC's new QTH near top of the highest hill in Staunton is 208 Williams St. OVII a new Falls Church ham, Bob, 4OWI (ex-1GFPP), and Russ, 4OTU (ex-1GFQ), Leach are again active on 7 and 14 Mc. with 813 final. They are ex-New Haven and now located at 4819 N. 9th St., Arlington. OQE and OMZ joined the AEC. NNN worked five new countries in a single day in early March and now boasts 183. JXH edits the FB PARC publication, WORD. 1BUD attended recent PVRC meeting. 8MJ is decorating basement for use as new shack. IUU, KPK, and LIM joined PVRC. IA and KFC had a nice chat with 1BDI during the latter's visit to Washington. Traffic: (Feb.) W4KYD 223, FF 220, KVM 165, NPG 129, IA 93, KFC 88, LAP 85, LRI 80, LPP 44, II 41, ITA 26, CLD 15, QWM 14, CQW 10, FV 8, VE 8, IWO 6, JHK 4. (Jan.) W4JDL 43, IUU 34, JHK 9, LRI 9.

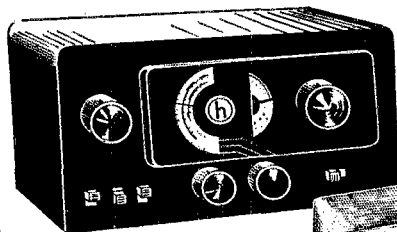
WEST VIRGINIA — SCM, Donald B. Morris, W8JM — Director Bately, 4IA, visited the MARA at its March meeting. JM made formal presentation of the club call, W8SP, to members of the MARA and plans were made for the best Field Day ever, 4KIX, ex-AKZ, visited OXO and sent messages home through WVN Net. AUJ is on TL "M." OXO is on TLCS and GBF is manager of TLC. WKP is new station at Keyser. WSL is running tests on indoor bedroom beams and has new Collins 32V-1, EHA, ESQ, YGL, and EP are running tests on 145 Mc. FMU reports excellent results of his trip to the Charleston/Huntington area on SEC work. CSF divides time between AEC work and WYN. HUK, NCS for the WVN 'Phone Net, has appointed YBQ as first alternate. MOP and UOW are active on 3.85-Mc. 'phone. New appointees are OXO as ORS, PZT as OPS, ESQ as EC, DDF has moved to Fairmont. QG has maintained schedule with a boat from Seattle to Manila. KWL has new 28-Mc. beam. KWI reports 62 countries the first week of the DX Contest. W. Va. still needs a PAM. Won't you 'phone men come up with a recommendation? Don't forget Field Day. Let's have a big turnout this year. Traffic: W8GBF 384. OXO 351, CSF 61, DFC 35, AUJ 22, JM 19.

## ROCKY MOUNTAIN DIVISION

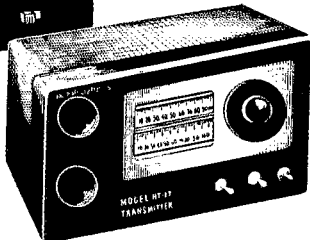
COLORADO — SCM, M. W. Mitchell, W0IQZ — SEC: CKHQ. RM: IC. UGD bought a farm in Kansas and has resigned as SEC. The new SEC is KHQ at Eads. We all hate to see Ben leave, just when he was getting an emergency net started. All EC reports should be sent to KHQ. BKQ spent ten days in New York. IPJ is leaving for Panama to take a new job. OWP reports that PQZ, PSB, and OPS are new stations in Brush. ZSO handles traffic with Meissner EX VFO running 8 watts. LZV has withdrawn from the IUN and has started a Slow Speed Net on 3560 kc. 8 p.m. Monday through Friday and would like representation from all sections of the State. SGG reports that 9EBX wants a schedule with a Colorado traffic station at 9 p.m. MST, 7150 kc. nightly. SGG now is equipped for full break-in operation. NCS stations on IUN are as follows: Mon.—7HRM/ZSO, Tues.—1PJ, Wed.—FJL, Thurs.—EKQ, Fri.—DRB. IC needs stations in Grand Junction, Boulder, and Sterling, and would like to see more EC stations report in to the net. DYS is experimenting with 420 Mc. SNH and IPH are new OES appointees. Yours truly finally got to use the new golf clubs with no improvement in the score. CQR is new CO of communications in Civil Air Patrol. SAU and SWN joined the CAP. IQZ was promoted to warrant officer in CAP. QYT was promoted to captain in the CAP. Let's all give KHQ, the new SEC, all the cooperation possible. Traffic: W0IC 233, 1PJ 77, LZV 70, SGG 68, DYS 51, FPL 46, EKQ 35, ZSO 33, MOM 2, KHQ 1.

(Continued on page 84)

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S-38 ..... \$49.95  
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**\$121.45**

\*with coils

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**\$79.45**

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**REGULAR  
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VALUE  
for only**

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Balance in one year**

### HT-17 ACCESSORY KIT FOR IMMEDIATE OPERATION

Includes: 80 and 40 meters crystals, 100 ft. #14 antenna, CW key, 3 ft. zip cord connection, 2 antenna and 1 feed-thru insulators. **ONLY \$7.50**

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304TH .....	3.95	815 .....	1.39	1616 .....	.49
803 .....	3.50	826 .....	.49	6AC7 .....	.79
805 .....	3.50	830B .....	2.95	6AC7 .....	1.06
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Brand new \$100 plywood mast! A "steal" at only \$39.50!

Designed for UHF or VHF antennae and easily adapted for FM and TV beams. Comes complete with all guys and collars, plus 9-foot boom to lift the assembled mast! Two men can erect this 4-section dandy in 15 minutes. It is weather-proof, portable, non-metallic, and cheap to maintain (no paint required). No concrete foundation required. Mast weighs 29 lbs., fittings 41 lbs., erection kit 15 lbs.

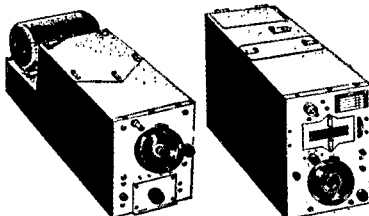


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### SCR 274N COMPONENTS



BC 454 Rcvr (3-6 mc) .....	\$ 7.95
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### NEW PE-103 DYNAMOTOR



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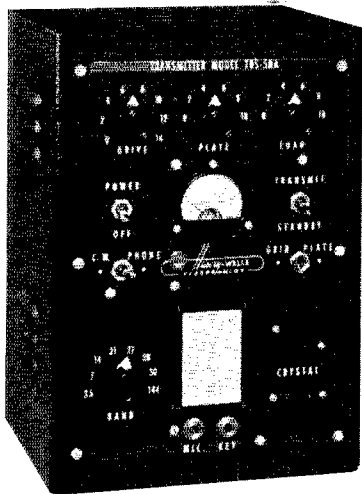
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UTAH — WYOMING — SCM, Alvin M. Phillips, W7NPU — Asst. SCM, Charles M. Conley, 7UOM, PAM: FST, SEC: UTM, RM: KFZ, LQE will schedule and QSL 100 per cent stations needing Utah for WAS, FJE is back in AF and playing nursemaid to thirteen transmitters. KOZ reports slow progress in rebuilding program, but new ideas and increase of power will justify delay. NCO, a new-comer from Oakland, Calif., is on 28-Mc. 'phone. LKM is regular FARM Net participant. LVU is new EC for Casper area. UTH, our SEC, says that there are plenty of unassigned areas available. How about some requests for EC appointment, men? We need more reports of activities, fellows. It's hard to dream this stuff up and besides my dream might turn out to be a nightmare. OARC is discussing Field Day preparations. JUV has dusted off the mobile rig and may be heard any time or any place. LRR has almost forsaken amateur radio for l.v. UOM still is giving the boys Utah on 14-Mc. 'phone and c.w. when not servicing t.v. and auto radios. DTB is making friends with the DX lands. NPU is on the air again with limited operating time. JVA is back on the air following move to new QTH. MFQ has been on an extended business tour. Traffic: W7UTM 352, BED 149, LKM 11, FJE 2, JVA 2.

### SOUTHEASTERN DIVISION

**ALABAMA** — SCM, Dr. Arthur W. Woods, W4GJW — A DXB has a new 40-watt portable rig and a new jr. operator! MXU consistently leads the section in traffic and he meets more nets and trunks than any other two members. KIX schedules AENB, TLO-S, and 80XO. EDR and DD appeared on 3.85 Mc. to refute their standing as stalwart c.w. hounds. GJW is making preparations to QSY to the high frequencies for summertime operations. So far only Aniston and Tuscaloosa have reported plans for Field Day. What about the Sheffield, Phenix, Montgomery, and Dothan groups? AENB is a smoothly functioning net and it is conceded it does well. AENB needs the support of more c.w. operators in order to increase coverage and stimulate traffic. New-comers are particularly welcome. Also, watch for the opening of AENZ on 7 Mc. this summer. Your section now has 112 AEC members. Please, each of you, send me the name of a non-member of the Emergency Corps so I can send him an application. Club secretaries: Please send information and news for publication in this column. Traffic: W4MXU 241, KIX 54, GJW 44.

**EASTERN FLORIDA** — SCM, John W. Hollister, jr., W4FWZ — With the passing of LJS, amateur radio has lost a friend. Seriously incapacitated physically, Bob operated under tremendous difficulties. The Tampa Club and associates chalked up another traffic mark at the recent Florida State Fair. Traffic was channeled via PL 2RTZ/4, BVK, AYV, IQV, CFL, DQW, NNJ, KJS, LCV, GBD, JPY, and 5LSN. Operators at DUG included IWX, BIF, HAD, DES, JFH, OZ, BNI, NRT, GNJ, ALP, MNT, AFU, GLZ, KM, CRA, JPR, FYI, IJ, KKY, Messrs. Magnon, Dancy, and Winslow. ALP did the organizational work. 3675 Net: AYV, who has done a great job as RM, has reluctantly resigned. His successor is RP. The Tampa Club put on an enjoyable hamfest. Brooksville: MNT took time out from his new Clapp VFO to help pound brass for the Fair at DUG. Cortez: It's BPL for DQW. Gainesville: BGW is back with a KJ6 call. JQ offers him a nickel to go back to the Island so he can QSO on 3910 kc. (But JQ and WS did work Japan on 3.85 Mc.) At the University the Gator Club elected the following new officers: IEK, NIW, NUC, IED, and HRB. Lake City: IQV made BPL. IQV reports Sunday schedules with RU and EID of Jacksonville on 144 Mc. Lake Placid: BYR reports ISR tied in to ridge-section emergency net. A complete v.w. station is located at BYR. Miami: GHP schedules DL4KY. IYT has 19 countries with 7 watts on 14-Mc. c.w. Tampa: 9NRB/4 and 7GQG/4 were operators at DUG during the Fair. AXV is sending out a swell bulletin on K. of Kc. activities. West Palm Beach: It's BPL for 2RTZ and continued amazement at the FB conditions down here on 3.5-Mc. c.w. IUJ has sixteen-element on 50 Mc. Winter Park: QVJ reports Rollins College is back on with old call of GMN with p.p. HK-254s at 450 watts. Traffic: W4DUG 2517, IQV 616, DQW 598, 2RTZ/4 574, 4RP 273, AYV 228, DES 77, GHP 30, 8CLA/4 11, 4IYT 6, MVJ 4.

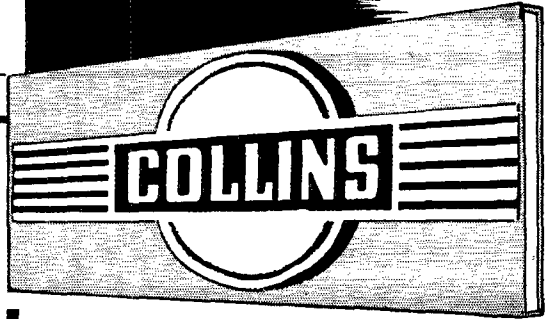
**WESTERN FLORIDA** — SCM, Luther M. Holt, W4DAO — PARC held a party at NDB's home. EQR won the grand prize. MS built a new 'scope. CQF moved to 7 Mc. EGN works 14-Mc. DX during the wee small hours of the morning. DAO moved to Pine Forest. The Tallahassee gang want 144-Mc. schedules with Pensacola. BGI was transferred to Guantanamo Bay, Cuba. CNK built 144-Mc. converter. OWN is new Pensacola call. FHH moved to 3.85-Mc. 'phone. HQ built a new rig for 28-Mc. 'phone. EZT and EED play pinball by radio. OHS worked Wake Island on 7 Mc. using 20 watts. OHJ schedules his brother, 5NGN. GQM is new president of Tallahassee Amateur Radio Club. ACB renewed his SEC appointment. OKD, DLO, CNK, and AXP organized the Western Florida C.W. Net. They meet Tuesdays at 7:30 P.M. on about 3600 kc. All Western Florida hams are invited to join this Net. OKD is new EC.

(Continued on page 88)



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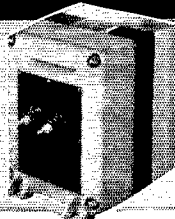
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GEORGIA — SCM, Clay Griffin, W4DXI — GGD is new RM. BOL will take over EC duties for Cochran. The Atlanta Club will have a hamfest this summer. Details to be announced later. NHG and OTA are new 144-Mc. hams in Atlanta. AQL the Tech Radio Club station, has been having good success with new 14-Mc. beam and 3.85-Mc. doublet. All W districts were worked in one night on 3.85 Mc. Savannah: CK and FEH have new 75A receivers. BWV and FEH have new Collins excitors. The Savannah Club has started a code class. KGP sent a nice report. He has been working some 3.5-Mc. c.w., after being on 28-Mc. 'phone. Traffic: W4GGD 376, BVK 219, DXI 10, MMQ 8, LNG 6.

WEST INDIES — SCM, Everett Mayer, KP4KD — AM has his Subrao back on 28 Mc. and his 25-watt rig on 14 Mc. BE added OK3ID on 28-Mc. 'phone to his DX list. HR gave the Subrao back to the OM and is on with 4-watt 'phone, 5-watt c.w., and worked G and KZ5 on 'phone and G on c.w. on 28 Mc. DV is active between building and installation periods. HJ keeps IL on 28.7-Mc. 'phone with traffic and DX such as SV, VK, TI, CX, and OA. EZ sent HRO7 back to the factory and is using HRO5. DJ is working five bands, 'phone and c.w., besides handling the C.W. AEC Net and handled traffic. JA schedules Cuba regularly on 14-Mc. 'phone with FB results. IG and CM got beams tuned up and working nicely. HU still is plugging away on DX. FU is back on with new rig. GW is now in the Army at Ft. Bundy. GO lost all of his gear in a fire and is starting again from scratch. VE1QZ and W4OLC (ex-KP4BJ) visited in KP4 during February. BL went to work with CAA. Traffic: KP4EZ 58, DJ 31, IL 7, KD 4.

CANAL ZONE — SCM, Everett Kimmel, KZ5AW — GD, our SEC, with the assistance of Pacific EC, AY, and Atlantic EC, NM, have built up an active and efficient AEC. Planned weekly drills and surprise simulated problems have operating efficiency to the point where the local chapter announced that Canal Zone amateurs were to handle all Red Cross-sponsored communications of all types. AEC members already are handling such traffic. NB's 50-Mc. signals finally broke through to make several Canal Zone "firsts." KZ5-CX, KZ5-JUs 1 and 8, and KZ5-OA4 contacts, all in the last week of February and the first week of March. NB expects to make the first KZ5-W contact momentarily. NB's persistence paid off. The ARRL DX Contest was quite a scrap, with three times the number of last year's participants. Fighting it out on five bands were AX, CG, CO, ER (AY and friends), GD, IP, MB, PA, WG, and XJ. Reminder: Your station activities report card is due the first of each month.

## SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Vincent J. Haggerty, W6IOX — AEC Activities: SEC ESR is stimulating AEC interest and forming new nets by visiting clubs in the section. Revision of areas and new appointments show the following changes in the Emergency Coordinator list: BTA, La Crescenta-Glendale areas; FMO, San Gabriel Valley; PYV, Ventura County; TWT, Santa Barbara area; TSN, Venice, Culver City areas; RIT, North Centinella Valley; ZCV, So. Centinella Valley; HKD, San Bernardino area; WGT, Riverside area. The addition of Venice-Culver City and Ventura County areas gives complete coverage coastwise from Long Beach to Santa Barbara. AAE received ORS endorsement. AM has been operating mobile on Long Beach Emergency Net. ANT worked PMS in February and found their last QSO was 19 years previous when PMS was 9DPG. BEG sends code practice on 147.5 Mc. Sat. and Sun. (1000-1100 PST) and Mon. through Fri. (1900-2000 PST). BUD has a new rig on 14 Mc. with a three-element beam. CE again BPLed to lead the section in traffic and received RM appointment. Traffic reports were received by radio from CMN, CZF, DDE, KSX, and ZMZ. CZF and DDE made the BPL on deliveries. CZF and ZMZ are new ORS. CTJ is the new president of the Paso Robles Radio Club. HFY is building a 28-Mc. mobile rig. MYI has new folded dipole for DX work. MSG took Naval Reserve cruise. KEI is busy with AEC work and completion of his 1-kw. rig. NAZ held several personal QSOs with Okinawa for visitors. PMV is on 28-Mc. 'phone. VFG made WAC on 28-Mc. 'phone. ZOL worked ZL3NH on 3.5 Mc. 0LZY wants 3.5-Mc. traffic outlets to California. ZUX says EFE, FIX, and RZT are experimenting with 420-Mc. television. New officers of the Metropolitan Radio Club of L.A. are: MBA, chairman; OI, vice-chairman; EGE, secy.; WNF, treas.; and ATC, GHX, FZL, VHZ, and V.J. Short, advisory board. Plans for Field Day are under way with the Metropolitan Club. PAM MVK reports: "DRI is a YL operator with a 24-element beam on 144 Mc. POW is on 28 Mc. with a 610E. MBA made WAC on 28-Mc. 'phone mobile. DEB is building coaxial tuners for 28 Mc. MVK uses high level clipper and tests show no negative peaks over 100 per cent even with twice as much audio as r.f. input. ARZ and YGB work 144 Mc. between fire calls. The VHF Net, with WKO as control, held a simulated emergency drill to familiarize members with AEC message handling. MYC gave a talk and demonstration on 144 Mc. direct oscillating crystals to

(Continued on page 88)



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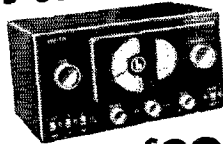
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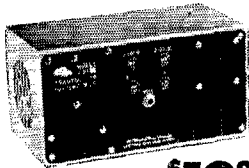
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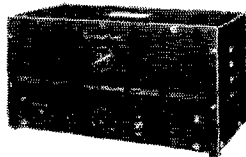


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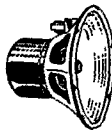


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3E29	..... 3.29	954	..... .19
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211	..... .29	958A	..... .19
285A*	..... .75	959	..... .19
286A*	..... .69	1616	..... .69
304TL	..... 1.39	1619	..... .19
316A	..... .29	1625	..... .19
331A/805*	..... 3.65	1626	..... .19
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the Two Meters and Down Club and told how to get on v.h.f. easily and cheaply. KH18GS visited Los Angeles hams during March. PEZ is a new ham on 144 Mc. with a 522 and sixteen-element beam. SEC ESR was a guest at the Santa Barbara Club's February meeting and addressed the members on AEC organization. The Ventura County Amateur Radio Club is now affiliated with ARRL. The club runs a 3.5-Mc. c.w. round table on the third Thurs. of each month and a 28-Mc. round table on the fourth Thurs. Club meetings are held the second Thurs. An arrangement with the Ventura Post Office routes scantily addressed Ventura QSL cards to the club secretary who forwards the stray cards. This system has kept 37 cards from the "dead letter" file during the three months it has operated. Traffic: W6CE 1106, DDE 304, CZF 301, ZQV 86, IOX 78, ZMZ 76, K5X 28, CMN 19, BUD 10, AM 8, KEI 8, FMG 6, ASW 2, FYW 2, VFG 2.

ARIZONA—SCM, Gladden C. Elliott, W7MLL—LPK reports three good DX contacts: VR3A, OH1KV, and ZC6XY. PEY reports his 100th confirmed DX contact. LAD worked LQD on 28 Mc. for the first Tucson-Phoenix contact on that band this year. LHI has a 100-watt band switch rig on 3.5 and 28 Mc., phone and c.w. LFK has a Meck on 28 Mc. PDA reports a ZL on 3.5-Mc. c.w. with 25 watts. REO, LQG, and MSQ have nightly 144-Mc. schedules in Winslow. KTP has a 60-degree corner beam and phase modulator on 420 Mc. VOZ reports he loads his window screen for 28-Mc. operation and gets out nicely. LOJ has an SCR-522 on 144 Mc. MAT is working 28-Mc. mobile in Tucson. LPA is new Phoenix EC. Active members in the 3515-kc. net are RJN, JPY, LPA, LYS, MPE, MWZ, RU, and UDI. NDQ is a new ham at Casa Grande, and is on 3.5- and 7-Mc. c.w. KQR reports good results with a high vertical three-element on 28 Mc. KAC has a new VFO. RJN is using an HT-18 to drive his 150-watt rig. UPR has new kw. running 127As in the final. NQZ has a new f.m. rig on 3.85 Mc. JTO has a pair of 813s on 3.85 Mc. PEY was February winner of the Old Pueblo Radio Club Contest with 24 countries. For details on the Arizona Field Day contact any Arizona radio club or see this issue of QST.

SAN DIEGO—SCM, Irvin L. Emig, W6GC—Asst. SCMs, Gordon W. Brown, 6APG, and Shelley E. Trotter, 6BAM. SEC: DUP, RM: BGF. K6NMC comes through with the highest traffic score for the section. BGF reports that he has been a ham for twenty years and just recently worked WI4W for the first time! Between junior college and bowling FMZ has difficulty meeting with the SBN. BAM worked six new countries during the month and reports that KH6JL is on the air from the Santa Ana Naval Air Station. CNQ isn't home enough to do much with radio these days although he has his license modified for the temporary San Diego address. DBZ says that 5ETZ has acted as NCS for the SBN (Southern Border Net) several times lately, putting in a beautiful signal with 400 watts. DBZ also is active at the Naval Reserve station, K6NRT. K6NMC is very active from Camp Pendleton. VJQ now is Class A. AWW and YXI recently took the exam. A new radio club, known as the Soledad Radio Club, has been formed, with AHV as president; VJQ, vice-president; and YNZ, treasurer. The San Diego YLRL entertained the Los Angeles YLRL at the Grant Hotel with TBI as the principal speaker. KD is mobile on 3.85-Mc. phone. IBS is working San Bernardino from San Diego on 144 Mc. by bouncing his signal off Mount Baldy. The Palomar Radio Club has been reorganized as a strictly northern county group, with VTS as president and other officers to be elected. PAX, who is working for the Navy at Long Beach, recently visited La Jolla. EWU and his son, ERZ, keep 3.5-Mc. c.w. schedules. EPM is manufacturing large television tubes in his home glass lab. A new attorney in San Diego, ECP, now is on 3.5-Mc. c.w. WXW has departed for WI Land. Operators at the Naval Reserve station, K6NRT, (USN TraCen SD) are BVY, DBZ, DEQ, LRU, RCD, TYF, and ZTA. Traffic: K6NMC 244, W6BGF 198, DBZ 41, FMZ 32, BKZ 23, BAM 3.

## WEST GULF DIVISION

NORTHERN TEXAS—SCM, Joe G. Buch, W5CDU—AJ is president of the East Texas Club and KWH is vice-president. OGS is too busy with school work to spend much time on the air. 0OML is working at KGVL, Greenville. DN is going strong on 28 Mc. NIP works 7 Mc. Our SEC, AAO, has a bit more time for operating since completing a business move. LXV and OLD, of Sulphur Springs, have rigs working on 420 Mc. HBD is active with NTX Traffic Net. AKM, Ranger, has been appointed OBS. GTL graduated from U. of T. in January and is now living in Kilgore. All nets are operating on schedule and with good attendance. Four active nets operate in our section at the present time. Making BPL is getting to be a habit with LSN and GZU. Wish we had more members in the A1 Operator's Club. NSN, of Childress, is a new net member in NTE Net. We regret the late receipt of emergency operations from BYP, Wolfe City. The additional lines allocated for this column would have contained the activity reports you forgot to send on the first of the month. Please help fill

(Continued on page 80)

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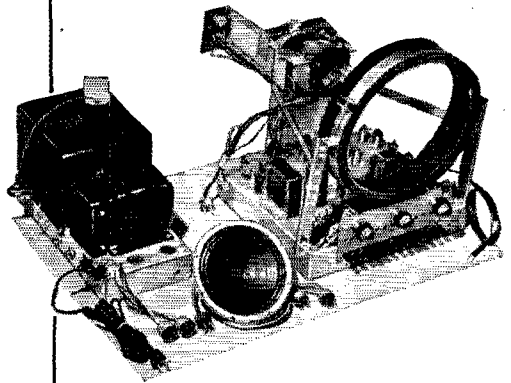
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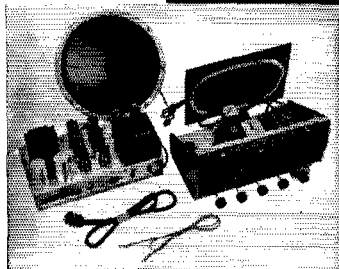
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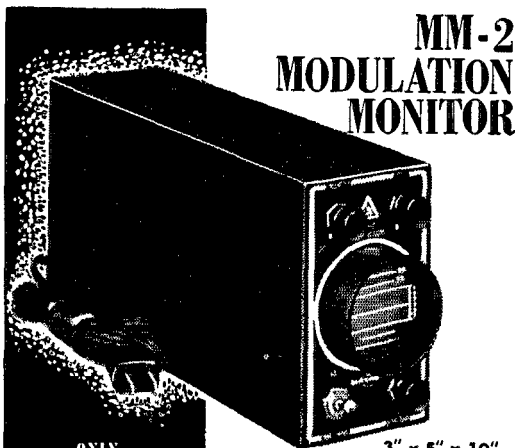
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our space by sending in news. Traffic: WLSN 1100, GZU 669, CDU 200, ARK 105, ASA 23, GUD 22, BKH 17.

OKLAHOMA — SCM, Frank E. Fisher, W5AHT/AST — SEC: HGC. Oklahoma hams, and in particular 'phone netters, were lauded for emergency work in a fifteen-minute broadcast by KVOO, KDH and OWV received ORS appointment. PAN is operating from hospital bed at Sulphur. Ardmore ARC has 100-watt gas-powered rigs on 3.5 and 7 Mc. BIW has new control panel with built-in Monitone. KHF has completed new rig with 300 watts to 813 all bands. NDN, PBB, and PCL are new-comers to OLZ. This net now has 39 stations active. New hams reported are PHR, Bartlesville; PNG, Ardmore; and POY, Beaver. Give these boys a hand and welcome them to a grand game. FRB has transmitter trouble and is off the net. OWV and KDH now schedule JLK and TLL in addition to OLZ and several other state nets. These boys are busy and a real help to OLZ. GVS moved back to Enid from Oklahoma City. MBV resigned as NCS of OLZ in order to activate FOM at Fort Sill into MARS. EHC has regular schedules with his brother, 8F'XQ, in Illinois, with another brother and sister in Colorado listening. Oklahoma needs more stations active in traffic and emergency work, especially in the larger cities and towns. If interested contact your SCM or SEC. Traffic: W5AST 132, OWV 127, KDH 124, K5NRJ 98, W5ADB 19, ADC 16, IOW 10, EHC 7, PCL 6.

NEW MEXICO — SCM, Lawrence R. Walsh, W5SMA — SEC: ZU, RM: NXE, PAM; FAG. The Sierra Amateur Radio Assn. (SARA) was organized by the amateurs in the vicinity of Hot Springs. The Club held an emergency drill Feb. 13th. MDM was the fixed station with six mobile stations in the field. Frequencies used were 3885, 3920, 7266, and 27400 kc. MMX reports that Belen now has three active amateurs, PDQ on 7 Mc., PIB on 7 Mc., and MIMX on 3.5 and 28 Mc. Kaye has a new three-element beam and is trying to work Albuquerque on groundwave. PEJ, NKG, and MYA have received their ORS appointments. DER, CXP, and MJF have four-element beam on 144 Mc. They would like to work other New Mexico stations. This month the amateurs in the Four Corners area organized a club called the Four Corners Radio Club. Club officers are NSV, pres., and NTN, secy. KAO, Class I OO, reports eleven violations for out-of-band, harmonics and over-modulation conditions. JYW reports that he is working on emergency equipment only with a maximum power input of 7.5 watts. The Los Alamos Radio Club had a demonstration of a home-built triple conversion receiver by 8AG at its regular meeting. Traffic: W5NXXE 117, IGO 113, BYX 75, ZU 72, OCK 33, SMA 14, PEJ 11, MIMX 7, JYW 5, KWP 5.

**CANADA**

**MARITIME DIVISION**

MARITIME — SCM, A. M. Crowell, VE1DQ — EC: M FQ, RM; GL, OBS; RR, HG has over 100 countries on his work list using only 40 watts to an 807. FQ maintains contact with the boys in Hudson Strait on 14-Mc. 'phone. ME, recently on 14-Mc. 'phone, is attending "Dal" University and is interested in contact with other college stations. ET has been going after the choice DX on 28-Mc. 'phone in addition to his weekly schedules with G2CC. LK reappeared on 28-Mc. 'phone with low-power portable rig. LY has been keeping schedules with his brother, VE7ABJ. CR has been going after DX in a big way on 14-Mc. 'phone. ADVANCE NOTICE: The IARC definitely will sponsor the 1949 Convention. This event is on the Halifax Bicentennial Program for Sept. 3rd, 4th, and 5th. Circle these dates on your calendar and watch for HARC bulletins regarding special arrangements for housing, reservations, etc. We already have booked the Nova Scotian Hotel for Convention Headquarters so mark those dates, and plan your vacation accordingly! MK and GB both send in nice traffic reports this month, via 3.5-Mc. c.w. OE now sports new Meissner Signal Shifter. DQ wants to join "Surplus Anonymous." The ART-5 is the "last." Traffic: VE1MK 29, GB 16, DB 3.

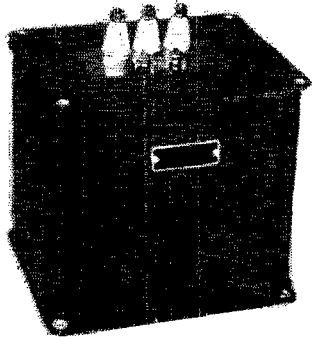
**ONTARIO DIVISION**

ONTARIO — SCM, Thomas Hunter, jr. VE3CP — Asst. SCM, M. J. McMonagle, 3AWJ. SEC: KM, RM; ATR, AWE, BUR, GI, TM, WX. PAMS: DD, FQ, RC. BPL certificates have been issued to ABS and ATR. AQQ reports BVN and BOW on 144 Mc. AIB reports over thirty stations on 144 Mc. in Toronto. AKW is on 28 Mc. using cathode modulation. BHS has a two-element on 14 Mc. FT is on 14 Mc. with 807 and folded dipole. QE made WAC in three hours on 14 Mc. EC is using 810 in final. EAE is doing FB on 7 Mc. ABP is on 7 Mc. with 829B, BKM, AMI, and BSC are on 7 Mc. from Hamilton. ZM now boasts of 97 countries, and BNQ 93. The Hamilton Club puts out an FB monthly sheet edited by BNQ. BVC worked his first ZS. AAW is working out FB with folded dipole. BIJ has 20-watt mobile, BSW reports for Nortown Radio Club. ATR reports the 7-Mc. net is going very fine. AML, ex G3FT, is on from St. Thomas. The Stratford Club elected ADX, pres.; GZ, vice-pres.; and MH, secy-treas. WY operates on.

(Continued on page 92)

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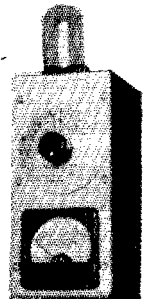
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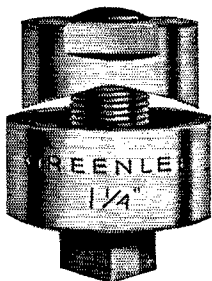
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## VANALTA DIVISION

**ALBERTA**—SCM, Sydney T. Jones, VE6MJ— Meet your old friends and make new ones at the Alberta Hamfest on July 30-31 in Edmonton. Bring your portable and mobile rigs. If you need reservations why not send them via amateur radio and the Alberta 'Phone Net. QS is holding down Trunk Line "I" for WG. NO is a new call at Raymond. EA has portable rig for his car in readiness. EY is all set for the next Frequency Measuring Test. PE is having good luck on 14-Mc. c.w. and has worked several choice contacts. HY claims 50 Mc. is spotty these days. OD is Net Control on the newly-formed Alberta 'Phone Net. This Net operates on 3760 kc. MJ has qualified for 20-w.p.m. Code Proficiency Certificate. Members of the AEC in Calgary are conducting weekly tests with mobile rigs on 28 Mc. The CARA is sponsoring a "Get-acquainted Contest" for the younger hams in Calgary. EE is leaving for a new QTH in Winnipeg. Sorry to see you go. Stan. Traffic: VE6QS 44, MJ 14.

## PRAIRIE DIVISION

**MANITOBA**—SCM, A. W. Morley, VE4AM— Reports are coming in better. Thanks, fellows. GV, at Minnedosa, is using an 807 and a surplus 1155 receiver. JI has an 1154 on 3.8-Mc. 'phone and 3.5- and 7-Mc. c.w., and uses an 1155. He is working on WAS. FP is using 1155 receiver and also is working on WAS. From Binscarth, JB reports he is using a BC-458 with 55 watts on 7 Mc. AI sticks to 28-Mc. 'phone. MF is on 14 and 28 Mc. and is working DX with 10 watts. DK is on 7 Mc. TJ reported traffic. RZ has new converter for 28 Mc. 5TI was a visitor in the Peg. Watch for him on portable. JY and IW have new VFOs. RP added 4th element to beam and went to town in the DX Contest, along with LC, SH, and RO. GQ is the first to report on s.s.s.c. experimenting. CE is using a 6V6 modulated with 6V6 on 3.8 Mc. and an SX-25. Bob also has a new bug, so guess he's not lost to c.w. yet. The AFARS 'Phone Net will operate on 3775 kc. Get in touch with JO for details. SW, EN, and AX are on 3.8 Mc. at Rivers. The Above 100 Club had a demonstration on 2400 Mc. and worked several feet. Attention Brandon Area: DN is your EC. Get in touch with him NOW for your AEC card. Traffic: VE4TM 46, AM 35, GQ 20, TJ 4, JO 3.

**SASKATCHEWAN**—SCM, J. H. Goodridge, VE5DW— HR has been appointed RM and is pleading for stations interested in the section c.w. net to write him or QSO on 3690 kc. Mon., Tues., or Wed., 7:30 p.m. IC has OBS appointment. VB has moved across the lane! DD is a new call at Nipiwini. AI is on 3.8-Mc. 'phone. LM, LV, BF, 6KN, and 6OD had a get-together on 3.8-Mc. 'phone for YMCA service club members in their respective cities. HR is active on Trunk Line "I." The station of HS was completely destroyed by fire. HI has been heard working a schedule with his brother, HJ. The Northern Saskatchewan Amateur Radio Club meets in PA the first Wednesday of each month. OM has a surplus rig on 3.8-Mc. 'phone. AJ works DX on 14-Mc. c.w. IB is planning a three-element beam for 28 Mc. JB is heard on again. If interested in ORS, OES, OPS, OBS, OO, EC, or PAM appointment, please write in. GG is working 7 Mc. with TBS50. BF gets S9 with 28 watts and S8-9 with 400 watts from a G3 contact! BA has trouble with his new rig. BU and GC visited Saskatoon. MQ is on 14-Mc. c.w. and n.f.m. GE is building a 20-tube receiver and JF a 28-tube receiver. KJ is active on 3.5-Mc. c.w. If you have emergency equipment contact RC, our SEC, for details on the Emergency Corps. Traffic: VE5HR 69, KJ 13.

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414	424	434	443	452	477	490	498	504	509	516	523
415	425	435	444	454	479	491	501	506	511	518	
416	426	436	445	456	481	492					
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419	429	438	447	472	484	494					
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Easily altered for 100kc Standard. Mounted in low loss 3 prong holder.	526,388 533,333 537,500 527,777 534,722 533,888 529,166 536,111 530,555 531,944
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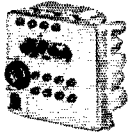
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GE 2" Round 0-500 D.C.-M.A..... **\$2.97**

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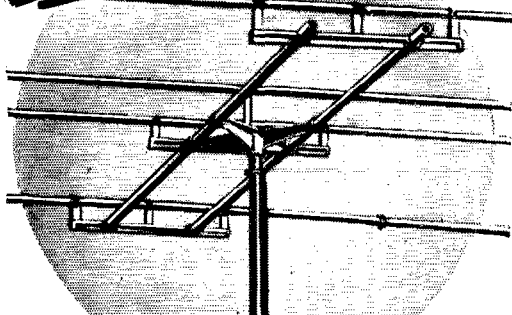
Triplett 2" Square 0-40 D.C.-V..... **2.97**

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\$6.00 EXTRA FOR  
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FOR PRICES  
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Makers of Fine Antennas for AMATEUR · FM · TELEVISION  
528 TIFFANY ST., BRONX 59, N.Y.

## Simple Gear for 420 Mc.

(Continued from page 14)

tapped r.f. choke,  $RFC_1$ , should be checked by the same method as recommended for the transmitter. The nodal point is that at which little or no change in the receiver's operation is noticed as the line is touched. As with the transmitter, this point will be near the middle of the line. This test should be made with the receiver set near the middle of the band.

### Results

Just as with simple lower-frequency gear, it should not be expected that this one-watt transmitter and three-tube receiver will set the 420-Mc. world on fire. They are presented as examples of just about the simplest sort of gear with which practical communication can be carried on—on this or any other band. The beginner in this field will find the gear good enough to provide a lot of fun, particularly if there are several other amateurs within a radius of a few miles with whom to work. Not much beyond line of sight can be expected from such a low-powered transmitter, but even line of sight may include some pretty good distances if the rig is used for portable operation from high locations.

The receiver does surprisingly well, for such a simple layout. To be sure, it has all the disadvantages of the superregen—radiation of an interfering signal, somewhat critical tuning, and the characteristic superregen hiss—but the discrepancy between its performance and that of most superhets for 420 is not so great as is experienced on lower frequencies. The shortcomings of the superregen are somewhat alleviated by the inherent characteristics of the 420-Mc. band, and the advantages of this old stand-by of the v.h.f. experimenter show up well in this design. It is fully selective enough for present conditions on the band; its simplicity and low cost are a welcome change from present trends in receiving equipment; and its performance, in a tube-for-tube comparison, is hard to beat.

## Linear R.F. Amplifiers

(Continued from page 20)

that the system has been adjusted for optimum performance, and enjoy the fruits of his labor.

The design and adjustment techniques described in this article have been somewhat different from those which apply to the more common Class C amplifier. However, it is the author's sincere conviction that most difficulties which may arise in the design or handling of the Class B linear amplifier will be due to lack of familiarity with it, and that as the Class B linear amplifier comes into more common use, the amateur will soon handle it with the same ease as he does his other equipment. This has certainly been true of several amateur stations with which the author is familiar, and where linear amplifiers have been installed recently.

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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.

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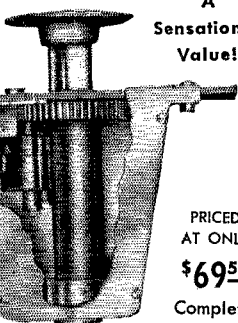
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## How's DX?

(Continued from page 48)

- CT3AV Beco Co Chao da Loba, 5, Funchal, Madeira Islands  
EA3EE Esperanza 18, Barcelona, Spain  
EP2B (via W4FIR)  
FO8AB Amateur Radio Station FO8AB, Papeete, Tahiti  
GD3UB Beach Cafe, Port Moar, Ramsey, Isle of Man, U. K.  
HA1BG (via MRRE)  
HB9EU Rudy Faessler, Rheinfelden 754, Switzerland  
HC1KX Maurice M. Bernbaum, % American Embassy, Quito, Ecuador  
HH2CP Wilfrid C. Plante, % Pan-American World Airways, Port-au-Prince, Haiti  
HL1BQ (via W9CFT)  
HZ1HZ Ahmed Zaridan, Mecca, Saudi Arabia  
I1VGF via Orivolo 13, Florence, Italy  
I6AO (via MI3ZZ)  
KC6EA Navy 3410, FPO, San Francisco, Calif.  
ex-KH6LF WAIMV, 1412 Elizabeth Ave., Tarrant, Birmingham, Ala.  
KH6OT/KJ6 APO 105, % PM, San Francisco, Calif.  
KH6UK CGLTS, French Frigate Shoals, via Box 4010, Honolulu, T. H.  
KR6NE Navy 1175, FPO, San Francisco, Calif.  
MI3SC APO 843, % PM, New York City  
MI3ZZ P. O. Box 379, Asmara, Eritrea, East Africa  
MT2E P. O. Box 400, Tripoli, Tripolitania, North Africa  
PAØDOC Star Numanstraat 16, Groningen, Netherlands  
PK4KQ Box 222, Soerabaja, N. E. I.  
PY2JO P. O. Box 22, Sao Paulo, Brazil  
SU1CR (via RSGB)  
SV5UN (via W3KXS)  
SV0WF Major J. M. Moss, APO 206, % PM, New York City  
TI9BR % Puntarenas Brokerage Co., Puntarenas, Costa Rica  
VE8OG Loran Unit 5, Cambridge Bay, N.W.T., via RCAF Stn., Edmonton, Alta.  
VO2JH Gander Airport, Gander, Newfoundland  
VP2LX APO 867, % PM, Miami, Fla.  
ex-VP4TAN Victor L. Felix, 654 Lincoln St., NE, Minneapolis 13, Minn.  
VS7LA Box 907, Colombo, Ceylon  
WILBW/C1 (via ARRL)  
ZA4F Box 654, Tirana, Albania  
ZA5A (via ZA5AC)  
ZA5AC Soldiers Staff Central, Police Office C. C., Tirana, Albania  
ZC6BF G. F. Kelly, 15 Earlswood Ave., Croydon, London, England  
ZM6AI Box 46, Apia, Western Samoa  
ZS4TO (via SARRL, ex-VP4TO)  
4X4CZ I.A.R.C., Box 4079, Tel Aviv, Israel

If you birds can use any of the above you owe W1s APA, BOD, DF, EKU, FTJ, HX, IKE, JMY, KUF, QBD, QMJ; W2s ADP, CJX, EMW, EQS, KZE, LXL, TXB, WC; W3DLI; W4s CYY, IUO, MR; W5ALA; W6s JWL, ZBY, ZGY; W8TLL; W9s AND, DGA; W0s UOX, VIP; I1VS; KH6PM and KZ5AX all a large vote of thanks.

NOTE: The semiannual listing of QSL bureaus of the world will be published in June QST this year, instead of May. See the "I.A.R.U. News" section next month.

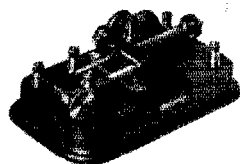
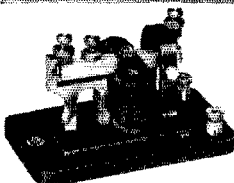
### Tidbits:

With such exotic personages as RV2, EAXXX and M1A turning out to be as good as gold we might have known it was too good to last

(Continued on page 98)

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P 58	550-550	400					
	1080-1080	1000+	125	4 3/8	3 1/2	5	8.23
P 59	500-500	400	150				
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P 67	800-800	600					
	1450-1450	1200	300	5 3/4	6 1/8	4	19.84
P 68	1175-1175	1000					
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\* For dual operation with simultaneous use of both sec ratings.  
† Has 40-volt bias tap.

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VR-6112	60	8	\$24.00
VR-6113	120	14	\$31.00
VR-6114	250	25	\$48.00
VR-6115	500	45	\$75.00
VR-6116	1000	92	\$125.00

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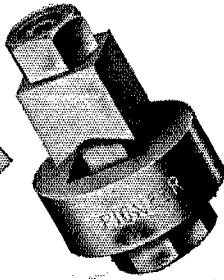
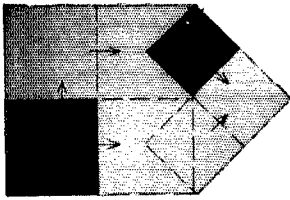
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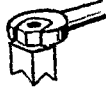


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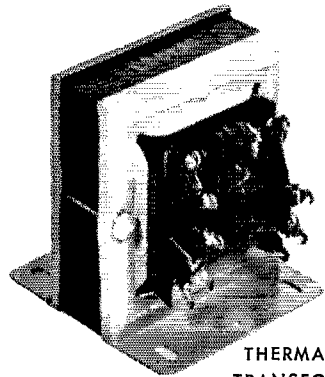
4709 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

..... Organizations specializing in the accumulation of DX laurels have a new source of competition in the Ohio Valley Amateur Radio Association. The long membership list of crack DX men includes W4FU, W8s BHW, BTI, BOJ, RSP and JJW. Officers are W8s POK, FGX, CVK and PBU, ranking in the order named. .... Ralph Bird, W5KWY, is heading again for Swan Island where he intends to crank up KS4AI as of old. Plenty of activity on all skip bands, 'phone and c.w., is anticipated. .... If you kept an eye on WIAW then you probably got first crack at Heard Island's VK1FE/VK1VU. An 80-watt bandswitching rig is currently used on 7, 14 and 28 Mc. plus an Eddystone receiver and (get this, Tilton) gear is available for 50 and 144 Mc. Operators VK4FE and VK3VU are scheduled to keep Heard on the propagation maps until around March of 1950. [The boss's blooper hasn't heard hide nor hair of Heard yet, either! — Jeeves]. .... Ex-VQ3EDD, now G5YM, is gadding about Piccadilly and vicinity operating mobile, of all things. Perhaps not only the local gang is having sky-hook trouble. .... TA3AA is still functioning more or less under cover and QSLs are desired only via ARRL. Jules has been looking for his buddy WIDX "on 14,000 kc." and wonders what's happened to him. He should know by now that since By got the single-sideband bug he's been misplacing his carrier like his collar buttons. Last we saw of it was somewhere around his fifth doubler stage. .... According to W2TXB, KB6AG is leaving Canton for Midway. .... VR6AB came through with a stack of wallpaper from his Sussex QTH and remarks that VR6AC had been intending to become active about the time Gil left the premises. .... MT2E dishes out a little Tripolitanian trivia: Active 28-Mc. stations there include MT2E (28.4-28.9), MT2D (28.1-28.6), MT2FU who is ex-ST2FU (28.3), and tentatively, MD2B. MT2E runs 50 watts to an 807 and an air force model receiver is in use. .... Quoting W4CYY, a letter to CP1AQ will fix you up with a Bolivian sked if you're located in North Dakota.

..... QSLL. ZC8PM cards are now getting around, and W2NYC of ZC6UNT believes he has finally cleaned up his backlog in this category, via QSL managers. If yours hasn't shown try a plea direct to W2NYC. .... W1LKB, who keeps things rolling at the Hq. bureau, has a load of pasteboards for HL1 stations now QRT whose operators are somewhere Stateside. He'd appreciate hearing peeps from you ex-Koreans. .... HP1PL requests through W2TXZ that we keep our shirts on regarding his cards. He intends to QSL first upon his return to the U. S. .... Not to lunge at conclusions, reports from various sources indicate pirate activity involving these calls: OK1QD, VO6BL, FP8N, LX2PN, ZA5AC, PX1C, YA3B and HV2B. Data come from troubleshooters W1JEL, W1NLM, W4CYY, W4MR and I1PL.

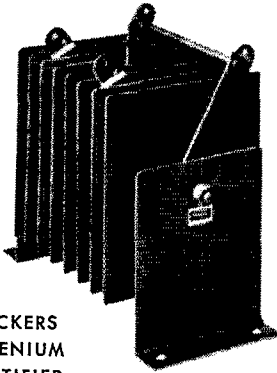
.....

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S-167A	14	10	3.75	10.95	RPS-8885	18	12	12	6.15
S-292A	14	40	12	29.95	RPS-8886	18	46	35	19.65
S-296A	28	1.8	1.25	5.75	RPS-8888	36	2	5	4.15
S-344A	28	5	5.75	11.50	RPS-8889	36	6	12	6.75
S-172A	28	10	6	16.50	RPS-8892	36	12	25	11.65
S-291A	28	20	12	29.95	RPS-8890	36	23	32	19.25
S-297A	28	40	23	52.25	RPS-8891	36	46	78	51.25

NOTE A: All transformers have 3 extra taps—for example: 20, 19, 18, 17, volts and 38, 37, 36, 35 volts.

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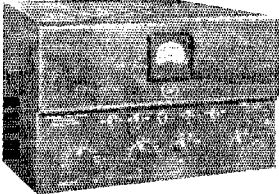
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**V.H.F. QSO Party**

(Continued from page 48)

5) The band your transmitter is on determines whether a QSO counts 1 or 5 points. Cross-band work shall not count.

6) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.

7) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 5 points for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked, i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted.

8) A contact per band may be counted for each different station worked. Example: W1JSM (E. Mass.) works W1MEP (Vt.) on 50, 144 and 220 Mc. for complete exchanges. This gives W1JSM 7 points (1 + 1 + 5 = 7) and also 3 section-multiplier credits. (If more Vt. stations are subsequently contacted on these bands they do not add to the multiplier but they do pay off in additional contact points.)

9) Each section multiplier requires actual completed exchanges with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

10) Award Committee decisions shall be accepted as final.

11) All reports must be postmarked no later than June 14, 1949, to be entered for awards. See p. 55 of May, 1948, QST, for form.

**Reporting**

Submit contest logs to Headquarters immediately, even if your score is small, to help in cross-checking the claims of others. ARRL will supply convenient reporting forms upon request.—F.E.H.

**Filters for TVI**

(Continued from page 46)

Besides reducing amateur interference, high-pass filters will frequently improve television reception generally. This is because many current receiver models have rather poor i.f. rejection, and a filter having a cut-off above 30 Mc. will prevent many signals, such as h.f. broadcasting in the 21-Mc. region and industrial heating in the 27-Mc. band, from riding through the front end to the receiver's i.f. It's a good point to stress, when dealing with a set owner, particularly when you find yourself being blamed for all sorts of interference that doesn't originate with your station.—G. G.

**World Above 50 Mc.**

(Continued from page 49)

another, and we would have been glad to put whatever weight we swing to the side which won out on that point alone.

But the picture has changed in recent times. TVI, not long ago the sole concern of a few amateurs in the New York area, now threatens a considerable portion of the amateur body, and more are having to live with it every day. It has reached the point, in many metropolitan regions, where it is the most serious problem amateur radio has ever faced. In New York, New Jersey and Eastern Pennsylvania, we saw at first hand how TVI is changing the amateur picture. We found hundreds of hams ready for any move

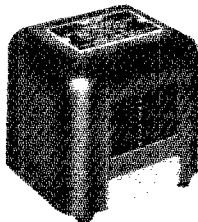
(Continued on page 108)

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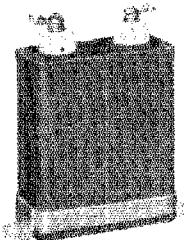
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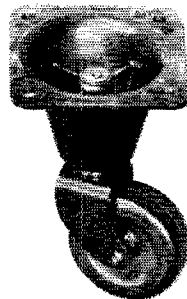
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Johnson 225, 5 prg. ceramic sockets	8 for 1.00
Johnson 70F20, 70 mmf, 2000 v. spacing.....	1.00
Bud double-bearing 100 mmf.....	2 for 1.00
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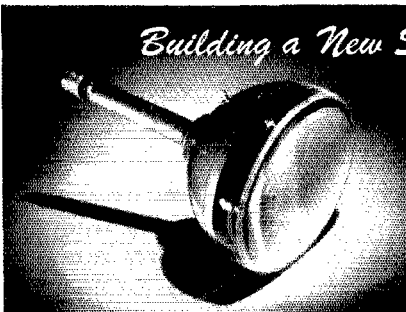
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which offered relief. There is growing interest in our v.h.f. and u.h.f. assignments, since it has been demonstrated that, in many instances, it is possible to operate on 144 Mc. and higher in places where 10- or 20-meter operation in the evening hours leads to inevitable trouble.

There is some 2-meter TVI, of course, but there also are TVI-free operators. It doesn't take much thought on the polarization question to see that, with television and f.m. standardized on horizontal, that polarization simply does not stand a chance of general acceptance for 2-meter work in such areas. TVI is the first really important factor to develop in the polarization picture, and it may well be the clinching point in the argument, for our money. Unless it can be demonstrated that horizontal offers some advantage far greater than those mentioned above, it can hardly be given the green light as a standard system in the television-happy East. Circular polarization, widely heralded as an answer to the burning question, is not likely to be too satisfactory a solution, either. Real DX has been worked on 144 Mc. only through the use of really high-gain antennas, and a helix of practical dimensions cannot be expected to give the 15 db. or so needed for effective extended-range work. It could be a useful compromise, but no better; and since it has a considerable horizontal component it will be a possible source of TVI.

### The World Above 420 Mc.

*Rye, N. Y.* — Having equipped himself with an APT-5 and a 32-element array, W2BAV decided that the receiver was next in line for improvement. Experimentation with various types of tubes indicated that lighthouses offered about the only hope of building up the receiver gain and sensitivity. At present Bill has three stages of lighthouse r.f., using trough circuits of simple design. The trough lines are made of flashing copper, the working of which requires no complicated or expensive tools, and the performance is quite impressive. To one accustomed to the lethargy of the various war-surplus superhets the antenna noise which is in evidence when these circuits are tuned to resonance is something to behold. They feed into a 955 mixer which converts to 55 Mc., where three stages are employed before converting to 15 Mc. Two types of i.f. are used, one having a bandwidth similar to that of the radar surplus jobs, and the other having a passband of about 500 kc. The former is used for strong modulated-oscillator signals and the narrower one for the weaker or more stable sigs. Experience has shown that the narrower band is far superior in weak-signal work. Bill works W2JND, Syosset, L. I., 12 miles across the Sound, W1PBB, Stratford, Conn., 30 miles up the coast, and W2NPJ and W2BLF, in Elizabeth and Newark, N. J., about the same distance in the opposite direction, regularly. He will be working on 420 from his 800-foot elevation in Bedford, N. Y., this spring. Polarization in this area is largely vertical.

(Continued on page 104)



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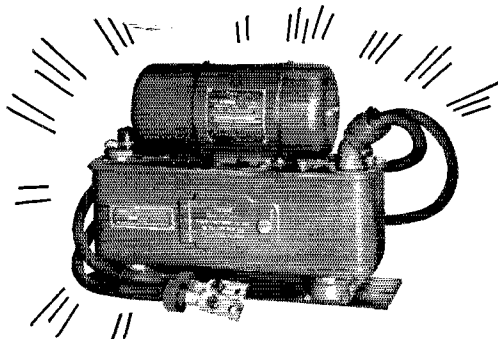
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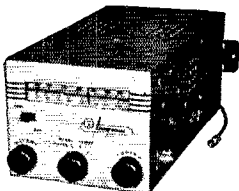
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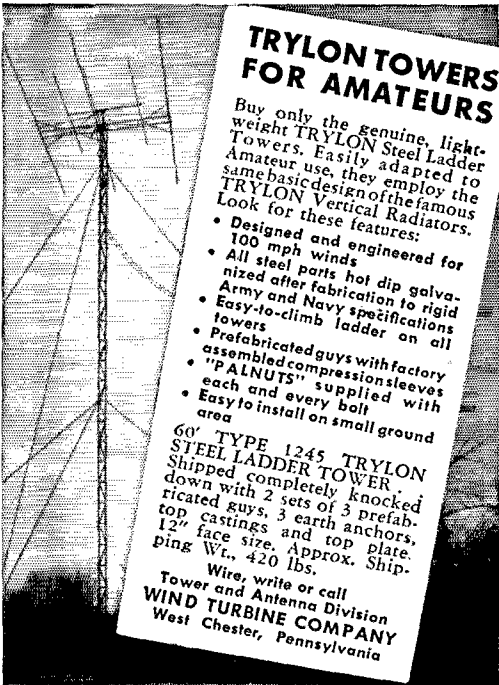
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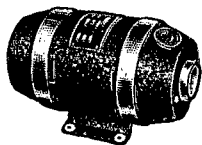
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Bristol, Conn. — Improved receiver performance, and the first contacts out of town, resulted when WIPNB built a 420-Mc. converter using a lighthouse mixer with a coaxial circuit. This works into a Howard f.m. tuner on 90 Mc. Contrary to the general belief, the bandwidth of such an arrangement is not too narrow for satisfactory reception of modulated-oscillator signals, if the swing of the latter is held within reason. The f.m. detection provides noiseless reception and exceptional audio quality. WIPNB now works both W1HDF and the writer regularly with S9 signals, but it was a matter of some three months of trying before anything was heard over either path. The next objective for all three is a contact with W1AEP, Springfield, Mass., who has a pair of 8025s at 60 watts, a triple-conversion superhet, and a 16-element array. Polarization in the Connecticut Valley is horizontal, but since vertical is generally used in the territory on either side it may be necessary to change to extend our sphere of operation.

Denver, Colo. — Nightly contacts on 420 Mc. are made by W0SNH, W0LAQ and W0IPH at 8 P.M. Though the distance between SNH and the other two is only about four miles, it is far from a direct line-of-sight proposition, and signal strengths vary considerably from night to night. LAQ uses a 2C40 oscillator, while SNH and IPH have push-pull 8012s at about 25 watts. Vertical polarization is used. W0SNH has a crystal rig in the works. W0s AYV, FYY and OLL are getting equipment in shape, and television experiments are contemplated when enough stations are on the air.

## Correspondence

(Continued from page 50)

jamming stations was terrific. But despite it, I could read the faint signals in cipher my radio op was copying.

The exciting news was that the preceding wings had met a "reception committee." This was passed on to the other planes in the flight which immediately assumed defensive formation and were thereby prepared for the greetings from Jerry, which soon followed.

How readily could this have been copied on 'phone? If copied on 'phone, how much longer (please remember that seconds were a matter of life or death) would the transmission have required when delivered in cipher?

— Lt. Beverly O. Bush, W5MAD

714 Pierpont St., Rahway, N. J.

Editor, QST:

... Why allow 'phone operation on any band for say the first year? Why not make it as easy as possible (minimum code ability) to get on c.w. but not the choice bands. A log of hundreds of contacts plus good code speed would then obtain license for choice c.w. and 'phone bands. Those still poor on code could elect to take a good theory test and go to above 400 or 1200 Mc. for experimenting using either c.w. or 'phone.

This might attract much more younger blood and such an apprenticeship at c.w. would insure better code ability of all new amateurs. This would also tend to populate more of the slightly-used bands.

— D. E. Roberts

Atkinson, Nebr.

Editor, QST:

... Here is my solution to the 'phone-c.w. situation: Run a poll at once and have all hams vote which they prefer — 'phone or c.w. Have the votes counted fairly and then

(Continued on page 106)



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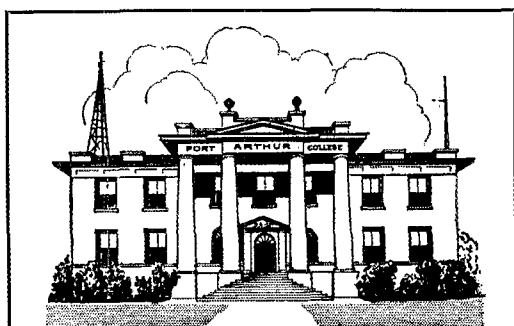
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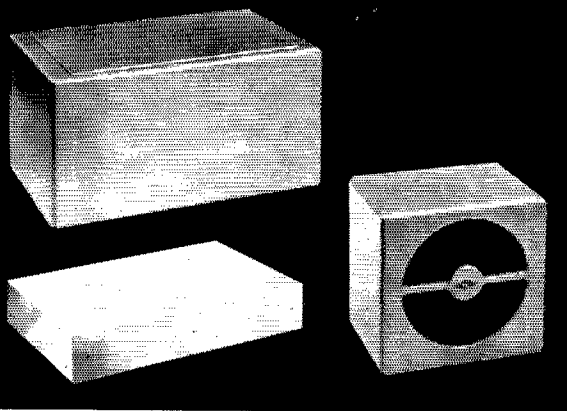
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divide each band (including 40 meters) in the percentage the votes were cast for 'phone or c.w. Now the c.w. men will say, "What about the Canadian and foreign 'phones?" The 'phone men will say, "A phone transmitter needs more room on the band." It looks to me like one would offset the other. . . .

— J. K. Schultz, WØEXJ

4610 Pall Mall Rd., Baltimore, Md.

Editor, QST:

. . . Three questions have been bothering me for some time:

1. Why do not contacts with /MM stations when in foreign ports count as legitimate DX?
2. Why are we limited to only ten meters — surely we could be allotted some space within other bands to operate in which would not clash with any broadcast services as might be carried on by other nations — for example, why not 100 kc. in 20 meters?
3. How do we /MM operators stand on the coming 15-meter band?

— W. L. Simms, W3NKS

Route 2, Box 2, Portland, Ind.

Editor, QST:

. . . What I am particularly against is the idea of placing a 20-word code test on the Class A license. I am also not in favor of requiring all amateurs to renew licenses by taking the examinations over again. If it is desired to limit the number of amateurs, I am in favor of raising the present code speed for the Class B and Class C tickets. . . .

— Richard O. Schramm, WØETS

182 Prospect St., Newburgh, N. Y.

Editor, QST:

. . . To solve the problem of amateur-band congestion, I favor some means of reducing the width of sidebands instead of the number of operators. To this end, I would like you to consider petitioning the FCC to require that amateurs use narrow-band filters or single sideband in 'phone transmissions on overcrowded bands.

I think I speak for the newcomers in saying that we would rather face the technical problems of providing sideband chopping than to face rigid c.w.-test requirements in order to "earn" 'phone privileges, because we just aren't in love with c.w.

— James A. Smith, jr., W2WV5

2220 Woodside Ave., Springfield, Ohio

Editor, QST:

The Springfield Amateur Radio Club proposes, among other things, that:

- a) The Class A exam shall include questions of a more advanced nature on 'phone theory than those of the present Class A examination.
- b) The Class A exam shall include a code exam of a speed higher than 13 w.p.m.
- c) 'Phone stations shall be required to use filters or devices for limiting frequency response, such as clippers, etc.
- d) Allocating one-half of the 15-meter band to unrestricted 'phone operation, if and when this band is opened to amateur operation.

— Pearl Taylor, W8OKB

6418 Argyle St., Philadelphia 11, Pa.

Editor, QST:

. . . In all fairness to everyone why shouldn't the 40-meter band be divided equally for c.w. and Class B 'phone? It looks to me as though the c.w. interests in amateur radio are gradually going to force all 'phone operation out of amateur radio. I am operating on 10, 20 and 75 'phone and can see good reason why there should be more 'phone frequencies. Why should one band be open exclusively for c.w. when there aren't 'phone bands exclusively for 'phone operation?

— Edward Lambrecht, W3FXY

302 Starnes Park, East Gadsden, Ala.

Editor, QST:

. . . The fone boys didn't get enuf of our c.w. bands to suit them. Now I make a motion that the c.w. men be allowed to operate in the fone bands using m.c.w.!! To see what a nice sound a well-modulated m.c.w. sig makes in the 75-fone band, beating with the heterodynes, just key your signal generator. Haw. Sounds FB!!

— D. W. Bearden, W4IKK

# 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 an 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.*

Please note the 7¢ rate on hamads is available to ARRL members only.

**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 McEachiron, 1408 Brentwood, Austin, Texas.

**QSLs!** Kromtek cards at a fair price. Dauphinee, WIKMP, Box 219, Cambridge 39, Mass.

**QST'S SWL'S**. 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, W1VQ, 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. 3/4" 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.

**SUBSCRIPTIONS**. Radio publications a specialty. Earl Mead, Huntley, Montana. W7LCM.

**DON'S QSL's** — "The finest". Samples. 2106 South Sixteenth Avenue, Maywood, Illinois.

**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.

**QSL** Quality cards priced right. Samples. Ferris, W9UTL, 1768 Fruitdale, Indianapolis, Ind.

**SURPLUS:** Deluxe crystal finishing kits containing holders, quartz blanks, abrasive, etching fluid, complete instructions. \$2.00 each postpaid. Formerly sold \$8.75. Vesco Company, Parkville, Missouri.

**BEAUTIFUL,** inexpensive QSLs. Samples for stamp. Timmers Printing, 2503 Gmsiner Road, Appleton, Wis.

**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 IS- 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.

**OUR** business: Buying and selling amateur radio transmitters. Transmitter Exchange, Wakefield, Rhode Island.

**COLLINS** 30K, Super-Pro SP-400-X. Both same as brand new, 6-element Workshop factory beam with rotator. Complete Deluxe station, cost \$2125.00. Condition guaranteed perfect. VFO and Super Pro in streamlined gray cabinet. Speaker to match. A beautiful station. Sacrifice for \$1200.00. H. E. Hightower, Blakely, Ga.

**QSL'S SWL'S:** America's Finest! What's your desire? Samples free, QSL Printer Sakkers, W8DED, Holland, Michigan. "Made-to-order QSL cards!"

**LARGE** decal transfer call-letters for your car. Any call, 50¢. Three sets, \$1.00. Pleasant, W9UDZ, Mattoon, Illinois.

**METER:** RCP 446A, never used, \$14.00; Brush BA-106 mike, new, \$13.00. Ray Bohmert, Medford, Wisconsin.

**CRYSTALS:** 100 Kc. Guaranteed perfect. Manufactured by nationally known company. Complete with holders, 1/4" pin spacing. \$2.95, postpaid. Art A. Johnson (W9HGQ), 1117 Charles St., Rockford, Ill.

**SELLING** out: HRO7 receiver with coils plus broadcast band, speaker, power supply, \$250. These are both in perfect condition and used very little. BC221 frequency meter, crystal, calibration book and AC power supply, \$25.00. Cash only. Shipped F.O.B. Alexandria, Minn. Frank A. Eberhardt, W0FTJ, Box 141, Alexandria, Minn.

**FOR** Sale: Practically new Thordarson 1750 and 2000 volt 500 mil xformer, \$20.00. Thordarson 500 mil smoothing choke, hardly used, \$10.00. Both F.O.B. Mills, Mass. Hammond, WIGCD, Plain St., Millis, Mass.

**W0CVU** is QRT. Complete Collins station equipment at almost half price. Guaranteed latest model 75A, 30J transmitter with speech clipper, 2 813's final, 400-watt phone with push-to-talk, remote control, new tubes, 75-40-20-10 and 6 meters, 310C exciter. First check for \$1000.00 takes all. Charles W. Boegel, jr., P. O. Box 224, Cedar Rapids, Iowa.

**BOOK** wanted: "Fun With A Recorder". State price and condition. W5FXO, Sanatorium, Texas.

**SELL** or trade: Pair 100TH tubes. Guaranteed brand new, packed in their original cartons. \$8.50. W5LCB, Edwards, 3112 NW 13th, Oklahoma City 7, Okla.

**MEISSNER** 150-B transmitter modified for 10 meters; crystal mike. Excellent condition, \$200.00 or best offer. Vaughn, WIAMK, 187 Orange St., Rosindale 31, Mass.

**RME-69** xtal and noise suppressor, \$70; Meissner S.S. \$25.00; W2HMM, 53 S. Bedford Rd., Mt. Kisco, N. Y.

**MERCURY** II camera in factory, re-conditioned, 1st class shape. In leather case for 100 or Gonset 10-11 meter converter. W5AJ, Rt. 2, Box 172-A, Pittsburg, Texas.

**SELLING** out: HRO-7 complete with broadcast coils and NBPM adaptor, \$275.00; HT-18 VFO, \$75; UHF Resonator 3-element 20-meter beam, \$75. Truman Pennington, 26 Central Court, Huntington, W. Va.

**BEAM** tuning simplified. Vobar beam tuners replace parasitic element tuning coils. Sec. P, 88, August '48 QST for details. \$3.69 each; two for \$7.00. Vobar Products, 8536 Orchard, St. Louis 14, Mo.

**SALE:** Stancor 20P 25 watt xmitter. Complete with tubes, coils, all bands, and crystals. Phone/CW rig in 8 3/4" x 13 3/4" x 19", standard cabinet. Ed Sepe, 228 4th St., Elkins, W. Va. W8CJU, \$60.00.

**SWAP** BC453 and \$15.00 for 10-11 Gonset. Sell G-E 1.73 KVA plate transformer, tapped 115/230 primary, 2000 to 2500 VDC secondary, 3kVA pole transformer, similar voltages. 2 kW 230 VAC Variac W4K1Z, Clarksville, Tenn.

**FOR** Sale: One BC610-D, complete, \$550.00 F.O.B. Steelville, Mo. Also for sale: One Collins ART-13 transmitter with complete power supply, 40 thru 75 meters, \$150.00, less power supply for 110 VAC. \$195.00 with supply. Box 113, Kenneth C. Horne, Steelville, Mo.

**QSL's!** G. L. Taylor, Sumrall, Mississippi.

**TRANSMITTING** tubes 100TH, \$7.95, pair, \$15.50; 75TL, \$2.35, pair, \$4.50; 814, \$2.50, pair, \$4.85; 803, \$3.75, pair, \$7.25. Grand new, guaranteed fully. Famous makes. McConnell, 3834 Germantown Ave., Phila., and Hunter.

**RME-45** and Hunter cyclemaster, used very little. Will sell both for best offer above \$300.00. E. J. Hoover, W0UUC, 223 1/2 E. Second St., Muscatine, Iowa.

**SWAP** new Philco 1405 table radio with 45 min. record player for good communications receiver or high power rifle. W0DJM, Dale C. Conger, Wagner, So. Dakota.

**SELL:** New BC348B converted for AC. Best offer over 75 dollars; also Telekit T4 wired and tested with tubes, less T4P4 and cabinet. W9ECC, 619 Seventh Ave., West Bend, Wisconsin.

**FOR** Sale: BC221, frequency meter, Silver 701 transmitter. Roy Rickles, 901 Shaan Ave., Alabama City, Ala.

**BARGAINS:** New and used transmitters, receivers, parts: Globe King, \$229.00; New 150-watt 'phone, \$199.00; 60 watt 'phone, \$99.00; Globe Trotter, \$57.50; R9'er, \$15.00; Millen exciter & VFO, \$25.00; TR-4 \$22.50; HT-9, \$295.00; MB-611, \$45.00; Silver 701, 801, 801, \$29.50 ea.; NV-173, SX-28, \$149.00 ea.; NC-240C, HC-129X, HRO, \$139.00 ea.; RME-45, SX-25, DB-22A, \$49.00 ea.; NC-44, S-38, \$35.00 ea.; S-1, \$25.00 ea. See our League stock.

**Trade-ins.** Free trial. Terms financed by Leo, W0GFO. Write for catalog and best deal to World Radio Labs, Council Bluffs, Iowa.

**BC-348N**, new, \$95.00; BC-654 trans-rcvr, new, \$50; Collin TCS-12 trans. and rcvr, 1.5-12 MC xtal and VFO, 110 VAC power supply, new, \$475.00. National NC-183 NFM adaptor, speaker, new, \$245.00.

**TR-4** (two) trans.-rcvrs, used, \$50.00. T. Howard, 46 Mt. Vernon St., Boston, Mass.

**SELL** Hallcrafters S-40A with S meter. In good condition, \$65.00. R. Cooper, Westtown School, Westtown, Penna.

**BC-610**, in excellent condition, coils for 80, 40, 20, and 10. Meissner DeLuxe, prewar, signal shifter, several sets coils. Prefer buyer who can come and get it but can have created. Will sell for best offer. WARD, I. Goldwasser, Louisville, Georgia.

**SIGNAL** Shifter (1948 Meissner) and SX-25. Best offer. Geise, 5 S. Lafayette, Atlantic City, N. J.

**SELL:** 60F Meek transmitter, perfect, \$80.00. WIMJW, 13 Pemberton St., Cambridge, Mass.

**QSL's**, Samples 10¢. Albertson, W4HUD, Box 322, High Point, N. C.

**FOR** Sale: SP-400-X Super pro, \$375. Shipped postpaid in original cartons. Speaker and power supply included. W0SSR, 227 Scott, Fort Collins, Colorado.

**FOR** Sale: RME-45 receiver and speaker to match, \$90.00. NC-101X receiver and speaker, \$60.00. WIDBS, John Savonis, 11 Dwight Court, New Britain, Conn.

COUNSELLOR wanted for boys' camp in Maine for summer. License required to operate ham voice station. 20 years minimum age. Healy, 48 Jane St., New York 14, N. Y.

SELL: BC610E in perfect condition, factory modified all bands, complete with speech amplifier, spare 250TH and others. Selling out. \$40.00. W6VCA, E. H. Willingham, 3821 Chestnut St., Del Paso Heights, Calif.

BARGAIN! New and reconditioned Collins, National, Hamcrafters, Hammarlund, RME, Millen, Sonar, Meissner, etc. Reconditioned S38, \$29.00; S20R, \$49.00; S40A, \$69.00; SX-43, \$139.00; SX-42, \$199.00; HQ-129X, \$129.00; SP-400SX, \$199.00; HRO, \$99.00; NC-173, \$149.00; NC183, \$199.00; VHF-152, \$59.00; HRE-45, \$99.00; Temco 75CA, \$249.00; NC57, HRO7, SX24, SX25, SX28A, SP-400X, BC348, HT9, BC610, other receivers, transmitters, VFO's, etc. Shipped to you on trial. Easy terms. List free. Write: Henry Radio, Butler, Missouri.

WANTED: 250-Watt RCA broadcast transmitter, antenna, studio equipment. Box 1656, Delray Beach, Fla.

WANTED! APR-1 or APR-4 tuning units for use by ARRL official experimental station. Will buy or swap. W. R. Bliss, W0SNH, 2836 W. Archer Pl., Denver 9, Colorado.

SENSATIONAL values: Selling out complete station of late M. P. Mims, W1BDB. List includes dual 3-element deluxe Signal Squirtor and 50" tubular steel tower; custom-built 500-watt c.w.; 375 watt phone transmitter for use on all amateur bands, 10-80 meters; pair 805's modulated by Class B, 805's; J5-T's for 6-meter operation. Complete with power supplies in 72" rack cabinet; NC-183; frequency meter and standards; test oscillator; W.E. marine transmitter/receiver; miscellaneous tubes, meters, condensers, microphones, etc. Write for complete list. Bryan Mims, 1866 Beacon St., Waban, Mass.

GOLDEN opportunity: All that must go! Transmitter: Millen varifam and exciter, V12TA, Pr V12TA, commercial speech amp., Class E 805's, built-in 72" x 29" x 24" surplus Wilcox steel cabinet, capable 1 Kw; ART-13; TBS-50; Meissner signal booster; VHF-152, Link police mobile rig. All offers considered and answered. James C. Bailey, W9CLP, Macomb, Ill.

FOR Sale: Half-kilowatt CW and phone transmitter. Seven 12 x 20 chassis; two power-supplies, modulator, crystal exciter, buffer, final, antenna tuning unit, all in vertical stack, and separate speech amplifier. Built just before war, disassembled in 1942. Needs rewiring between units. All high-grade components. Offered as is to anybody who can come and look at it and make an offer. WIGS, 53 Westwood Road, West Hartford, Conn.

SILICON steel transformer lamination cut to order. Magnet wire, supplies. Write for price list. Morton Electrical Service, Maywood, Ill.

300-watt 'phone C.w. transmitter-receiver, 5-band 1.49 Mc. to 12.5 Mc., type RT-16/RFC-1, four sliding decks, never uncrated, \$350.00; Temco 75CA transmitter, \$250.00; K.P.-81 receiver, \$25.00; RME DB20 preselector, \$20.00; Deluxe jeweled chrome Vibroplex, \$12.00; National CRU oscilloscope, \$17.00; Astatic crystal mike, model T-3, with grip to talk stand, \$14.00; W6VC, E. DeTurck, 4100 Fulton St., San Francisco 21, Calif.

HALICRAFTERS S20R 1946 model, excellent condition, \$47.50. D. L. Lassiter, 6907 Madrid, Houston 4, Texas.

WALKIE Talkies, 1 pr. BC611C with original crystals for 3885 Kc. In excellent condition. Have not been tampered with. Original circuits and cases, \$50.00. W1CAS, P. O. Box 976, Danbury, Conn.

MUST sell: National NC240D receiver and speaker, excellent condition. \$145.00. Write: Bill 1008 East 18th St., Tulsa, Okla.

SELL: Halicrafters SX-28, excellent condition with speaker, \$120.00, W2VCA, E. H. Willingham, Tremont Place, Orange, N. J.

FOR Sale: Mark II smttr (never used); plus two transformers and schematic necessary for conversion, \$30.00. Vern Petersen, A-145 Quadrangle, Iowa City, Iowa.

SELL: Surplus parts and equipment. Write for complete list. D. Vetese, W20TI, Pomona, N. J.

WANT IP25 or German B1WA 128 preferably with optical accessories. Paul Rockwell, 910 Overbrook Rd., Baltimore 12, Md.

BOSTON and vicinity amateurs Use Lausen 500-watt, 115 V., 60 cycle gas generator, \$60.00. Herbert W. Gordon, 12 Sunnyside Ave., Wellesley, Mass.

RESISTORS, 5000 ohm, 20 W. 50¢ each; condensers; oil tubular 0.1 ufd, 1200 DCWV also Pyranol filled metal. 0.05 ufd, 600 DCWV, 2 for 25¢. All new, postpaid. W4JUX, Oak Ridge, Tenn. R. Somers, 10 Norton Road.

BC-312 with RA20, 60 cycle, AC power supply and xtal filter (same as BC-342), \$55.00. BC-412 oscilloscope, \$35.00; Bendix TA-12-D transmitter, \$25.00. All in excellent condition. Four Eimac 304TH tubes, brand new, in their original cartons, \$4.50 each or trade for 813's or 810's. W8GU, 18944 Sorrento, Detroit 21, Mich. Donald King.

SELL: Millen 90700 ECO, \$25.00; Millen R 9'er with coil, \$15.00. In new condition. Paul E. Trued, W4HXM, 1137 W. Academy, Winston-Salem, N. C.

QSL-SWLS. Samples free! (stamp appreciated) Cushing, W1HJI, P. O. Box 33, Manchester, N. H.

FOR sale, or will trade for a good receiver: Bausch & Lomb microscope. A. Morton, 1429 South Crescent Ave., Park Ridge, Ill.

SELL: Instructograph, complete with 10 rolls of tape, phones, key and oscillator. First choice for \$25.00 takes it. WZZRY, Bandieramonte, 141 A. 22nd St., Brooklyn, N. Y.

10-METER beams: \$15.95; 3-element .15-2 spacing, aluminum construction, weight 10 lbs. 304TL filament transformer, 5 volts @ 25 amp., \$5.25. 304TL sockets, \$1.20. Atronic Corporation, 1253 Loyola Ave., Chicago 26, Ill.

SELL your communications receiver, transmitter, test equipment and tools for highest cash offer. Send details to Overbrook Company, Overbrook, Mass.

QSL! Snappy new line, free samples. Larry's QSL Shop, Box 59, Opportunity, Wash.

HT-19: never used, complete—\$275.00; express collect. J. Redding-shafer, W9RHH, 1429 South Crescent Ave., Park Ridge, Ill.

COMPLETE station, less key and speaker. Sonar SRT-75, coils 80-10. 100 m. take-over, 2B22's. Gon-Set, 2-6-10 converter. BC-348-Q AC powered, \$275 F.o.b. Montgomery, Alabama. Major John Gibbs (W4MQM), AC & SS, Box 471, Maxwell Air Force Base,

BC-696, BC-459: Both new on shock-mounted rack; 100-watt power supply with 4VR tubes and key input; excellent beginners' transmitter. First \$60.00 takes rig; BC-454, BC-455; rcvr to match, xmitr. On shock-mounted rack with power supply. Take it for \$22.50. Also 10-meter mobile rig with 45 watts input. Complete with dynamic mike, shielded cable, dynamotor and relays. \$40.00 will buy complete outfit. Don Fleischhauer, W9DIP, Mulberry, Ind.

FOR Sale: HT-9 transmitter, in excellent condition; coils for 80-20-10 M, spare tubes, instruction book, crystals: \$250.00. L. F. Brown, W2JJD, 37-30 81st St., Apt. D-5, Jackson Heights, L. I., N. Y.

SELL: New National NC-183 receiver, NC-183TS speaker and narrow band FM adaptor NFM83 for above. Originally cost \$298.95. Will sell for \$250.00. F.o.b., Birmingham, R. M. Jones, W4WR, 1601 13th Court North, Birmingham 4, Ala.

SELSYNS GEJ1G1 tested used pair, \$1.49. Free bargain list. "Tab", 6 Church St., New York City 6, N. Y.

COMPLETE station, including nearly new HQ-129X, 300-watt 'phone and CW rig, \$300.00. Grammer superhet, power supply, speaker, \$20.00. WIPMX, 53 Pine Ridge Rd., Arlington 74, Mass. AR. 5-4258M.

CAMERAS, single lens reflex. Trade either for top-notch receiver, Korelle II, coated F2.9 Schneider, 2 1/4" square; Graflex 2 x 3 F4.5 revolving back, accessories. Both have views. W6NFW, 2408 Malabar, Los Angeles, Calif.

WANTED: Amertran plate transformer, 6200 VCT 750MA. Advise price in your first letter. L. Davis, 836 E. 6th Street, Des Moines, Iowa.

WRITE for list of equipment including Super-Pro BC-348 APR-4 xmitra, etc. W8VHJ/H, 624 West Market, Lima, Ohio.

SELL: 1 kilowatt, TVI, BCI, proof transmitter final 100TH mod. 805's power supply, Variac controlled, 3000 volts, 800 mill separate power supply for each unit, 7 1/4 ft. relay rack, VFO. Remote control line amplifier. Reason: USAF, subject for overseas. Guy Migliori, W1ONZ, 6 Myrick St., Ayer, Mass.

TIRED of surplus and "special buys" that prove unsatisfactory? Trade at northern New England's foremost amateur radio supply house for standard nationally advertised products at regular prices. Evans Radio, Concord, N. H.

BC-610 Thoradoran oversize modulation and power transformers nine plate and grid meters, two spare final and modulators tuning units, ten meters. \$600.00. W3AFR.

SELL: VHF-152, \$60.00. Meissner Model EX, factory-assembled, \$70.00; 829-B, \$2.00; SCR-522 receiver and transmitter, partially converted, \$10.00 each. F.o.b. West Hartford. W1KEE, 38 LaSalle Rd., West Hartford, Conn.

XMTTERS, BC459A, \$15.00; BC458A, \$4.95; 50 w. 807 mod. by 61.6's in gray cabinet metered, \$50.00; rcvr BC454, BC converted, \$25.00; 807 mod. by 61.6's, \$5.00; Millen TCO 90700, \$27.50. All above purchased new and used only a few hours. Sold original packing f.o.b. St. Louis. W0FGZ, 5333 Waterman Ave., St. Louis, Missouri.

KILOWATT transmitter PP 810's 810 Mod. 6' rack, gray crackle well built, excellent appearance and operation. Pictures. Will sell or trade for car. F. L. Jones, W8STM, Unlontown, Kans.

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SELL: A.C. senior model Instructograph, in excellent condition. Complete with oscillator and 10 tapes. Also offer complete Candler System Hspeed telegraphy and typewriting. Both for \$25.00. H. A. Simolina, Jr., 1618 Central St., Toledo 6, Ohio.

SELL or trade: BC-348B converted to A.C., pair new 810's, Rider Manuals volume 11, 1, 1.14 Precision Signal generator E-200. What's your offer? W4BGO, Quincy, Fla.

SELL 5-band 150-watt C.W. transmitter, built-in VFO, antenna tuner, meters in 17 1/4 inch cabinet. \$150.00. 809 multimatch modulator and complete speech amplifier on same chassis, room for power supply, \$40.00; Biley CCO-2A with tube, \$7.00, \$10.00. Odd parts and tubes. Must sell by June. Hurst, 5369 Bancroft Hall, U.S. Naval Academy, Annapolis, Md.

MEISSNER 150-B; 250 watts, all bands, 10 through 80, crystal mike input. Complete with Meissner Model EX Shifter \$225.00. SX28A, \$135.00. VHF152A, \$65.00. 10-meter, Gon-Set, \$25.00; all in excellent condition. Paul Weland, W5LCCZ, Benton, Arkansas.

ALUMINUM tubing, angles, sheets and fittings. Write for list. Willard Radcliff, Fostoria, Ohio.

SELL brand new National NC-183 with NFM Adaptor and speaker, \$220.00 W1MUO/8, R. L. Gysan, 29255 Lake Road, Bay Village, Ohio.

QSO 35 miles (confirmed) with my converted Abbott DK-3 transmitter. Has new UTC modulation xformer, mike, vertical antenna and batteries. Best offer takes it. Reason no time. George M. Clark, Jr., W2JBL, 222 Hicks St., Apt. 4C, Brooklyn 2, N. Y.

QST'S: May 1936 to May 1949. One cover torn, balances excellent, \$25.00 plus postage. John Mack, 3630 North 3rd St., Milwaukee, Wis.

SELL BC-312M converted, in perfect condition. Best offer. Joe Cole, W4LFP, South Boston, Va.

FOR sale: Mon-Key, used one month, cost \$30.00, sell \$15.00. Prepaid. W0FLK, Westbrook, Minn.

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DB-22A, Excellent condition. \$55.00. W5ALA, 4531 Fairway, Dallas, Texas.

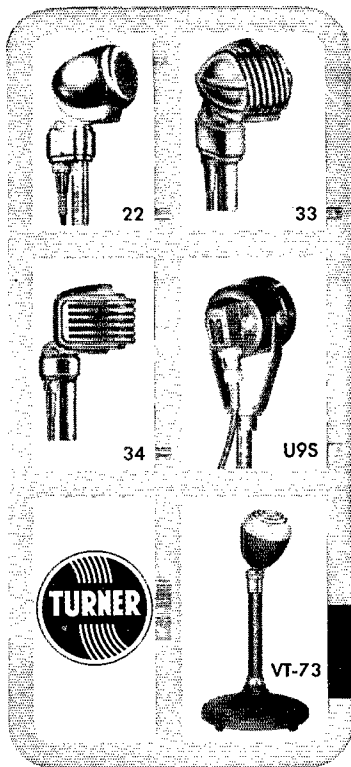
QSL SWLS. Send stamp. McEachron, 1408 Brentwood, Austin, Texas.

SELL-SWAP: Underwood 5 typewriter capital keyboard for CW, \$12.50, new Telex Monoset, new headphones, sacrifice. W0SGG, Colorado Springs, Colo.

HAMMARLUND Super Pro BC-779-B Model with power supply; no speaker; in excellent condition. \$150.00. Also antenna tuner, BC-939-A used with BC-610, \$20. M. E. Wanamaker, 514 Amherst Rd., South Hadley, Mass.

CANADIAN QLS1 Supergloss kromekote. Catalog in preparation, samples on request. Write for yours. W. John Chivers, Box 38, Grimsby, Ontario.

WILL trade new high power microscope with turret head, adjustable table, light condensing lens with iris, for good used receiver as 75A, NC183, etc. or test equipment, W2ZGE, West Sayville, N. Y.



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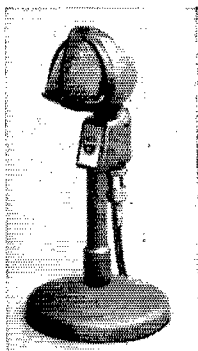
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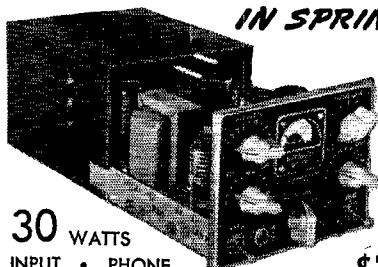
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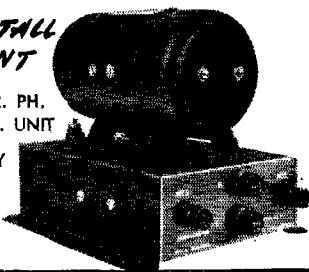
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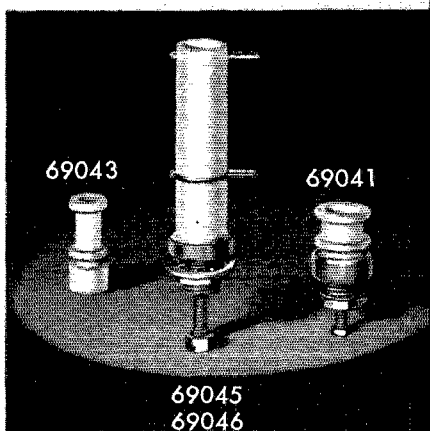




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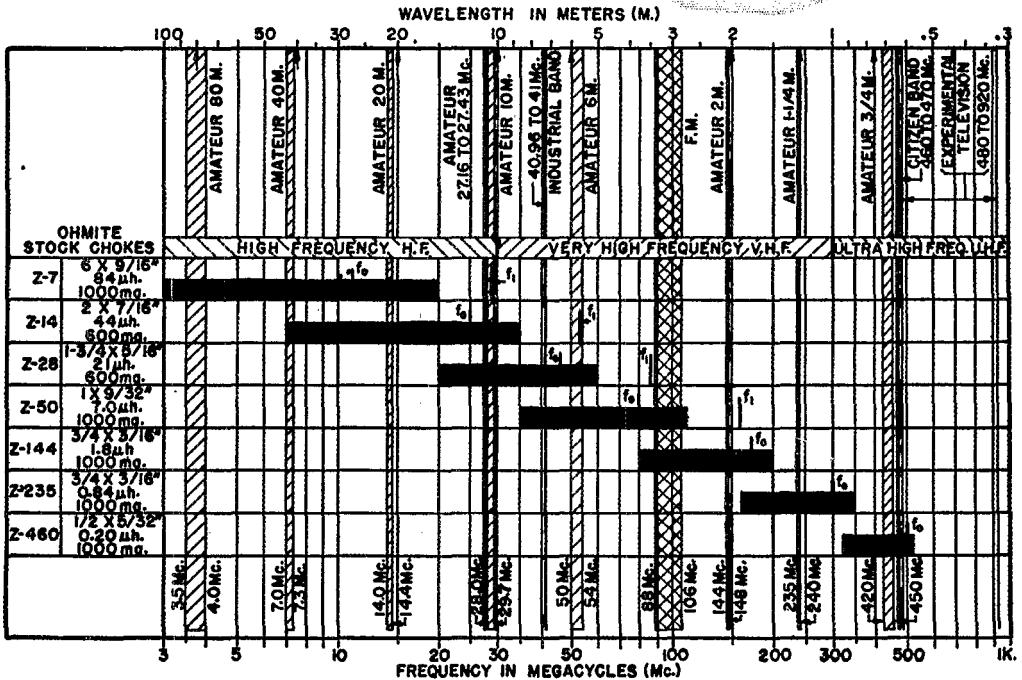
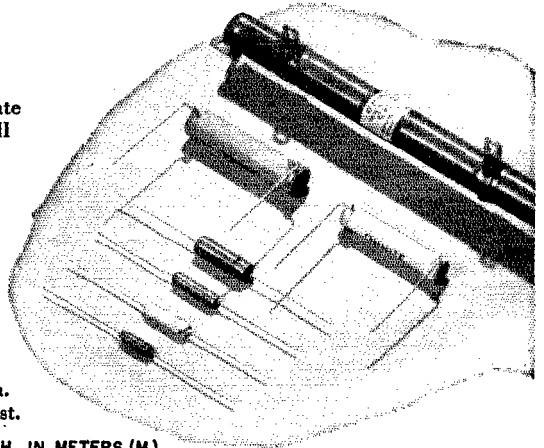
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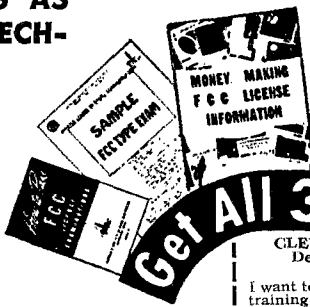
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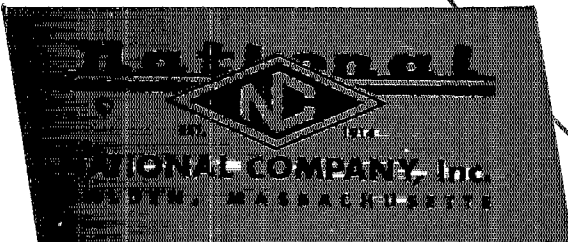
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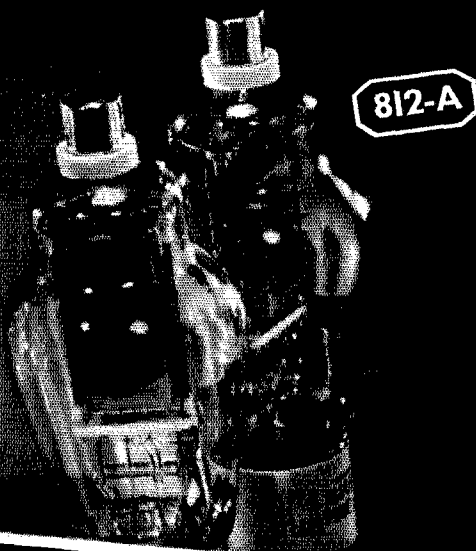
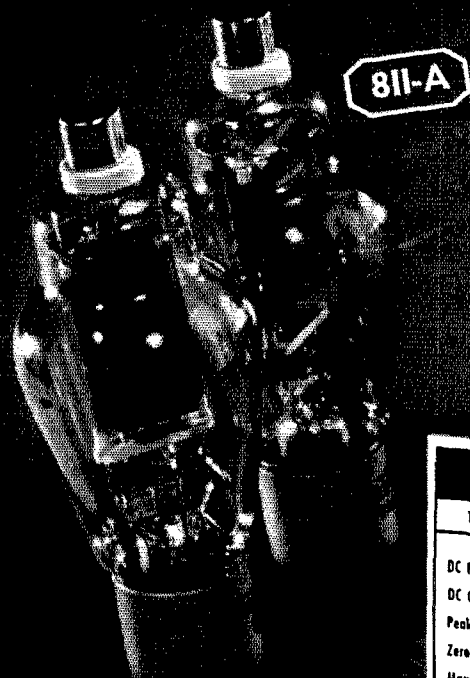


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