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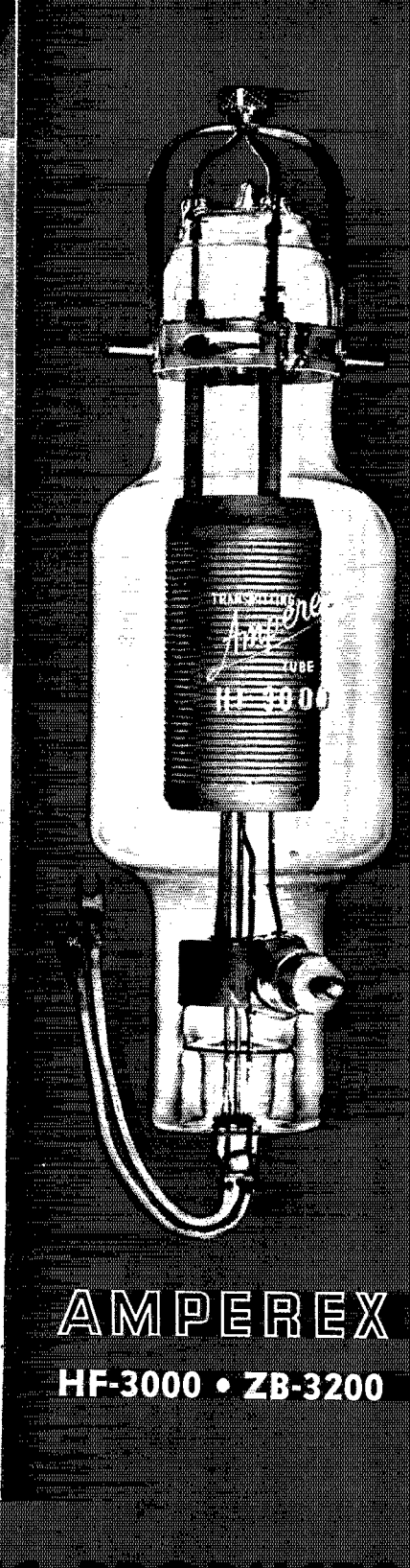

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JULY 1941

VOLUME XXV

NUMBER 7

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QST *devoted entirely to*

AMATEUR RADIO

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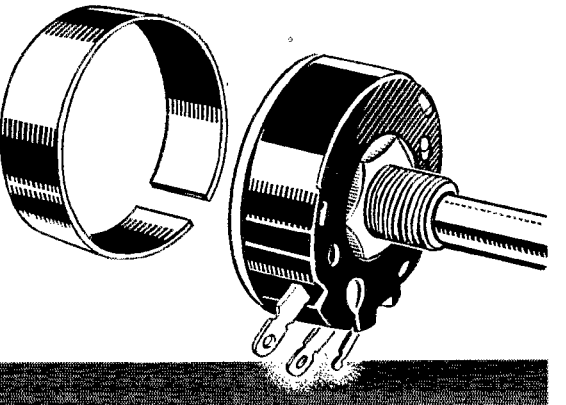

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial 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. Correspondence should be addressed to the Secretary.

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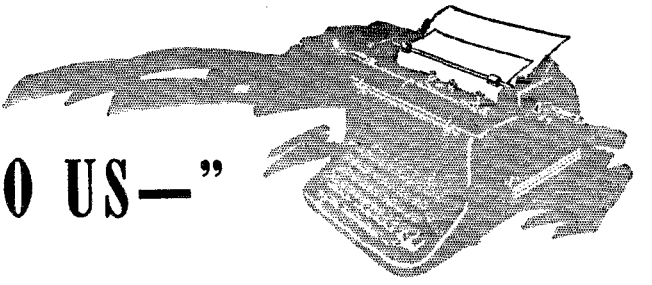


"IT SEEMS TO US—"

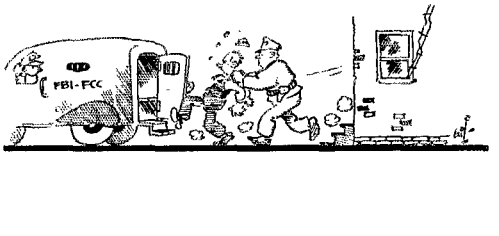
"FRITZ"

WE SUPPOSE every amateur in the country has heard of the apprehension in a midwestern city of an unlicensed punk who signed himself Fritz and who led the government authorities a merry chase for several months while he played tag on War Department frequencies. He wasn't an amateur and he'd never had a license and he wasn't using amateur frequencies, and the FCC and the press associations were very careful not to refer to him as an amateur. But some newspaper headline writers did so call him and there was a rumor that some highly-placed officials were getting the wind up over the case and wondering if it didn't show the unreliability of the amateurs. So you see that, even though the mug wasn't a ham, these things can hurt us.

Where were the local amateurs while all this fun was going on? We have a letter from an ARRL official in that city, from which we want to quote:

> "All I can say is that all of us failed to do what we should have done. Half the locals had heard this station. The subject was brought up at the club meetings and some effort made to run him down, but it never did get anywhere. There were rumors that he attended club meetings, that some of the gang knew who he was, that he had applied for a license and would soon have it, etc., etc. In fact, it finally got to where no one mentioned the subject for fear that the bootlegger was present!"

Fellows, the time has arrived for us to stop fooling around with cases of this sort. It seems to us that our interests require that we show no tolerance either to bootleggers or to violators of the FCC's special orders. How much better it would have looked for amateur radio if the locals had tracked down this egg Fritz to a certain area and then yelled for the FCC to come and get him, regardless of whether he was somebody's friend! We can't afford to be tolerant of bootleggers or violators; it means too much to all of us. We urge that no amateur listen to such stuff and sit idly by. If it's only a brother ham showing simple ignorance or dumbness about the special orders, the good amateur will make the necessary effort to get hold of him by radio, telephone or letter and straighten him out. If he perversely continues, or if it's plain that he's deliberately trying to sneak a little foreign DX, even though it's harmless, we have only one clear duty to ourselves: to report him instantly to the nearest FCC monitoring station. And if the business involves something palpably subversive, the nearest FBI office should also be sicked onto him.



Within the framework of certain restrictions designed to keep us safe, amateur radio is going along full blast. It must be obvious to any thinking ham that if that framework won't hold us, somebody in authority will cook up another and worse idea. *Verbum sap.*: we owe it to ourselves to assist in the policing effort.

K. B. W.

CLIPPINGS

WE HAVE just been taking a look through a folder in our press-clippings file marked "editorial mentions" — i.e., mentions on the editorial pages of newspapers rather than in routine news stories. Such mentions, it may be said, are vastly more significant than ordinary news items because they demonstrate that a lasting impression has been made on the editorial writers — who are among the best-informed people on earth.

As we pored over this file we were impressed anew with the sympathetic attention that is being paid amateur radio by the press, especially in the last year and a half. In these times the things we have been preparing ourselves for are being recognized for their worth. In the words of the Harrisburg (Pa.) *Patriot*, "The diligence and skill of these 'hams' in past years now becomes a definite national asset."

A particularly notable group of these clippings surrounds the time a year ago when the FCC found it necessary to restrict foreign DX and portable operation. A gratifying number of papers, with the Chicago *Daily News* at their head, rose militantly to defend the amateur against any resulting unfavorable popular reaction. Said the *Daily News:* ". . . Anyone familiar with the breed can testify that these 'hams', as the amateurs delight to call themselves, are as ardently patriotic a group as can be found in American life. Most of us are familiar with the record of their splendid services in times of civil emergency and natural upheaval, such as floods, fires and storms. What the general public is less likely to appreciate is that their coördinated services have put them in position to prove, if the necessity ever rises, just as valuable in a military as in a civil emergency. . . ."

On the same occasion the Redlands (Calif.) *Daily Facts*, commenting on the FCC action, said: ". . . 'Fifth column' hysteria should not upset our good judgment and smother one of the best defenses we have. Free and open operation by these stations is highly important in the field of radio. These 'hams' are ardently patriotic, and nothing could please them better than to aid the authorities in tracing down subversive influences. . . ."

The Boston *Traveler* has paid several tributes to the amateur. On one occasion it said: "Leading the world in military preparedness and peace preparedness is America's glorious and brilliant army of amateur radio operators. The story of the American Radio Relay League is one of the most inspiring in our history, and one of the most unselfish. . . . Here is ready at hand a most important home-defense service, completely equipped." And again, a month later, the *Traveler* editorialized. . . . "As a group the American 'hams' have clearly demonstrated their loyalty and patriotism."

Along the same lines is the view expressed by the Dallas *Morning News:* ". . . The Federal Government has indicated its confidence in these amateur radio operators and enlisted their coöperation in national defense. . . ."

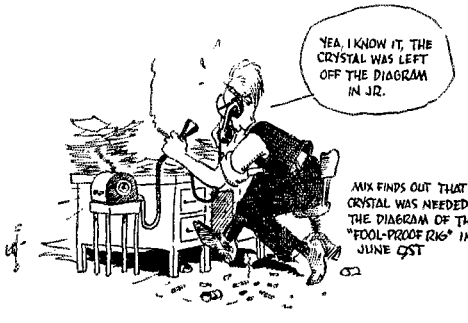
There are many other clippings in that "editorials" file of ours — from newspapers all the way from the Manchester (N. H.) *Union* to the Tacoma (Wash.) *News Tribune* — but space does not permit quoting more. They all serve to demonstrate that the amateur, by his consciousness of public responsibility and his willingness to render unselfish service, has earned the respect of the people of this country and the support of an important section of the press.

— C. B. D.

★ SPLATTER ★

FEEDBACK

In the article, "A Fool-Proof Rig for 80 and 40 Meters," June, *QST*, the crystal was omitted from the circuit diagram of Fig. 1, page 21. The crystal should have been shown connected between the grid and cathode of the oscillator tube.



(Gil's idea of Mix estimating the situation is really very conservative.—Ed.)

Strays

Director Shelton, W4ASR, warns amateurs in the southeastern part of the country against an individual who has been posing as W4SP. His habit is to contact hams (presumably through the call book), tell a hard-luck story, put the pinch on for a loan and then disappear. The man has a lengthy criminal record with convictions for forgery, drunkenness and vagrancy.

— • • • —

Many radio components require materials which are being placed on the defense priority lists. These include tubes of certain types which require nickel and other important metals. It might not be a bad idea to stock up on some of these items which may be difficult to obtain in the future.

— • • • —

Constructors, especially those working on u.h.f. gear, should be interested in Amphenol's two-hole polystyrene spacing bead No. 73-2, designed to carry two No. 18 wires. They are just the thing for making up closely-spaced link lines for use between transmitter stages or between the receiver and a preselector. The whole assembly may be pulled into a ⅜-inch copper tube if shielding is desired. The surge impedance will then be 150 ohms. — *W5AJG.*

A Versatile Portable-Emergency Transmitter

Using Either 6.3- or 1.5-volt Tubes

BY CALVIN F. HADLOCK,* WICTW

ALTHOUGH operation of portable apparatus on the lower frequencies has been restricted, the possibility that an emergency may arise in which the amateurs may render invaluable aid is as great as ever. Preparedness to meet such situations is just as essential, if not more so, to-day as it has been in the past. And preparedness is the only *effective* way of coping with such emergencies. We should not wait until a hurricane strikes or until the rivers have reached flood level before we begin thinking about emergency apparatus. We should have the gear built and ready to go to work *before* that time arrives. It was with this thought in mind that the transmitter to be described was built.

In designing any radio gear, the use to which it will be put and the conditions under which it will be operated must always be given careful consideration. This is particularly true of emergency equipment. There must be one or more "field" stations located where the emergency exists to establish contact with a "home" station that can readily dispatch the traffic to any point.

On the regular ham bands, any number of "home" stations are usually available; in fact, there are often too many, causing serious difficulty from interference. The weak link in the chain is the fact that, since emergencies are likely to occur at any point or under any conditions without regard to the convenience of radio amateurs, it is very likely that there may not be a "field" station available at a suitable location to accumulate and handle traffic for the area involved. In this case, it becomes necessary to transport a field station quickly to a location where it can be operated most effectively. This point has been brought out most emphatically during disasters in the past five years.

Such equipment should be small and light. It should require a minimum of "gadgets" such as crystals, coils, condensers, etc. It should not require an "instruction book" to get it into operation by amateurs not familiar with that particular apparatus. It should be versatile enough to operate with reasonable efficiency on any type of antenna that may be available or that can be hung up quickly. It should be capable of operating from *any* type of power supply that may be available. This last point is particularly important. It may be possible that a.c. power is still available.

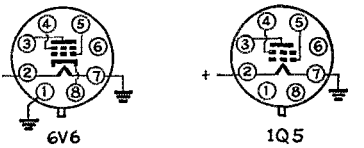
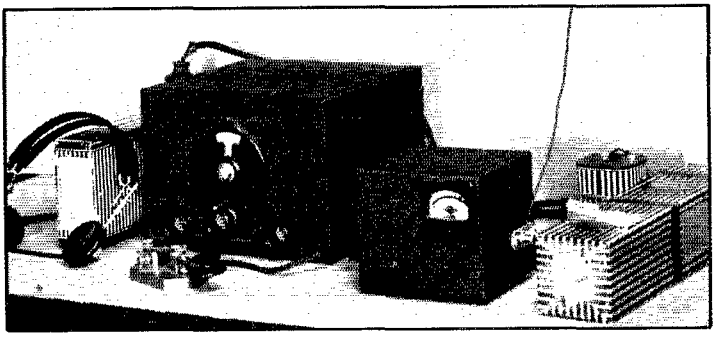


Fig. 1 — Socket diagrams (bottom view) of the tubes used in the portable-emergency transmitter, showing how the tubes can be used interchangeably.

Lacking this, operation may be possible from storage battery supplies such as dynamotors or vibrator-packs. If this cannot be obtained or if the location to be reached is such that the transportation of storage batteries is too difficult, it should be possible and *practical* to operate the apparatus entirely on dry batteries.

The requirements for small size, portability and battery operation rule against 'phone operation. While there may be occasions when the ability to use 'phone may be advantageous, accurate dependable message-handling usually calls for c.w.

*Engineer, National Company, Malden, Mass.

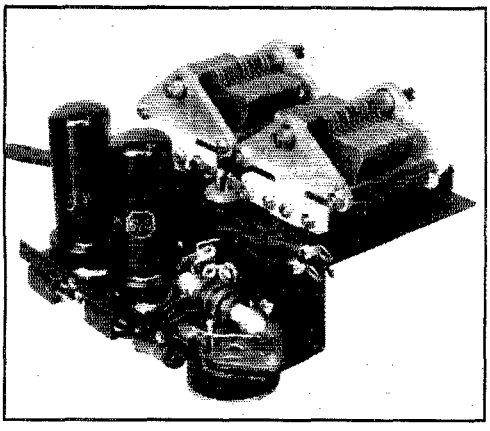


An idea of the size of the transmitter can be obtained by comparing it with the SW-3 receiver on the left. The transmitter can be operated from dry cells with a few watts input or from a 350-volt supply and about 20 watts input, by simply changing tubes and power supplies.

operation. From the standpoint of portability, much less power and apparatus are required for generating a c.w. signal than for generating a 'phone signal.

The transmitter to be described was designed solely for c.w. transmission. It is small and compact. Two-band operation can be had from a single crystal merely by replacing the output tank coil. A simple yet effective antenna impedance matching system is provided. Moreover, the transmitter can be operated on an a.c. power pack, a 6-volt storage battery supply using a vibrator pack or dynamotor, or entirely on dry batteries. When using an a.c. pack or storage battery supply, two 6V6 (or 6V6-GT) tubes are used with 15 to 20 watts input. When using dry batteries, the above tubes are replaced by 1Q5-GT's using a single 1.5-volt cell for the filaments and about 135 volts on the plates with inputs from 1.5 to 2 watts. The change from 6-volt to 1.5-volt operation is accomplished merely by replacing the tubes and power supply. Figure 1 shows a diagram of the socket connections of the 6V6 and the 1Q5-GT tubes, illustrating how the tubes can be made interchangeable. One side of the heater is grounded and care should be taken that the grounded side corresponds to the *negative* side of the filament when 1.5-volt tubes are used. A 6F6 could have been used in place of the 6V6 for the crystal oscillator, but the use of the 6V6 gives slightly more output and requires carrying only one type of tube for replacement purposes. The circuit diagram of the transmitter is shown in Figure 2.

The transmitter is built into a metal cabinet which measures 5¼ by 5¼ by 5½ inches. Everything is mounted on a sub-chassis except the meter, B + switch, key jack and antenna-ground strip which are mounted on the cabinet. The sub-chassis is a piece of steel bent to form two platforms as shown in the photographs. The purpose of this chassis shape is to make it possible to utilize all the space inside the cabinet and make a very compact unit. Two angles are bent over at both edges of the chassis by which it is fastened to the cabinet with screws.



A top view of the chassis with the cabinet removed.

If the worth of any portable-emergency gear can best be measured by its versatility, the transmitter described in this story is well up towards the top. It can be coupled to almost any wire for an antenna, and it can be made to operate from a 6-volt heater and 300-350-volt plate supply or 1.5-volt filament and 135-volt plate supply by simply plugging in the proper tubes. Being properly designed, it doesn't take up any more room than it has to.

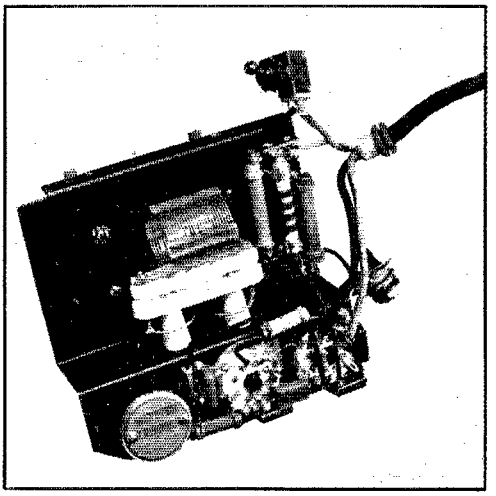
The two output tank condensers are mounted on the upper platform. The rotor shafts have been cut off and slotted and are rotated by means of a screwdriver which is inserted through two holes in the side of the cabinet. These condensers are mounted directly on the platform thereby grounding the rotors. The stators are connected to the tank coil on the opposite side of this platform by two bus-bar leads passing through the rubber grommet near the front.

On the lower platform are mounted two isolantite octal sockets and a socket for the crystal. The tube near the middle is the crystal oscillator and the tube near the end is the output tube.

The r.f. choke mounted above the crystal socket is the plate choke for the crystal oscillator. The two leads dangling above this choke are the meter leads, the meter being mounted on the cabinet in the space directly above this r.f. choke.

Looking at the bottom of the platform, several resistors and condensers can be seen mounted in the most direct and convenient spots around the tube sockets. The condenser C_8 is mounted on the upper platform between the coil support and the end of the r.f. choke. It will be noticed that the tank coil L_1 is mounted on the angle piece between the two platforms. The two bus-bar leads from the tank condensers can be seen coming through the chassis to the coil connections. The National *XB*-16 coil socket is used as furnished. The coils have been revised somewhat to make it possible to fit them into a smaller space. The link is removed and then the spacers are removed so that the coil fits down against the base. Only the two end prongs are used, the others being removed. A few turns must also be removed from each coil, as specified in the coil data.

At the right of the coil can be seen two 2-watt resistors and an r.f. choke. The outside resistor is R_8 while the one nearest the coil is R_7. The r.f. choke is the plate choke of the output tube. At the right-hand side can be seen the B + toggle



A view of the bottom of the chassis. Note that the coil has been lowered on its plug-in mount to give more room.

switch and the keying jack. Both of these mount on the side of the cabinet. The crystal and coil are replaced from the bottom of the cabinet. The tubes are replaced from the top. The antenna-ground strip, which is a National Type FWG, is not shown but is mounted on the cabinet at the left of the coil, and a piece of bus-bar is run over to the left coil connector from the antenna post. The ground post is connected to the chassis by a lug. A four-wire cable supplies the *A* and *B* power for the unit.

The circuit of the transmitter is not particularly new, having been used in similar outfits in the past.[1] The circuit consists of a Pierce oscillator which is coupled to the output tube by means of an untuned impedance, followed by an output stage which can be operated either on the fundamental frequency of the crystal or as a frequency doubler. A better means of coupling the output tank to the antenna load is used. Although this system is very simple and uses a minimum of parts, it has proved to be very effective over a comparatively wide range of antenna impedances. The antenna loading is adjusted by juggling the relative capacities of the tuning condensers C_1 and C_2. When C_2 is at maximum capacity, the loading will be at a minimum. As this condenser is decreased in capacity, the loading will increase. The capacity of C_1 must be adjusted at the same time, of course, to keep the tank circuit tuned to resonance as indicated by minimum plate current. By this juggling process, good coupling can be obtained to practically any reasonable antenna system.

It will be noted that the final amplifier is keyed by opening the screen supply of that tube rather than by opening the cathode. This system produces satisfactory keying and is employed because the use of 1.5-volt tubes makes cathode keying impossible. Break-in could be obtained by keying the crystal tube although trouble may occur due to the final amplifier oscillating as a crystal oscillator, even with the key up, when operating straight through on the crystal frequency. With the present system, no trouble occurs when operating "straight through."

The transmitter has been thoroughly checked during the past year on the air both at home and in the field, including two field days when it was operated by a group of amateurs from the Eastern Massachusetts Amateur Radio Association. On one of these outings the car was driven off the main road, a piece of wire about 60 feet long was attached near the top of a tree and the transmitter put into operation in the car using a genemotor supply. The report obtained from about 100 miles away was that the signal was just slightly weaker than the 25-watt transmitter being operated back at "headquarters," which used a half-wave single-wire-fed antenna. At another time, the transmitter was operated at home using a 10-meter Zepp antenna with the feeders tied together and with 2 watts input to the 1Q5-GT's. Operation was on 40 meters and a solid half-hour QSO was had with a station in Buffalo, N. Y., at about 9 P.M.

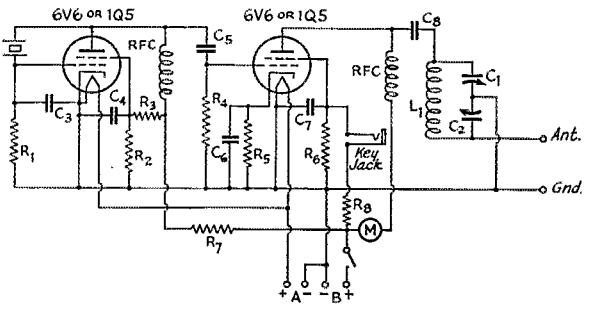


Fig. 2 — Wiring diagram of the portable-emergency transmitter.

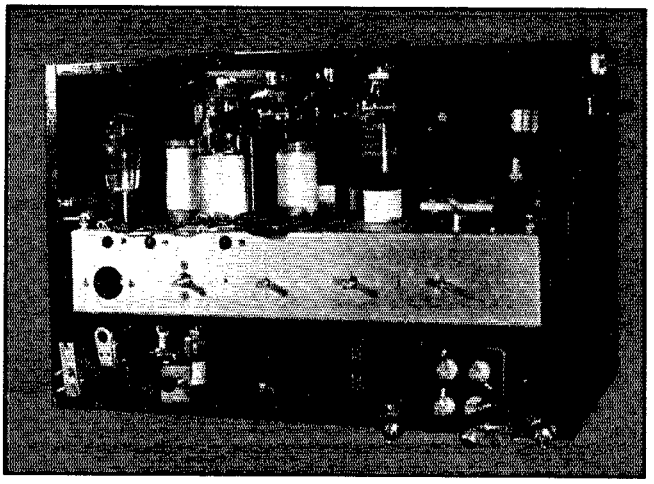
C_1, C_2 — 250-$\mu\mu$fd. variable (National TMS-250).
C_3 — 50-$\mu\mu$fd. midget mica (Aerovox 1468).
C_4 — 0.005-μfd. midget mica (Aerovox 1468).
C_5, C_6, C_7 — 250-$\mu\mu$fd. midget mica (Aerovox 1468).
C_8 — 0.001 μfd. (Aerovox 1467).
R_1 — 50,000 ohms, ½-watt.
R_2 — 100,000 ohms, ½-watt.
R_3 — 50,000 ohms, 1-watt.
R_4 — 20,000 ohms, ½-watt.
R_5 — 350 ohms, 1-watt.
R_6 — 100,000 ohms, ½-watt.
R_7, R_8 — 15,000 ohms, 2-watt.
RFC — 2½-μh. radio frequency choke.
M — 0–75 milliammeter.
Key Jack — Single closed circuit phone jack.
L_1 — 3.5 Mc.: 48 turns (National AR-16-80).
7 Mc.: 23 turns (National AR-16-40).
14 Mc.: 12 turns (National AR-16-20).

[1] Priest and Turner, "Norfolk Amateurs Prepare for Emergencies," *QST*, Sept., 1938.

Apartment-Size 100-Watt Transmitter

Cabinet Construction for Space Economy

BY WILLIAM A. WOEHR,* W9WOP



Removing the front panel shows the arrangement of the parts for the 100-watt transmitter. Space is saved by using only one chassis, for the r.f. and modulator section, and mounting the power supply components on the bottom of the cabinet.

The r.f. section is mounted along the front, starting with the oscillator on the left-hand side, the buffer in the center and the final amplifier on the right-hand side. The final amplifier plate coil mounts towards the rear of the chassis — the ceramic platform in the foreground takes the 50-$\mu\mu$fd. padding condenser used on 1.8 and 3.5 Mc. The speech amplifier and modulator stages are lined up directly behind the oscillator and buffer stages.

THIS transmitter came into existence through the requirements of apartment life, making the good old rack and panel job a thing of the past. It is compact, self contained, neat appearing, provides 'phone and c.w. operation, and best of all it doesn't cost a fortune to build. It fills the bill nicely for the amateur who must keep everything on one table and yet desires a moderate power transmitter of the 100-watt size.

The r.f. lineup uses reliable circuits and will give good 10-meter output using 7-Mc. crystals. Of course all the other bands are also included, and changing from one to the other is only a matter of a few minutes at the most.

The oscillator uses a 6V6G in a regenerative circuit of a type giving good harmonic output. The plate voltage is below 300 so that there is no danger of damaging crystals. The 60-ma. dial lamp in series with the crystal is mounted so that it extends through the panel and serves as an indication of crystal current. At the best the lamp will only light to full brilliancy, and usually a slight retuning of the oscillator plate circuit will reduce this considerably. SW_1 is mounted on top of the chassis and is marked "osc" and "har." For regular fundamental oscillator output the switch is thrown to the "osc" side, by-passing the cathode choke to ground, while on the "har" side the switch is open and a certain amount of regeneration is obtained in the cathode circuit, thus giving good harmonic output. The small trimmer condenser in this cathode circuit should be adjusted to a point where stable crystal operation is obtained on the second harmonic. This adjustment is rather broad and no difficulty will be experienced in making it. On 40 meters, as well as on 20 and 10, the usefulness of variable

The panel of the 100-watt transmitter presents a pleasing appearance through the balanced placement of controls.

* 521 S. Lockwood St., Chicago, Ill.

frequency crystals as a means of safely changing frequency when dodging QRM becomes immediately apparent.

A small adjustable coupling condenser is mounted on the chassis so that on harmonic operation more input can be used to the 807 buffer. This is especially useful for 10-meter operation. On all the other bands this condenser is set near minimum capacity. The buffer circuit is conventional with the exception of the 150-ma. flashlight bulb in series with the cathode. It is a very useful panel indication for tuning up the rig. The oscillator is adjusted to the point giving greatest current indication on this lamp, after which the buffer tank circuit is tuned to the point of lowest current. No meter or extra switching operation is needed.

The final amplifier is a single TZ40 running at

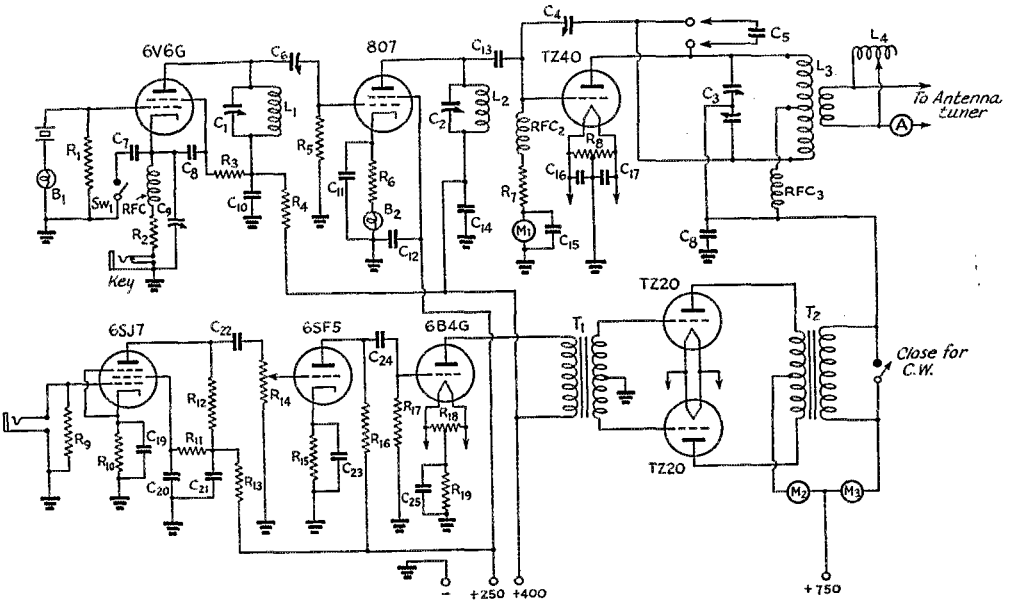


Fig. 1 — Circuit diagram of the 100-watt transmitter.

C_1 — 100-$\mu\mu$fd. midget variable (Cardwell ZU 100 AS).
C_2 — 100-$\mu\mu$fd. variable (Cardwell MR-105-BS).
C_3 — 100-$\mu\mu$fd. per section dual (Cardwell MT-100-GD).
C_4 — 6-$\mu\mu$fd. neutralizing condenser (Cardwell NA-6-NS).
C_5 — 50-$\mu\mu$fd. pad used on 1.8 and 3.5 Mc. (Cardwell JD-50-OS).
C_6 — 50-$\mu\mu$fd. variable coupling condenser (Cardwell-ZR-50-AS).
C_7 — 0.01-μfd. mica.
C_8, C_{11}, C_{12} — 0.005-μfd. mica.
C_9 — 50-$\mu\mu$fd. adjustable mica.
C_{10} — 0.005-μfd., 1000-volt mica.
C_{13} — 0.001-μfd., 1000-volt mica.
C_{14} — 0.02-μfd., 2000-volt mica.
C_{15}, C_{16}, C_{17} — 0.002-μfd. mica.
C_{18} — 0.001-μfd., 2000-volt mica.
C_{19}, C_{23} — 5-μfd., 25-volt electrolytic.
C_{20} — 0.05-μfd., 600-volt paper.
C_{21} — 4-μfd., 450-volt electrolytic.
C_{22}, C_{24} — 0.01-μfd., 600-volt paper.
C_{25} — 25-μfd., 50-volt electrolytic.
R_1 — 0.1-megohm, 1-watt.
R_2 — 300 ohms.
R_3 — 15,000 ohms.
R_4 — 5000 ohms.
R_5 — 50,000 ohms.
R_6 — 400 ohms.
R_7 — 2000 ohms.
R_8 — 30 ohms, center-tapped.
R_9 — 5 megohms, 1-watt.
R_{10} — 2500 ohms, 1-watt.
R_{11} — 2.5 megohms, 1-watt.
R_{12}, R_{16}, R_{17} — 0.5 megohm, 1-watt.
R_{13} — 50,000 ohms, 1-watt.
R_{14} — 0.5-megohm volume control.
R_{15} — 4500 ohms, 1-watt.
R_{18} — 50 ohms, center-tapped.
R_{19} — 750 ohms, 25-watt.
All resistors 10-watt unless otherwise mentioned.
RFC_1, RFC_2 — 2.5-mh. r.f. choke, 125 ma.
RFC_3 — 1-mh. r.f. choke, 600 ma. (National R154).
T_1 — Audio driver transformer (Thordarson T-19DO3).
T_2 — Class-B output transformer (Thordarson T-19M16).
M_1 — 0.50 milliammeter.
M_2, M_3 — 0–200 milliammeter.
A — 0–1.5-r.f. ammeter.
B_1 — 60-ma. dial lamp (orchid bead).
B_2 — 150-ma. dial lamp (brown bead).
L_1 — 1.8 Mc.: 55 turns No. 24 d.c.c., close-wound.
3.5 Mc.: 27 turns No. 20 d.c.c., spaced to occupy 1¾ inches.
7.0 Mc.: 16 turns No. 20 d.c.c., spaced to occupy 1½ inches.
L_2 — 1.8 Mc., 3.5 Mc. and 7 Mc., same as above.
14 Mc.: 7½ turns No. 18 enam., spaced to occupy 1½ inches.
28 Mc.: 3½ turns No. 16 enam., spaced to occupy 1¼ inches.
L_1 and L_2 are wound on 1½-inch diameter forms.
L_3 — B & W type BL 100-watt coils for all bands.
L_4 — Variable link control (Ohmite LC12).

The amateur who is looking for a medium-power 'phone and c.w. transmitter of compact design will be interested in this description of a transmitter that was built with operating convenience in mind.

approximately 100 watts input, or more if you feel so inclined. An 0–50 milliammeter is used for grid current indication and the excitation should be adjusted so as to give about 25 ma. on all bands. It is quite likely that this amount will be greatly exceeded when working straight through on the crystal frequency. However, this can be simply reduced by detuning the buffer condenser slightly. An 0–200 milliammeter serves as a plate current indicator for the TZ40.

Next, we come to the speech amplifier and modulators. A very simple speech amplifier is used as will be seen by reference to the diagram. However, it provides adequate driving power to the TZ20 modulators. The input transformer is mounted underneath the chassis, while the modulation transformer is located on top. The volume control is mounted on the chassis and once it is adjusted it needs no further setting. Some trouble was experienced with r.f. feedback, but this was very easily taken care of by shielding the 6SJ7 grid lead and grid resistor in a piece of flexible cable shielding of the woven-wire type. Some feedback can still be obtained if the gain is wide open but of course at this point overmodulation can also be obtained. Therefore we back off the gain and the feedback disappears. The 0–200 milliammeter for the modulator plate circuit is located on the lower part of the panel. The conventional crystal-type microphone is used and gives very satisfactory results with the layout as shown.

The problem of controlling the transfer of r.f. energy from the final stage to the antenna circuit was very simply taken care of by using one of the new link controls. This unit is basically a variable inductance and is connected in the final r.f. link circuit, thus affording a convenient panel-mounted control of the link line. It is mounted underneath the chassis and connected in parallel with the link line. The parallel connection has been very satisfactory in most cases, although the series method can be used.

Now we come to the secret of how to make a rig of this type compact. Looking at the photo showing the inside arrangement, you will notice that there is no chassis in the lower part of the cabinet. Instead the various transformers, chokes and condensers for the power supplies are fastened directly to the cabinet bottom. Using the components as listed, it is possible by laying the transformers and chokes on their sides to get everything in so that it does not project up into the chassis just above. This particular cabinet measures 12 by 11 by 19 inches and was intended

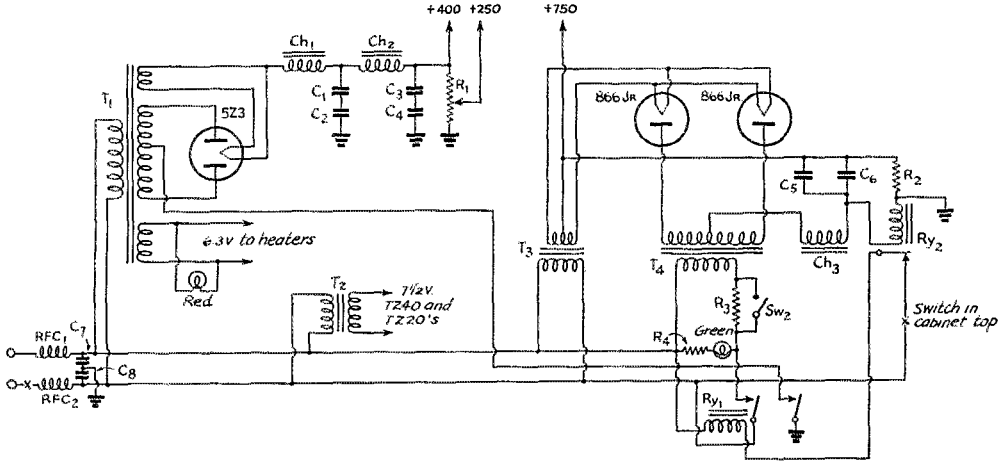
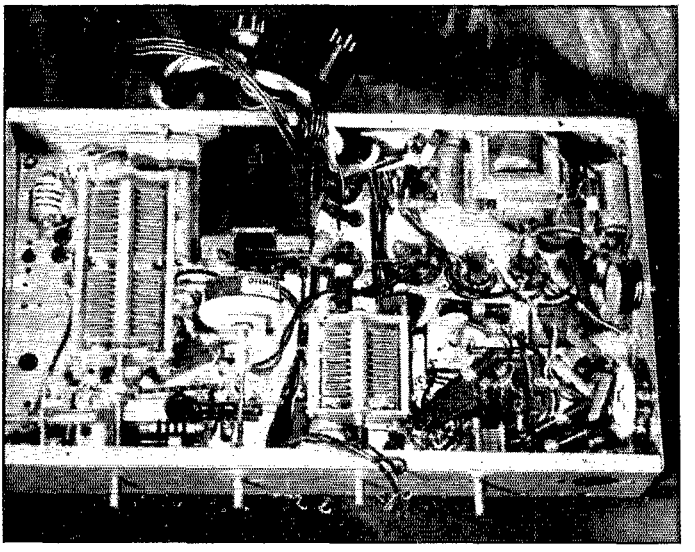


Fig. 2 — Wiring diagram of the power supply.

C_1, C_2, C_3, C_4 — 8-μfd., 450-volt electrolytic.
C_5, C_6 — 2-μfd., 1500-volt.
C_7, C_8 — 0.1-μfd., 400-volt paper.
R_1 — 40,000 ohms, 100-watt adjustable.
R_2 — 0.1-megohm, 100-watt.
R_3 — 250 ohms, 50-watt.
R_4 — 800 ohms, 25-watt.
RFC_1, RFC_2 — 14-μh., 10-ampere line chokes (Ohmite Z-21).
T_1 — 400–0–400, 200-ma. power transformer (Thordarson T-13R16).
T_2 — 7.5-volt, 8-ampere filament transformer.
T_3 — 2.5-volt, 10-ampere filament transformer.
R_4 — 900–0–900, 225-ma. plate transformer (Thordarson T-19P56).
Ch_1 — 5–20-henry, 200-ma. input choke (Thordarson T-19C35).
Ch_2, Ch_3 — 12-henry, 200-ma. smoothing choke (Thordarson T-19C42).
Ry_1 — D.p.s.t. relay (Guardian B-100).
Ry_2 — Adjustable overload relay (Guardian X-100).



A view underneath the chassis shows the location of the variable condensers and the variable link-shunt control. Note the neutralizing condenser mounted near the final tank condenser.

for a receiver, being provided with end louvres and an opening of 2 inches across the rear side at the bottom. This was used to advantage by mounting the 400-volt supply bleeder resistor so that the adjustable lug could be set from the rear. Also along this opening four tube sockets are mounted. Tube bases are utilized as connector plugs and make the necessary connection with the chassis above. The three rectifier tubes are mounted on the left rear corner of the chassis, thus putting all the tubes in the transmitter in position such that they are readily accessible through the hinged cabinet top.

Safety was one of the design factors and was quite easily obtained in this rig. You will notice a push button arrangement in the lower left of the panel. This was made from a station selector switch as used on small radios. When the white button is pushed a circuit is made that closes a 115-volt a.c. relay. This in turn closes the negative lead on the 400-volt supply and also the primary on the high voltage supply. Pushing the black button releases the switch and the a.c. relay opens. In order to prevent sudden and unexpected antics by the operator caused by bodily contact with the high voltage, a simple contact was so arranged as to open the 115-volt lead to the a.c. relay whenever the cabinet top was opened.

An additional protection to equipment was added in the form of an overload relay. This is in the high-voltage negative lead and is adjusted to throw out should the final r.f. stage become detuned and draw excessive plate current. A series resistor and shorting switch are connected in the high voltage transformer primary circuit to permit reducing the final input power while tuning up. This is a very handy thing, simple as it is.

In order to dress up the panel and add a bit of sparkle, two jeweled pilot lights were installed. The first one is green, being connected to the filament circuits thus indicating whether the main switch is on or not. The red pilot is hooked into the high voltage primary circuit and gives a positive warning that "You're on the air."

Quite a bit of heat is given off by having so many tubes grouped close together, so much so that after ten minutes of operation it was decidedly uncomfortable to lay a hand on top of the cabinet. To overcome this we shopped around at a few of the bigger drug stores and finally located a small 115-volt a.c. fan with blades about 5 inches across. This was stripped of its nice colorful case and mounted in one end of the cabinet so as to blow a stream of air across the tubes. For a refinement, a rheostat for the fan was mounted in the back of the cabinet, since full speed is not really necessary in this application.

Results of the last two or three months operation on the air make us feel very well satisfied with this little rig. While having a preference for 20-meter 'phone, very good performance was secured on all the other bands, not including the broadcast band. This lack of b.c.l. trouble may be partly accounted for by the inherent overall shielding offered by the metal cabinet, and also to the r.f. line choke designed to effectively reduce r.f. feedback over the power lines.

Silent Keys

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

Louis S. Adams, W1INO, Lynn, Mass.
Albert L. Alland, W5AIF, Decatur, Texas
Roy C. Coombes, G5QI, Devon, England
Forrest Ellsworth Brown, W5SZ, Oklahoma City, Okla.
Perry J. Eubanks, ex-W8EX, ex-W8VK, Cleveland, Ohio
Walter H. Hauswirth, W7HMU, Albany, Oregon
A. Turner, G2XO, London, England

★ WHAT THE LEAGUE IS DOING ★

NEW MEMBERSHIP RULES

LEAGUE membership is now divided into two classes. Only licensed U. S. amateurs, holding either station or operator license, are eligible for full voting membership;[1] any interested person may become an associate member.

There has been no great practical need for this classifying, since there has never been any doubt about the control of our affairs by licensed amateurs. For the past seven years, only members who were licensed at the time [1] could vote in our elections. But this practice was not so soul-satisfying as it might have been, since the League otherwise accepted interested unlicensed persons in the same status as amateurs and sent them ballots, even though the ballots weren't counted if they were returned. The system didn't quite meet the needs of idealism. In the constant endeavor to perfect our structure, a practicable formula was finally worked out for confining the rights to hold office and to vote to those who are licensed amateurs — thereby setting up "professional" entrance requirements akin to those observed in the engineering societies. This practical solution is to accept a licensed amateur as a Full Member for a period of one year, realizing that he will not suddenly lose his savvy or amateur viewpoint if he becomes unlicensed during that year; and then to require that the continued possession of a license be demonstrated at each renewal.

The new types of membership certificates are now in use and the classifying procedure is being applied to all renewing members as well as to new applicants. Our expiration notices and application forms have been amended appropriately. Present members are governed by the old by-laws until their paid-up period expires, so it will take a year before the whole membership has been submitted to the new rules. That means that balloting this autumn will be in the old manner, but thereafter ballots will be sent only to the Full Members. Members paid for more than one year in advance will be solicited annually to determine for what class they are eligible.

The criterion here is an amateur license. If you have a license it is very important for you, when joining the League or renewing, to indicate that fact so that you can be given full membership. Show your call if you have one. But many amateurs have an operator license only, no station. These are equally eligible for full membership: state the class of amateur license you hold. We recommend that you send your application direct to headquarters (or through an affiliated club secretary) and not through a newsstand or subscription agency, since we can grant only associate membership if we have no evidence of your licensed status, and you won't have the right to vote.

The League continues to extend a hearty invitation to persons not yet licensed, but interested in amateur radio, to become Associate Members. They will continue to receive membership certificates. They have all the rights and privileges of League membership except the right to vote and nominate and the right to hold the offices of director, alternate director and SCM.

In fact, all the members of the League outside the United States and Canada are Associate Members, even in the case of the thousands of licensed foreign amateurs who have long been members, since they have never had a vote in our affairs. There is thus no change whatever in their status and we shall continue to welcome them and to grant them certificates.

Both classes of members will receive *QST* and the dues are the same for both grades. Associate Members who attain an amateur license will be transferred to full membership upon application, without transfer fee or change in dues. All eligible Associates are invited to apply for transfer, so that they may have the franchise and the right to stand as candidates.

Old members will not get a new type certificate until the expiration of their present period of membership. But if you have a station call and it's not shown on your certificate or *QST* wrapper, please drop us a post card to that effect so that we may perfect our records.

This classification procedure will not become effective in Canada until three months after the resumption of licensing in that country. Meanwhile there will be only one class of membership in Canada; members there will continue to receive the old type of certificate and will be gov-

[1] Except for the very few unlicensed persons who have maintained continuous unlapsed membership since before May 15, 1934, when the by-laws were changed. This is a legal requirement.

When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

erned by the old by-laws, which state that they may vote only if they are licensed at the time. And meanwhile, of course, Canadian elections have been suspended "for the duration." But just as soon as it is feasible, the Canadian membership will have the benefits of this same classifying procedure.

Cuban amateurs, having their own society and not living in the administrative territory of the League, of course are eligible only for associate membership. But the new by-laws provide that Cuban Associate Members who are licensed amateurs may nominate for, be a candidate for and vote for the office of West Indies SCM, the same as in the past. Precisely the same arrangement will be extended to the amateurs of Newfoundland and Labrador (attached for operating purposes to the Maritime Division) as soon as the new arrangement takes effect in Canada.

NEW A.R.R.L. TREASURER

WHEN the League's Board of Directors selected a successor to its late treasurer, A. A. Hebert, it chose a man with a thoroughgoing background of service to ARRL. Next to Secretary Warner, David H. Houghton has the longest record of service on the League's Headquarters staff, having joined up as Circulation Manager back in April, 1922, when three or four small

David H. Houghton

rooms on the second floor of a downtown Hartford office building constituted the Hq establishment and the League was an infant organization struggling to pay off its post-war reorganization bonds and make its name in the world. The organization has grown considerably since that time, and Dave Houghton grew with it.

The man in charge of the ARRL Circulation Department with its involved records must be thorough, exact and conscientious. Dave is all of these and more. In addition to the control of *QST*'s world-wide circulation, the distribution of all other ARRL publications is in his hands. This is a job that entails the handling of over 50,000 letters and orders yearly, the maintenance of a retail distribution system involving some 850 dealers, the distribution of over 800,000 copies of publications annually. Houghton participated in the decision to bring out a tentative first printing of five thousand copies of *The Radio Amateur's Handbook* in 1926 and has seen it become the ham's standard manual, selling nearly a million copies of it in the doing. He negotiated the publication of a Spanish edition of the Handbook in 1937, making a three-months' trip to Buenos Aires to do it. His seasoned judgment has been evident in shaping the other publication policies of the League, as well.

Although probably every member of the League has seen his bold, flowing signature on correspondence at some time or other, Dave himself has consistently shunned the limelight. Always actively interested in amateur radio, he has still never quite got around to getting his own call. Every fall when the golfing season ends he vows to bone up and make the trip up to Boston to take the exam and get his ticket. And then, every fall, the busy season comes along and he has to burn the midnight oil over records and correspondence instead of a transmitter, and so the ticket goes by the board for another year. *This* year, though, Dave vows to bone up and make the trip up to Boston to take the exam and. . . .

A native of Washington, D. C., Houghton followed a short pre-war stint for the AP by enlisting in the 22nd Infantry in the Regular Army in 1918. The war ended just as he finished an officer's training course at Camp Hancock. Thereafter, he worked successively for the Pennsylvania Railroad and the General Electric Co. It was from the latter's Lynn (Mass.) plant, where he was employed in the accounting department, that he came to ARRL.

HARMONICS OF 7200-7300

THE 40-meter band has a greater effective width than 20 — the portion from 7200 to 7300 kc. does not double into 20. The result is that the second harmonics of these frequencies do not fall in amateur territory and are giving quite a lot of trouble to the other services operating between 14,400 and 14,600. If you operate between 7200 and 7300, you would be well advised to search for even harmonics and do the necessary if you find one, particularly a second harmonic. Although every amateur has the responsibility of avoiding harmonics, we're tipping you off that it is particularly important for you right now.

FINANCIAL STATEMENT

THE first quarter of the year is generally the best one in the League's business affairs and this year resulted in an operating gain of over $10,000 before disbursements against Board appropriations. For the information of members, the operating statement is here published, by order of the Board:

STATEMENT OF REVENUE AND EXPENSES EXCLUSIVE OF EXPENDITURES CHARGED TO APPROPRIATIONS, FOR THE THREE MONTHS ENDED MARCH 31, 1941

REVENUES

Membership dues	$17,464.48	
Advertising sales, *QST*	20,153.12	
Advertising sales, Handbook	3,291.75	
Newsdealer sales, *QST*	9,985.48	
Handbook sales	14,889.46	
Spanish edition Handbook revenues	27.87	
Booklet sales	5,382.29	
Calculator sales	550.52	
Membership supplies sales	2,701.60	
Interest earned	572.58	
Cash discounts received	469.58	
Bad debts recovered	27.25	$75,515.98
Deduct:		
Returns and allowances	$ 3,820.90	
Cash discounts allowed	536.54	
Exchange and collection charges	47.46	
	$ 4,404.90	
Less: decrease in reserve for newsdealer returns of *QST*	435.76	3,969.14
Net Revenues		$71,546.84

EXPENSES

Publication expenses, *QST*	$14,317.36	
Publication expenses, Handbook	9,316.28	
Publication expenses, booklets	2,071.78	
Publication expenses, calculators	361.42	
Salaries	23,167.96	
Membership supplies expenses	1,826.20	
Postage	1,509.41	
Office supplies and printing	1,701.48	
Travel expenses, business	487.20	
Travel expenses, contact	171.33	
QST forwarding expenses	1,141.26	
Telephone and telegraph	534.84	
General expenses	1,023.95	
Insurance	93.39	
Rent, light and heat	1,168.45	
General counsel expenses	250.00	
Communications Department field expenses	209.81	
Headquarters Station expenses	303.53	
President's defense expenses	477.79	
Provision for depreciation of:		
Furniture and equipment	258.98	
Headquarters Station	477.76	
Total Expenses		60,870.18
Net Gain before expenditures against appropriations		$10,676.66

EXECUTIVE COMMITTEE MEETINGS

FOLLOWING is an abstract of the actions of the Executive Committee of the League during the past year between Board meetings, as ratified by the Board at its recent meeting, here published for your information by order of the Board.

Meeting No. 162, Aug. 27, 1940. Examined nominations for director in special election in Southwestern Division, ordered eligible names listed on ballots. Approved 2 conventions, affiliated 5 clubs. Approved Navy Department proposal to operate NAA in communication with amateurs, provided the station did not work in an amateur band.

Meeting No. 163, Oct. 1, 1940. Canvassed the balloting in special Southwestern Division election, found W6BKY elected. Approved a convention, affiliated one club.

Meeting No. 164, Nov. 1, 1 40. Examined nominations in regular autumn elections, determined eligibility of candidates, ordered eligible names listed on ballots. Affiliated one club.

Meeting No. 165, Dec. 3, 1940. Advised the President on naming a representative, an alternate and 6 regional advisers to represent the League in the work of the Defense Communications Board; directed the Secretary to advise these persons and the DCB of their appointment. Affiliated 4 clubs.

Meeting No. 166, Dec. 20, 1940. Canvassed balloting in regular autumn elections, determined and certified the winners. Affiliated one club. Decided not to ask the War Department to recognize code proficiency certificates as warranting immediate assignment of draft men to signal work. Decided that club responses to an offer of a resident scholarship in a radio institute were insufficient to assure success of a suggested competition. Examined initial responses of directors to proposal to reduce code requirements for license; examined investments of League.

Meeting No. 167, Jan. 27, 1941. Examined nominations for alternate director, Northwestern Division, declared W7CPY elected without balloting, as only eligible candidate. Studied director responses on projected new type of license, drafted and approved specifications therefor, submitted them to Board for expression. Affiliated 3 clubs. Authorized the President to correspond further with K6NYD. Reported favorably to the Board a proposal for a new League publication.

Meeting No. 168, Mar. 18, 1941. Approved 2 conventions, affiliated 3 clubs. Proposed to the Board the postponement of Canadian elections. Examined relations between Emergency Corps and State Guards, directed the Communications Manager to write the governors of the 48 states offering coöperation, through the ARRL Emergency Corps, in providing communication on behalf of State Guards in time of emergency. Recommended that Board, at its annual meeting, examine sub-allocations in the 10-meter band.

Strays

Suction cups used for holding windshield defrosters are fine for mounting metal call letters on the windshield or rear window of the car.

— *W1KRB.*

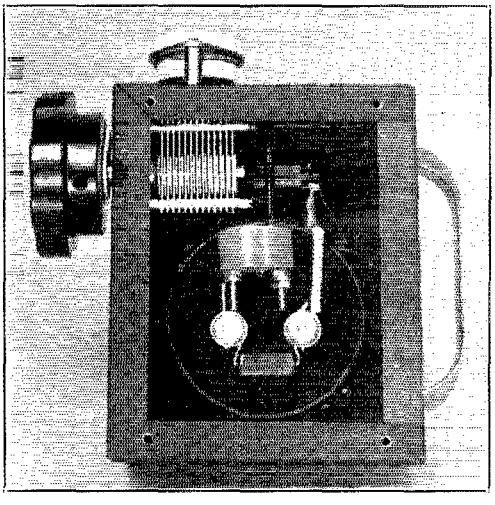
• *For the Junior Constructor —*

A Sensitive Absorption Wavemeter

An Easy-to-Build and Handy Device for R.F. Checking

THE title on this ought to be "A Hint from the Good Old Days," but we once had a title like that in *QST* so it's ruled out. Nevertheless it would be accurate, because the gadget herein described is in principle of ancient vintage. To-day's parts can't disguise the bare bones of the circuit diagram, which Dr. Woodruff, if he reads this, will recall having fathered along in 1927 or '28.

The absorption wavemeter, after an eclipse when the heterodyne meter came along, started to stage a comeback a few years ago. It came to be realized that for certain purposes the absorption meter was ideal because it would respond to only the actual frequency present, whereas anything involving a vacuum-tube oscillator would give innumerable responses because of harmonic beats. Thus the meter would give a positive answer to the question, "Is my doubler actually doubling or am I on the third harmonic?," even though with ordinary usage it could not be depended upon to distinguish between 7000 and 7010 kc. accurately. On the other hand, the heterodyne meter could say very confidently that the frequency was 7010 and not 7000, but couldn't guarantee that it mightn't be 3505, or 14,020, or 21,030 — or possibly 10,515 or any number of other harmonics of the crystal that happened to be in use. (We won't mention the other beat possibilities — the picture gets so complicated that you throw up your hands and admit you have to know the approximate frequency before the heterodyne meter begins to be useful.)



An inside view. The tuning condenser and coil socket are mounted on the frame of the box; remaining parts are fastened to one of the removable sides.

The instrument described here is an absorption meter with a sensitive indicator. The latter feature greatly extends the usefulness of the meter as compared with the ordinary type which has no indicator at all, or which uses a flashlight lamp or neon bulb for the purpose. It is unnecessary to depend on the plate-current flicker of an oscillator or amplifier to show resonance — a method which often doesn't work when hunting for the frequency of a parasitic oscillation. Because of its rather high sensitivity the meter can be used for checking

(1) the fundamental frequency of an oscillating circuit,
(2) presence and order of amplitude of harmonics,
(3) frequency of parasitic oscillations,
(4) neutralization of an amplifier,
(5) field strength on a qualitative basis,
(6) presence of r.f. in undesired places, such as power wiring,

or any other application where detection of a small amount of r.f. and measurement of its frequency provides useful information.

Circuit and Construction

The circuit diagram, Fig. 1, shows that the device is simply a resonant circuit, L_1C_1, to which is coupled an indicating circuit consisting of a pickup coil, L_2, crystal detector, D, milliammeter, M, and by-pass condenser, C_2. For high sensitivity a low-range milliammeter is necessary, but ranges up to at least 10 ma. full scale are usable. The instrument shown is a 0–1 ma. unit with a shunt, R_1, which can be switched across it for extending the range to 10 ma.

To avoid the necessity for hunting mislaid calibration charts each coil is provided with a calibration scale, an idea borrowed from the G.R. Type 574 Wavemeter, although necessarily carried out in a much cruder fashion. Since the scale is fastened to the coil it is automatically inserted in place when the coil is plugged in the

socket. No attempt was made to provide for high accuracy in frequency-measurement; for the purpose for which the gadget is intended a calibration good enough merely to separate harmonics is satisfactory. In practice it's easy to do much better than that, but it is certainly no substitute for a frequency standard!

A 3- by 4- by 5-inch box serves as the "chassis" for the instrument. The milliammeter and the switch for its shunt are mounted on one side panel, the coil socket on top, and the tuning knob on the right-hand edge, as shown in the photographs. A drawer pull on the left-hand edge allows the unit to be held in the left hand while tuning with the right, the meter being easily read while the coil is pointed at the circuit under test.

An inside view is given in one of the photographs. The tuning condenser is mounted on the side wall directly below the socket. The crystal detector is supported by the No. 14 wiring; the particular crystal used here is a Philmore, and the mounting greatly resembles a miniature transmitting crystal holder. Other makes may come in different sizes and shapes, but they would hardly be big enough to necessitate any change in the layout. The by-pass condenser, C_2, is mounted by its wire leads directly across the meter terminals.

The meter shunt is a simple affair. The grounded meter lead is covered with a piece of spaghetti tubing, around which enough resistance wire is wound to give a 10-times shunt when the switch is closed. Approximately 7 inches of No. 31 Advance wire (around 3 ohms) gave us the shunt we wanted, but in any case it will be necessary to adjust the resistance carefully if an exact multiple of the scale is to be obtained. However, an accurate shunt is not at all necessary for the kind of work this gadget is intended to perform.

The calibration scales on the coils are small pieces of thin metal cut and bent to the shape shown in the photograph. The bent end is fastened to the coil form by a machine screw which fits into a threaded hole drilled near the edge. A No. 4 screw is about right in size, and the head should be filed as flat as possible to permit the coil form to be inserted into the socket properly. The part of the metal piece which holds the scale is 3 inches wide and 1¾ inches high. The scale itself is paper, glued to the metal, paper being used because it takes pencil or ink markings readily.

Coil specifications are given under the diagram. It is not necessary to follow these exactly; as a matter of fact the same range can be covered with a smaller number of coils by taking advantage of the 3-to-1 tuning range of the condenser. However, we preferred to fix things so that one amateur band was near the high-capacity end of the condenser scale on each coil. With this arrangement each coil covers two adjacent bands, which is a convenience in checking harmonics.

The wavemeter and one of the extra coils, showing how the scale is attached to the coil form.

Since the polarity of the crystal is not marked, the proper connections must be determined by trial. If the meter reads backwards, reverse the crystal leads.

The coupling winding, L_2, may profitably be the subject of experiment if maximum sensitivity is desired. Since the impedance of crystals varies considerably, the number of turns specified will not necessarily give maximum meter current. It is a simple matter to try different numbers of turns, keeping the coupling between meter and r.f. source fixed, to determine which gives the largest reading. Aside from this there should be no tinkering to do.

Calibration

Calibration is fairly easy if a continuous-range receiver is available. With an ordinary regenerative receiver, simply tune in a signal of known frequency, couple the meter to the coil in the oscillating detector circuit, and jot the frequency on the scale at the spot where the pointer lies when C_1 is tuned to resonance. There should be a good indication on the meter even with such a low-power oscillator.

The same method may be used with a superhet, but it is necessary to remember that the oscillator frequency differs from the signal frequency by the intermediate frequency. For instance, if the signal is known to be on 6500 kc. and the receiver i.f. is 456, the oscillator frequency will be 6956 kc., which is the frequency which should be marked on the meter calibration scale. It is necessary to know whether the oscillator is on the high or low side of the incoming signal; in most receivers the high side is used throughout, but some receivers shift to the low side for the high-frequency part of the range.

COIL DATA

Approx. Freq. Range	*No. of Turns, L_1*	*Wire Size*	*Winding Length*	*Approx. No. of Turns, L_2**
1.5– 4.5 Mc.	60	24 enam.	Close-wound	10
3.0– 9.0 Mc.	24	24 enam.	1 inch	5
6.0–18.0 Mc.	12	18 enam.	1 "	3
12.0–36.0 Mc.	6	18 enam.	1 "	2
24.0–72.0 Mc.	2	18 enam.	1 "	1

* No. 28 enameled, close-wound next to ground end of L_1.

Coupling to the oscillator may represent a slight problem in manufactured superhets, since the coils usually are not accessible. However, the tuning condensers generally are out in the open, so it is possible to use a small amount of capacity coupling to the hot side of the oscillator condenser and achieve the same end. A few turns of insulated wire wrapped around the top end of the wavemeter coil, with one end of the wire extended so that it is near the stator plates of the oscillator condenser, should do the trick. It is not necessary — in fact, is undesirable — to use more coupling than will give a small indication on the most sensitive scale.

For most ham work it will suffice to mark the limits of the various bands, since these are the frequencies in which we are most interested. However, it will be useful to plot enough intermediate points so that in-between frequencies can be known at least approximately. The calibration on a communications receiver will be good enough for all practical purposes.

Some Applications

The meter will give good indications from a distance of a couple of feet from a low-power transmitter, so some care must be taken in using it. *Don't jam the coil practically inside the transmitter tank;* at best, this will burn out the crystal, and at worst you may lose the milliammeter. Switch in the shunt for preliminary exploration, and open it up only when the reading is well down on the meter scale. It is always sensible to use the loosest coupling between meter and transmitter which will give a satisfactory reading.

Most of the uses of the instrument are self-evident. Given an operating tank circuit to which the meter can be coupled, tuning through the range will show the frequencies present. The one which gives the largest deflection is of course the "fundamental"; and some idea of the relative amplitudes of harmonics can be obtained by observing the meter readings at the harmonics, maintaining fixed coupling between tank circuit and meter. Unfortunately the crystal is not linear, so that double the reading does not mean that the field is twice as strong. Thus no accurate quantitative picture can be obtained, and for the same reason the device is not satisfactory as a visual modulation indicator. Qualitatively, however, it is very useful.

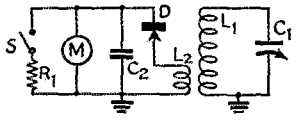


Fig. 1 — Circuit diagram of the indicating wavemeter.
Grounds indicate connections to the metal box.
C_1 — 140-$\mu\mu$fd. variable (Hammarlund HFA-140-A).
C_2 — 0.001-μfd. mica.
D — Fixed crystal detector.
M — 0-1 d.c. milliammeter (Triplett Model 321).
R_1 — 10X shunt; see text.
S — S.p.s.t. toggle.

Neutralization Indicator

As a neutralization indicator it is very convenient, although its sensitivity may cause some head-scratching about an amplifier which seems to neutralize well enough by ordinary indicators! One advantage of the device in this connection is that it may be placed wherever necessary to get a good view of it, and the actual coupling made by means of a link line — one link around the wavemeter coil and the other on the tank coil of the amplifier being neutralized. The link coupling should be loose at the start, and tightened up for fine adjustment as the neutralizing point is approached.

By providing the meter with a small pickup antenna, field strength indications can be obtained in the vicinity of the transmitting antenna. It is also possible to explore the antenna field for harmonic radiation in the same way, and, by leaving the meter in a fixed position, observe the effect of transmitter adjustments or changes on harmonic output. And, as already mentioned, the same type of exploration can be carried out for r.f. in power lines, guy wires, and other conductors where it shouldn't be. Altogether, there are plenty of uses to which such an instrument can be put around the ham station, and it will quickly justify its rather small cost.

Since a 1-mil meter is useful for lots of measurement work, it might be a good idea to put in an additional switch to cut it out of the circuit and bring out leads to a pair of binding posts so the meter can be used independently.

— *G. G.*

Mexican Amateurs in Colima Earthquake

Heroic Service Performed in Latest Emergency

BY ING. MANUEL MEDINA*, XE1N

We are privileged to present a condensed translation from the Spanish of XE1N's graphic account of amateur emergency work during the tragic Colima earthquake, prepared for the LMRE's official organ, *Onda Corta*. It was a typically magnificent amateur performance, and we join in congratulating our XE friends on their splendid humanitarian work.

THE picturesque city of Colima was shaken on April 15th by the most intense earth tremor recorded in its history. Suffice it to say that this seismic disturbance registered 9° on the Mercalli scale and that 12° is the maximum that this scale will record. In plain language it may be translated into "*some* earthquake!" It is mere luck that Colima was not simply wiped off the map. Even so, 72 per cent of all its houses suffered destruction, 20 per cent were seriously damaged and a mere 8 per cent of all habitations remain in a livable condition. All public service plants ceased functioning as a result of damage to machinery, buildings, wiring system, etc.

We who were not in Colima during the anxious minutes from 1:15 to 1:21 P.M. on April 15th can hardly form an idea of the death-dealing happenings in that unlucky city. Those who were home at that time were forced to flee, and many must have been buried under the débris of their homes. In offices, schools and barracks, human masses had to clasp at each other and form a common chain, to hold their equilibrium. The air could hardly be inhaled, due to the dust that formed by walls that came tumbling down to earth. Human ears were touched by cries of death agony, mixed with other noises caused by crashing buildings, the shrieks of pain of the wounded and the hysterical shouting of the panic-struck population.

Immediately following the earthquake the Signal Corps of the 20th Military Zone, under command of Lieut. Salvador Esqueda, proceeded to remove the débris under which the radio communication apparatus was buried. One hour later, at exactly 2:15 P.M., a portable station was installed in the kiosque of the Independencia Park, and the first messages of an official nature apprising the world of the disaster were sent out. Meanwhile, Lieut. Esqueda proceeded to install another portable set in the building of the Western Hydroelectric plant. This station established contact with Mexico City and Guadalajara and did not cease operating even after the second shock was felt, causing roof tiles and bricks to fall on the operating table. Those army men who operated the first plant are worthy of the national army and amply honored the school from which they graduated. The able director of the school is entitled to our expression of admiration for the sense of duty he has instilled in the amateurs of this republic.

In the city of Colima our distinguished amateur colleagues are Roberto Levy, XE1IO and Wenceslao R. Olea, XE1IJ. The stations of colleagues Levy and Olea were both put out of commission by the disaster. Nevertheless, like the good and loyal soldiers they are and cognizant of the duty they had to perform, they set to work immediately. Levy, XE1IO, started to repair the large station belonging to the 20th Military Zone, a 50-watt crystal-controlled transmitter which was seriously damaged when the roof tumbled in. At four o'clock the water in the generating plant was exhausted and communication was suspended. Once more Colima was isolated. Mr. Levy then offered his home and a small 300-watt generator which he proceeded to install. He obtained immediate success, and continued to work without interruption until 4:30 of the following day. At 5:30 he again went to work and did not stop until 5:30 of the next day, namely, the 17th, during which time communication was interrupted only occasionally, for the purpose of feeding gasoline to the motor.

Meanwhile, all amateur stations in the country were trying to establish contact with Colima, offering their services in whatever manner possible. Special mention should be made of station XE1LK of Guadalajara, operated during the first moments by Mrs. Aurora E. de Franco and later, by her husband, Idelfonso Franco, and herself. Colima was bombarded by calls from every direction, to the extent that at certain periods the band was completely congested. Broadcasting stations in Mexico City were also calling and for a time utter confusion reigned. It is obviously due to this ensuing confusion that amateurs were ordered officially to shut down their transmitters

* President, LMRE, Apartado Postal 907, Mexico, D. F., Mexico.

working on 7 Mc. during a part of the day of April 17th.

On the afternoon of the 16th there arrived at Colima by airplane Messrs. Zeferino Noriega, XE1DZ, and Engineer Villafana, sent by Jose Farell, XE1Q, President of the Western Hydroelectric Co., S. A., and a renowned amateur operator. They brought along with them an 800-watt electric plant and a portable, as well as an Echophone receiver. After they had communicated with colleague Levy they proceeded in erecting a single-wire antenna, and the next day at 10:15 they succeeded in making the first contact with XE1LK, Guadalajara. This station worked with the call XE1NZ, authorized personally by the Director General of Postal and Telegraphic Communications, General Fernando Ramirez, who, following his usual active and efficient tendencies, went to Colima by airplane to do whatever was deemed necessary to reëstablish official communication.

From the time station XE1NZ started to operate, every call was answered by amateurs throughout the country who immediately offered their services. Among these stations we will designate the following by honorable mention: XE1Q, Mexico City; XE1LK, Guadalajara, Jal.; XE1ND, Morelia; XE1FR, Uruapan; XE1FT, Morelia; XE1NJ; XE1HB, Mexico City; XE1O, Guanajuato; XE1NH, Guanajuato; and XE1NS.

As already stated above, all stations in Mexico were ready to lend a hand, and as a matter of fact, they remained alert to enter at the opportune moment. The above-mentioned stations made direct and permanent contact with XE1NZ, and performed their job religiously and thoroughly, according to the urgency of the situation, delivering telegrams, etc.

In addition to the foregoing list we feel duty bound to honor also the military personnel who attended to the radio-communication service in Colima through the Army station XBZ20.

At 6 P.M. on the 20th, telegraphic communication with Colima was reëstablished and XE1NZ was dismantled, inasmuch as it had amply done its duty. This act was attended by a stirring ceremony, comprising a funeral oration made by colleague Franco, XE1IN, from Guadalajara, deeply stirring the amateurs who had assisted at the interment.

The LMRE will add this page replete with honor to the already sizable documentation compiled by Mexican amateurs and will give a special diploma to all who made contact with XE1NZ in their labor for humanity.

The Western Hydroelectric Company, S. A., has already sent similar diplomas to the amateurs who coöperated in the emergency service, and finally, the LMRE has received an honorable official communication from General Othon Leon Lobato, Director of Transmission Service of the Army, reading as follows:

To the President of the
Liga Mexicana de Radio Experimentadores, City.

I am pleased to enclose herewith a copy of the message I am sending to colleague Roberto Levy (XE1IO) on the occasion of the efficient work he performed and the unselfish assistance and coöperation he showed the Communication Officials who were in charge of installing Army Radio equipment in Colima, as a result of the emergency produced by earthquakes in that part of the country.

Once more, I take this opportunity to assure you my appreciation for the scientific and efficient job performed by radio amateurs and experimenters.

(sig) OTHON LEON LOBATO,
Brigadier General of the Mexican Army

The LMRE is profoundly stirred by the fact that, for the first time, official recognition is made of the useful and humanitarian service rendered by this unit, and wishes to add that all the amateurs who collaborated in the work may well feel proud of their accomplishment.

Got Your Proficiency Award?

CODE PRACTICE is sent nightly except Friday from W1AW, starting 9:45 P.M. EST (8:45 P.M. CST, 7:45 P.M. MST, 6:45 P.M. PST) using 1762, 3825, 7150, 14,253, 28,510 and 58,970 kcs. (simultaneous transmission). Approximately 10 minutes' practice is sent at progressive speeds of 15–20–25–30–35 words per minute. Besides this special practice material ARRL official messages "to all radio amateurs" are sent by tape at 8:30 P.M. and midnight EST at one of the three lower speeds, giving opportunity for additional practice. Opportunity for getting the League's Code Proficiency Certificate Award or to try out for a silver endorsement sticker (for demonstrating increases from the original word speed certified) will be given in two July qualifying runs, as follows:

July 1st (Sun.), 1:30 P.M. EST. (Text at 1:45 P.M. EST.)
July 20th (Sun.), 9:45 P.M. EST. (Text at 10 P.M. EST.)

ARRL aims to extend code proficiency certificate recognition at *some* speed above government license requirements to every FCC amateur licensee. Copy the test text at the best speed you can. Underline the *full minute* of perfect copy necessary to qualify at any speed. Tell us if you copied by ear without help except for your pencil or mill (mention which used), and if you are working for first certificate or endorsement. Send in copy and statement. We will check your paper with the official tape, then advising you of success or failure, sending any appropriate award or advices within about thirty days from the date of any *qualifying* run. — *F. E. H.*

Predictions of Useful Distances for Amateur Radio Communication in July, August, and September, 1941

National Bureau of Standards, Washington, D. C.*

THESE predictions are for maximum and minimum useful distance ranges in the five amateur frequency bands regularly useful for long-distance sky-wave transmission during July, August, and September, 1941. They are based on ionosphere observations and field-intensity measurements made at Washington. For a discussion of sky-wave transmission see Letter Circular 614 of the National Bureau of Standards, "Radio transmission and the ionosphere," and Letter Circular 615, "Distance ranges of radio waves."

* Report prepared by N. Smith and C. O. Marsh.

The use of the charts in the present article was explained in the article in the September, 1940, issue of *QST*, page 26, entitled "Predictions of useful distances for amateur communication." The skip distances are represented by dotted shaded areas. The average skip distances during each month are shown by the most densely dotted area, and the shaded areas show the probable limits of variation. For example, at 18 o'clock on a day in August the average skip distance for 14 Mc. will be 1100 miles. The skip distance will almost always be greater than 800 miles

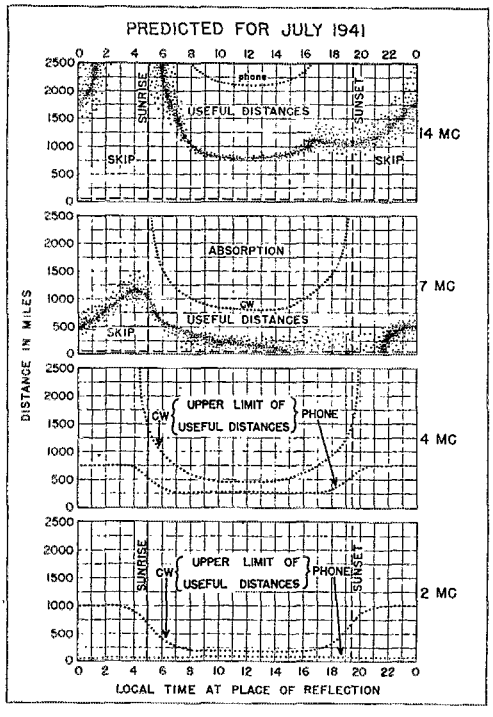


Fig. 1 — Useful distances for radio wave propagation via the regular layers of the ionosphere, predicted for July 1941. The 28-Mc. and 56-Mc. bands will be useful only for local transmission (optical and quasi-optical paths) except on frequent irregular occasions when "sporadic-*E*" transmission may occur at these frequencies over distances of 400 miles or more. At these times the skip distance on 14 Mc. will be unusually short.

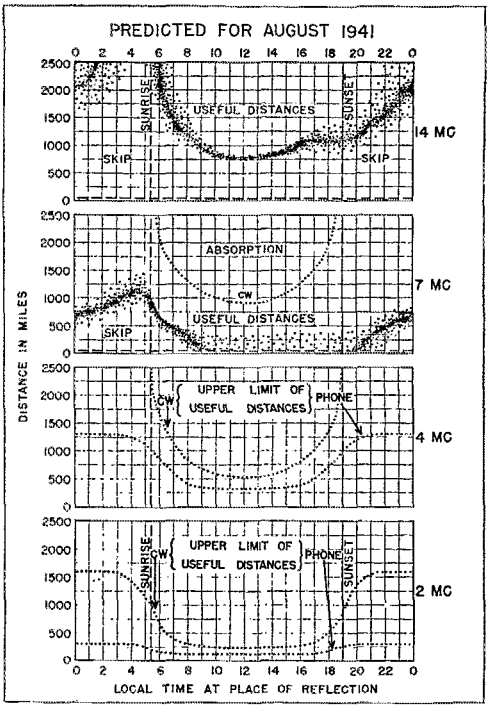


Fig. 2 — Useful distances for radio wave propagation via the regular layers of the ionosphere, predicted for August 1941. The 28-Mc. and 56-Mc. bands will be useful only for local transmission (optical and quasi-optical paths) except on frequent irregular occasions when "sporadic-*E*" transmission may occur at these frequencies over distances of 400 miles or more. At these times the skip distance on 14 Mc. will be unusually short.

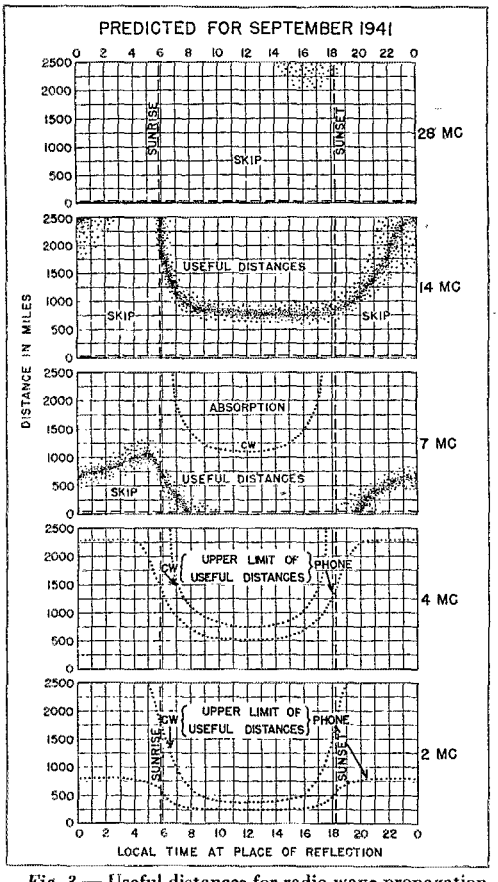


Fig. 3 — Useful distances for radio wave propagation via the regular layers of the ionosphere, predicted for September 1941. The 28-Mc. and 56-Mc. bands will be useful only for local transmission (optical and quasi-optical paths) except on a few irregular occasions when "sporadic-*E*" transmission may occur at these frequencies over distances of 400 miles or more. At these times the skip distance on 14 Mc. will be unusually short.

and almost never be greater than 1300 miles.

The dotted curves marking the maximum distance range as limited by wave-absorption in the ionosphere are labeled "phone" or "CW." This is because a greater field intensity is needed for good phone reception than for good CW reception. These curves are based on 100 watts radiated power, both for phone and CW. Higher-powered transmitters can transmit to distances greater than shown by the dotted curves; lower-powered transmitters to distances not as great. For example, to produce a good CW signal at the distance shown by the "phone" curves would require a power of only 2 watts; to produce a good phone signal at the distance shown by the "CW" curves would require a power of 8 kw.

During July and August the 28-Mc. band will not be regularly and dependably useful for transmissions of more than 100 miles or so. This is the limit of ground-wave transmission. Propagation conditions during July and August will be characterized by long skip distances, great sky-wave absorption during the day, and great static intensity, both day and night. During these months there will be periods, especially in the morning, late afternoon and evening, when 28 Mc. and at times even 56 Mc. may be transmitted over distances of 400 miles or more. This effect is known as "sporadic-*E* transmission" and rarely occurs for distances shorter than 400 miles on 28 Mc. or 600 miles on 56 Mc. At these times the skip distance on 14 Mc. may become zero. Sporadic-*E* transmission is irregular and unpredictable in detail, but is usually most prevalent during May, June, July, and August at the latitude of Washington.

In September the skip distance will decrease as winter conditions approach. There will also be markedly less daytime sky-wave absorption as well as less static intensity, so that the maximum useful distances will be greater in September. "Sporadic-*E*" transmission will occur occasionally, but not nearly as much as during July and August. The 28-Mc. band will, on the average, during September not be useful for distances greater than 100 miles or so, but on a few days, and for a few hours in the early afternoon, it may be useful for a limited range of distances as indicated in the shaded area.

W9BSP Is 1940 Paley Award Winner

Marshall H. Ensor, W9BSP, receives 1940 William S. Paley Amateur Radio Award from Paul Kesten, vice-president of CBS, at presentation luncheon at the Waldorf-Astoria in New York

CULMINATING a 10-year career of code-practice instruction in which he helped to train thousands of new hams, Marshall H. Ensor, W9BSP, received the William S. Paley Amateur Radio Award for 1940 at a presentation luncheon at the Waldorf-Astoria in New York on June 2nd.

Ensor was picked for the award by a distinguished Board of Awards, composed of Norman H. Davis, Chairman of the American Red Cross; Dr. J. H. Dellinger, Chief of the Radio Section, National Bureau of Standards; Lieut. Commander Charles P. Edwards, Chief of Air Services, Department of Transport, Ottawa, Canada; Hon. R. Henry Norweb, U. S. Ambassador to Peru, and Rear Admiral Russell Randolph Waesche, Commandant, U. S. Coast Guard.

W9BSP was chosen by the judges because of his service to the nation in voluntarily conducting code practice transmissions and courses in the fundamentals of radio over his station. The service he rendered in training thousands of present-day amateurs is regarded as particularly valuable at this time when its reserve of trained radio men is proving so important to the nation.

Paul W. Kesten, Vice-President of the Columbia Broadcasting System, presented the award to Ensor. The ceremonies, which were broadcast over the coast-to-coast CBS chain, included tributes by Admiral Waesche of the Coast Guard, Rear Admiral Stanford C. Hooper, Director of Communications, U. S. Navy, and ARRL President George W. Bailey.

Marshall Ensor was presented with a silver replica of the Paley Trophy and a parchment scroll commemorating W9BSP's accomplishments. The trophy itself, an impressionist stainless steel sculpture by Alexander Calder, was returned to the guardianship of the ARRL, its permanent custodian.

Accompanying Ensor when he flew to New York for the luncheon was his sister Loretta, well known to hams as W9UA, who aided in the W9BSP work. The previous Paley Award winners — Walter Stiles, Bob Anderson and Will Burgess also attended the luncheon. Anderson, who received the award following his heroic performance in the 1937 Ohio River flood, is himself a "graduate" of Ensor's "School of the Air," as is many another prominent present-day amateur (including a member of the ARRL Hq. staff).

Following the presentation luncheon and broadcasts, the Ensors were brought to West Hartford and entertained by the Hq. gang.

W9BSP's unparalleled record has been previously described in *QST*.[1] The specific 1940 accomplishment that led to the award was his preparation of a book-length 80,000-word thesis study entitled, "Teaching Radio By Radio," in which he summarized his extensive studies in the field of over-the-air training and described the technique evolved as a result of his researches. This thesis led to an M.A. degree for Ensor.

One of the first dozen ARRL Volunteer Code Practice Stations when the system was inaugu-

(Continued on page 64)

[1] "Eight Years Before the Mike," *QST*, Feb. 1939, p. 32.

W9BSP looks over some of the QSL cards sent him by amateurs whom he has aided through his nightly code-practice transmissions during the past ten years.

How many hams are there "in the services" these days? We don't know the exact number, unfortunately; we wish we did.

One Washington authority mentions a figure between nine and ten thousand, with two-thirds of that total in the Navy and one-third in the Army. That figure seems a little high. The authority in question probably counted every V-3 Naval Reservist on active duty as a ham, whereas of course there are quite a few who are not. On the other hand, a considerable number of amateurs have enlisted in the regular Navy directly, with no preliminary tenure in the Reserve. Then, too, he considered only the Signal Corps in arriving at the Army figure — and there must be hundreds of hams doing the specialized radio jobs of the Air Corps and the Tank Corps.

All of which leads to make again this plea to every single amateur associated with national defense in any way — on active military or naval duty, in school, with other government agencies, engaged in civilian operating or research: Send us your service record in accordance with the form below. Not only that, check on your mates whom you know to be hams and get them to report, too.

One more think: If you are in a selective service camp and operate your own station in camp to handle "trainee traffic," tell us about that, too.

—•••—

Every time we glance through the "in the service" records, we have already compiled, we are amazed at the number of active amateurs now on the list and off the air. There are a lot of well-known names and calls in those files. There is Lt.-Comdr. Wm. Justice Lee, ex-4XE, for example, now probably the No. 1 Naval Reservist (he was associated with NCR back in '25), has been on active duty for some time. Others, like Wilmer Allison, 5VV, who was recently appointed a captain in the specialist reserve and is doing u.h.f. research for the Air Corps, are new arrivals. Old-timer Ens. Irving Herriott, now 9LEH, is stationed at Norfolk as watch officer at NAM. Mel Wilson, 1DEI, is another 5-meter man doing defense research at the Naval Research Labs in Washington. Sheldon Dike, 5HAG, is a civilian researcher at the Department of Terrestrial Magnetism. Capt. Robert Hertzberg has given up magazine editing to write technical manuals for the Signal Corps at Ft. Monmouth.

ARRL Director Shelton, 4ASR, has been appointed by the Governor of Florida to the state National Defense Committee. W. J. Halligan, 9WZE, is a member of Chicago's Commission on National Defense.

The following hams are reported on active duty at the Navy Department in Washington: Lt. Tucker, 9HF; Ensigns Allen, 8OQ; Holland, 5DOM; Slade, 1GOG; Haluska, 2CJI, and Hayes, 6OBK. Speaking of ARRL Directors, Ens. Wm. Green (West Gulf), 5BKH, has been assigned to the Naval Air Station, Pensacola.

Capt. Don Meserve, 1FL and formerly advertising manager of *QST*, is stationed at the Field Artillery School at Ft. Sill. Temporarily detailed to the 2nd Armored Division Replacement center at Fort Benning is Capt. Ben Adams, 4EV, former ARRL Southeastern director.

The Army has called the following reserve second lieutenants to active duty: Wade, 4GHB, assistant regimental communications officer at Fort Knox; Kime, 8BMK, Co. M, 29th Q.M. regiment at Fort Sam Houston; Brown, K6PSB/4, ex-2KAE, communication officer, Hq. Battery, 70th C.A. (A.A.), Camp Stewart; and Lindley, 8FJN, radio officer, 37th Division, Camp Shelby.

Lt. Leroy Watson, 6BI, is one of the Naval Reservists on active duty at the Naval Air Station at Kaneohe Bay, T. H. Even further out in the Pacific is Lt. Fred Schoenwolf, ex-9AO and ex-9AJN, who is senior communication watch officer and coding officer at NPO, Navy Yard, Cavite, P. I. Lt. B. P. Williams, 8ZAE, has been attached to the 4th Naval District staff headquarters at the Philadelphia Navy Yard as District Communication Reserve Commander. Lt. (jg) Geo. Hansen is now on active duty in the office of the DCO, 9th Naval District, in charge of radio and telegraph communication.

Ens. Harry Livingston, 1KBG, is communication watch officer at the 1st Naval District headquarters in Boston. Although an architect rather than a radioman, Ens. S. E. Johnson, attending the Post-Graduate School at Annapolis, deserves mention because he is also 2FBX. Ens. E. P. Drozek, 1RK, is communication officer at the Portsmouth Navy Yard. Ens. James Hoffman, 3GXV, is assigned to the DCO at the Naval Operating Base, Norfolk, Va. In April Ens. Carpenter, 1KYC, was ordered to the officers training school at Noroton Heights, Conn., as was Ens. Cowan, 2DQT.

RM2c MacDonald, 6GIV, is aboard the *California*. RM2c Popoff, 3DUZ, is a radioman on the battleship *New York* of the Atlantic Fleet, as is RM3c Mann, 8SEI. RM3c Lunbeck,

(*Continued on page 68*)

Optimum Q and Impedance of R.F. Inductors

Design Charts for Solenoids and Toroids

BY R. S. NASLUND,* W9ISA

THE design of radio-frequency inductances for maximum Q and impedance has received considerable attention, and theoretical formulas for determining these quantities have been derived. However, as is true in a great many other cases, it is considerably more convenient to have this information in graphical form, since the desired result can be obtained quickly and with a minimum of arithmetical work, and a large number of configurations can be investigated quickly without tedious calculation. Accordingly the accompanying set of charts was prepared as a guide to inductance design; the equations on which they are based will be found in the Appendix. Besides the familiar solenoid, two types of toroidal inductances are included.

Solenoids

The single-layer solenoid of round wire, used almost to the exclusion of other types of inductors except perhaps at ultra-high frequencies, is considered first with the length-diameter ratios extended considerably beyond the experimental verification by Pollack, whose paper [1] is used as

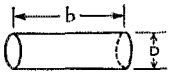


FIG. 1

a basis for this section. Above 25 megacycles and when the coil is very long or very short, the deviation from the calculated Q can be expected to be far greater than even at lower frequencies since such factors as coil-form material, wire insulation, shields or other metallic objects are excluded. Only the skin-effect resistance and proximity-effect of the turns are included in the equations, together with the assumption that the frequency is not near the natural frequency of the coil.

The graphs and their use will be illustrated by example. Suppose space and shielding requirements are such as to make a coil with a length of 4 inches and a diameter of 3 inches desirable. All dimensions are given in centimeters in the graphs and equations (except for duplicate scales on some of the former) so that length b in Fig. 1 is 10.15 cm. and diameter D is 7.62 cm. From Fig. 2 the dimensions factor of Q_m (Q with optimum wire size [2]) is 478 and at 3.5 Mc. the Q_m of the coil wound with copper wire of optimum size is 895 since the square root of 3.5 is 1.871 and Q_m is the product of $\sqrt{f_{Mc.}}$ and the dimensions factor shown in Fig. 2. Suppose that by one of several equations or calculators the number of turns N for the desired inductance is 30 turns. From Fig. 3 the optimum wire size is seen to be between No. 10 and No. 11. The optimum size, however, is not highly critical and using No. 10 or No. 12 would not decrease the Q by any appreciable amount.

There is no optimum length-diameter ratio as can be readily seen in Fig. 2; the Q varies with the size, the square root of the frequency, and inversely with the square root of the resistivity of the wire.

Maximum impedance at parallel resonance also occurs when the optimum wire size is used because the inductance is independent of the resistance and the resistance is dependent only on the factors making Q maximum and the resistance minimum; that is, $Z = X_L^2/R = X_LQ$. This equation can be used only when the capacitor is assumed to have negligible losses and the coil has a reasonably high Q. The above example, having an inductance of about 38 microhenrys, will provide an impedance at resonance (55 $\mu\mu$fd.) of three-fourths of a megohm since $Z = X_LQ = 2\pi f_{Mc.}L_{\mu h}Q = 6.28 \times 3.5 \times 38 \times 895 = 748{,}000$ ohms.

The construction of solenoids is so well known that little comment is necessary. It is interesting to note that aluminum is not greatly inferior to copper and may well be considered when weight is a prime factor. Silver-plated wire seems to have little advantage for most applications, but the use of tinned wire is to be discouraged. The resistivity of the wire and its effect on the Q and impedance of the coil will be discussed later.

Toroids

Toroidal inductors, perhaps because of their constructional difficulties, have received less attention and application than they deserve even though three noteworthy examples exist in the ultra-high-frequency oscillator field.

In the first of these, the Kolster "derby hat" oscillator,[3] a single-turn toroid is split along its greatest circumference and plates attached to each edge to form the capacitor to complete the tank circuit.

* Lake Bronson, Minn.

[1] Pollack; Elec. Eng., vol. 56, Sept. (1937); (reprint) RCA Rev., vol. II, pp. 184–201, Oct. (1937); (abstract) *QST*, vol. XXIII, pp. 54–57, Feb. (1939).

[2] Without resorting to three-dimension graphs, a separate graph for each wire size or some other parameter would be necessary for Q when the wire size is greater or less than optimum.

[3] Kolster; Proc. I.R.E., vol. 22, pp. 1335–1353, Dec. (1934); (abstract) *QST*, vol. XVIII, pp. 69–70, May (1934).

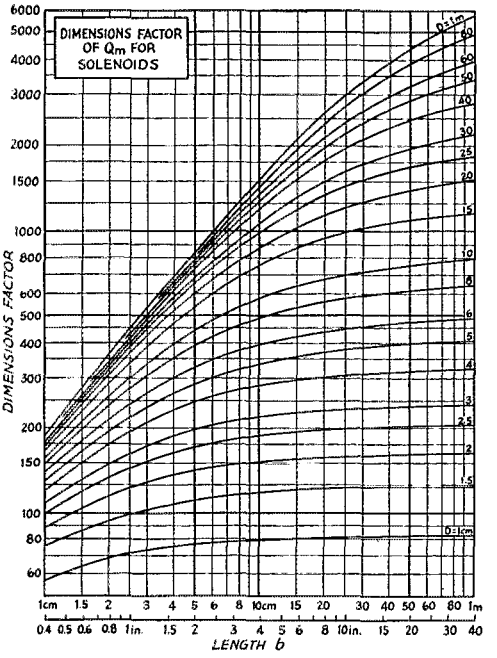


FIG. 2

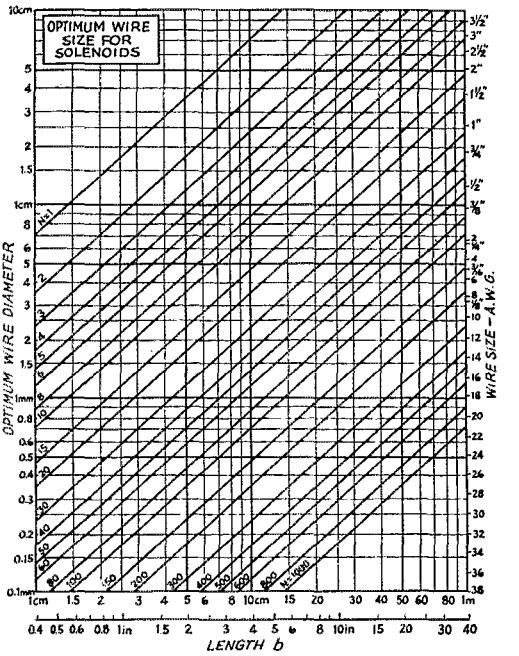


FIG. 3

The Zottu multi-tube oscillator [4] uses a toroid having the outer cylinder replaced by three pillars to facilitate connection of the oscillators to the inner cylinder. The plate on top of the inner cylinder and the top cover provide the capacitance.

The third example, the Peterson "doubler-boiler" oscillator,[5] is also a one-turn toroid arranged in about one and a half layers to make it a high-C circuit and to reduce its length in comparison to the concentric transmission line from which the rectangular type of toroid was derived.

The most recent example of toroids in u.f.h. application is the ingenius "inductive-output" amplifier and oscillator.[6]

Only the two basic forms of the toroid will be considered, although combinations of the two and other configurations are possible.

Circular Toroid

The toroid of circular cross-section, Fig. 4, can be compared to a doughnut with the exterior in one or more turns, counting each time a single conductor passes through the center hole as one turn.

Both Terman [7] and Reber [8] have shown that Q is maximum when $r = 0.71\ R$; where r is the radius of the turns and R is the radius from the axis to the center of the cross-section of the turns winding, thus making the outside diameter twice the sum of r and R.

Using an example again, suppose R is made 10 cm. Radius r becomes 7.1 cm. and from Fig. 5 the dimensions factor of Q_m is 891 and independent of the number of turns. At 14 Mc., assuming that the toroid is made of copper, the frequency factor is $\sqrt{14} = 3.74$ making $Q_m = 891 \times 3.74 = 3335$. Dividing this coil into 10 turns would give an inductance of 3.8 μh as shown in Fig. 6.

If maximum impedance in a resonant circuit is

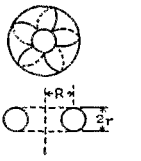


FIG. 4

desired instead of maximum Q, the ratio [9] of radii is increased so that r = 0.92 R and the dimensions factor of Q_z (Q for maximum imped-

[4] Zottu; *QST*, vol. XX, pp. 21–23, 74, 76, Oct. (1936).

[5] Peterson; Gen. Rad. Exp., vol. XII, p. 5, Oct. (1937); (reprint) Communications, vol. 17, pp. 26–27, Dec. (1937); *QST*, vol. XXIII, pp. 19–26, Sept. (1939).

[6] Haeff & Nergaard; Proc. I.R.E., vol. 28, pp. 126–130, Mar. (1940); see also *QST*, vol. XXIV, pp. 78–80, Sept. (1940).

[7] Terman; Proc. I.R.E., vol. 23, pp. 1069–1075, Sept. (1935).

[8] Reber; Proc. I.R.E., vol. 23, pp. 1056–1068, Sept. (1935).

[9] This ratio of $r/R = 0.92$ is in disagreement with Reber [8] who uses about 0.88. He found that both ratios for maximum Q and maximum impedance varied somewhat with the circular toroid's dimensions.

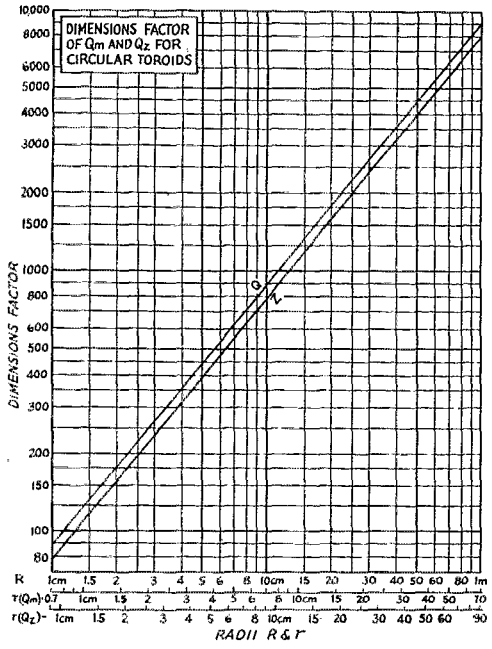


FIG. 5

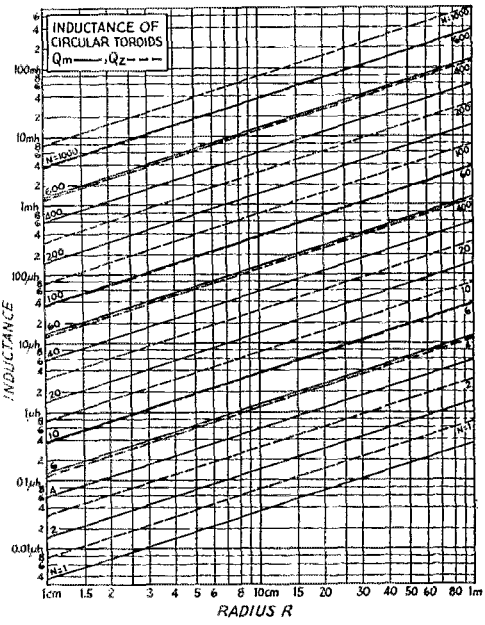


FIG. 6

ance) becomes 790 (Fig. 5) when $R = 10$ cm. and $r = 9.2$ cm. Ten turns on this coil yield 7.67 μh. (Fig. 6) which, at 14 Mc. (22 $\mu\mu$fd.) produces a parallel impedance of $6.28 \times 14 \times 7.67 \times 790 \times 3.74 = 1{,}990{,}000$ ohms.

Rectangular Toroid

The toroid of rectangular cross-section, Fig. 7, is in reality a variation of a concentric transmission line having both ends closed and the surface in one or more turns where each turn is a single conductor passing through the center hole.

A concentric transmission line has been generally considered to have minimum attenuation when the ratio of the outer radius to the inner radius is 3.59, and in view of the close relationship between a concentric line and the rectangular toroid, it is not surprising that Q will be maximum when the ratio of r_2 to r_1 is also 3.59 as has been shown.[7, 8]

If the outer radius r_2 is made 10 cm., the inner radius r_1 becomes 2.78 cm. and the dimensions factor of Q_m, also independent of the number of turns, is 660 when the axial height h is 20 cm. as shown in Fig. 8. As in the case of the solenoid, there is no optimum ratio of height h or length to diameter; the Q increases with both these dimensions. At 28 Mc. the Q_m will be 3500 for copper as the frequency factor is $\sqrt{28} = 5.3$.

The inductance of the rectangular toroid is shown in Fig. 9. Ten turns in the above example will yield 5.3 μh.

Maximum impedance[10] is obtained when $r_2/r_1 = 12$. This ratio is not critical as 11 or 13 diminish the impedance by a negligible amount, but the equation and graphs apply only when $r_2/r_1 = 12$. As an example, make $r_2 = 10$ cm. and $h = 20$ cm. The inner radius r_1 becomes 0.833 cm. and the dimensions factor of Q_z is 485 (Fig. 9) while the inductance for 5 turns is 2.49 μh (Fig. 10). At 28 Mc. (13 $\mu\mu$fd.) the parallel impedance is $6.28 \times 28 \times 2.49 \times 485 \times 5.3 = 1{,}130{,}000$ ohms.

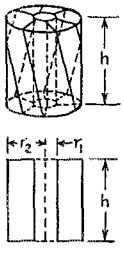


FIG. 7

Construction

Circular toroids of more than one turn are most easily constructed by copper plating a ring of the desired dimensions and cutting through the copper to form the turns. A wax or soft-metal ring[7] which can be melted out after the plating could also be used, with insulating strips ce-

[10] Reber [8] found the ratio for optimum impedance to be the same as for maximum Q; that is, 3.59.

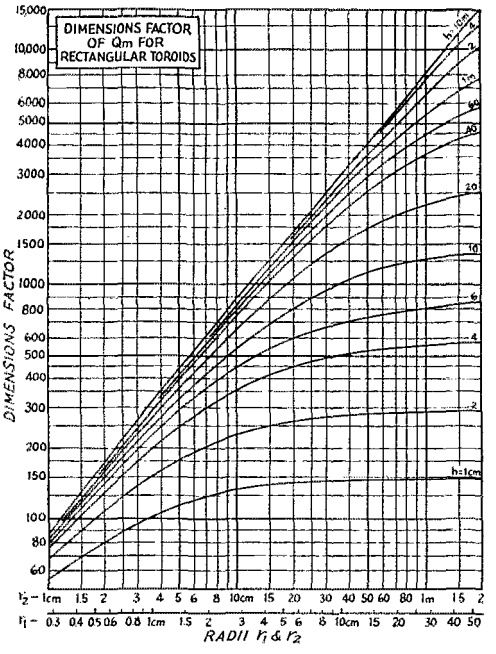


FIG. 8

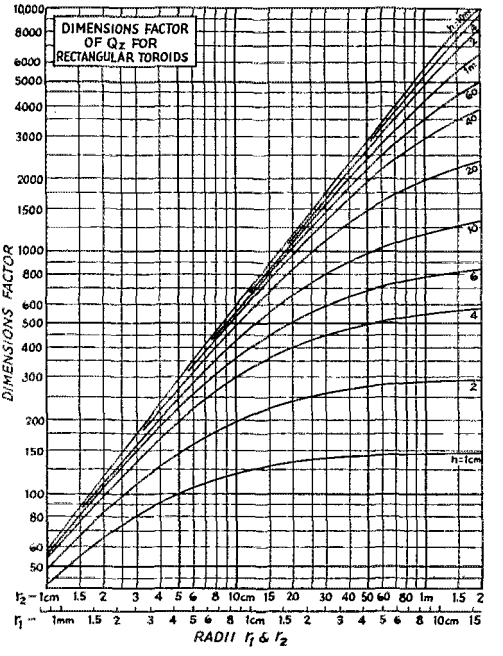


FIG. 9

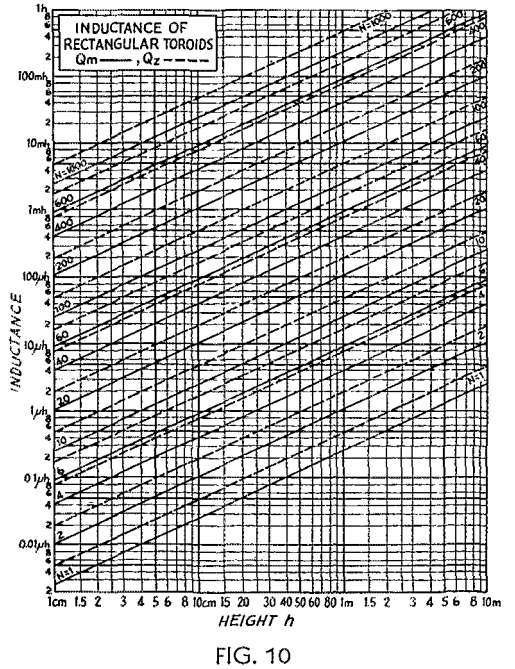


FIG. 10

mented across the slits between the turns to give the structure rigidity. The rectangular toroid can be made by soldering or otherwise fastening the two cylinders and two end plates together, cutting through with a saw to form the turns, and copper plating the whole to cover the high-resistance joints. The objective is to make the surfaces smooth and continuous except for the slits between the turns in toroids of more than one turn. The ultimate toward this end is that the difference in radii at the edges of the turns and elsewhere shall be less than the skin depth of current penetration.

Toroids, like concentric transmission lines, have no external field and therefore require a minimum of shielding.

The inductance [11] of toroids wound with round wire will be very nearly that given in Figs. 6 and 10, but the Q will be reduced to the point where a solenoid of good design might be superior. No equations for Q can be given when the space between turns is greater than a negligible fraction of the circumference.

Dimensional limits making the diameter less than a quarter-wavelength and preferably nearer a tenth of a wavelength have been set.[8] The rectangular toroid should have its length not greater than five times the diameter or longer than a quarter-wavelength. As the dimensions of a toroid approach those of resonant sections of concentric transmission line the distributed constants become increasingly important and the

(*Continued on page 62*)

[11] Bur. Stand. Cir. C74, p. 251 (1937).

★ U. S. A. CALLING ★

ELECTRONIC SPECIALISTS FOR SIGNAL CORPS COMMISSIONS

AN OPPORTUNITY decidedly out of the ordinary awaits specially-qualified amateurs in the new Electronics Battalion of the Signal Corps. The experience of England has established the urgent need for men who have specialized in electrical engineering radio communication and electronics, for a special task. The Army Signal Corps has made special arrangements for the appointment of qualified specialists to the grade of Second Lieutenant, for immediate duty. They are desired for the specific purpose of studying and operating devices which employ high-frequency apparatus of an extremely complex nature.

The campaign to secure these officers has a heavy atmosphere of old-time hams. The officer selected to organize the training of the special unit is Lt. Col. W. R. Lansford, S.C., of Washington, ex-W3UG and prewar 3AAB. The publicity work is directly in charge of our own George W. Bailey, W1KH, who has become chairman of the radio section, Office of Scientific Personnel, National Research Council, Washington. George receives applications, passes on technical qualifications, turns over the qualified to the Office of the Chief Signal Officer — meaning to Major H. O. Bixby, personnel officer. Bix is old W1EF, built the original MIT transmitter at W1XM, installed the first apparatus at W3SN, Baltimore CA Hq. An Army B-18 bomber is being used in a publicity campaign urging colleges and other EE training centers to locate suitable men, and also for a more important assignment: every candidate must be personally interviewed by members of a board, and planes have been assigned to make frequent hops to major educational centers all over the country to interview candidates. G.W.B. will be on tour this summer!

George W. Bailey, W1KH, NRC radio personnel chairman, turns over to Lt. Col. W. R. Lansford, W3UG, CO of the new Electronics Battalion of the Signal Corps, publicity material to be dropped by plane to college presidents in inaugurating the campaign for specialized officers. At the left is Major H. O. Bixby, ex-W1EF-1XM-3SN, personnel officer of the Signal Corps, charged with procuring and commissioning the new officers. Insert shows how a message bag is dropped from an observation plane—except that barracks caps will not be worn this season while in flight!

Appointments in this service not only defer a call under the Selective Service Act but offer complete exemption. Men selected may already have been called to active service, either as selectees or under Reserve Commissions in branches other than the Signal Corps.

Candidates must have a college degree (or its practical equivalent) in electrical engineering and have specialized in communications or electronic physics. Noncollege men of eight or ten years intensive amateur activity and ample professional experience in electronics can be considered. The type of expert most eagerly sought is those who have some experience of microwave and cathode-ray technique. Candidates must be unmarried and without dependents, from 21 to 36 years old, in excellent physical condition. While commission will be for five years, term of active duty will be for one year only, with option on the officer's part to extend it another year. Pay and allowances vary from $183 to $363 per month, depending upon duration and place of service. Thirty days leave per year.

Interested persons should indicate their interest at once, so as to be included in the plane interviews. Write directly and without delay to George W. Bailey, National Research Council, 2101 Constitution Ave., N.W., Washington.

F.B.I. RADIO OPERATORS

THE Federal Bureau of Investigation wants radio operators for service in its technical laboratory at Washington. The position is of course civilian work, but it is not under the Civil Service. Starting salary, $2000. Probationary for 90 days.

Applicants must be U. S. male citizens between 23 and 35, in good

physical condition, of at least high-school education, able to receive 25 w.p.m. directly on a typewriter (and to send 25) and to operate a teletypewriter, do ordinary maintenance work under supervision. Preferential consideration for applicants having college degree in science or engineering, commercial experience, etc. Must be willing to accept assignment or transfer to any part of U. S. or Possessions. Special duties from time to time.

Here's your chance to be a G-man. Forms direct from J. Edgar Hoover, Director, FBI, Dept. of Justice, Washington, or from any FBI field-division office (list in *QST* for August, 1940).

NAVY PHYSICAL RELAXED

FOR the present emergency, physical requirements for enlisted operator in the Naval Reserve have been reduced, as concerns teeth, height, weight, chest expansion — provided applicants are well proportioned and muscular. A considerable number of men rejected for slight defects of this nature may now be able to qualify for enlistment in the Naval Reserve and active duty.

NAVY ENSIGNS

SEE the dope on this subject in last *QST*. The opportunity still exists. Correspondence direct to ARRL. No exceptions from advertised requirements.

GALLUPS ISLAND INSTRUCTORS

THE Maritime Commission's school in Boston Harbor, described in our last issue, is looking for four junior instructors. Interested? Candidates must be high-school graduates, between 21 and 45, citizens; must have at least five years radio experience, hold a commercial radiotelegraph ticket, have at least one year at sea in commercial brasspounding. Pay, $99 per month for first three months, $157.50 thereafter, plus quarters, food, uniforms, medical and dental attention. Instructors will be enrolled in the Maritime Service but may resign at any time. Address Chief, U. S. Maritime Service, U. S. Coast Guard Hq., Washington.

CIVIL SERVICE OPPORTUNITIES

IN ADDITION to operating and military openings, there are many other openings for civilians having a knowledge of one phase or another of radio. One such opening is in connection with high-frequency direction finders, together with several research and "put-it-together" positions either on Civil Service or on a contract basis. The laboratories maintained by the military and naval services and the NDRC all find the personnel problem becoming increasingly difficult, and many of their needs can be filled by amateurs who may not have an engineering education but who can put together and test equipment, particularly ultra-high frequency gear, conceived by the "master minds." Those interested in a civilian connection should (a) register the fact with ARRL on the form suggested in February *QST*, (b) request application papers from the Civil Service Commission, Washington, for Engineer (Radio). They tell us you shouldn't let the title scare you.

SHIP OPERATORS WANTED

ALTHOUGH the merchant marine is looming large in our defense picture, ship sailings are frequently held up for want of a radio operator. We are advised that during the next fourteen months there will be openings for an estimated 1300 commercial seagoing ops and that they are receiving from $150 to $275 a month, plus subsistence. Applicants, under existing law (amendment pending), must have had six months' experience at sea and possess commercial firsts. Most of the hiring seems to be done through the radio officers' unions which have contracts with the ship lines, and those interested may get in touch with the nearest office of a radio union.

Strays

On February 25th, W9QLH of Lincoln, Neb., and W9ZIU of Topeka connected on their customary Tuesday schedule at the dot of 6 A.M. as usual without either realizing, until the contact was finished, that both had misread their clocks by one hour!

—···—

On March 1st W3FEG reports that he heard W5EBB calling W3EUY. Immediately after W5EBB signed off, another signal, much weaker, was heard also calling W3EUY on the same frequency. W3FEG was astounded when he discovered that the second calling signal was again that of W5EBB, using the same wording. Upon contacting W5EBB, W3FEG ascertained that W5EBB had made but one transmission, and that, therefore, the second signal must have been a delayed echo. Checking with a watch the delay was estimated to be at least twenty seconds.

—···—

W4FJL says an old variable-condenser assembly, minus all plates, makes a good shaft and bearing unit for a homemade variable link. The link coil is mounted on an arm fastened to the condenser shaft.

—···—

A bell-ringing transformer will serve as a satisfactory substitute for a microphone transformer in an emergency. The microphone is connected in the normal secondary circuit. — *W5FYP*.

ON THE ULTRA HIGHS

CONDUCTED BY E. P. TILTON,* W1HDQ

THE mere fact that the sheet marked "April" had been torn from the calendar turned out to be no guarantee of DX on Five in 1941! After last year's phenomenal outbursts on May 1st and 2nd, the late arrival of this year's openings caused plenty of uneasiness, especially on the part of the many new converts who were down on 56 Mc. for their first crack at this much talked-of "Five-Meter DX."

May 6th was the first date reported open, but this was a minor opening wherein a few W5-W8 contacts were made. The business really started on the afternoon of May 10th; when, in a slam-bang session of four hours' duration, skip contacts were made in every call area and "new states" were added to many 56-Mc. logs. No ordinary opening, this, as numerous contacts were made over paths in excess of 1500 miles, and at least one instance of trans-continental reception has been received — reception of the signals of W6ANN, San Pedro, Cal., by W3GUF of Chester, Penna.

For the gang in the East it all started with a grand rush to work W5HTZ, whose signals from that rare state, Oklahoma, appeared around 6 P.M. Merlin worked just about every W3 and W8 who was on at the time, most of these being within the normal skip range. A few W2's made the grade, too, but the going was rocky for the W1's; only those favored with high elevations and fancy antennas being able to snag this new one.

Sharing the spotlight as a representative of another "new state" was W5BDB, Texarkana, Ark., Mims running up twenty contacts in ten states and six call areas. Just across the line in Texarkana, Tex., W5DXW was having his first experience with skip on Five, with nineteen stations worked.

While all this was going on California and Arizona W6's were having their best DX of the season, and the W7's in Oregon were getting their first break of the year. Outstanding DX known to have been worked includes the following: W8QQS-W6ANN, W3RL-W6PBD, W6OVK-W3IIS, and W6OVK-W3BKB, all between 1800 and 2000 miles!

The following morning produced another fine opening, but this was not of the multiple-hop variety and contacts were confined to normal hops of 700 to 1300 miles. Highlight of this opening was the presence of W7IFL, Cheyenne, Wyoming, who provided a new state and the long-awaited W7 for W9HAQ and W9ZHB.

*329 Central St., Springfield, Mass.

It was a bit late in coming, but DX was reported in some part of the country practically every day during the balance of May. Conspicuously *out* of the picture, however, are W1's, 2's and northern W3's. This area has had just three openings in the spring cycle, up to May 28th — a brief flurry on April 14th, the tag end of the session of May 10th, and a freak opening early in the evening of May 19th. This last was the occasion of the shortest skip ever witnessed in this part of the country, several contacts being made with W8's and 9's over distances as short as 400 miles. No skip longer than about 700 miles was reported; whereas, in the opening of May 10th the shortest distance over which contacts were made from the First Call Area was about *1300 miles!*

HERE AND THERE

THERE has been plenty of sitting tight and waiting for DX to break out on Five for W1's! Not the least of this has been going on at 38 LaSalle Road, West Hartford, where W1INF, station of the Headquarters Operators' Club is rarin' to go, with a pair of 35T's on 56,300, and an 8-element horizontal beam aimed West. Members of the League Staff take turns on the nightly stint, hoping that some of your conductor's predictions (?) will come true. At Newington, W1AW is also all set, with no place (very far away) to go. Don't give up the ship, boys, we still insist that the band has really *got* to open sometime! And in the meantime — well you've got plenty of company! The opening of May 10th resulted in contacts for only W1QB, W1KLJ, and W1HDQ. Web got W5HTZ; Bob worked W5's HTZ, AJG, and DXW; while your conductor got these and W5BDB. It may be significant that the three lucky W1's were using rhombic antennas atop better-than-average locations. The rhombics at KLJ and HDQ were far superior to 3-element horizontals tried at both locations on this stretching-the-limit skip of 1300–1500 miles. The session of May 19th was the exact opposite, with the W1's apparently on the near edge. W1KLJ worked W8OJF, Dayton, Ohio, and W9AQQ, Indianapolis. W1AEP got W8OJF and W9QCY at Fort Wayne. Numerous W8 contacts were made by stations in Eastern New England, but complete details are lacking, as yet. Your conductor worked his shortest skip in this one; W8CLS, McDonald, Pa., a distance of only 400 miles.

In Lakehurst, N. J., W2BYM has increased power from 50 to 350 watts and is getting much better average coverage as a result. Mel worked W5's HTZ, BDB, DXW, DXB, and AFX on the 10th and W8QQS, Saginaw, Mich. (more of that short skip) on the 19th. Other W2's reporting DX contacts on the 10th were W2BYW (W5HTZ) and W2DDV, who worked W5's HTZ, DXW, and BDB, and heard AFX, DXB, AJG and W9ZJB. For the first time in recorded history of skip DX, W2AMJ was *not* on — until too late to have it do him any good.

W3GUF, Chester, Pa., got the thrill of his life on May 10th, when the signals of W6ANN, San Pedro, Cal., were heard for 20 minutes. This would have been awfully close to a world's record if contact could have been established. Ed worked W5's HTZ, BDB, and DXW, and W9ZJB. W9TMQ and W5's AFX, and DXB, were heard. W5HTZ was worked again the following day. W3GUF would like

skeds at 8 A.M., E.D.S.T. Pretty early for the boys out west, Ed!

W3GJU, Philadelphia, reports one that went almost unnoticed on May 16th. Frank heard W4DRZ calling CQ at 9:23 P.M.

Here are two new ones in Florida. W4FNR/Miami has a pair of HK-24's on 57,656, running 100 watts. W4BRB, West Palm Beach, has a single '24 on 57,440, putting 40 watts into a full-wave W8JK Array, horizontal. In Winter Park, W4GJO is wondering about his receiver, having heard little sign of DX this season. Grid worked W8RFW on the 10th, and heard W9PK and several weak carriers. The next morning W9ZJB was heard. Better not worry too much about that receiver for a while, Grid — at least until the boys start working the ones you can't hear.

W4FBH, Decatur, Ga., reports reception of a W6 in Santa Ana, Cal., on the morning of May 11th. This should be W6QG, as Ray was on at this time. Incidentally, we have no record of any W4-W6 work on Five. Also missing are W4-W7, and W7-W1, 2, 3, and 8.

Gather 'round all you boys who waited the whole month of May for a good opening, and let's shed a tear for "pore ole Leroy." All the gang were after Arkansas and Oklahoma — the skip wasn't right for Texas — and the poor fellow worked only two W1's, one W3, *seventeen* W8's and two W9's. Yeah, that sure was a bad night for W5AJG! Up here in Five-Meter Paradise we've worked just seven contacts on skip *this year!*

In Texarkana, Tex.-Ark., W5DXW and W5BDB are now working W5AJG on schedule. First contacts were made with W5HTZ, Cromwell, Okla., W5AAN, Denton, Tex., and W5AJG on May 18th. This is mighty nice extension of the local working range; a new high for this part of the country. The 1-kw. rig of W5VV has also been heard in Texarkana, a distance of 350 miles!

It took W5JKM (Mrs. W5AJG) to break down the 200-mile path to W5VV for W5AJG. Leroy now has his 300-watt rig on Five and is getting a real kick out of working W5HTZ and W5VV. Keep up the good work, gang!

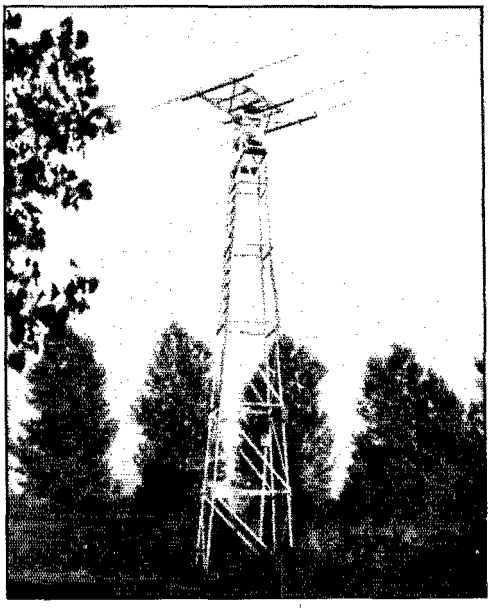
Amarillo, Texas, is now represented on Five by W5HYT (150 watts, DM-36, NC-200, 8-element horizontal array, 57,200); W5CHG (30 watts, DM-36, NC-100, vertical co-axial antenna, 57,040); and W5WX (50 watts, DM-36, RME-99, 4-element horizontal and vertical co-axial, 57,-232). W5HYF (Mrs. W5CHG) will be on shortly with a 25-watt mobile rig on 57,218. DX was worked by the Amarillo stations on May 11th, 19th, and 20th.

This May 10th opening was one of those times when the directivity of supposedly sharp arrays means very little. W6OVK, Tucson, Ariz., worked stations all the way from South Dakota to Texas without turning his 4-element array. Skip DX, apparently, can come from almost anywhere. This should be borne in mind when listening for possible openings of the band.

The band was open practically every day for the Arizona stations for a considerable period. W6QLZ, Phoenix, reports DX heard or worked on May 10th, 11th, 12th, 14th, 19th, 20th, and 21st. W6OVK caught all of these and adds the 15th and 16th as open nights. W6QLZ heard W1KLJ at 7:05 P.M., May 10th. Also heard were W8's QXV, CIR, and OKC, and a W3 near the low end, probably W3RL.

The WACA list has been growing rapidly. Several W9's in South Dakota and Missouri, along with at least two W5's, have worked them all; but it took a former W1 from Glastonbury, Conn., to bring 56-Mc. activity to Cheyenne, Wyoming, and thus bring the Seventh Call Area within reach of more of us. W7IFL completed the Grand Slam for W9HAQ and W9ZHB on the morning of May 11th. W9PK and W9ZJB were heard. On the 19th, Johnny worked W7FDJ and W7FFE and heard W7CIL. This is the first known instance of skip work between two W7's, but it can hardly be called short skip, being a distance of around 1000 miles.

W7ACD, Shelley, Idaho, has been working stations on 56 Mc. by calling CQ on Ten and listening on Five. W9ARN, W9ZHB, and W5AJG have been worked in this manner. Louie has a pair of 35T's about ready to go on Five, but farm work (13 hours per day, average) keeps him pretty busy during the spring and summer months.



The dual 28–56-Mc. array of W9YLV, Morton Grove, Ill. Both units are close spaced, of similar design, and are rotated mechanically from the operating position.

Advocates of vertical polarization could hardly believe their ears when they heard W8QDU, long a strong supporter of the vertical side, announce that he was using a 4-element horizontal array. Fred hastens to explain that this is part of the long-promised test of the burning question. Checks, to date, have not been sufficiently complete to enable Fred to draw any conclusions, other than that any good beam is superior to any dipole. More from Detroit on this subject later. Horizontals have recently appeared at W8's KQC, KKD, QXV, CIR, and QQP.

W9PK, Lyons, Ill., recent arrival who runs 300 watts to a pair of T-55's on 56,008, sends information on two other newcomers, W9IOD and W9AKF, Elmhurst, Ill. W9IOD runs 100 watts to a T-40, feeding a 3-element close-spaced array. He works W8CVQ in Kalamazoo, Mich., regularly. This is welcome news — the gap between the Chicago Area and the W8's, left by the passing of W9VHG, is now taken care of for future Relays. W9AKF has a T-55 at 100 watts. Both use home-built supers of similar design.

A new station in South Dakota is W9CJS at Bryant. Checks on band conditions are made with W9ZQC at Brookings at 12:30 and 7 P.M. daily. They note that Five has been open recently when only a few weak sigs are heard on Ten. Rig at W9CJS is e.c.o., with a pair of HK-24's in the final. Antenna is a 3-element horizontal array.

And here is a new one in Kansas. W9QZS at Great Bend has a pair of 809's, a 3-element horizontal rotary, and a DM-36, RME-69 combination.

From Wauwatosa, Wisconsin, comes word that George Pfister, W9IZQ, has been called for active duty in the Naval Reserve. After a preliminary period at Great Lakes, Ill., George will be at school at Noroton Heights, Conn.

W8OKC sends us a correction on our report of his activities in the aurora session of March 30th. Somehow Bill's list got badly garbled. Here is the correct dope: Worked W1SI, W2AMJ, W2BYM, W8QXV. Heard W1's LLL, BJE, KTF, W2TP, W3HDJ, and W8's FGV, OPB, CLS, CIR. Sorry, Bill!

112 MC. AND UP

For several weeks, W1KSF has been attempting to work 112-Mc. DX from a plane aloft over Norwood Air-

U.H.F. MARATHON

Third Period Winner: W8CIR—404 points

Call	Contacts Through May 15th 56	112	224	400	Score	States in 1941
W1AEP	49				353	6
W1AVV	60	34			389	8
W1BCT		12			43	2
W1CGY	11				43	2
W1DJ	84				331	4
W1EHT	46				253	2
W1EKT	66				303	4
W1ELP [1]	51				194	3
W1HDQ [2]	140	28	4		1031	14
W1IJ	23	24			257	4
W1JJR	24	48	2		307	5
W1KLJ	88	24			551	9
W1LCC	8	6			34	2
W1LFI	7	31			134	2
W1LLL	59	38			603	12
W1LSN	47				292	3
W1MBS		155			534	2
W1MEP/1	9				78	3
W2ADW	1	14			149	2
W2AMJ	109				707	10
W2BYM	67	4			413	12
W2COT	76	18			335	5
W2DZA		157	2		560	4
W2FJQ	47	24			287	8
W2LAL	70	6			322	4
W2LXO		76			247	3
W2MBS		24			63	2
W2MEV	38				164	5
W2MGU		87			360	3
W2MQF		42			172	2
W3ABS	42				173	5
W3ACC	70	3			435	9
W3AXU	70	13			354	9
W3BZJ		75			422	3
W3CGV	61	6			396	11
W3GJU	34				128	6
W3HOH	71	127			782	8
W3IIS	39				349	12
W3RL	4				59	2
W4FBH	12				71	4
W4FKN	5	1			18	1
W5AJG	35				340	12
W5DNN	1				1	1
W5FSC	4				56	2
W5VV	12				79	7
W6ANN [3]	37	88			794	7
W6IOJ	16	34	1	1	256	1
W6OVK	26	5			469	11
W6QG	31				283	4
W6QKM	4	52	1		211	1
W6QLZ	27	5			397	9
W6RVL		129			472	1
W7CIL	10				133	3
W7RT		4			24	1
W8CIR	65	10			1021	13
W8KKD	48	34			418	6
W8QQS	19				169	6
W8RUE	29	5			248	8
W8TDJ	13				143	3
W8UUY		7			92	4
W9AB	3				25	2
W9ANH	11				224	2
W9ARN	32				372	5
W9BDL	21				395	3
W9FHS	2	15	1		58	4
W9LLM	18	25			169	2
W9PK	33				182	6
W9PNV		72			398	2
W9RLA		37			154	2
W9UNS	9				137	5
W9YKX	17				316	7
W9ZHL	18				251	2
W9ZJB	6				41	3

[1] Frequency modulation used exclusively at W1ELP.
[2] Not eligible for award.
[3] Four contacts over 1500 miles helped W6ANN to make 470 points for the 4th reporting period.

port, near Boston. It was no trick at all to work countless stations, with the tremendous activity in Eastern New England, but to work beyond 100 miles was almost impossible, due to the local QRM. On May 18th, W1KSF/1 was heard S9-plus by W2GPO, Huntington, L. I., a distance of more than 150 miles, but no contact could be established. W1KSF and Pilot Fred Stanwood are now planning an attempt at some time when activity will be at a minimum in the Boston Area; probably early some morning, if some W2's and W3's can be lined up for specific tests. Plane work on 2½ is also reported this month by W9FHS who has been operating from a plane over the Chicago area.

Working mobile? Have you checked that fishpole antenna carefully to find the best length? It may not be any of the conventional multiples of a quarter wave, due to detuning effects of the car body. Better adjust it carefully for maximum output, regardless of what length this comes out. W1NCY/1 has been getting fine results with 90 inches. Don finds it a good stunt to adjust the antenna at each location worked, if possible.

W9PNV, Riverside, Ill., reports that a mirage of the Chicago shoreline appears occasionally in the sky at Gary, Indiana. This occurs after a hot day when it turns suddenly cool in the evening. At such times the signals of all 112-Mc. stations are much stronger. This is the characteristic coastal temperature inversion which is a daily affair in warm weather along the shore of any large body of water. By concentrating on careful listening during the hours around sunset, operators so situated should be able to work some choice DX frequently during the summer months.

W3HTF, Philadelphia, reports that Thursday, May 22nd, was an excellent night on 2½. W2's LZY, MIV, and NKO, all of Brooklyn, N. Y., were contacted, along with W2BZB and W3HOH of Palisade and Bernardsville, N. J. Philadelphia to Brooklyn is an 80-mile hop. W3HTF runs 36 watts to an HK-24, feeding a 4-element array. He pleads for more use of m.c.w. on 2½, especially for calling weak or distant stations.

If you have an f.m. receiver you are passing up a fine means of improving your reception on 2½ if you haven't tried a converter for 112 Mc. ahead of it. So says W3HOH, who should know. Since Ken got this combination going he has been able to hear many stations that were inaudible before. The new setup gives excellent quality on all signals, whether stable rigs or modulated oscillators, and the sensitivity and selectivity are far superior to the best superregen.

W6OVK has the same to say for a converter working into a super-regen receiver on 20 Mc. as the I.F. Acorn tubes need not be used, though these are distinctly worth while. Jim has had fine results with a 1232 mixer and 6C5 oscillator.

In San Diego aboard the U.S.S. *Narwhal*, W5HYD/6 has been finding plenty of activity on 112 Mc. Four Call Areas are represented on the band by W1JYI/6, W9JPM/6, W6HYD/6 and countless local stations, fixed and portable. Another area where there is plenty of out-of-town portable activity is Washington, D. C. Summer vacation spots, the country over will be populated with 112-Mc. mobiles and portables. Better get a rig in the car now and join in!

Strays

In Northwest Washington, near the home of W7GQF is a small town named Sekiu, pronounced *CQ!*— *W9IJT.* —·—·—

Fluorescent light tubes, even though "burned out" make excellent r.f. indicators. — *W4GIS.*

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A free booklet, "Designing Timer Structures," which should be of interest to those building antenna masts, may be obtained by writing to Timer Engineering Co., Inc., 1337 Connecticut Ave., Washington, D. C. In particular, it discusses the various uses for their non-weakening timer connectors. — *W9OPJ.*

ARMY-AMATEUR RADIO SYSTEM ACTIVITIES

War Department, Office of the Chief Signal Officer, Washington, D. C.

A.A.R.S. CONTINUE DURING SUMMER

FOR the first time since the inception of the Army Amateur Radio System in 1926, the members will continue normal operations during the summer months. In the past, it had been the custom to close all regular drills and operations from the last Monday in May to the first Monday in September. An important reason for this is to continue the handling of the greatly increased traffic, by Army-amateurs and other coöperating amateur stations, to the thousands of men away at the various Army training camps. Also, it was felt that training in Army radio procedure and methods of operation should remain unbroken during the summer months.

V.W.O.A. AWARD TO W5FDR

THE Veteran Wireless Operators Association's Marconi Memorial Award for Code Proficiency was awarded on May 26, 1941, to William B. Hollis, W5FDR/WLJR, Houston, Texas, winner of the AARS Code Speed Contest, held on February 10, 1941, by Major General J. O. Mauborgne, Chief Signal Officer of the Army.

A photograph of this handsome trophy appears below. The inscription on it reads as follows:

MARCONI MEMORIAL
AWARD
Presented To
W. B. HOLLIS
W5FDR-WLJR
Winner
1941 A.A.R.S. CODE
PROFICIENCY CONTEST
65 W.P.M.
May 26, 1941

NINTH C.A. CODE SPEED CONTEST

THERE had been so much interest in the annual AARS Code Speed Contest, previously held on February 10, 1941, that the Signal Officer of the Ninth Corps Area sponsored another Code Speed competition on April 28th. Automatic tape transmissions were sent from WLV/W6NLL, the 9th Corps Area NCS located at the Presidio of San Francisco, California, at speeds from 15 w.p.m. to 60 w.p.m. in increments of 5 w.p.m. The 3497.5 kc. frequency was used for these transmissions to all 9th Corps Area Army Amateur members. All Army-Amateur members had been invited to participate but static and poor conditions marred reception in the other corps areas. Results received to date indicate that 222 Army-amateurs in the Ninth Corps Area and 14 in the Seventh Corps Area participated. Arland N. Page, W6FWJ, won the contest by qualifying at the 60 w.p.m. speed. The following is a summary of the results in the Seventh and the Ninth Corps Areas.

Code Speed	*Number Qualifying*
15 w.p.m.	18
20 w.p.m.	48
25 w.p.m.	46
30 w.p.m.	53
35 w.p.m.	31
40 w.p.m.	21 *
45 w.p.m.	10
50 w.p.m.	1
60 w.p.m.	1
	229

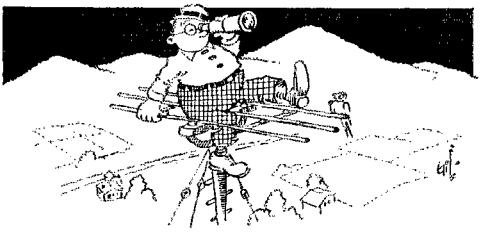
* Includes W9HBF and W9HUT of 7th Corps Area.

WAR-AMATEUR SCHEDULES

MORE than 1400 amateurs have contacted WAR since the inauguration of these contacts on December 3, 1940. Approximately 750 of these contacts have been on the 80-meter amateur band (WAR on 4020 kc.) and about 650 were on the 40-meter band (WAR on 6990 kc.). The special WAR QSL card was sent to all stations worked who had mailed in their own cards.

Effective June 2, 1941, the 4020 kc. WAR schedules on the 3500–4000 kc. amateur band will be maintained only on Saturdays from 7:00 P.M. to 8:00 P.M. EST. The present daily 9:00–10:00 P.M. EST 6990 kc. WAR schedules will be continued during the summer as long as amateurs desire these contacts.

Marconi Memorial Award to W5FDR



Notes on U.H.F. Antenna Heights

BY W. J. STILES, JR.,* W2MBS

THE method of determining how high a transmitting antenna must be to cover a given "line of sight" distance on the u.h.f. bands probably is unfamiliar to many amateurs. The radio "line of sight" is slightly greater than the optical because of refraction in the atmosphere along the path. This refraction is caused by the gradual de-

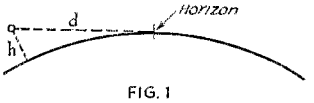


FIG. 1

crease with height of the refractive index of the lower atmosphere, which causes the waves to be bent toward the earth. By including this effect of refraction we obtain the following formula:

$$d = \sqrt{2h}$$

The distance to the apparent horizon, d, is expressed in miles while the height of the transmitting antenna, h, is in feet. The receiving antenna is assumed to be at ground level.

It should be understood that while we refer to the elevation of the transmitting antenna the same effect is obtained by elevating the receiving antenna insofar as "seeing" the other end of the circuit is concerned. When both the transmitting and receiving antennas are elevated we have the following formula:

$$d_1 = \sqrt{2h_T} + \sqrt{2h_R}$$

The total line-of-sight distance is d_1, while h_T and h_R are, respectively, the transmitting and receiving antenna heights expressed in feet. In other words, the distances obtained for each antenna alone are simply added together.

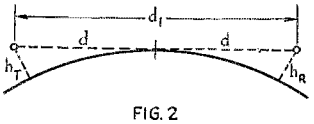


FIG. 2

The formula takes into account only earth curvature; in actual practice there are likely to be obstructions which interfere with the line of sight. These must be allowed for in calculations for any particular path.

It should be kept in mind that line-of-sight distance is not the same as maximum transmitting range; beyond line-of-sight, however, the signal strength will drop off at a considerably more rapid rate with distance than it does within "optical" range.

The "direct wave" travels along the shortest possible transmission path (line of sight) between two well elevated objects such as two airplanes in flight. Fig. 3 illustrates this "direct wave" with respect to the "ground reflected wave." The latter contributes little to any received signal except under the most favorable conditions when the "direct wave" and the "ground reflected wave"

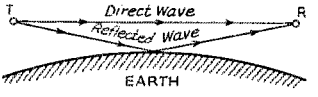


FIG. 3

arrive at the receiving antenna in phase. Under usual practical conditions of distance, antenna height, and frequency this reflected wave arrives at the receiving antenna more or less out of phase with the direct wave and therefore makes the net signal strength less than that of the direct wave alone.

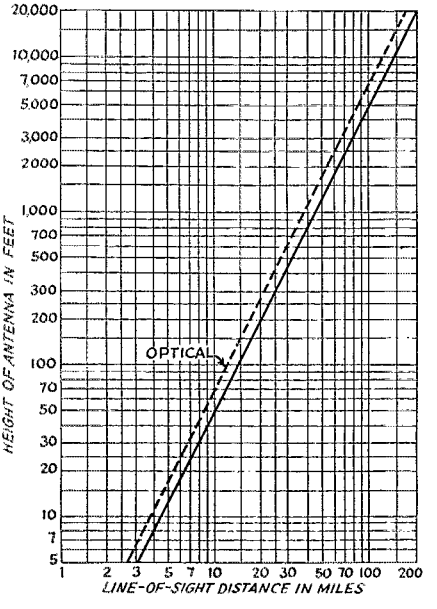


FIG. 4

* 19 Beechwood Drive, Packanack Lake, N. J.

Generally speaking it can be assumed that there is little to be gained by taking the transmitting antenna higher than say 20% above that level which provides an unobstructed path to the receiving antenna. Since the received signal strength is proportional to the product of the heights of the transmitting and receiving antennas, the most satisfactory arrangement usually can be realized by elevating both the antennas so that the sum of their heights is equal to the required transmitting antenna height when the receiving antenna is at ground level.

EDITOR'S NOTE. — The chart of Fig. 4, which gives the solution of the optical distance-height equation in convenient graphical form, was furnished by A. W. Parkes, of Mountain Lakes, N. J. To it has been added (solid line) the radio line-of-sight as determined from the formula above, this being based upon the assumption that the effect of refraction is equivalent to increasing the earth's radius by a factor of 4/3. For a given distance, the antenna heights required at transmitting and receiving locations may be obtained by dividing the distance into two parts and finding the heights separately for each distance. For example, suppose the distance to be covered to be 30 miles; by dividing it into two equal sections of 15 miles each it is found that the antenna must be 110 feet high in each case. Or suppose that the transmitting antenna height is known to be 200 feet, which gives a line-of-sight distance of 20 miles; the height required at the receiving location to cover the remaining 10 miles is found to be 50 feet.

WWV Schedules

IMMEDIATELY after the standard frequency station WWV of the National Bureau of Standards was destroyed by fire November 6th last, a temporary transmitter was established in another building and partial service was begun. The service has now been extended, although still with temporary equipment. It is on the air continuously at all times day and night, and carries the standard musical pitch and other features. The radio frequency is 5 megacycles per second.

The standard musical pitch carried by the broadcast is the frequency 440 cycles per second, corresponding to *A* above middle *C*. In addition there is a pulse every second, heard as a faint tick each second when listening to the 440 cycles. The pulse lasts 0.005 second, and provides an accurate time interval for purposes of physical measurements.

The 440-cycle tone is interrupted every five minutes for one minute in order to give the station announcement and to provide an interval for the checking of radio measurements based on the standard radio frequency. The announcement is the call letters (WWV) in telegraphic code.

The accuracy of the 5-megacycle frequency, and of the 440-cycle standard pitch as transmitted, is better than a part in 10,000,000. The time interval marked by the pulse every second is accurate to 0.000,01 second. The 1-minute, 4-minute, and 5-minute intervals marked by the beginning and ending of the announcement periods are accurate to a part in 10,000,000. The beginnings of the announcement periods are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods; this adjustment does not have the extreme accuracy of the time intervals, but is within a small fraction of a second.

NOT only did Tuska's correspondence decide him against folding for the summer: the July, 1916, issue of *QST* soared to the new high of 48 pages! The leading technical articles were on "An Impulse-Excitation Transmitter," by Ellery W. Stone, then an assistant radio inspector and now operating vice-president of Postal-Mackay; and on "Distributive Capacity and Dead-End Effect," by Harry Sadenwater (what would Camden be without him now?). There is also an unsigned story on "Portable Station SK" which, if recollection is not playing us tricks, was written by Robert S. Kruse. Kruse, in fact, has a signed article in the number, being some suggestions on relay work, immediately followed by some comments from John M. Clayton on high note versus low. We find this particularly interesting in view of the fact that Kruse and Clayton were later to be respectively the technical editor and assistant t.e. of this rag. The first of the 8UX cartoons, by D. A. Hoffman, also appeared in this issue.

It is summer but work on the relay routes continues, and the appointment is announced of the Seefred brothers, Howard and Lyndon, 6EA, as managers of the Pacific Coast trunk lines. Edgar Felix cooks up some statistics to show that there are 4360 amateur stations in the U. S., with an average power of 259 watts, but only 268 of them are kilowatt stations. Amongst new members accepted are Professor E. G. Shalkhauser, 9AHO of Sterling, Nebraska, now the mainspring at RME, Peoria; and Paul F. Godley, 2ZE, later to be sent to Scotland by ARRL in the first successful trans-Atlantic listening tests.

Strays

I have been using an old b.c. variable condenser immersed in kerosene oil to replace one which cost five dollars and which was arcing over at 500 watts. Two out of every three plates were removed, but both voltage breakdown and capacity were increased by the immersion. While the efficiency may not be so good at the higher frequencies, the condenser works very well on 75 and 160. — *W9GCE.*

HINTS AND KINKS FOR THE EXPERIMENTER

ADJUSTING ROTARY-ANTENNA ELEMENTS BY REMOTE CONTROL

H. K. HENTZ, W1ARC, has worked out a quite ingenious device for adjusting the lengths of the director and reflector elements of his rotary antenna from the ground. The photograph shows the essential parts of the mechanism.

A threaded shaft, driven by a pulley operated from the ground, serves to lengthen or shorten the elements, depending upon the direction in which the pulley is rotated.

The threaded driving rod is ¾-inch in diameter and 45 inches in length overall. One end of the rod must be threaded right hand, while the other has a left-hand thread. An unthreaded portion of

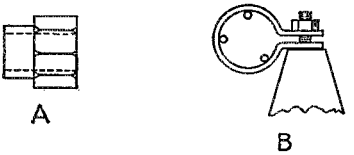


Fig. 1 — Special threaded nut (A) and keyed clamp (B) for mechanism for remotely adjusting antenna-element lengths.

five inches is left at the center for the pulley and sleeve bearings which are clamped in the first stand-off insulators either side of center.

Premax corrugated-tubing elements are used. A special threaded nut with a shoulder as shown in Fig. 1A is soldered into the inside ends of each half of the reflector or director. These nuts ride on the threaded rod, serving to draw the elements back and forth as the threaded shaft is rotated in first one direction and then the other. To keep the corrugated tubing from turning, the clamp of the second stand-off insulator on each side of the pulley is keyed by soldering three short pieces of No. 12 wire inside the clamping ring as shown in Fig. 1B. These clamps are adjusted to be loose enough to permit the elements to slide. The clamp of the third, and last, stand-off insulator on each side of center is loose but has no keying.

Several turns of heavy cord are wound around the pulley, which is 7 inches in diameter, and the cord is brought to the ground. A guide and brake for the cord are fastened to one side of the pulley as shown in the photograph.

The overall length of the director is adjustable from 30½ feet to 33 feet, while the reflector is adjustable from 33½ feet to 36 feet.

LIGHT FOR THE WORKBENCH

FIG. 2 shows the sketch of a handy light for the workbench which I have been using for some time. The shade is made from an ordinary

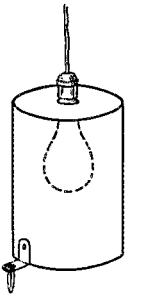
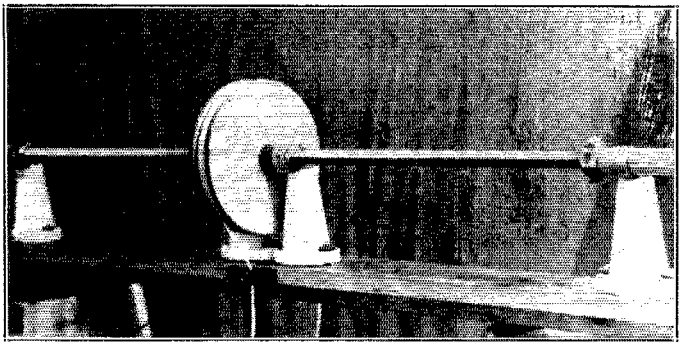


Fig. 2 — W9IBC's homemade lamp for the workbench. The reflector is a 2-lb. coffee can soldered to a brass-shell socket.



Pulley and threaded-rod arrangement for adjusting antenna-element length from the ground.

two-pound coffee can. A hole is cut in the bottom of the can to fit a brass-shell pendant receptacle to which the can is soldered.

The light hangs by the cord which runs through an eyelet in the ceiling so that the light may be raised or lowered to the needs of the project at hand. The banana plug, fastened to the edge of the can with a small angle bracket, fits into a jack which is mounted with a similar bracket on the top shelf above

the bench. This holds the light in a position high enough to provide good light for the entire bench. The beauty of the thing is that it can be lowered to provide a spotlight effect when working inside a transmitter or receiver chassis. — *Dayton Warner, W9IBC.*

RE TRANSFORMERLESS SUPPLIES

W7ABU points out that the chassis of the transformerless supplies described in the Hints and Kinks section of *QST* for May should be grounded *before* connection is made to the power line. Otherwise, there is danger of shock in making the ground connection. This, of course, should be quite obvious.

LOW-FREQUENCY ANTENNA FOR EMERGENCIES

A LONG bamboo fishing pole wound with wire makes a very good portable antenna for emergency purposes. It is light in weight, offers little resistance to strong winds and is easily installed in almost any location.

One which works well at 3.5 Mc. has a winding consisting of about 60 feet of No. 18 enamelled wire, space-wound over the top 14 feet of the bamboo pole and then close-wound for three feet. The remaining length at the bottom is left free of wire so that the pole may be lashed to a tree or other convenient upright or simply stuck in the ground when no support is available.

The bottom end of the wire is connected through an antenna tuner to ground. Such a radiator seems to be much more effective than one would suppose. One of our stations in Southern California has worked the East Coast on 75-meter 'phone with only 40-watt input and one of these antennas. — *Vernon C. Edgar, W6CRF.*

ANOTHER GLASS-TUBING FEEDER SPREADER

I HAVE done some experimenting with glass-tubing feeder spreaders which might be of interest to some of the other fellows.

Having tried the other methods described in previous issues of *QST*, I finally came upon another method which is simpler and which seems to result in an equally good job.

Fig. 3 — W6SKW's glass-tubing feeder spreader.

Simply heat the end of the tubing until it becomes soft and is almost closed. Just before closing thrust a "hairpin" of wire into the end closing it completely, as shown in Fig. 3.

I could not by the hardest pulling remove the wire from the spreader after the glass had cooled. — *Dick Huntington, W6SKW.*

SYSTEM FOR BREAK-IN AND KEYING MONITORING

FOR several years I have been watching for a simple solution to the break-in problem for c.w. operation. I was after some system which would be foolproof and one which would eliminate the nerve-racking clicks and thumps which invariably occur when the receiver is tuned near the transmitter's operating frequency. I thought it would be nice if the system could include a means of monitoring when using a "bug" key.

Fairly good results had been obtained using a system of relays, although the relays did not seem to follow well enough for keying at higher speeds and the relay noises interfered with proper keying monitoring. After considerable experimenting, I developed a system which requires no relays, eliminates noise from the transmitter and provides for excellent monitoring of keying.

With a little experimenting, any amateur should be able to adapt the principles to his own

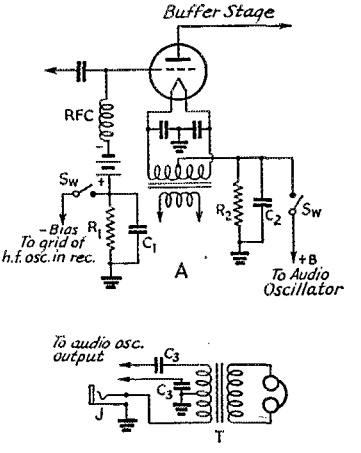


Fig. 4 — W8NCJ's break-in arrangement for obtaining plate voltage for the keying-monitor oscillator and blocking voltage for receiver from resistances in buffer stage. C_1 and C_2 are each 0.01 μfd. S_w is an ordinary toggle switch which is necessary only in case it is desired to have means of cutting off either voltage. See text for suggested values for R_1 and R_2. *B* shows the method of coupling the output of the audio oscillator to the headphones. *J* is the headphone jack in the receiver, C_3 0.1 μfd. and T a push-pull audio transformer.

equipment. Very few parts need be added to incorporate the system, as shown in Fig. 4A.

Since most successful break-in systems require oscillator keying, the following amplifier and doubler stages must be biased to plate-current cut-off with excitation removed to prevent plate-current flow in these stages when the key is open. Clicks in the receiver are prevented by making

(Continued on page 86)

CORRESPONDENCE FROM MEMBERS

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

TRAINING TROUBLES

EDITOR'S NOTE. — Although not originally written for publication, the following letters are here reproduced because of possible importance in any evaluation of amateur participation in defense training work. Names and other identifying details are withheld for obvious reasons.

Because of the character of the training program, it is practically impossible for selective service trainees to secure transfers after assignment. In theory, enlisted men can obtain transfers within the regular Army, but in practice it is a difficult and often expensive procedure. There is, therefore, nothing much that can be done about these cases (and others that are coming to light).

Editor, *QST:*

I read in one of your editorials a few months back a request that all radio amateurs inform you of any radio work they are doing in the Army. The exact opposite is the reason I am writing you.

When I was inducted into the Army I was classified as a radio operator and sent to Camp ———. Then, for some unknown reason, I was sent to Fort ———, and finally down here. We are supposed to receive 13 weeks of infantry training before being sent to a regular regiment somewhere else.

Recently I was made a bugler. I have never played a bugle before, and I do not want to play a bugle. When I do learn how to play this bugle, I will be a bugler as long as I am in the Army. I have been inquiring around, and I find that we are to stay in the line we are in now, and that we won't have a chance to transfer into anything else. There is no radio school here.

I am a member of the A-1 Operators Club, WAS, and have received a 30 w.p.m. Code Proficiency certificate. I feel I should have some chance to become a radio operator in the Army. I would appreciate anything that you could tell me as to how I might be able to transfer into the Signal Corps.

— ——— ———, W1——

Editor, *QST:*

I have read in *QST* how the Army needs radio men.

I am an amateur myself, and a friend of mine is also. There are several more radio men here in ——— Barracks. I don't see where the Army needs radio men, for they are using us for squadron duty such as taking care of recruits and policing the barracks. If they need radio men, why don't they . . . make use of us? . . .

. . . When they called me back to duty they checked on my service record and honorable discharge paper. . . . We took a trade test for different work that we did in civilian life, and each man was checked for the work he was qualified for. I told them that I wanted to get into radio work. . . . I qualified for that type of work and took aircraft examination for radio operating and repair and passed the examination (which qualifies me for an air mechanic's pay). . . .

I have had three years in the Army and, upon being discharged due to expiration of my service, I joined the Army Reserve. We were to be called to active duty when an emergency arose or war was declared. Since they called me back to active duty I feel they should have sent me to an Air Corps base instead of here doing fatigue work any untrained man could do. . . .

— ——— ———, W9——

THE BRIGHTER SIDE

Hq. Co., 138th Inf. Regt., Camp Robinson, Ark.

Editor, *QST:*

. . . Your editorial written several months ago about the amateur radio operator entering the service contains some very good suggestions for a person, such as I, who has very limited knowledge of the procedure of induction and assignment, or of the function of the Army.

I find that there are two steps (standard, I believe, in any branch of the Army) to be taken by the selectee desiring to follow the work for which his amateur activities have given him a good foundation. The first is the personal interview given at the Reception Center, wherein one can make known his radio interests and qualifications, and the second is an aptitude test, given after three weeks of basic military training have been completed. The second test is given to determine one's aptitude for learning the code, and offers no problem for the amateur.

There is considerably more to Army radio communication than mere knowledge of the code, of course, but I find that my experience in transmitter construction and operation, and operating and traffic-handling technique as an amateur has been of great value to me during this brief period of the beginning of my service.

Before entering the Service I was in some doubt as to the advisability of requesting radio work; I was advised to do so, and, even though my experience is still very limited, the possibilities in radio communication are such that I would advise any ham about to enter the Army to take advantage of his radio training unless he is very particularly qualified in some other trade for which the Army has an equally pressing need.

— *Pvt. John Brawley, W9GYZ*

PHYSICAL FITNESS

403 West 205 St., New York City

Editor, *QST:*

I don't know what luck some of your readers and hams may have had, but in the search for a radio job these days prime importance is attached to physical fitness. For an airline radio operator, the requirement is good physical condition, plus 50 w.p.m. on typewriter, plus a second class radiotelephone commercial license. For RCA the minimum requirement is a second class radiotelegraph commercial license. For a broadcast station technical job the minimum requirement is a first class telephone commercial license, and preferably also an engineering degree or a certificate from a good technical school. . . .

In research these days higher education, primarily for the mathematical background of calculus, is demanded. Two years of engineering at college will get you into a lot of places in the radio manufacturing business or in the government as a Signal Corps inspector. For the government or civil service as well, good teeth and physical condition are demanded. . . .

— *Willard Moody*

THE SUPER-INFRAGENERATOR REVIVED

Tucson, Ariz.

Editor, *QST:*

Just recently got hold of the November and December issues of *QST* for the year 1935, and read Ross Hull's articles

(*Continued on page 70*)

OPERATING NEWS

F. E. HANDY, W1BDI, Communications Mgr. **J. A. MOSKEY,** W1JMY, Asst. to the Coms. Mgr.

Unlimited Emergency. Our national leader has proclaimed that a state of unlimited emergency prevails throughout the land. The nation is girding itself for maximum production, for an "all out" effort for defense of our firesides and the ideals of liberty. Both in the armed services and in the planning for civilian defense, *preparedness* on the communications front is essential. Where one can help best or most depends on his inherent abilities and experience as well as on analysis of the national requirements for every day and defense services. One thought is uppermost in the minds of amateurs with whom we have talked . . . the desire to help.

A background of mechanical and electrical skill is an attribute common to most radio amateurs. In spite of the impressive numbers in the services engaged in the communications branches and allied fields very many radio amateurs will find themselves helping the common cause best by aiding in the less spectacular but equally vital contributions in keeping the wheels of machinery turning by way of a usual livelihood. In their spare time these may also interest themselves in civilian radio defense measures. Others whose age and qualifications permit can enlist their technical and radio operating skill directly (full time) in the national effort. Such needs of the nation are set forth in the "U.S.A. Calling" department of *QST* from time to time to help you find a place in the picture as your situation permits.

To do your bit in the *operating* line personal operator and operating training is the important necessity. This is so whether you aim to become part of the Signal Corps, Naval Reserve (V-3) or want to be ready for Civilian Defense work on the communications front. To be preferred one must have high ability and proficiency. To make yourself a real operator you must have copying ability and must cultivate accuracy. *Writing down* all you hear will increase your copying proficiency. Take advantage of the W1AW practice runs (nightly except Friday). You can check your copy with known announced texts (listed elsewhere in this issue) for three of the six practice transmissions weekly. Get all the practice you can! Practice makes perfect.

Tentative Fall Activities. Already schedules are being drawn up for amateur radio activities for the months to come. We refer to special events, since CODE PROFICIENCY AWARDS, WAS, RCC, etc., are constantly available to those qualifying under the usual rules.

A Code Proficiency Party, a simple enjoyable radio operating activity with a scoring system to make it interesting, is being planned for the week-ends of September 12th–13th–14th, 19th–20th–21st. All the thousands of amateurs who have qualified for Proficiency Awards at any speeds, and amateurs who qualify on official qualifying runs between now and the September dates will be considered eligible for work in this leading activity. Be ready for this coming event. Get after an Award in the CP program if you haven't made it a point to receive ARRL certification before!

Besides the annual *Navy Day Receiving Competition* (Oct. 27th) and the most-popular-of-all *Sweepstakes Contest* (the 12th) tentatively scheduled for November 8th–10th and 15th–16th, another date may be specified for a radio station and *AEC Operator Test* just for all registered members of ARRL's Emergency Corps. This latter idea of a test mobilization report by radio message in a general activity for all licensees registered in the Corps is the subject of a study now in progress. All plans may be subject to modification if necessary in line with other defense objectives.

Better send a postal card asking for blanks to register your equipment in the AEC to-day if you have never got your identification card making you a member of the Corps, or if you neglected to re-register on the colored forms at the last year-end. Get your CODE AWARD and AEC CARD right now. These will be the tickets to admit you to participation and points in the objective activities of the season just ahead. Each activity also should contribute to our *organized operating abilities* as have the recent season's highlights.

On Copying Behind. W5ELC writes, "Doubling the practice time was the finest thing that could have been done. . . . The new idea of advising the text used on alternate nights has a value not mentioned by you . . . it will help considerably in learning to *copy behind.* Having read the text and forgotten parts, I was even so, able to run three or four words behind with surprising accuracy. Practice can extend this to 8 or 10. . . ." This mentions a value in pre-announcement of our Sun.-Tues.-Thurs. runs as to the text to be used that we had not thought much about. Besides the main purpose, to facilitate self-instruction by listeners in perfect sending, and help in checking some of your own copy after reception, slight familiarity with a text

can aid in building confidence and throwing off the fear that a word will be missed if we don't copy right on its tail! The W5ELC idea to assist us in copying behind can be a stepping stone making possible more rapid progress along the path to advanced proficiency in handling code.

Wanted—Pacific Coast Stations with Tape Rigs. Any additional amateur stations that can undertake a good grade of code practice transmissions to assist those in their areas in attainment of advanced code proficiency are requested to advise ARRL Headquarters what schedules they can keep, and what speeds they can run.

In addition to this, the Communications Manager would like particularly to hear from any amateur *in the W6 and W7 areas* who has equipment for automatic transmissions at 15–20–25–30–35 w.p.m. utilizing Klein/Creed or Wheatstone perforated tapes, who could arrange to transmit on at least two and preferably three frequency bands simultaneously with W1AW at monthly intervals for the purpose of making *qualifying* runs even more widely available, through the added voluntary efforts of such stations.

— *F. E. H.*

ARTICLE CONTEST

The article by Mr. Walter H. Daehler, W1LWH, wins the C.D. article contest prize this month. *We invite entries for this monthly contest.* Regarding subject matter, we suggest that you tell about what activity you find most interesting in amateur radio. Here you will find an almost limitless variety of subjects. Perhaps you would like to write on working for code proficiency, Emergency Corps planning, traffic work, working in Section Nets, 'Phone and Telegraph operating procedures, holding a League appointment, working on radio club committees, organizing or running a radio club, the most interesting band or type of ham activity, or some other subject near to your heart.

Each month we will print the most interesting and valuable article received. Please mark your contribution "for the C.D. contest." Prize winners may select a bound *Handbook*, *QST* Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of A.R.R.L. supplies of equivalent value. Try your luck!

Traffic Handling

BY WALTER H. DAEHLER, W1LWH*

In my opinion, traffic handling, particularly in a net, is the most interesting and useful branch of amateur radio. More and more of us are getting into this phase of activity and for the newcomer's possible benefit I would like to offer the following suggestions.

The fundamental advantage of traffic handling is in case of emergencies, when an organized system of experienced operators is of the greatest utility. During this time it is desirable that traffic be handled quickly and accurately. Therefore, don't send at a speed that is about one half or twice as fast as the receiving operator is capable of copying. Get accustomed to varying your sending speed to the capabilities and convenience of the receiving operator. In routine unimportant communicating, send slightly faster than the operator can copy so that he will be increasing his receiving speed. Send plainly and accurately and an infrequent break or fill will indicate that the speed is about right to keep him plugging. In an actual emergency, where accuracy attains greater importance, use a speed that he can comfortably copy solid.

The best method is to copy on the typewriter, using the touch system. If you get a mill with the intention of copying on it, learn the touch system from the start, before even attempting to copy code. When copying with a mill, place one sheet of paper in the mill, then start a second sheet. As you copy the first message, the second sheet will be feeding into the mill and when you finish it, it is only necessary to turn the roller back a little to have the second sheet ready for its message. While copying the second message place a third sheet under the roller. When using blanks, with carbon paper for duplicates, delay entry of the second form until you near the end of the first message or it may turn up under the type, recording a part of the first message.

Counting the check of the message is of greater importance than most operators seem to attach to it. When copying on the mill write five words, double space, and write five more, then start a new line. At the end of the text it is only necessary to count the numbers of full lines, times ten, plus the words on the last line and you know the check. If this doesn't agree with the check of message, quickly run your eyes over the lines, noting if there are five words per half line. If you are right and the check as sent appears wrong, call the transmitting station on the check. Using pencil, it will depend on the individual, but if you write small perhaps you can copy exactly the same as you would with the mill. If not, write five words to the line.

Practice servicing with the left hand while transmitting messages, writing the call of the station you are sending to, the time and date at the bottom of the message. When receiving, write in the call of the station sending to you, the time and date. If more than one operator works the station it is necessary to get the operator's sine down also. Servicing each message as handled is essential, and may save you an embarrassing mix-up sometime. In c.w. operation, it usually helps greatly if you send the number of the message, the station of origin and the signature twice, for accuracy and to give the receiving operator time to complete his servicing of the message before.

Undoubtedly the best procedure is the least procedure, but at any rate use the procedure prescribed for your particular organization. It is surprising how it speeds things up when everyone reports in uniformly and all requests for repeats, fills, etc., are requested for in a uniform manner. While the net is in a traffic handling status, cut all incidental transmitting to a *minimum*, don't say a word or make a dit that isn't essential.

I hope these suggestions may be helpful to present net workers. If you have not tried traffic handling, give it a try. It is certainly a grand feeling to be a part of a net that is handling lots of traffic in a minimum of time and you will surely feel that you are participating in something that is really accomplishing things.

* 23 Fairview, Beverly, Mass.

Corrections, Sweepstakes Contest Results

Due to the fact that W3HYT's SS score was submitted on special Frankford Radio Club log sheets, his total of 60,783 points was inadvertently listed with the Eastern Pa. c.w. scores in June *QST*. W3HYT had the highest Southern New Jersey score and is, therefore, the c.w. winner for that Section. The operator, Robert L. Kass, used an NC-101X and P.P. 807's e.c.o.-controlled on 3.5, 7 and 14 Mc., and worked 423 stations in 58 sections. W3HPE was

also incorrectly listed in E. Pa. He made a score of 50,588 and placed second in the S.N.J. Section.

The call of the San Joaquin 'phone Section winner, W6QEU, was erroneously listed as W6QMH. W3HRD's call was listed in error as W3HRP under the E. Pa. c.w. scores; W9CWW, Kansas c.w. Section winner, was credited in the June *QST* writeup with a total of 430 contacts. The correct figure is 484.

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Hamfest Schedule

June 29th, at Murphysboro, Ill.: The Annual Hamfest of the Egyptian Amateur Radio Society will be held Sunday, June 29th, at Riverside Park, Murphysboro, Ill., in the form of a basket dinner. There will be demonstrations of f.m. and h.f. equipment. Entertainment and recreation for all. *For further details write* Harry Wilson, W9QZJ, Secretary E.A.R.S., Murphysboro, Ill.

June 29th, at Burlington, Iowa: The Iowa Illinois Amateur Radio Club will put on a hamfest, Sunday, June 29th, at Kreuger's Park on the north side of Burlington, Iowa, on Route 61. Good speakers will be on the program and a lunch at reasonable price may be obtained on the grounds. A good time for everybody is assured. Registration fee will be 75¢.

July 19th and 20th, at Glacier Park: The Sixth Annual Glacier Park Hamfest will be held July 19th and 20th at *Two Medicine Lake in Glacier National Park. Everyone is* invited, and there will be plenty of opportunity for outdoor sports, portable radio operation and picture-taking. Additional information may be obtained from Mace L. Reed, W7GUJ, Washington Ave., Newport, Wash.

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Meet the S.C.M.'s

W4DGS

James F. Thompson, SCM, Alabama, operates frequently on 3994 and 7106 kc. Two transmitters are in general use. On 1.75, 3.9 and 7 Mc. a 6J5-6L6 with 6L6 modulator is employed most of the time, although a high-power outfit with 6L6-RK20-PP T55's modulated by TZ40's is available for other bands to 28 Mc. or when the going gets tough. A vibrapack and genemotor are kept in readiness if emergency power becomes necessary. W4DGM is a member of the Montgomery and Birmingham Radio Clubs, holds appointments as ORS, OPS, OBS, and is Ass't Director in his division. He received his first license in 1930 and operated at W4SN, later obtaining his present call. SCM Thompson is a member of the Alabama ORS Net and has been associated with the Alabama ARRS 3.9-Mc. 'Phone Net for six years. He did notable emergency work during the Alabama Flood in 1938, and was active during the Louisville Flood of 1937. Racing homing pigeons and the family farm are his avocations, and he actively engages in a bit of tennis and outboard racing when working hours permit. Occupation: Clerk in the Technical Department of City Library, Birmingham, Ala.

Brass Pounders' League

(April 16th–May 15th)

Call	Orig	Del.	Rel.	Extra Del. Credit	Total
W6ROZ	171	243	1676	227	2317
W5FDR	118	281	1532	260	2191
W3GKO	29	47	1681	36	1793
W7EBQ	60	133	1326	123	1642
W6LUJ	336	633	2	630	1601
W4PL	11	41	1326	35	1413
W6PGB	141	379	425	374	1319
W9JMG	18	46	1192	17	1273
W2SC	41	107	1049	55	1252
W6RWW	75	171	802	154	1202
W3BWT	45	123	794	112	1074
W4AAO	16	50	946	48	1060
W2MNT	32	42	928	32	1034
W6DH	62	281	428	212	983
W6FWJ	200	92	494	92	878
W5DWW	25	44	596	29	694
W8DAQ	15	27	615	17	674
W6IMI	72	134	343	119	668
W9ILH	20	91	528	24	663
W8GJX	583	18	44	—	645
W9OZN	6	5	630	2	643
W4DEP	3	41	550	20	614
W9QMD	14	17	542	13	586
W5MN	42	81	386	65	574
W2MLW	124	107	240	90	561
W6IYZ	75	69	354	63	561
W6IOX	9	33	484	32	558
W3HAL	21	36	461	20	538
W2BO	33	53	400	43	529
W9QKL	17	69	417	6	509
W4FJR	0	7	496	5	508

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
KA1HR	1875	910	18	882	3685
W5OW	137	165	1198	51	1551
W3CXL	112	46	1001	46	1205
KA1HQ	338	239	292	220	1089
W1AW	62	137	482	124	805
W3BAQ	604	6	—	6	616

These stations "make" the B.P.L. with total of 500 or over. One hundred deliveries+Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count.

W6IIG, 303
W8SCW, 236
W8JIW, 233
W8UFH, 210
W4HHG, 207
W9KXR, 201
W5HBQ, 183
W6RBQ, 182
W6SPB, 180
W6ZX, 175
W7APS, 171
W5BN, 163
W5BN*, 154
W5CEZ, 149
W9VBQ, 149
W5GFT, 136
W2LZR, 131
KA1FA*, 128
W9OUD, 126
W5AAJ, 125
W6RGQ, 124
W2KI, 123
W2NCY, 123
W8KWA, 122
W2BGV, 120
W6ITH, 112
W8KZZ, 112
W1JCK, 104
W9UN, 100
More-than-one-opr.
W2BQH/4, 120
W5CEB/5, 112

A.A.R.S.

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLN (W2SC)	42	107	485	62	696

MORE-THAN-ONE-OPERATOR STATION

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLM (W3CXL)	268	239	2692	239	3348

A total of 500 or more or 100 deliveries+Ex. D. Cr. will put you in line for a place in the B.P.L.

* Mar.–Apr.

BRIEFS

The YLRL *now has branch units in* Cleveland, Cincinnati, St. Louis and New York City. The New York Branch was recently organized by Lenore Kingston Conn, W2NAZ, formerly the Ninth District Chairman in Chicago when she was W9CHD.

April '41 O.R.S.-O.P.S. Parties

A goodly number of the ORS-OPS appointees turned out for the regular get-togethers in April. W1TS took first place among the ORS, followed closely by E. Pa. representative, W3DGM. Although he is always among the first five highs, this is the first time Don managed to take top honors. Rumor has it that he's just going to sit back and take life easy during future parties, but we're giving ten to one that he'll be in there pounding away even more enthusiastically than ever in the July shindig! W9BRD stepped up from fifth in the previous two activities to snare third place this time. Congratulations to the "high ten" and other outstanding participants whose standings are listed below!

For the third consecutive time, W4DCQ led the OPS gang with a score substantially higher than his nearest competitor, W9MWR, who pushed up from way down the list last time to second place. FB, OM's!

The next ORS-OPS Parties are scheduled for July 26th and 27th. With interest in organized activities at an all-time peak, the immediate future promises to provide no end of operating enjoyment to those who "get in" on things *now!* Applications for ORS appointment from amateurs sincerely interested in traffic handling will be gladly received. Similarly, 'phone operators who take pride in the signals they put on the air and who aim to use their stations in a worthwhile manner are invited to apply for OPS. Write to ARRL or to your SCM for complete information on how to receive appointment as ORS or OPS.

Official Relay Station Scores (April)

Station	Score	Diff. Stns.	Diff. Sects.	Heard	Power (Watts Input)	Operating Time
W1TS*	18,568,290	232	50	—	400	16 h. 45 m.
W3DGM	18,195,730	218	48	—	250	18 h. 45 m.
W9BRD	12,249,345	181	50	—	95	19 h. 55 m.
W3IWM	10,939,050	173	49	10	130	19 h. 15 m.
W9DIR	9,054,900	180	45	29	—	13 h. 1 m.
W2LZR	8,771,256	186	48	19	—	15 h. 20 m.
W9VES	8,710,968	180	48	16	100	13 h. 25 m.
W3BXE	8,262,760	168	43	20	100	18 h. 35 m.
W8UUW	7,354,818	153	45	11	100	17 h. 55 m.
W8ROX	6,447,800	158	42	9	125	16 h. 35 m.

Station	Score	Diff. Stns.	Diff. Sects.	Station	Score	Diff. Stns.	Diff. Sects.
W9GKS	6,357,020	143	47	W7HCV/7	2,260,032	73	33
W8YA	6,237,312	149	43	W2HXQ	1,917,027	114	33
W9QMD	6,094,872	140	49	W8OKK	1,878,261	108	33
W4WE	5,423,660	137	41	W1KYT	1,861,920	114	30
W8TWP	5,194,980	144	42	W3ILK	1,810,455	104	33
W3GQW	4,902,288	145	43	W6BAM	1,764,000	63	33
W3GDI	4,717,488	131	43	W9QDF	1,760,625	92	33
W4FDT	4,536,350	143	40	W1IKE	1,755,072	101	31
W9VOQ	4,210,760	120	42	W8SCW	1,730,610	93	33
W6LMZ	3,735,451	89	38	W2MRL	1,626,090	98	36
W2NDQ	3,690,032	128	39	W8UZJ	1,599,015	89	32
W9GHD	3,515,820	117	37	W5IVG	1,559,684	71	37
W9IHN	3,291,570	108	38	W9KEI	1,460,640	81	39
W8DAE	3,210,503	110	39	W6GBN	1,457,356	58	33
W9BNB	3,059,700	117	38	W8NAL	1,449,000	91	29
W5DBR	2,952,925	105	40	W8SNA	1,306,160	90	26
W2MHJ	2,747,176	116	32	W3DRD	1,285,880	94	30
W5KC	2,628,000	104	40	W8TOJ	1,213,056	88	29
W8SFV	2,553,020	116	37	W1BHM	1,179,711	89	28
W3ADE	2,290,565	105	40	W1BFA/1	1,023,433	70	31

* Headquarters Staff member.

Official 'Phone Station Scores (April)

Station	Score	QSO's	Sects.	Heard	Power (Watts Input)	Operating Time
W4DCQ	11,072	64	32	13	900	7 h. 22 m.
W9MWR	7,245	50	23	20	175	5 h.
W1EAO	4,708	33	22	12	250	5 h. 45 m.
W1DWP	3,944	37	17	22	400	4 h. 55 m.
W9BOF	3,781	34	19	2	500	4 h. 22 m.

Station	Score	QSO's	Sects.	Station	Score	QSO's	Sects.
W8QFN	3,610	25	19	W1GKJ	1,749	22	11
W1LBH	3,600	33	20	W9WVQ	1,485	17	15
W2LXI	3,468	33	17	W6CHV	1,404	14	12
W4FWO	3,400	34	20	W2JZX	1,300	15	13
W3FJU	2,535	28	15	W8KNF	1,152	14	12
W8KBJ	2,400	30	16	W2JKH	1,150	18	10
W1LNI	2,286	24	14				

BRIEFS

Want to help your copying on a mill, OM? Amateurs interested in learning to touch-type may obtain without charge a booklet entitled "Accurate Touch Typewriting" from their local Underwood Elliott Fisher Company branch or by writing to the Typewriter Division, 1 Park Ave., New York, N. Y.

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"The Smoke Eaters Radio Club" is composed of radio amateurs throughout the country who make their living working for fire departments. The roster at present numbers eighty-five members. Among the associate members are fire protection organizations in Massachusetts, Illinois, California, Ohio and London, England.

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Eastern Massachusetts SCM, W1ALP, claims to have in his Section the youngest ORS in the ARRL field organization. W1MTQ is the little laddie and is only thirteen years young.

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W8JIW recently had his WAS certificate endorsed for working all states on each of three bands — 3.5, 7 and 14 Mc. His is only the third such endorsement to be issued by the League.

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Prospective amateurs are invited to attend free code and theory classes held by the North Newark Amateur Radio Club at their headquarters, 137 Broadway, Newark, N. J.

(*Continued on page 48*)

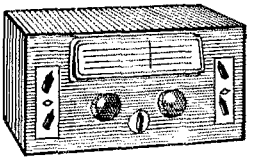
W1AW SENDING-PRACTICE SUBJECTS

June 22nd to Aug. 1st., Sun.-Tues.-Thurs.

(*Start at 9.45 P.M. EST*)

Date	*Start of Practice Text — From June, QST*
*June 22.	*Code Proficiency Program*, p. 40.
*June 24.	*Fist-Tape Comparisons*, pp. 64–66–68.
*June 26.	*On the Ultra-Highs*, p. 33.
*June 29.	*112 Mc. and Up*, pp. 35–82; *Op. News*, p. 45.
*July 1.	*Hints and Kinks*, pp. 42–60; *M.E.C.*, p. 50.
July 3.	*Editorials*, pp. 7 and 8, June *QST*.
July 6.	1.30 P.M. EST, W1AW daylight qualifying run. Unidentified copy.
6.	QST *Visits Gallups Id.*, pp. 9–11–12.
8.	*U. S. A. Calling*, pp. 18–19.
10.	*A Fool-Proof Rig for 80 and 40*, pp. 20–21–22.
13.	*Improving the Transmitting Loop*, p. 24.
15.	*Tube Keying*, p. 30.
17.	*What the League is Doing*, p. 34.
20.	Evening qualifying run instead of full practice run. Unannounced copy.
22.	*A Transmitter Frequency Control Unit*, p. 45.
24.	*Eleventh A.R.E.L. Sweepstakes Results*, p. 49.
27.	*Hints and Kinks*, pp. 56–57.
29.	*Op. News (Revoked. Copying Ability)*, p. 63.
31.	*Minutes of 1941 Annual Meeting*, pp. 35–36.

* May '41, *QST*.



NATIONAL does not bring out new receiver models very often. This is not due to laziness on our part. We have found that a program of steady improvement will keep older models as modern as the minute, without introducing any of the "bugs" one sometimes finds in new receivers. The proof of the record shows that National receivers are exceptionally "bug-free", but so many of our customers are commercial and government services where reliability is of paramount importance that we cannot be too careful. The NC-44 has been going through just such a series of minor improvements since it was first introduced. But the most recent changes, including a new noise limiter with an additional tube in the circuit, seemed to warrant a new name as well, so it has now become the NC-45.

We might as well go back to the beginning. One of the first changes, made some time back, was to improve the AVC circuit. We found that the AVC did not control extremely strong signals adequately. It was entirely satisfactory for any signal strength found on the high frequency ranges, but in the broadcast band where signals may reach volts instead of microvolts (and particularly in Philadelphia, for some reason) the AVC action was not adequate. So we changed the second detector from a pentode to a 6SQ7 diode-triode. This resulted in a much stronger AVC action, but to make assurance doubly sure, we wired the coil switch so that AVC control voltage would be applied to the grid of the 6K8 converter whenever the receiver was used on the broadcast band, thus giving additional control where needed. On higher frequencies, the 6K8 operated under the most favorable fixed bias conditions. Consequently, the NC-44 worked fine, even in Philadelphia.

IF transformers now employ a special silver plated mica condenser totally enclosed in a molded bakelite case, making them virtually proof against humidity. The old condensers were OK, but we found a way to improve them and took advantage of it. In similar fashion, we found that slight improvements would result from better shielding of the audio gain control, and from a revised construction of the CW oscillator.

The new noise limiter is of the series-valve type, described in *QST* for October 1939. But in the NC-45, a new wrinkle has been added. By means of a new circuit, the AVC voltage developed at the second detector is used to provide the necessary threshold voltage for biasing the limiter tube. By this means, automatic adjustment is obtained, with no manual adjustment required. The limiter sets itself to pass audio peaks, but stops noise peaks of higher amplitude. The only control for the limiter is an off-on switch on the panel. This circuit requires one extra tube, (6H6), so the NC-45 has eight tubes.

This is about the whole story, except for the addition of a tone control which is such an obvious improvement that it needs no comment here. We would like to have you try out the NC-45 and see what a nice job it is. It really is a new receiver, even though it keeps all the time-proven virtues of the NC-44. It even *looks* like a new receiver, as you may see from the picture on the inside back cover of this *QST*.

DANA BACON

Well, fellows, we are off to a splendid start, and as time goes on and *QST* is read by our boys overseas, we are positive our Column will become more interesting.

The Amateurs overseas are the chaps we want to hear from, so any of you reading this Column kindly pass along to me, or direct to Headquarters, all the news about yourself or your former friends of the pre-war rag-chewing days.

I have just learned that several new clubs have been organizing to keep up interest, and expect their affiliation with the League shortly. This is grand work and we would like to hear, not only from the new clubs, but from the old ones as well.

Alex Reid, VE2BE

The Month in Canada

THERE won't be time for much in the way of preliminaries this month. "The Month in Canada" is not only rolling, but it's already up to flying speed and climbing fast. We have nearly 300 VE's aboard this month, and that's the reason these introductory remarks will have to be cut short — 300 VE's take up a lot of room, and the Managing Editor is more than likely to make noises about overcrowding or a housing shortage in the columns of *QST* if we don't!

Seriously, though, we do want to thank the VE gang for their reception of this page. The response has been splendid. We would like to mention each of the individual letters of appreciation received from Canadian members — but that really would burst the page forms! So we will simply make a grateful collective acknowledgment, and get on with the business of the meeting.

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MARITIME—VE1

L. J. Fader, VE1FQ and VE1 QSL Manager, put in a highly productive month gathering notes on activities in that section. He gets around a lot, having become connected with the "Concert Parties Division" as a consequence of his home recording experience, and meets a number of the lads in that way. Most of his evenings are occupied travelling to hostels, barracks, and outlying posts entertaining the troops — and collecting ham news such as the following:

LZ is in the RCAF stationed at Halifax and also spends several evenings with the concert parties division running stage equipment. HK, last acting secretary of the HARC, joined the RCAF and is now serving overseas. LY has joined the RCAF and is serving overseas. He was with the Concert Div. also during the winter of '39–'40, as a member of the stage crew. FO joined the RAF in August '39 just previous to the outbreak of the war. FB graduated from college last summer and has since joined the Canadian Navy as a Lieutenant. He was the former VE1 QSL Manager. CK (ex-3ZM), now with the RCAF stationed at Halifax, expects to go overseas during the summer. He was an instructor at the Agricultural College at Fredericton, N. B., before signing up. AX is with the RCAF stationed at Halifax. He was formerly connected with the insurance business and also the b.c. station at Halifax. CP is also with the RCAF. Previous to the outbreak of war he was with the Marine Section of the Royal Canadian Mounted Police, which was later consolidated into the RCAF and Navy.

Ex-1EC, now with the RCAF in Newfoundland, was formerly with the RAF in England, and prior to his transfer to Canada spent considerable time in China. 1JM/3ALK is with the RCAF, stationed at Winnipeg as an instructor. Previous to signing up he was on the staffs of the University of Delaware and of MacMaster University at Hamilton, Ont. IW is with the Radio Laboratories of the National Research Council at Ottawa. He graduated from MIT last spring. LP is an Electrical Artificer with the Canadian Navy at Halifax. He was formerly with the CNR railroad shops at Moncton, N. B. GH has been on the staff of radio station CFCY at Charlottetown, P. E. I., for the past three years. The owner of this station is our good friend Keith Rogers, HI. HB is with the RCAF stationed at Moncton, N. B. A great bowling enthusiast, he formerly was in the restaurant

business at Fredericton, N. B. ME is at present serving on one of Canada's armed cruisers. His father is a commander in the Navy. EV is also with the Canadian Navy serving on one of the armed cruisers. Previous to the war he was on the office staff of the City Hospital at Moncton. CD is serving on the same ship as EV. Both are doing wireless operating. CB is located at the Canadian Army Camp at Debert, N. S., where he is in charge of the electrical work.

CX is still located at Moncton where he is in charge of radio sales for T. Eaton Co., Ltd. CY is in the Canadian Navy, exact location unknown. DC is in the service and sound business at Moncton. DJ is the registrar of motor vehicles for the Province of Nova Scotia. He also spends a couple of nights per week at the control board of CHNS at Halifax.

SCM DQ is still watching the film go through the projectors at the Capitol Theatre at Halifax. He has taken up a new hobby in the form of home movies, with very good results. DW is still conducting his radio service business at Yarmouth, N. S. DX is now located at Halifax, where he is connected with the Imperial Oil Co. EA assists his father in conducting a gent's furnishing business at Windsor, N. S.

EK is still looking after the books for a Halifax wholesale radio house and paying a bit more attention to his stamps now. EL travels the province of New Brunswick for one of the country's most prominent rubber and tire companies. EP, now with the Dominion meteorological service stationed at Halifax, has taken unto himself an XYL.

(OM Fader has another collection of VE1 dope coming up next month. — Ed.)

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QUEBEC—VE2

SCM Lin Morris, VE2CO, again offers evidence that ham radio is neither gone nor forgotten in his section:

HL has moved to Cap Rouge and is now a gentleman farmer. LE is married and has a commission in the RAF. SE makes good use of a bicycle he won in a contest. HB, LN and AW are with station CJBR in Rimouski. OF has not been heard of since his marriage last year. NW is with the CBC in Ottawa. FJ has bought a factory-made trailer. HD has moved to Charlesbourg, while RM has taken up farming at Les Saules.

The Quebec Club gang still complain that president AB spends most of his time in Montreal. MS practices hard speeding up his sending. CW has joined the Navy. BK is now stationed at Camp Borden. ID, NT and ex-2FB are engaged in civilian war work of importance.

PW scored highest marks on record in recent McGill OTC signal exam. PX and XM are with the active army. MW is back with Shawinigan Power for the summer. DR has just received his commission in the Navy. LR and PI finished their freshman year at McGill and are at Northern Electric for the summer vacation. Congrats to BW on the arrival of a junior op.

HK has been promoted to an important post with the RCN. DD is married and located now in Nova Scotia. Another just-married is FI. HP's tall mast still stands as a mute reminder of the good old days. BO, FG, LV and CD are reported to have arrived overseas. EY and KO are enthusiastic home-movie fans. IT has been transferred to Winnipeg. We are sorry to hear that AC has had a recurrence of his illness.

How many spotted ex-2FB's picture in a recent issue of *Life*? DU sees a number of the gang on his travels between Quebec, Montreal, Ottawa and Toronto. OR and KH have changed positions. IC victoriously captained a team of aviators in a true-false contest run by Dr. Harry Hagan in Montreal recently. DM is in the reserve army. HT, BG, GF, EM, DY are heard from occasionally.

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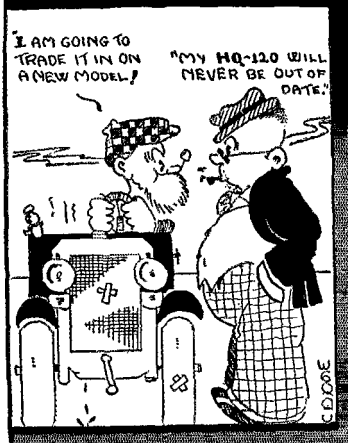
ONTARIO—VE3

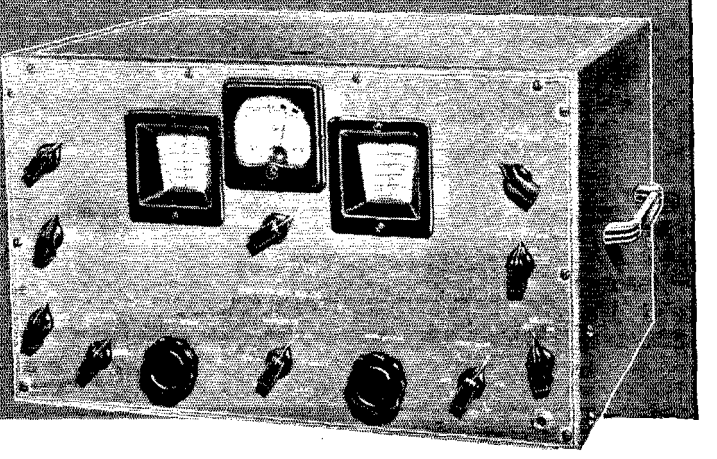
Len Mitchell, VE3AZ, asks the coöperation of Ontario hams in supplying him with items of interest for this page. In particular, he is anxious to arrange for regular correspondents in the communities outside Toronto.

Meanwhile, Len has supplied us with a partial list of Canadian amateurs with the Royal Canadian Air Force, prepared by Fred Hamilton, VE3KV, who was with the

(*Continued on page 58*)

You don't have to TRADE "HQ" the "HQ"





HQ-120-X

TAKE a tip from the fellow who owns an "HQ-120-X." He'll tell you how he has been saving the "trade difference" for over two and a half years and still has superior performance. The fact that used "HQ's" are as scarce as ***hens' teeth*** is proof that they satisfy. Every detail of the "HQ" has sound engineering and years of experience behind it to insure lasting service. You will find special treatment of many so-called minor details makes all the difference in the world after a receiver has been in use a year or more. . . . The "HQ" just doesn't grow old.

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HAMMARLUND

EXPORT DEPARTMENT, 100 VARICK ST., NEW YORK CITY

Station Activities

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Fred Ells, Jr., W1CTI — We were all pleased to see W1CJD back on the cover of June *QST*. CTI was visited by EAO, BRA and BCG. 1ITI will be on for AARS drills only during the summer. NCY is taking a 6-week refresher course at Noroton Heights. BQL is doing teletype operating in the Navy. KAT is on AEN, Sunday, at 10 A.M., and Conn. State Police Net, Mondays, 7 P.M. and 10 P.M. on 2015 kc. JFN has been very busy with HQ work, but finds time to get on once in a while. HAX rejoined AARS after a lapse of five years, and has a portable 112-Mc. rig in the works. HYF is fooling with 112 Mc. in his car. KFN is at Fort Monmouth, and says there are so many hams there that a CQ on the auto horn brings answers from all W districts. Nutmeggers look for Tommy; his 6L6 gets through on 3640 kc.

Traffic: **W1**AW 805 (WLMK 12) TD 159 CTI 127 ITI 99 (WLGQ 24) W1KQY 98 W1KYQ 81 W1BDI 45 W1KAT 40 W1BITH 21 W1JFN 18 W1MEM 10 W1HAX 8 W1FMV 4 W1JHN 3 JFN 18.

MAINE — SCM, Harold W. Castner, W1IIE —

ANNUAL RADIO FIELD DAY

KNOX COUNTY HAMS TO HOLD ANNUAL SUMMER OUTING AT OAKLAND PARK — EVERYBODY INVITED. The boys of Knox County plan a Field Day for Sunday, July 6, 1941, at Oakland Park, which is between Glen Cove and Rockport on Route 1. The road will be posted, so you cannot miss it. It will be an all-day affair and a lot of real fun. Drive right in. No charge for parking, and there is room for several hundred cars. This will probably be the biggest ham radio affair held in Maine for years. All amateurs everywhere are invited with their families and friends. Bring your own lunch. Hot dogs, soda, etc., will be sold at the park also. In case of showers, there is a large pavilion. The new SCM will be there. We hope to see every Maine ham on hand. The Rockland and Penobscot gang are a live bunch, and you will have the time of your life. For details address the Chairman, Ralph W. Tyler, W1RU, South Thomaston, Maine. See you there!

We had a swell radio meeting in Skowhegan, May 4th. W1LKA, President of the Skowhegan Radio Club, presided, and many of the boys from Waterville and Fairfield came up. IFF is working in Bath. EJS is proud father of a fine new jr. op. Congratulations! I visited TO recently, and Bob sure has a fine rig. MFJ reports that the Androscoggin Amateur Radio Association has applied for incorporation. IGW is pres.; MFJ, vice-pres.; GXF, secy., and HUT treas. These men with CBF and IJX constitute the directors. The city of Auburn has turned over the rooms of the NCR, and a self-powered rig is being built to provide excellent protection to the Section in case of emergency. They already have a 25-watt Utah c. w. rig. LEF is on NCR duty, and left his rig with them also. MML was called to active NCR duty. LAP is in Hawaii at present, on duty. HYH is back on 3.5 Mc. LOZ returned to Camp Blanding from Fort Benning, June 1st. LPA is at radio school in Fort Benning. NGV is doing some fine 'phone work with his new modulator. AWR is on active duty in the NCR at Boston. MFJ and GXF are on 112 Mc. a lot. MFS is also on 112 Mc. EEY is still working on self-powered rigs. Your SCM took a trip to New York and New Jersey. I visited W2CGG and broke into the Pine Tree Net, and had a fine QSO with all the boys. Everyone put through a wonderful signal down that way. Pop is a grand fellow and is a most active RM of N.N.J. nets, and does some wonderful QSP work for the boys in the service from Essex County N. J. I spent a whole evening with Communications Manager, W1BDI, who took me through ARRL Hq. It is with great pride that I assure you our affairs and interests are in most competent and efficient hands. You have no idea of the magnitude of this great central institution which we are all a part of and which works for our protection constantly. As I rode through the various cities and towns I noted hundreds of beam antennas of assorted kinds, and met many hams. As this is my last report, I wish to leave a brief thought with you all. We have come a long way in this hobby and we owe much to the League. I hope everyone will remember this and do all he can to support it. We also owe much to our generous government for the continuation of this privilege. It is our duty to do all we can to become better operators and never overlook any opportunity for public service. I leave you with a full conviction that you all will continue to be a credit to the game and loyal to ARRL. I sincerely hope you will continue your loyalty to the next SCM, and I leave you with a most cordial and sincere farewell, with untold thanks for all kindnesses and most pleasant associations of the past two years. And so, friends: — SK.

Traffic: W1IIE-W1NGV 19 BTY 9 CBU 20 GOJ 123 LNI GKJ 11 GMD 33 LKP 52 BAV 170 LOA 102 LYK 52 KYT 6 MBR 18 DHH 4.

EASTERN MASS. — SCM, Frank L. Baker, W1ALP — The MVARC held its Annual Eatfest at the Lawrence YMCA, with a nice turkey supper and a fine attendance. KH, SL, DFS, ALP and DTP were guests. A fine demonstration of portable work on 112 Mc. was put on with rigs in the Red Cross, Police, Newspaper and YMCA headquarters, and one in a car. FB, gang. The Framingham Radio Club had its 9th Annual Hamfest at the Hotel Kendall, with a fine turkey supper and a good time. A record crowd almost pushed the walls out of the place. ALP lost his voice, but has since recovered. A fine way to go to a hamfest! LSA has a rig to go on 112 Mc. soon. 112 Mc. AARS Net will drill all summer. The Eastern Mass. Net on 3745 kc. will be on Mon., Wed., and Fri, through the summer at 7:30 P.M. EDST. FWQ is now in the Navy. JJY gets on from HQH once in a while. KXU changed QTH. BXC has four schedules a week with K5AH on 14 Mc. New on 1.75-Mc. 'phone is the Surburban Net. Thanks to JKR for sending a list of all EC's and cities to all Coördinators. Watch this column for changes and additions. The E. Mass. Emergency Net has been started with tentative frequencies of 3868, 3968 and 2020 kc. at 9 A.M., Sundays. All EC's are urged to get on or listen in. We invite your suggestions or ideas. The 3968 gang have already been on several times. New EC's: CRN, Fall River; MPP, Watertown; 1GO, Methuen; BWJ, Natick; LTP, Marblehead; LOS, Sharon; KTE, Boston. Thanks to all for your interest. New OPS: KQN, LQQ, LXQ, MMM, MZF, HOB, JRN, PZ, MSK. PAM's GAG, MQO, KTE and EKT are doing a nice job. New ORS: BXC, MTQ. Let's have some more. MRK, DJ and HRA applied for OPS, NAR and KKO for ORS. LQQ, ARQ and MCK are now on active duty at Key West, Fla. Luck, fellers, and let's hear from you. JCX is rebuilding for new QTH. MOX is getting married. LTC has a new signal shifter. LNO MSQ took the fatal step. Luck to you and xyl. MSS moved to Calif. Mystic Valley Radio Club is planning a big outing. MQO is fixed for mobile on 112 Mc. LO is on 112 Mc. MMD is on 28.5 Mc. MC is going into the Navy. BDM is on 14 and 112 Mc. JWC is keeping schedules with NGV on 1.75 Mc. for the latter's folks. HOB gang and T9 Club were active, on FD. MRK has new 3-element beam on 28 Mc. KSF was on 112 Mc. 12,000 ft. over Norwood Airport with a nice signal. LSA and AAL are going to have a test for all Attleboro emergency stations. LXQ has TZ20's in rig and is putting up 14-Mc. antenna. WV has the following hams in Mass. State Guard: ADT, BJU, DMS, 1IQ, IWG, IYU, LHV, LIO, LMO. They will be on soon with call NHZ. Welcome to NGF in Hyde Park and NIE in Dorchester; both are on 28-Mc. 'phone. MJK has e.c.o. on 7 Mc. and schedules 4BYF. MDN is on 56 Mc. most of the time. MME has new call NID at Fire Station. MIG is home and on 112 Mc. AKD and KSA went to Mts. in N. H. to work DX on 112 Mc. MJK is on 14-Mc. 'phone. AJA works 112-Mc. mobile. HIL is very active in nets. KTE, IXL and MSK visited Prov. Radio Club. Fisherman's Net held their First Annual Clambake at Marblehead with about 50 present. This net works at 3 P.M. on 1.75 Mc. EKT, the 56-Mc. PAM, reports a lot of activity. NW, IAQ, IZY, JQH, GGH, JNP, DGS/1 and BJB/MWU are on. FFM has Class A, and will be on 14- and 3.5-Mc. 'phone. WV wants some one to take his place in New Haven R. R. Net for Boston. Watsa, someone?

Traffic: **W1**JCK 229 (WLGV 41) AKS 229 (WLGO 56) AAR 171 BDU 150 BMO 62 LSA 61 EMG 55 HWE 43 AAL 28 KTE 23 MJK 18 MZF 17 BXC 7 EHT-HIL 6 MRK 5 GAG 3 MDV-MMM 2 WV 1 LWH 304 KXU 57 JSM 408 KCT 55 FSL 150. (Mar.–Apr.: **W1**JGQ 3 FSK 1.) 2½ AARS Net: W1EYR 157 LWI 78 MBS 30 MIF 38 MMY 9 MON 230 MQH 70 NBT 23 QD 68. AARS Nets: W1MOJ 105

FVL 13 AHP 86 MNW 30 EXU 27 KYN 16 LGH 19 NFV 3 CCL 24 IYU 49 MLZ 10 EPE 393 (WLGS 32) FGT 26 FRO 28 LPX 15 LYG 85 MAN 13 QA 81 TY 108 HIL 13 MTQ 38.

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — BIV is making a habit of being high scorer for the Section. IOR reports plans under way for a Worcester Hamfest. Committee includes LBU, IHI, IOR and CNY. BKQ put up new antenna. EJD is forming 1.75-Mc. 'Phone AARS Net in central Mass. AZW and JAH attended meeting of West. Mass. 1.75-Mc. 'Phone AARS Net at home of FOI. LUA is in the swing of things from new QTH in Great Barrington. JYA is new EC for Leominster. MIM, IOR, JYA, AUN, BVR, KZS, MKR, EOB, FOI, LJF and JAH attended the Framingham Hamfest. HNE is on again after spell in hospital. ADF has new bug. IHI reports the following active on 112 Mc. around Worcester: CNY, KLE, KGJ, JWM, LFI, KWS, MZS, ATK, DJU, IHI, MTB. BNL is still rebuilding. He acquired a new mill, and is gunning for 35 wpm certificate. BVR visited JAH.

Traffic: W1BIV 259 (WLGN 76) IOR 180 (WLGJ 26) AZW 165 (WLGD 5) JAH 113 (WLGH 7) LUA 103 (WLGC 15) MIM 79 BXF 54 KZS 44 AJ 39 MJP 36 DUZ 35 HNE 19 ICW 12 ADF 7.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — W1MIP was home for a few days' leave from duty in the Navy. It was good to see you, Ted. BFA has organized a 28-Mc. Net for the eastern part of the State, and this has been incorporated into the AARS with coverage in four cities. JZD has new call NEV for use in Boston. 3INK/1 is getting on the air at Dartmouth College. HFO spent a two weeks' vacation in Alabama, but is now back on NHN. CFG will be on active duty with the Navy before this comes out in print, and expects to be at District Headquarters in Boston. LSN and IUI are still prominent in UHF activities, and recently made a portable trip to Portland with excellent results. BFA now has a complete emergency station, and is all set to go. MUW, MLO and LKK attended Framingham Hamfest. JJD, CNX, LIN and AOQ are getting set for 56- and 112-Mc. operation. JKH has renewed ORS. APK and IJB have been installing f.m. equipment for the N. H. State Police. AVJ, after several years lay-off, is getting back on the air once more. With 11 of Concord's hams now on active duty with the armed forces of our country, the MVARA did not participate this year in the Annual ARRL Field Day, for the first time in many years. We know the boys missed this swell yearly affair, but their duties to Uncle Sam come first. Let's hope that DMD/1 will be heard from once more in June, 1942!! AWU has been under care at the Portsmouth Naval Hospital. Hope you're OK now, Red.

Traffic: W1IP 89 JDP-KIN 61 JKH 39 BFA 49 MMG 41 MLO 26 1WW 20 ICT 15 KEX 8 LSN 4.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — W1MTA (ex-K5AM) is now Master Sgt. and radio instructor at Fort Adams. He's at home week-ends and uses T200's final running 1 kw., SX 17 and has 6J5-6L6 portable for c.w., and works 14-Mc. 'phone primarily. He is interested in knowing about our radio clubs and activities. Club Secretaries, take notice. The NAARO operated from Pascoag on FD. MJL, LWA and MQF attended the Framingham Hamfest. Also seen at Framingham were JP, DDY, JEZ, NAD, Harry Nicholson (he never misses), CH, DTZ, KKE, MO and HRC. KYP is on 7 Mc. MQF is on 3.5 with 6SK7 e.c.o.-6V6 bfr-dblr and 807 final. KCS is on active duty with NCR. LWA now sports an HRO. The Westerly Radio Club plans for summer include an exhibit of amateur radio activities, participation in the ARRL FD and the annual hamfest to be held in July. KRQ writes that everything is fine in Glens Falls, but he hasn't met any hams there yet. IEJ is looking for a 1-hp. motor, so he can wind up a generator capable of delivering 5 kw. MVL has rebuilt. LZD has rebuilt, and can now work on any band from 1.75 to 56 Mc. INN has finished rebuilding, and can now put out 100 watts on 1.75- and 3.9-Mc. 'phone. AGJ's final finally gave up the ghost. The Westerly gang are showing considerable interest in AARS. It is expected there will be several new net members from there soon. JP is spending his time 112-Mc. portable-mobiling. NBH is hounding 7194 kc. trying for WAS. MUH installed hash filter for his 83, and is using 6L6GX now instead of 6L6 osc. FUB's 815 final works fb on 112 Mc., and he is also sticking to the 3.5-Mc. PRA Net. DDY is concentrating on portable-mobile equipment for his car. His outfit now employs two vibrapacks and a generator. KKE schedules his brother-in-law, W3JDK, regularly. W3JDK is our ex-W1IZO. MEK has borrowed a receiver and is on 112 Mc. now. JEZ says, "All emergency coördinators of R. I. most urgently request that every ham build at least a one-tube oscillator. This is extremely important." He appointed MOK and MJL EC's, and is tickled pink because he signed up NAD in AEC. Mr. Docherty, father of the late W1BML, donated a safe to the PRA to hold their almost complete file of *QST*'s. It's a fire-resisting safe with a combination lock, and certainly does make us feel pretty proud. As you probably know, HRC attended the Board of Directors meeting in Hartford as a non-participating observer. This was highly educational and, besides finding out how things get to be, one also gets a much broader outlook on our amateur problems as they apply to the country as a whole, and much light dawns as to why things that look fine to us locally don't fit into the picture at all when applied to the whole country. Thanks a lot, fellows, for electing me Alt. Dir. so that I could get this valuable opportunity. If occasion ever demands that I represent you actively, I am sure the experience this year will help tremendously in keeping me "out of the rough."

Traffic: W1LWA 261 KKE 35 MEK 9.

VERMONT — SCM, Clifton G. Parker, W1KJG — MKM and MVX recently announced "Deborah," a yl at their house. Congratulations! NDB has new 180-watt 809 final with band-switching osc.-dblr-buffer. Burlington Amateur Radio Club is active with regular meetings, and recently had showing of movie on communications receivers at Fleming Museum, followed by artificial respiration studies and demonstrations. The club participated in FD activities, and is considering a hamfest. MFL also had club members at William Science Hall where he demonstrated apparatus employed in Electronics and Communications Department. W2JBL/1, W8VVZ/1, W1KWB, LRV and MIH visited the club recently, as did your SCM. GAE has rig on 3.5-Mc. c.w. KDB is now on 7 Mc. JVS was visited by TJ. GAN is busy rebuilding units in his 3.9-14 Mc. 'phone rig. JVS keeps schedules with his mother on 3.9-Mc. 'phone via W3HGA. LWN reported fine results on 7 Mc. AVP secured real dx on 14 Mc. AVP, GAN, TJ, BJP, AZV, GQJ and CBW have informal net on 3.9-Mc. 'phone each Sunday forenoon. Incidentally, fellows, that feud between AVP and TJ over "pix" is merely trimming and not at all serious. AVP had OO, OPS and PAM appointments endorsed. KEP toured N. H. and Mass., and visited quite a few amatuers during her trip. BJP is heard on 3.9-Mc. 'phone and visited DQK. MJU, CGV and NDL have secured good results on 112 Mc. Activity on that band is increasing around central part of State. MMU is in new location and active on 3.5-Mc. c.w. and 1.75-Mc. 'phone. MLJ has new modulator and is running about 150 watts on 1.75 Mc. MMV is looking for a 500-watt Class B transformer! KUY has a new receiver. NDB moved and is toiling with a pair of poles for his skywire. MJU has new ganged e.c.o. unit completed with excellent results. MMV and EKU have completed 112-Mc. rigs. KJG was visited by ND, JRU, IDM, MCQ and is busy on station lists, etc. JRU expects to leave for Portsmouth shortly. KWB has been repairing his rig. AEA also has been practicing on his final. CBW has been busy with moving. MCQ goes to town consistently on 1.75 Mc. IDM installed new T55 final in his rig. JVT is active on 3.5-Mc. c.w. with plans for 7-Mc. operation during summer. It is planned to endeavor to keep our nets open during the summer with at least a skeleton line-up and traffic for Vermont can be delivered daily except Sunday at 8 P.M. DST on 3715 kc. and at 8:30 P.M. DST on 3860 kc. AVP and the gang on 3.9-Mc. 'phone, Sunday mornings, give additional outlets for some of those hard-to-deliver spots. Thanks for the petitions on the SCM matter. Apparently no one else cares to serve at this time, and will continue here in the hope that the limited opportunity available for SCM activities will tide us over. The large number of reports this month was most heartening. It certainly would be helpful if this trend became a habit! If any members other than in the Barre area are working on 112 Mc., let us know. Several other stations are interested and inquiring. AD completed converter for portable use on 3.5 and 14 Mc. for work with car radio on FD. NDB moved to 1 Bank St., Barre, Vt. LYD is serving with 13th Co., A. F. S. Detachment, Ft. Knox, Ky.

Traffic: W1JVT 14 KJG 79 FSV 65 MLJ 15 AVP 85 NDL 16 JRU 8 NDB 28 AD 36.

(Continued on page 66)

W9BSP Wins Paley Award

(Continued from page 26)

rated by the League in 1929, W9BSP is to-day the only one of the original stations still performing the service. Each winter some 60 to 70 lessons, averaging about one hour in length, are transmitted nightly seven times a week. The brother-and-sister team carried through last winter's course on schedule despite the death of their mother.

Although it is impossible to construct figures accurately reflecting the full extent of this accomplishment, it seems certain that W9BSP has trained more amateurs than anyone else. At the end of the 1939–1940 series thirty-eight known Ensor "students" took the license exam at Kansas City and about 300 at St. Louis. The totals at other examining points are not known. During the 1938–39 season cards and letters were received from 550 individuals who were following the course.

There are a lot of good hams scattered around the country who will feel mighty glad to learn that W9BSP has achieved this well-merited recognition, and grateful to Mr. Paley for giving it to him.

— *C. B. D.*

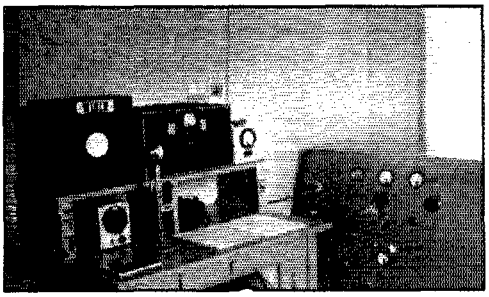
Strays

Filter chokes for suppression of "hash" from m.v. rectifier tubes are very effective in r.f. keying filters. In my case they were completely effective when the usual 2.5-mh. chokes were useless.

— *W6PQ.*

—···—

A copy of RCA's new transmitting-tube booklet is obtainable from your nearest RCA distributor or, by sending 10 cents to Commercial Engineering Section, RCA Mfg. Co., Inc., Harrison, N. J. This booklet covers commercial and special types as well as the types commonly used by amateurs.

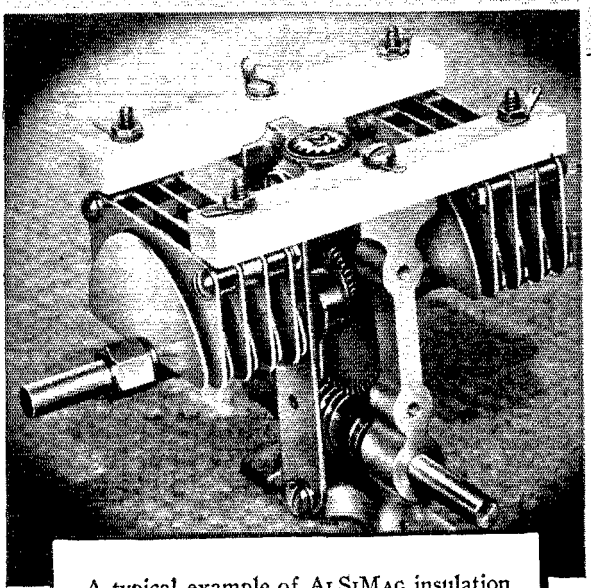


W1BLR, Nahant, Mass.

Operator — Don Shulkey, accountant, age 32, ham since 1920. Transmitter — Bandswitching exciter, 6V6, 6N7, 807 with crystal and meter switching driving single 812 final at 145-watts input. The rig is built into a homemade cabinet with sloping front panel, hinged top and removable back and shelves. Audio — 6SJ7, 6L7 a.m.c., 6N7 phase inverter, Class A 45's and p.p.-parallel 46's. Antennas — Homemade 2-element rotary for 14-Mc. and 3.5-Mc. end-fed half wave. Receiver — HQ120X Don divides his operating activities chiefly between 14-Mc. 'phone and 3.5-Mc. c.w.

ALSIMAG

STEATITE CERAMIC INSULATION WITH CONTROLLED PHYSICAL CHARACTERISTICS



A typical example of ALSIMAG insulation applied to its best advantage. This tuning condenser will remain positively aligned due to ALSIMAG's absolute and permanent rigidity. ALSIMAG's exceptionally low dielectric loss and high dielectric strength under all working conditions make this condenser unusually reliable.

ALSIMAG is the registered trade name of the many steatite ceramic compositions of the American Lava Corporation.

ALSIMAG is not the name of one composition but of many compositions. Year after year, new developments in radio and communications have brought new requirements for insulation. For 39 years the American Lava Corporation has spared neither time nor expense in developing materials ahead of the times. The laboratory and engineering staffs are constantly at work on problems vital to every industry using ceramics. Research and development is a continuous process and evolves new compositions as new requirements are presented.

The more frequently used ALSIMAG compositions are identified by numbers. For example, ALSIMAG 196 is an ultra-steatite with very low loss factor and unusual mechanical properties which make it invaluable for all high frequency applications. ALSIMAG 190 is the ideal dielectric in so-called "ceramic condensers" because of its high dielectric constant and low power factor. ALSIMAG 202 has a low coefficient of expansion and excellent shock properties and is used in transmitter design as an insulating material of excellent stability characteristics under varying temperature conditions.

The principal ALSIMAG compositions are listed in a Property Chart giving detailed physical characteristics of each "body". This Property Chart is sent free on request.

The advantages of ALSIMAG insulation are apparent. The engineer can choose the composition having the physical characteristics required by his application.

ALSIMAG pieces are custom-made in the size and shape indicated by the application. Thus ALSIMAG insulation has two outstanding advantages: (1) Correct physical characteristics (2) Correct form.

That is why you will so often find ALSIMAG insulation in the newest products. American Lava is proud of the long list of names on its books—famous names, many of them, whom we have served for most of our business life. We believe there is no reference in the field of insulation so powerful as such a list of year-in, year-out customers.

When you use equipment with ALSIMAG insulation you can be sure that the insulation has been engineered for the specific requirements and usually custom-built for that application. The controlled physical characteristics of ALSIMAG give you the best in insulation available for the application.

This advertisement is one of a series designed to give you a better understanding of the controlled physical characteristics and advantages of ALSIMAG insulation. It is not a solicitation of business. Custom-made ALSIMAG is sold direct to manufacturers.

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(*Continued from page 55*)

HUDSON DIVISION

EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — MIY reports Albany Radio Club did a swell job during Albany-NYC boat races. KWG is doing fb traffic work with AARS boys. JRG, FDA and MRO visited LNQ, chief operator at U. S. Navy Station, NJY, at Fire Island. LEI keeps Altamont on the map and was reappointed EC for Albany. HNH is back in the states after three months in the tropics with USN as RM2C. MEC schedules K6OJI, W6RBY and W5TCA. 9AIW/2 is new station in E. N. Y. 2MIY reports HTU and MUH active on AARS Net. The net is continuing on 3742.5 kv. through the summer. KUH/2 left for active duty in USNR at Noroton, Conn.

Traffic: **W8**SFD 211 2MIY 190 2KWG 110 2LRZ 55 2JQI 41 2HTU 3 2MEC 3.

NEW YORK CITY AND LONG ISLAND — SCM, Ed. L. Baunach, W2AZV — GP is now ORS and MWT OPS. NAZ recommends MWY for ORS. LR, KDC, LGK, DOG and CKU did a lot of preparing for FD. LYC has been experimenting with 112-Mc. rig on his new boat. NLQ has been operating 112-Mc. mobile. LRG has a new Abbott DK3 transceiver for emergency use. SC will continue operations throughout the summer. EC will continue operating Trunk AP during the summer. BO has been appointed NCS of the AARS Net, meeting daily, except Sunday, at noon EST on 7020 kc. LXL will soon be a W5, as he is working in Mississippi. KTF reports from the 8th Sig. Co. at Fort Jackson, S. C. AARS work in Washington keeps PF busy. ITX reports from Mexico City. DW is working hard to get Kings County organized for emergency drills. Any of the gang who would like to coöperate should get in touch with him. LZR is Corps Area AARS NCS on 3497 every Tuesday with the call WLNZ. JBL is home working 3.5 and 7 Mc. HGO is trying cross-band operating on 7 and 14 Mc. MEM operates on AARS S.N.Y. 80 three times a week. JZX is busy obtaining traffic at army camps to pass through the AARS. MHD is working on his e.c.o. DBQ's many duties keep him busy. KYO sends in a report after a long layoff. CXP is now married and is living up N. Y. state. BOK is operating on 7 Mc. HAY is now living in Brooklyn. KI is on 3698 daily with 3BWT. BGV is working for his A-1 OP certificate. BCS is working 14-Mc. c.w. KDC is building a new band-switching exciter unit. NAZ now has ten W2 members in the YLRL. AZV is rebuilding his shack. The Section Net will continue operations throughout the summer on 3710 kc. All stations should keep a sharp lookout for N.Y.C. traffic to insure 100% delivery.

Traffic: **W2**SC 1252 (WLN 696) BO 529 LZR 298 BGV 219 BWC 172 (WLNS 32) KI 159 MRL 128 DBQ 112 LR 93 JZX 87 MEM 84 MZB 81 GP 73 DW-EYS 70 AZV 64 MT 51 LBI 42 LGK 39 NAZ 36 KYO 35 NDQ 32 IXZ 25 LYC-BGO 21 FF 20 BCS 10 MHD 9 JAU 7 EC 6 PF-LID 4 AV-CET-BIV-AA 2 DOG-CKU-MSS-CHK 1.

NORTHERN NEW JERSEY — SCM, Edward Gursky, W2LMN — RM's: BZJ, CGG, IYQ. PAM: LXI. Section Net: 3630 kc. 8:30 P.M. to 9:30 daily except Sunday. New appointments: ORS: MRJ, NJO. This will probably be the last column written by me as SCM. I would like to thank all for the splendid coöperation given me in the past eight months. Through your efforts, the Section has become more active and better organized than ever before. Because of the location of our Section, it is one of the most important in case of any National Emergency. If we continue our support of organized amateur radio, we cannot miss, and shall come through with "flying colors" if the occasion demands. In parting I appeal to all the amateurs in the Section to continue the progress and coöperation given me, with whoever is our next SCM. IYQ was appointed NCS for the NJ40 AARS Net and assigned the special call WLNM, replacing MAX, who left for Antioch College. Making BPL is becoming a habit for MNT. He had a total of 1034 this month to lead the Section. NCY and MLW also BPL'd, NCY making it on deliveries. TP is using 500 watts on 1.75-Mc. 'phone. IQX has a new receiver. KSR thinks the AARS is swell stuff. MRJ became ORS and joined AARS. MNO reports that the Signal Corps Replacement Center is in the process of fixing up a super-ham shack for the use of selectees at Fort Monmouth. IKS says the town of Maplewood has a 400-watt gas-driven generator and have placed it at the disposal of the Maplewood AEC. The annual Maplewood Memorial Day parade had members of the Maplewood AEC amongst the marchers. Those participating were IKS, AIK, LNH, COT, HFB, FLN, HBN, LSR, IHK, MLD, LKH, HXJ, IAL and LKK. Members of the Clifton AEC also participated in local activities on Memorial Day. MRK built a mobile 112-Mc. rig and worked 6W1's while in Conn. MKW has a new job with regular hours, so will be active once more. The Clifton Radio Club held a hamfest in Garfield on May 10th, and a good time was had by all. HWZ moved into a new home, and expects to be on the air shortly. BVD, EYE, HFN, IQG and many others have been making regular visits to Garrett Mountain Reservation with mobile rigs. BLF has been active with e.c.o. and 30 watts on 1.75 Mc. MAX, MNT, AHN, HXI and MKN were among the hams from this Section who attended the annual N. J. AARS dinner in Trenton. A transmitter hunt run by the AARS under the direction of AHN provided a lot of fun for a number of the local boys. Two emergency-powered rigs were used, one on 1.75 Mc. and the other on 112 Mc. DAC, EKU, JKH and KXD were the first team to find the location of the hidden transmitter. Others participating in the hunt were: EWM, HAO, FDL, MRZ, MIG, IKS, CZS, GKX and GHZ. To inspire the sale of more poppies on "Poppy Day," the Raritan Bay Radio Club, working with the American Legion, had several 112-Mc. mobile rigs cruising around Perth Amboy. These stations accepted messages and forwarded them to club headquarters, where they were sent by various nets for delivery to all points in the U. S. HYR built an e.c.o. for 3.5 Mc. 73 and best of luck to all, and thanks again for everything. Ed — W2LMN.

Traffic: **W2**MNT 1034 (WLNW 81) MLW 561 NCY 166 MNO 118 MHJ 109 KSR 102 IYQ 100 MAX 92 (WLNM 33) MRJ 81 NJE 58 JUU 49 MKW 40 ANW 31 HCO 27 EKU 15 LMN 6 CIZ 4 IZV-MRX 3 MIG 2. (Mar.–Apr.: **W2**MHJ 287 MAX 106 (WLNM 10) ANW 43.)

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — W3GKO is again the only E. Pa. BPL. AQN says ORS Net is functioning on ball bearings. FJU is NC 2 CA fone and c.w. nets in AARS which keeps him quite busy. AOC has recovered from his recent operation. 8SSA, 8SZF and 8RKZ work together for W. U. Tel. as telegraph operators sending play-by-play descriptions of baseball games for their respective cities. 3BXE reports E. Pa. AEC well in hand. 8BQ is in the Phila. Naval Hospital. It's a boy at 3GOW's and a girl at 3ADE. Would like active 1.75-Mc. W8 in W. Pa. to assist in trunk line. Contact or write FMF. EWR, with DRO assisting, has taken over Lancaster County AEC work. 8UQM worked 88 stations in 24 sections in the April ORS Party using flee power from a signal shifter. 3FXZ worked portable W8 in FD. BES was QRL FD. HFD is giving EOZ and DOU competition on 28-Mc. 'phone. GYV is repairing "Big Berthas" for U.S.A. HJE and HXA will soon complete the world's largest X-ray installation which covers half a city square. We hope that it is well filtered and shielded. AQN talked his Red Cross unit into buying a gas-driven generator set. Frankford Radio Club purchased another generator delivering 300 watts ac. HFE built a novel 112 Mc. rig using 7A4's. BRZ was in a twelve-way qso in the OPS Party. 8IWT is rebuilding. 3DMQ will be on soon with an emergency layout. DGM looks like a sure thing in the April ORS Party. Attention, all ORS: Please attempt to sign up every amateur you know in the AEC. Blanks will be mailed upon request. BXE has all the EC's listed by counties. Contact him in order that you may help your local EC.

Traffic: **W3**GKO 1793 (WLQQ 53) 3AQN 374 3FJU 317 3AOC 312 (WLMB 138) 3AKB 200 8RKZ 181 3BXE 135 8ATF 124 8EU 119 3ADE 91 80KC 58 3ASW 45 8QEW 37 3FMF 33 3DRO 29 3GYK 21 8UQM 19 3FXZ 18 3BES-3DXC-3HFD 10 3EML 5. (Mar.–Apr.: **W3**ILK 9 3HJE 4.)

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Hermann E. Hobbs, W3CIZ — 3AQV would like either a c.w. or 'phone traffic schedule not AARS. BAK says the Argument Radio Club has 25 members and meets twice a month in Georgetown, Del. EQK has chased the bugs out of his 14-Mc. 'phone. FTD is now on 14-Mc. 'phone with 900 watts. FE is QRL with only time for AARS. FFN joined ARRL and is ORS with a 35T final and 150 watts. GME would like a 3585 xtal. Anyone knowing the whereabouts of such a critter, drop him a note. HAL makes BPL this month with 3SN schedules keeping him extremely busy. HWJ/3 moved. JDK has daily schedule with W1KKE on 7 Mc. OZ is active in AARS nets. WU worked KD4HHS (14280) for his 79th country on 14 Mc. and made a schedule with him for IUU.

Traffic: **W3**AQV 3 BKZ 132 BWT 1074 CDQ 32 CIZ 338 DRD 14 EQK 16 FE 7 FFN 5 GMK 28 HAL 538 HWJ 20 JHW 42 OZ 35 PV 131 WU 3 CXL 1205 (WLM 3348). (Mar.-Apr.: **W3**GMK 23 HAL 262.)

SOUTHERN NEW JERSEY — SCM, Lester H. Allen, W3CCO — Ass't SCM and AARS Liaison RM, W3ZI — Regional Coördinator in charge of Emergency Coördination, W3BAQ — RM's: 3BEI, W3BYR, W3ITU — PAM: 3EUH — Section Net Frequencies: OPS 1980 kc. (Thursday at 8 P.M. EDST), ORS 3700 kc. (Tues. and Sat. at 8 P.M. EDST), ORS 7280 kc. (Wed. and Fri. at 8 P.M. EDST). The Delaware Valley Radio Association, under the leadership of W3BAQ, demonstrated portable gear at the State Teachers College. About 600 messages were originated. A Hobby Show was held at Trenton and DVRA exhibited under the leadership of 3BAQ and 3CKY. IDZ renewed OPS. IUO and HAV are new ORS. GZS and FAX are OPS prospects. ABS and ACC are in charge of getting the 56-Mc. 'Phone Net started for the Section. Anyone interested, please contact either Horace or Stanley. JBU decided to *increase power and build a better receiver for net drills.* 8LJD/3 at Fort Dix received the special call WLNC. Bill will be glad to take traffic for the Fort via ORS or AARS channels. HWT is at U. S. Naval Radio School, Noroton Heights, Conn. His complete QTH is Company 8, Barracks G, and he would welcome letters from the boys. HOJ spent ten enjoyable days with the folks this month in Trenton, after being away at Fort Bragg, N. C. Sam keeps schedules with ATF. 8SZK/3 is at Fort Dix and is an operator at WLNC. Johnny Roberts over Atlantic City has been quite busy on 7-Mc. c.w. GEV returned to 28-Mc. 'phone. ABS has added a Meissner Signal Shifter. Radiograms were released this month to several of the appointees in this Section requesting information concerning appointments, and only a few replied. I must insist that monthly reports be sent in. If you do not find your call listed on the various rosters, you have been dropped from the ranks for inactivity. JBU recently met EOP and spent a very enjoyable evening. CFB is interested in getting the 7-Mc. ORS Net in high gear and asks those interested to contact him. IZT changed his buffer to 812 and gets enough drive for 800 watts to his final. George *is one of the faithful* 'Phone Net *members* and rarely misses a drill. CWG is active on the 'Phone Net. CFB schedules his brother every Wed. and Sun. on 7 Mc. HOH is doing an fb job on 2½, 56 and 112 Mc. these days and is NCS for the Army 56-Mc. Net. AEJ is operating 1.75 Mc. consistently and doing an FB job handling traffic by 'phone. HPX has a traffic outlet to Fort Jackson, S. C., *via* 2BQH/4. HYT *had the rig all straightened out and* perking FB. The AARS State Hamfest was held in Trenton, April 20th, with 26 members present, including our YL friend from Albany, WLNG. Speakers at the affair were 3CCO, 3BYR, 2MZX, 3EFM and our 3HKO. GCU is still looking for Ariz. and Nevada to complete WAS on 3.5-Mc. c.w., and expects to QRO to 600 watts. AVJ sends in a nice sizeable traffic total this month, and has many traffic schedules. JLT has been assigned to Jack Ritman in Trenton. Congratulations, Jack. Until next month, 73.

Traffic: **W3**BAQ 616 3BZX 336 3AQ 288 HDW 145 BYR 132 (WLNV 93) AVJ 117 GCU 91 IDZ 84 EWK 70 BEI 68 IHO 59 GMY 39 HKO 75 ZI 47 ASW-ATF 46 CCO 45 ITU 44 HYT 33 HPX 32 AEJ-HPX 20 HOH 18 CFB 16 CWG 13 IZT-ACC 10 GEV 8 GHR 6 JBU 5 HAZ 156 8LJD/3 147 (WLNC 9).

WESTERN NEW YORK — SCM, Fred Chichester, W8PLA — Big event of the month was the hamfest of the CNYRC at Syracuse. As usual, it was a great success. There was a fine attendance, plenty of prizes, and the dinner served at the Turn Verin Hall was enjoyed by all. RGA has *deserted* 3.9- for 14-Mc. 'phone. UPH *is going to* town on 7 Mc. MC has been appointed EC for Monroe County and is anxious to hear from anyone interested in this increasingly important branch of our activities. OQC flew in from camp for a brief visit on Mother's Day. LTJ is back on 3.5 Mc. TRC and PK are keeping their hand in on 28 and 56 Mc. USF won the code-copying contest at the Syracuse Hamfest. JIC is getting a 1-kw. gas engine-driven generator to power his portable rig. DKN has had his old call re-issued to him and is burning up the 7-Mc. band nightly. He and PDF are leading in the race for WAS in the RARA contest for the John Long Trophy. VUY is a *new Rochester call. RLI sends nightly code practice on* 3.5 Mc. RRF has left Rochester for a job in Schenectady. DFN and TJJ have moved to new locations with plenty of antenna space. Nine of the YL's in the Ladies Auxiliary of the RARA have received their code proficiency certificates for 10 wpm. Their code instructor and president is TUQ. PDF is instructing the girls in theory and is doing a swell job. Many of the girls expect to shuffle off to Buffalo soon, to take the exam. MNW has joined AARS. ATH and CWW are building radio-controlled boats. VDA is building a new e.c.o. VOW (ex-9GLZ) is now operating at WSAY. The annual RARA picnic will be held July 13th at Brookview Park on Chili Road. The EC's of Erie, Genesee and Monroe counties have started regular Sunday morning schedules on 3580 kc. at 10 A.M. DST. Any other coördinators are *invited to attend the schedules.* KYR plans to attend the YLRL Convention in Chicago. Her new location is ideal and the rig is working out fine. RKM and PLA attended Syracuse Hamfest and spent the week-end with CSE. RMRM worked a W3 with his 5-watt 1.75-Mc. 'phone rig. The Section is urgently in need of Emergency Coördinators in Chautauqua, Cattaraugus, Fulton, Montgomery and Otsego counties. We are also badly in need of ORS in this locality and in northern New York. Much traffic is coming *through from the men in camp and, at present,* must be mailed to towns in the parts of the state mentioned. Anyone interested is urged to communicate with the SCM.

Traffic: **W8**RZX 35 AOR 56 RTW 22 SBV 81 RKM 21 AQE 35 BJO 212 RTX 17 SJV 21 USF 22 JIW 316 UXT 37 PLA 288.

WESTERN PENNSYLVANIA — SCM, E. A. Krall, W8CKO — All members of the W. Pa Net are reminded of the various time changes in different towns and govern their actions accordingly. NCJ has erected a new 3.5-Mc. antenna which works FB. His XYL made 280 points in the YLRL contest. He also reports the W. Pa. traffic nets functioning smoothly, and all members are building up their code proficiency. TOJ took part in his first RM Nite on May 3rd. PER visited RM, NCJ and XYL. WQ is rebuilding and will be on the air by the time this is published. JSU visited NCJ, and says he admires the set-up a lot. PX still does his part on Trunk N. OKK will be on W. Pa. Net as long as traffic keeps coming. IOH has been playing with a galena crystal receiver and has received some distant stations. KXP is getting a big kick out of 3.9-Mc. 'phone. SFV is *quite active in ORS parties. The Pittsburgh* Area Radio Club Council held its April meeting at Uniontown, Pa. Thirty-three members were present, and many matters of prime interest were discussed. ARRL activities were well represented in the Section during the April-May period, and we hope they continue during the summer months. AARS membership has increased in the Section due to the *untiring efforts of KWA. ARRL and AARS nets tie into* each other in W. Pa. We invite traffic to and from the boys at camp. All messages are expedited in a coöperative manner. ORS and OPS are cautioned to get reports to the SCM in time to write up by the twentieth of the month.

Traffic: **W8**NCJ 402 KWA 264 MJK 261 MOT 254 TOJ 176 CKO 163 PER 107 WQ 106 JSU 105 PX 80 UWZ 73 CMP 69 YA 39 OKK 38 IOH 32 HKU 24 TWI 14 NDE 9 BOZ 2.

DELTA DIVISION

ARKANSAS — SCM, John R. Sanders, W5GNV — We now boast of three EC's in the Section and the ORS-OPS roll is also getting longer. The SCM again invites inquiries from qualified stations interested in appointments. He also urges *all* active stations to get that activity report on the 16th of every month. The current reports are looking pretty good but there is plenty of room for improvement. On the evening of April 22nd, the members and friends of the Greater Little Rock Amateur Radio Club enjoyed a picnic at a local park given in honor of the R.I. and his wife. Some 40 to 50 hams, XYL's and YL's and a number of Army hams from Camp Robinson were in attendance. *After the "eats" were taken care of, a number of high-*spirited games and a general gabfest took place. GGW schedules KD4HHS at Swan Island. HYS received a promotion recently, and says the rig is in line for the same with 812's in the final and 911's in Class B. IRY has our sympathy at the recent loss in his family. HER made Class B in April. GYR is experimenting with a top-loaded vertical. BJR was *appointed alternate DNCS for* AARS 1.8-Mc. 'Phone Net. GED received a visit from HBW, FWD and EQP who were in Little Rock for the exams. GWA is active on 1.8-Mc. 'phone and anticipates trying high power the Class B linear way. IGM was transferred to Del Rio, Texas. JBU and QI are working portable from their new location near Camden. JSR has recently been working on 2-Mc. c.w.

The Month In Canada

(*Continued from page 50*)

RCAF at Montreal. All of the following are now on active duty:

VE1 CP, EM, OX, JH, RD, LF, JR, HB.
VE2 EN, IO, DD, OI, IC.
VE3 AEO, AFK, AJP, AHW, AIP, AIU, ALF, ALG, ALR, ALX, ANF, ANV, ANI, AQQ, ARV, AVA, AX, AXD, AYX, BBH, BD, PK, CJ, CO, FB, HR, IF, JH, JB, KD, KV, LG, OZ, PK, PR, RI, SH (4AYS), SS, SY, VY, YX, FO, WI, EF, LG, SM, ex-3AIP, ex-3PI, ex-3ARX.
VE4 ADS, AGC, AGW, AGN, ALW, AMC, AMQ, ANH, AOS, ASE, FM, UO, VG, OQ, AX, AEZ, AHN, YO, VA, ZN, YJ, AKV, FO, AF, AJO, ABN, APT (5ABC), ex-4AAP, ex-4AEE.
VE5 KO, AES, AGA, AHJ, MP, AHV, ADK, MJ, ABC, ex-5ID, ex-5DR, ex-5AHS.
VO IT

AXC and IB are spending their spare time conducting code classes and teaching radio theory to prospective amateurs and recruits. Congratulations to KV, who has been promoted to the rank of Corporal in the RCAF. We hear KV has recently purchased a "new" car of rather ancient vintage and has been seen driving around Montreal and vicinity.

WY is officer-in-charge of the Strathburn Frequency Monitoring Centre at Glencoe. JV writes, "Incidentally, I have seen ARRL *Handbooks* and *Antenna Books* on some pretty important desks recently, so you can see you are helping solve some of our problems during this serious time." Thanks, OM! EF, who is now Flying Officer Gunn, is also now Headquarters Signal Officer of the Eastern Air Command, RCAF.

And ANB reminds all W's: "Should you or your friends desire to visit Canada, there are *no* restrictions. A good welcome awaits! No gas restrictions, and 10% on your money. This is a wonderful country both to live in and to visit — even if we are at war!"

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BRITISH COLUMBIA—VE5

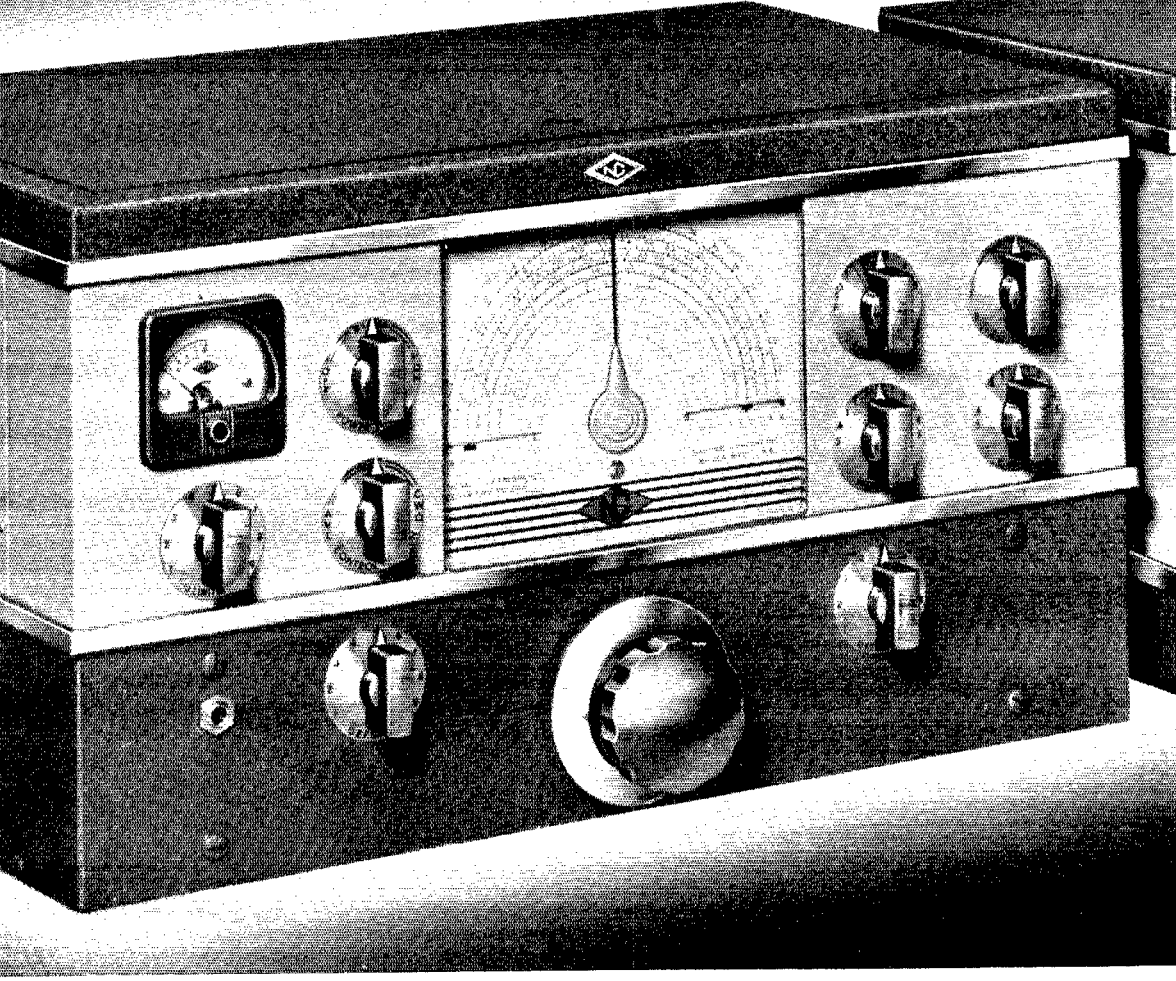
C. O. Sawyer, VE5DD and SCM for British Columbia, comes through this month with a report that only goes to prove how much he's been keeping to himself during all these months of silence. What's more, he promises to repeat on demand. Listen to what DD has to say, you VE5's, and act accordingly:

This new feature in *QST* is a welcome opportunity for us all to re-acquaint ourselves with one another after almost two years of silence. If all the VE5 gang will coöperate by sending me periodical reports, letters, newspaper cuttings or anything of interest, an endeavor will be made to assure a monthly report in *QST*. Remember, the 16th of the month is the deadline for this district, so let's have the dope, fellows.

The B. C. Amateur Radio Ass'n, an association of a number of clubs in the lower mainland district of B. C., is still active, meeting periodically and holding various activities such as picnics, roller-skating parties and dances all with the point in view of keeping the gang together. Several local clubs are still operating in Vancouver and New Westminster, including the Totem, the Royal City, the Junior Point Grey and the Point Grey clubs. I have had no definite information from Victoria but believe they still hold meetings. Will Vancouver Island and interior points please let me know their activities?

AC is quartermaster sergeant in charge of ashcans at a soldiers hostelry. AE is somewhere over the high seas at the radio controls. ACN is a camera enthusiast and has won several prizes for his work. AEJ is a control operator at broadcast station CBR. AET took over radio operator duties aboard the freighter *Wesser* captured by HMCS. *Prince Robert*, EU, FQ, BF, PA, RS, JK, EG, KQ and EH all work with trans-Canada airlines and keep their fists in shape. AEY is interested in ARP work. AGG is a teletype and telegraph agent in Fraser Valley.

BI is a flying officer in radio service overseas. BJ still dusts his equipment and patiently awaits the happy day. BK keeps the dynamos spinning and assures himself power for the future. BM is a radio beacon inspector and cruises up and down the coast. BQ is daddy of two boys and makes pipe furniture as a hobby. BR contemplates going into the

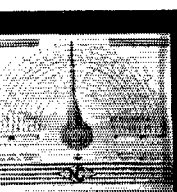


The Outstanding Amateur Receiver

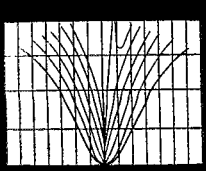
The NC-200 Receiver is outstanding for Amateur use. For example, four amateur bandspread ranges are provided in addition to the six general coverage ranges. These bandspread ranges are entirely independent of the other ranges, their calibration is fixed, and their setting is read from the big sweep pointer on the dial. And it is real bandspread, too — for the 10, 20, 40 and 80 meter bands are each spread out over the major part of the dial scale.

FEATURES: Sensitivity better than one microvolt • Series valve noise limiter • Improved crystal filter with rejection ratios as high as 10,000 to 1 • Stability 3 parts in 100,000 for 20 volt line fluctuation • AC line or portable operation • Speaker in matching cabinet • Amateur Net Price $159.50 without speaker.

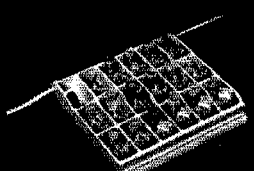
NATIONAL COMPANY, INC., MALDEN, MASS.



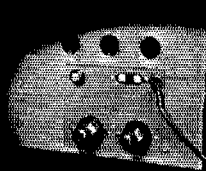
TEN CALIBRATED COIL RANGES



WIDE RANGE CRYSTAL FILTER



MOVABLE COIL TUNING UNIT



PORTABLE OR AC OPERATION

manufacturing business. BY, on duty aboard a plane over the high seas, dropped 5000 feet in 8 seconds and was only 400 feet from water when the pilot regained control and landed safely. AEU was torpedoed in the North Atlantic and sent out an SOS. CB is a flying officer in the RCAF instructing in radio. DD keeps in shape with commercial landline automatic telegraphs and digs his garden for a hobby. DO is in the North country. AL is fixing telephones for those who have the two-fifty.

CL and GH are patching punctured receivers in England. EP is down in Ottawa looking for a good maternity home between spells in the signals; cigars are in order any day now. If you remember, Don was SCM and married NG to save buying one license! HC is doing government research in Ottawa. DZ looks them over for the customs at the Pacific Highway border station. Look for a corpulent gent with curly hair.

KC and BE recently walked down the aisle, and FM says he expects to follow them very shortly. AEZ and AJM are with the RCAF in England. ND is president of the BCARA and father of an eight-month-old boy. EH hibernated somewhere on the West Coast, having been spliced to relieve the tedium. VE5EZ, Victoria Short Wave Club: DV and DY of the Victoria gang would like some news from you fellows. ES is active with the Totem Radio Club. FB is in the Signal Corps. FG's at Prince George — what's the news from up there, Doc? FI is teaching at a radio school. FO is doing research work for the government. GL is interested in ARP and Boy Scout work. GQ keeps his fist working on b.c. police radio.

GS was operating aboard the SS *Lisieux* when she foundered off Newfoundland, and spent 20 hours in a lifeboat. HA is secretary of BCARA and does a good job. AM and HI are in radio jobbing. HP is interested in radio manufacturing. ID is flying officer instructing radio in the RCAF. II is commercial op in government service. JB moved east with a large sound-equipment company. JD is radio op with a large smelting company in Saskatchewan. AS keeps business rolling in public address work. OM is still busy with b.c. police and keeps in touch with the gang at the clubs. ON is repeater man on CBC networks. OT is projectionist in a new theatre and keeps in practice with candid snapshots. PU is in the Signal Corps. RJ is repeater chief at Boston Bar. RV is radio op with the RCAF on patrol duty. UP is kept busy in radio jobbing. VP wishes he could crank up the 20-meter beam again. Ex-5GF is handing out cigars; it's a boy! KN keeps an eye on the boys at the military camps. His son Bill is a signal officer with an active service unit. NI keeps busy with radio manufacturing. In looking over this report it strikes me Dan Cupid and Daddy Stork maintain a pretty consistent schedule. A large number of the gang have answered the call of service in the radio branches and I know I have missed numbers of them, but as reports come in so shall the reports be sent to *QST*. 73 to all.

CU next month.

— *C. B. D.*

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Official Observer W9HQH takes his frequency measuring seriously. In the qualifying measuring test held last May 18th, he made measurements of W1AW with an average accuracy of 2.68 parts per million using equipment containing *6*$ tubes!

—•••—

Here are some examples of nifty relaying via u.h.f.: On March 17th, under conditions which were about the worst he had ever experienced, W1HDQ originated a message at 9:10 P.M. which was delivered to its destination, W3AWM, Washington, D. C., and a reply returned at exactly 9:30. Wilbraham, Mass., to Washington, D. C., and return in 20 minutes!! The relay route was W1HDQ, W2MO, W3GJU, W3CGV, W3WA, W3AWM, with return in reverse order. The same evening W1LSN, Exeter, N. H., sent a message to W3AWM at 7:25 and received the reply at 10:15. The route in this case was the same as the above with W1JDD helping in the extension northward from W1HDQ to W1LSN. There was no attempt made at a record in either of these cases. We hear of another fine circuit on 56 Mc. over which a message from W9ZJB in Kansas City, Mo., addressed to W9BNX, Wheaton, Ill., traversed several hundred miles to W9ZWF between 8:30 and 10:35 P.M. C.S.T., on January 28th. The stations known to have taken part in this relay were W9ZJB, W9YKX, W9NFM, W9HAQ and W9ZWF. We look forward with interest to observing results in the April 26th–27th U.H.F. Contest and Relay announced elsewhere in this issue.

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Drop me a line today, won't you!

HENRY RADIO SHOP

Bob Henry

W9ARA

BUTLER
MISSOURI

Optimum Q and Impedance

(*Continued from page 31*)

performance becomes more like that of a line than like a lumped inductance. In such cases the graphs are not applicable.

Skin Depth and Resistivity

The phenomenon of skin-effect causes the r.f. current to penetrate the conductor to a depth inversely proportional to the square root of the frequency, and when the conductor radius is greater than the skin-depth the material beyond the layer carrying virtually all the current has a negligible effect on the resistance. For copper the skin depth is $0.00662\ \sqrt{f_{Mc}}$ centimeters which amounts to 2 mils at 1.75 Mc., 1 mil at 7 Mc., 0.5 mil at 28 Mc., 0.25 mil at 112 Mc., and 0.13 mil at 400 Mc. This interesting property of r.f. conductors makes possible copper or silver plating of a high-resistance metal of low thermal expansion, thereby obtaining low resistance plus a low or zero temperature coefficient of inductance or capacitance. Copper or silver plating alloys is a common practice for resonant lines when excellent temperature stability is necessary, and this method has been extended to solenoids.[12] It is recommended that the plating be greater, even twice the figures given above.

The data given for solenoids and toroids are based on the use of copper as the conducting metal. For solenoids and toroids the Q and impedance vary as the square root of the resistivity of the conductor (or the plating if it is thicker than the skin depth). Thus the resistivity increases or decreases the Q or impedance to about 104% for silver; 99% for hard-drawn copper; 78% for aluminum; 55 to 53% for zinc; 52 to 46% for brass; 47 to 43% for nickel (magnetic); 42 to 16% for iron, steel, and their alloys (magnetic); and 39% for tin. Notice that the recent unjustifiable use of tinned wire, if the tinning is greater than the skin depth, will decrease the Q or impedance of a solenoid in a resonant circuit to about 39 percent of the values obtained with bare or enameled copper wire.

In using the graphs it should be borne in mind that the equations on which they are based do not include certain practical factors which will reduce the Q and impedance below the values indicated. Losses from any cause will increase the effective resistance of the inductance and thereby reduce the Q. In the case of solenoids, for instance, there will be some dielectric loss in the form on which the coil is wound, there will be eddy-current losses in shielding or other nearby metallic objects, and very likely also some radiation loss, particularly at the higher frequencies where the coil dimensions are greater in comparison to the wavelength than at lower frequencies. Experimental measurements show that the Q of a coil will in general vary as indicated by the graphs, but that the actual value will be lower than predicted; typical coils show actual Q's of the order of 60% or 70%

[12] Seeley & Anderson; RCA Rev., vol. V, pp. 77–78, July (1940).

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of the predicted values at the lower frequencies. Although the Q's and impedances indicated cannot actually be realized in practice, the charts are nevertheless useful for design purposes, and particularly for comparing the merits of different coil dimensions for a particular application.

In the case of toroids the theoretical results are based on the assumption of perfect geometrical construction, including surfaces so smooth and carefully aligned that no dimension varies as much as the skin depth of current penetration. At frequencies on which this type of inductance is used the tolerances are considerably less than a thousandth of an inch, and while this order of precision in construction may not be actually impossible, it is not likely to be met with in practice. The losses can be expected to increase considerably with ordinary variations to be expected in dimensions, so that again the graphs should be used as guides to optimum dimensions rather than as indicating actual values.

Appendix

Single-layer Solenoid (Fig. 1):

$$Q = \frac{\sqrt{f}\, L\, d\, S^2\, D}{31.62\, \sqrt{\rho}\, (S^2\, D^2\, N + 2\, N_3\, d^2)} \tag{1}$$

for copper

$$Q_m = \sqrt{f_{Mc}} \left[\frac{D\, b}{(102\, b + 45\, D)}\, 117.4 \times 10^{-6} \right] \tag{2}$$

$$d_o = 0.707\, b/N \tag{3}$$

$$L = \frac{D\, N^2}{102\, S + 45} \tag{4}$$

$$N = \sqrt{\frac{L\,(102\, S + 45)}{D}} \tag{5}$$

$$Z = X^2_L/R = X_L Q \tag{6}$$

where

Q = figure of merit = X_L/R
Q_m = Q with optimum wire size
b = length, cm.
D = diameter, cm.
d = wire diameter, cm.
d_o = optimum wire diameter, cm.
L = inductance, μh.
S = length/diameter = b/D
N = number of turns
ρ = resistivity, ohms/cm. cube
f = frequency, cycles ($f_{Mc.}$, megacycles)
Z = impedance at parallel resonance, ohms

Toroids

Circular Toroids, copper (Fig. 4):

$$Q = 303 \sqrt{f_{Mc.}\, R} \left[\frac{1 - \sqrt{1 - (r/R)^2}}{(r/R)} \right] \sqrt{1 - (r/R)^2} \tag{7}$$

when $r/R = 0.71$

$$Q_m = 89.1\, R \sqrt{f_{Mc.}} = 52.1\, (R + r) \sqrt{f_{Mc.}} \tag{8}$$

when $r/R = 0.92$

$$Q_z = 79.0\, R \sqrt{f_{Mc.}} = 41.2\, (R + r) \sqrt{f_{Mc.}} \tag{9}$$

$$L = 0.0125\, N^2\, (R - \sqrt{R^2 - r^2}) \tag{10}$$

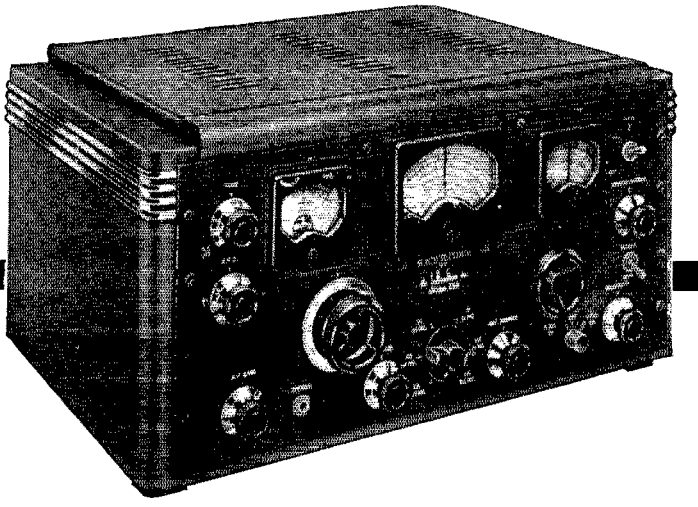
where

Q_m = Q with optimum dimensions
Q_z = Q for maximum impedance
R = radius from axis to center of cross-section of turns, cm.
r = radius of turns winding, cm.

Rectangular Toroids, copper (Fig. 7):

$$Q = \frac{303\, r_2\, \sqrt{f_{Mc.}}}{\left[\dfrac{2\, r_2}{h} + \dfrac{1 + \dfrac{r_2}{r_1}}{\log_e \dfrac{r_2}{r_1}} \right]} \tag{11}$$

hallicrafters SX-32



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when $r_2/r_1 = 3.59$

$$Q_m = \frac{84.3\, r_2 \sqrt{f_{Mc.}}}{\left(1 + 0.556\,\frac{r_2}{h}\right)} \qquad (12)$$

when $r_2/r_1 = 12$

$$Q_s = \frac{57.9\, r_2 \sqrt{f_{Mc.}}}{\left(1 + 0.382\,\frac{r_2}{h}\right)} \qquad (13)$$

$$L = 0.004606\, N^2\, h \log_{10} \frac{r_2}{r_1} \qquad (14)$$

where

r_1 = inner radius, cm.
r_2 = outer radius, cm.
h = axial height or length, cm.

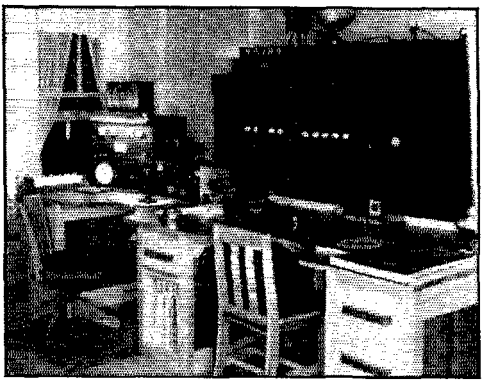
Roanoke Division Convention

Asheville, N. C., July 5th-6th

THE Roanoke Division Convention this year is being sponsored by the Asheville Amateur Radio Club. The two-day conclave will have many interesting highlights and plenty of entertainment is being planned, including a motorcade over the beautiful Skyline Drive. Tickets will also include a dance and a show at one of Asheville's best theaters. The Asheville XYL Club will keep the ladies busy, so don't leave them at home. Registration is $3.00, or $2.75 in advance by mail. For tickets or additional information address club secretary Cecil B. Shook, W4ESL, P. O. Box 128, Asheville, N. C.

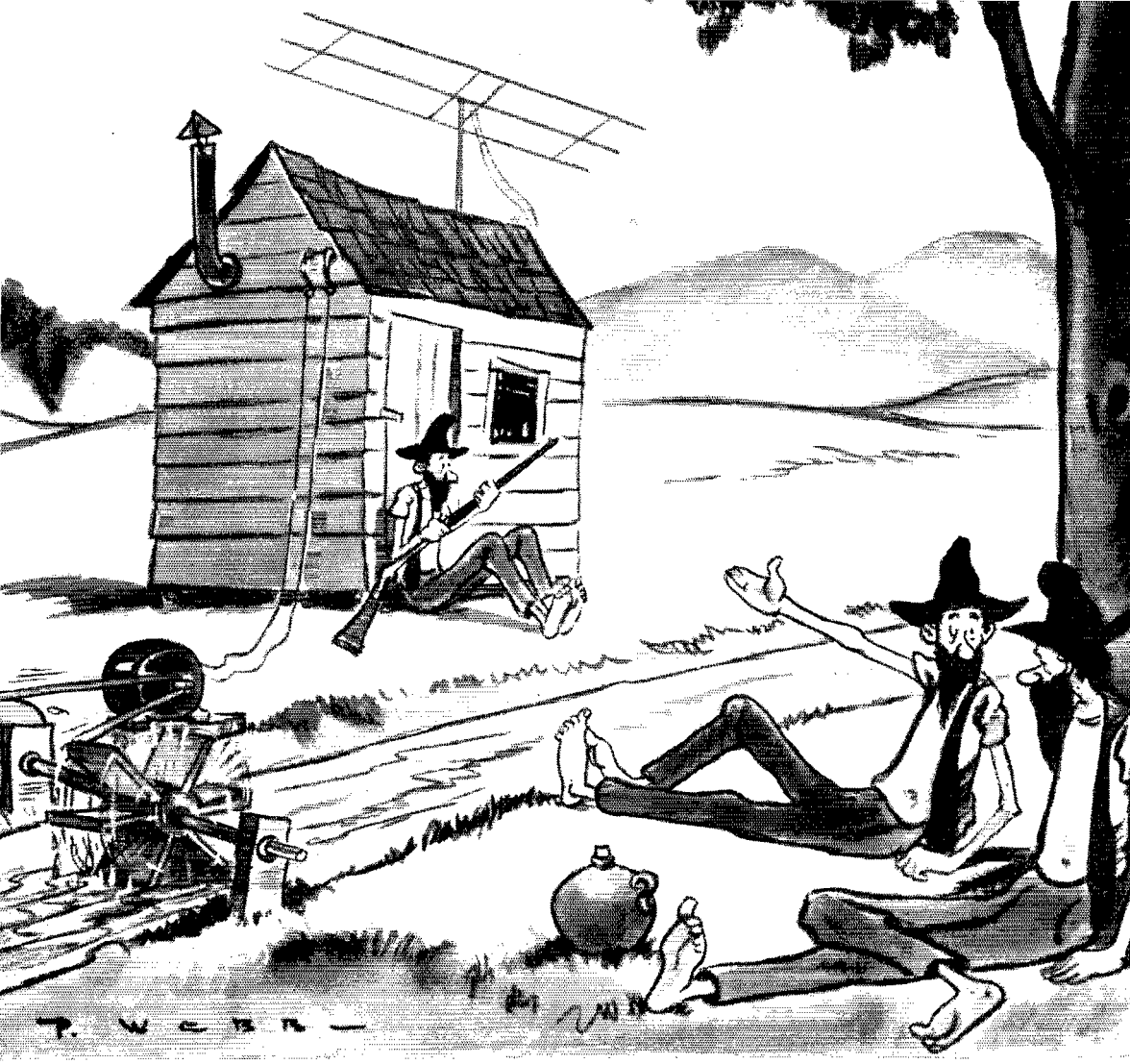
Strays

The Marine Corps League is conducting code classes here three times a week. There is no charge to anyone who desires to attend. The instruction is given by W6RPS on Monday, Wednesday and Thursday evenings at 500 West Washington St., Phoenix, Arizona.—*W6FZQ.*



W5IRO, Hodge, La.

Operator — Charles L. Kelley, executive, bag and paper firm. Transmitters — 28 Mc. — Meissner e.c.o., T21, TZ40, p.p. TZ49's, p.p. TW150's. 1-kw. input. 1.8 Mc. — Same e.c.o., TZ40, p.p. TZ40's, p.p. T200's. 1-kw. input. Audio — Dynamic mike, Thordarson speech amplifier, United HY57's. Receiver — NC200. Antennas — Mims 3-element rotary for 28 Mc., single-wire-fed half-wave for 1.8 Mc. Equipment also includes several emergency portable transmitters and independent power supplies.



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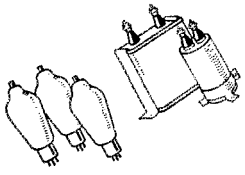

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407-10-690

In the Services

(*Continued from page 27*)

6IDU, is assigned to the destroyer *Winslow*. RM3c Stokes, 6SDU, is a code instructor at the Naval Air Station, Pensacola. RM3c Bullman, 6NQL, is on the *Mississippi*. RM1c Littlefield, 7DGY, is aboard the *Lexington*. RM3c Klisha, 2MZH, is a radio operator on the *Emerald*. RM3c Ecklund, 9AXN, is aboard the cruiser *Nashville*. RM3c Najork, 2HNH, is assigned to the *Wyoming* on Atlantic patrol. CRM Collins, 8QN, is in charge of materiel on the *Saratoga*. RM2c Childress, 9ZHD, is on the *Indianapolis*. RM3c Podgorny, 9MOS, operates on the *Kennison*. RM3c Cleary, 8NCS, handles transmitting room materiel on the *Chester*.

The Coast Guard is in a class by itself, we are told by O. W. H. Johnson, 1JCT, and so we'll give the hams among the Guardsmen a paragraph by themselves. CRM Johnson is a Boston District repairman doing temporary duty at the Navy d/f station at North Truro, Mass. RM1c Williams, 8NAZ, is in charge of communications on the Coast Guard cutter *Legare*. RM2c Nygard, 2JCZ, is aboard the cutter *Tulip*. RM3c Spencer, 6QZV, ex-8PQO, is at the Cape May, N. J., d/f station.

Here is a list of the hams 2FKE ran across among the trainees in the battalion signal school and around the post at Ft. Monmouth: 2HIO, 2HHY, 2HXF, 2JWX, 2INK, 2IDH, 2IMQ, 5IRF, 5GKX, 5JLG, 6LHW, 6MIR, 8MCQ, 8PAP, 8QGM, 9QAD, and K7BAQ. Another list comes from 2BDZ for the 2nd Armored Division's replacement center at Fort Benning. It includes: 1IZS, 1BDB, 2JSA, ex-2ILV, 3EXU, 6RUX, 7FCK, 9JKR, 9BRG and W9GXH.

Amateurs attending the second (March 10th) class at the Naval Reserve Radio School, Noroton Heights, Conn., include: W1HWW, Bachner; 1LIV, Bowen; 1LWK, Calabrese; 1MSF, Mikutajcis; 1KKB, Morrison; 1MQW, Murch; 1KCF, O'Hare; W1MXA, Pope; 1MBI, Rooney; 1MSY, Warner; 1JPT, Werlinsky; 1LMJ, Boudreau; 1LYB, Day; 1MBV, Hamilton; 1LER, Winslow; 1DZT, Woodberry; 1KMIT, Zervas; 1KOI, Woltosz; 1JWY, Barron; 1LQK, Bednarz; 1MCF, LaFleur; 1MGL, Leverone; 1KLI, Faubel; 2KAT, Papernow; 2IHN, Quinn; 2KJW, Skutnik; 2KQX, Spitler; 2GIJ, Sternfield; 2LBD, Templeton; 2JJT, TenEyck; 2LXN, Wisniewski; 2LAB, Yocus; 2MLO, Columbine; 2IIS, Cymmer; 2KLC, Jernick; 2KAU, Kowalik; 2MRV, Axelrod; 2ISW, Melnichook; 2MGL, Schreiber; 2JNO, Smith; 2JZT, Edelstein; 2IMX, Farkas; 2IRJ, Yeyman; 2MVM, Hluboky; 2NKZ, Iscra; 2MJM, Kehlenbeck; 2HQW, Krinsky; 2JBY, Mackey; 3EIE, Mason; 3HWV, Benner; 3IAW, Willey; 3HTO, Crider, Jr.; 3HWT, Sivo; 3IGR, Michaels, Jr.; 8NEB, Micolucci; 8RCL, Olsefsky; 8UJA, Shortridge; 8JQE, Yarnall; 8FXG, Rawson; 8RQT, Runyon; 8QMW, Bettner; 8ORK, Casselman; 8SJZ, Hawkins, Jr.; 8OQC, Lustyk; 9YDW, Osler.

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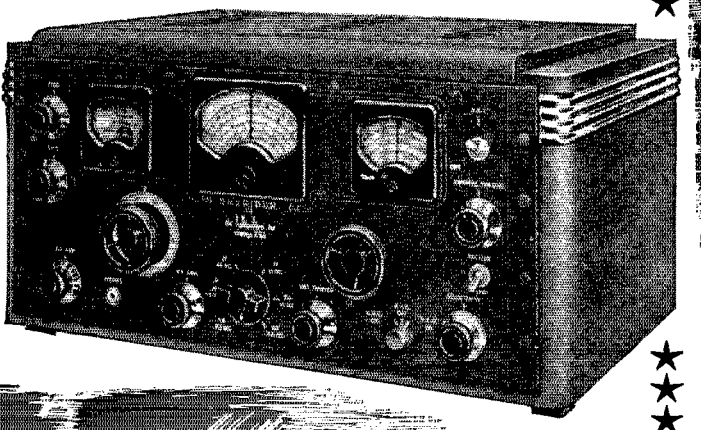

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73,
Bill Harrison, W2AVA

Very truly yours,

.....

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.....

Correspondence from Members

(Continued from page 42)

on the super regenerative final detector for u.h.f. super-het receivers.

I am now more fully convinced than ever, since reading Hull's articles, that the fellows on 112 Mc. and higher are overlooking a "best bet." . . .

After building a 6C5-1232 112-Mc. converter last February, I found it next to impossible to copy W6QLZ on 112 Mc., due to the instability of his modulated oscillator. W6QLZ came through consistently on 112 with fair signal strength, but only scattered words were audible on the average night. The output frequency of the converter was approximately 20 Mc., so I tried feeding it into an old super-regen tuned to this frequency, and the results were certainly surprising. Clyde came through with excellent quality and I found it very easy to tune the set-up, for it was just a matter of tuning the bandspread dial on the converter and refining slightly the tuning of the mixer tuning condenser. I've copied his signals daily since that time on 2½ meters with this set-up. So far there have only been two or three times when I could not hear him, and I found later that these failures were due to water soaked switches and feed lines in the antenna system. . . . His signals vary from a good R9 plus-plus to bare audibility, depending upon the time of day and local conditions. The distance is about 107 miles across three major mountain ranges, some of which reach a height of 5000 feet. . . .

High gain, high sensitivity (much greater than that obtained from ordinary "rush boxes" by themselves) noise limiting, selectivity, easy and simple antenna coupling, not to speak of the elimination of signal radiation from the receiver, are just some of the features of a system of this type.

I have found that direct coupling of the converter output into the super-regen detector is very satisfactory, although if real high selectivity is desired then I would strongly advocate Hull's system of one converter with a low i.f. being fed into a second converter using a comparatively high i.f. with this second converter output being fed into the super-regen detector. . . .

A final suggestion: Personally, I think it a good idea to line the converter up into an ordinary super het, and after this is done the super-regen second detector may be tuned to the input frequency of the super het. Then the converter is simply fed into this detector with no further adjustment, other than peaking the mixer on the converter. It is rather difficult for the practical ham, like myself, to locate the i.f. output of the converter on a super-regen detector. It is much easier to locate it first on an ordinary superhet. . . .

— James W. Brannin, W6OVK

THE SAFETY VALVE BLOWS

Champlain, N. Y.

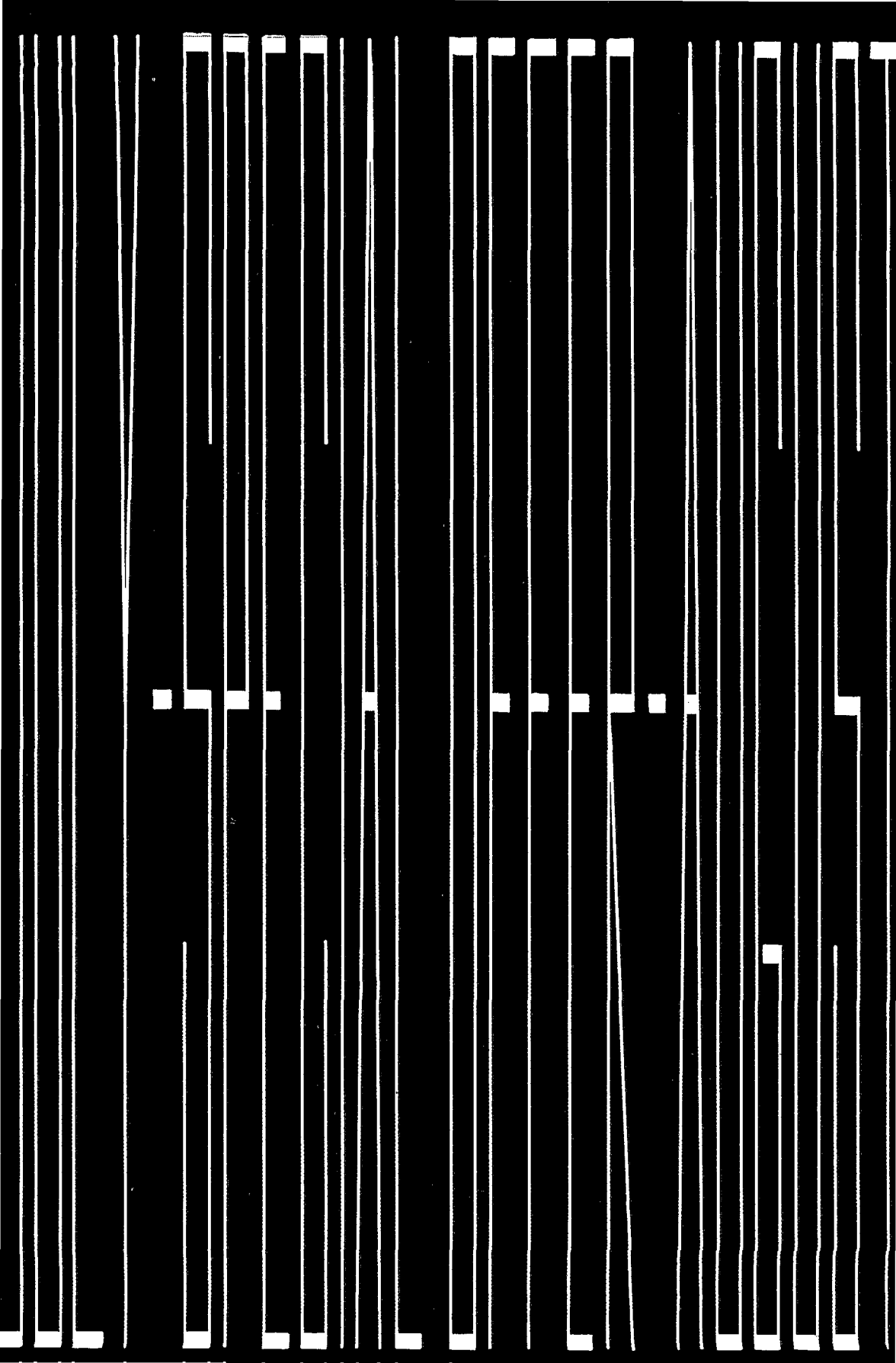
Editor, *QST:*

Been steaming up for quite some time, and now the safety valve has popped open!

May I ask what's wrong with some of the ORS and AARS "tfc" guys? Some time ago I asked a W1 "QSP Mass?" and he answered QRV, so I gave him my message. Heaven only knows what became of that message; all I know is that it never was delivered to the addressee. I could mention other instances like this one, but don't think it's necessary. All I want to say is this: "For the love of Mike, fellows, if you do accept messages, please see to it that they are delivered." This stuff of letting a message or messages, as the case may be, die on the hook is bad medicine for all of us hams, in that it's bound in time to lower our prestige in the eyes of the public. I've been a ham 13 years, and I can proudly say during these years never did I leave a message die on the hook. How many of you can honestly say as much? How many of you would walk three or four miles in snow up to your knees, with temperatures twenty below zero, to deliver a message? Well, I've done just that many times, and would do it again. Some of you ORS ought to be ashamed of yourself to let traffic die on the hook. . . .

— John E. Lambert, W8AOR

(Continued on page 72)



AN O O SPEAKS

103 Second Ave., Cedar Rapids, Iowa

Editor, *QST:*

Please, please — let's start right now enlisting our brother amateurs to spend a second and listen to both sides of the 'phone signal before making a report. It takes but a twist of the wrist to actually determine what *kind* of a signal it is and whether there are sidebands, overmodulation, etc. That is what a report is for. . . . If each station would give a true report instead of being afraid of hurting someone's feelings it would be a joy to act as Official Observer. As it is now, every bad report we send or give over the air is questioned, doubted, and perused over, and W9CVU is known as the big bad wolf with the stone conscience and a tin ear for 'phone stations. I find that most of the offenders with broad signals, side-band splatter and over-modulation are the same consistent ones; evidently an Official Observer report is just another scrap of paper to them. We don't get paid for this work, and it takes lots of time and effort to do it. . . . Possibly a suspension of a license after an O O report or two would convince these insistent offenders that there still are amateurs on the band that want their rights, and let these others who don't respect the amateur laws and FCC regulations be taught the lesson the hard way.

— *Chas. W. Boegel, Jr. W9CVU*

SAFETY, RACK-AND-PANEL, AND GROUNDS

70 Columbia Ave., Warwick, R. I.

Editor, *QST:*

An experience has happened to me which I believe should be of interest to the gang, since we are all trying to stress the *Safety First* angle.

Some time ago, I started blowing fuses in the 110-volt line switch box mounted on the panel of the transmitter, when I changed the final plate-voltage transformer primary switch from the 1000- to the 1500-volt tap. I blamed this on insufficient spacing of the input condenser in the Collins network, kept the voltage down to 1000, and went happily on my way. Finally, a high-voltage condenser was acquired for the Collins network, but still the fuses continued to blow on the 1500-volt tap. Then I noticed wax melting out of the filter condensers in the buffer power supply. The next move was to install an input swinging choke. Still the fuses blew, and the wax kept on melting. I replaced the condensers with pyranol-filled units and still the fuses blew — only this time they started blowing at 1000 volts. However, there was no flashing, and no blowing of fuses until the switch controlling the primary of the high-voltage transformer was closed. Then the cracking began and the fuse went.

Thinking the switch might have a loose wire on it, I started checking for loose wires and grounded 110-volt a.c. wiring, but the ohmmeter failed to show any trouble, either in the condensers, the chokes, the wiring, the transformers, or sockets. A point to remember here is that the ohmmeter had a potential of only 4.5 volts through 4500 ohms.

At this point, the power supply chassis in question was removed from the grounded rack and placed on a wooden bench. Power switches were operated and no fuses blew, but a sharp rap was received when my hand accidentally came in contact with the panel itself. Immediately the power was removed and a hunt for a break-down started, using a condenser leakage tester of the neon-bulb type and a voltage high enough to accomplish the result which the low voltage and high resistance of the ohmmeter failed to do. Lifting off first one transformer primary after another finally showed up a defective 2.5-volt transformer used to light the filaments of the 866's in the high-voltage supply. Taking the transformer apart (a manufactured one, of well-known grade, designed for the job it was doing), it was discovered a small hole had developed in the paper insulation between the primary and the secondary. Replacing this paper with two layers of Empire Cloth cured the trouble. The fact that the rig was constructed on metal and well-grounded caused the fuses to blow and kept this voltage off the panel, which showed a potential of 700 volts d.c. to ground.

As it was, I believe I was fortunate in being on dry ground at the time I touched that panel, and that I only got a rap instead of a nice kick that would have put out my lights. . . .

In my opinion this should help to settle the argument over metal rack-and-panel construction vs. breadboard construction, If my equipment had not been metal rack-and-panel, well grounded, I might not be writing this.

— *Clayton C. Gordon, W1HRC*

Skyrider 32

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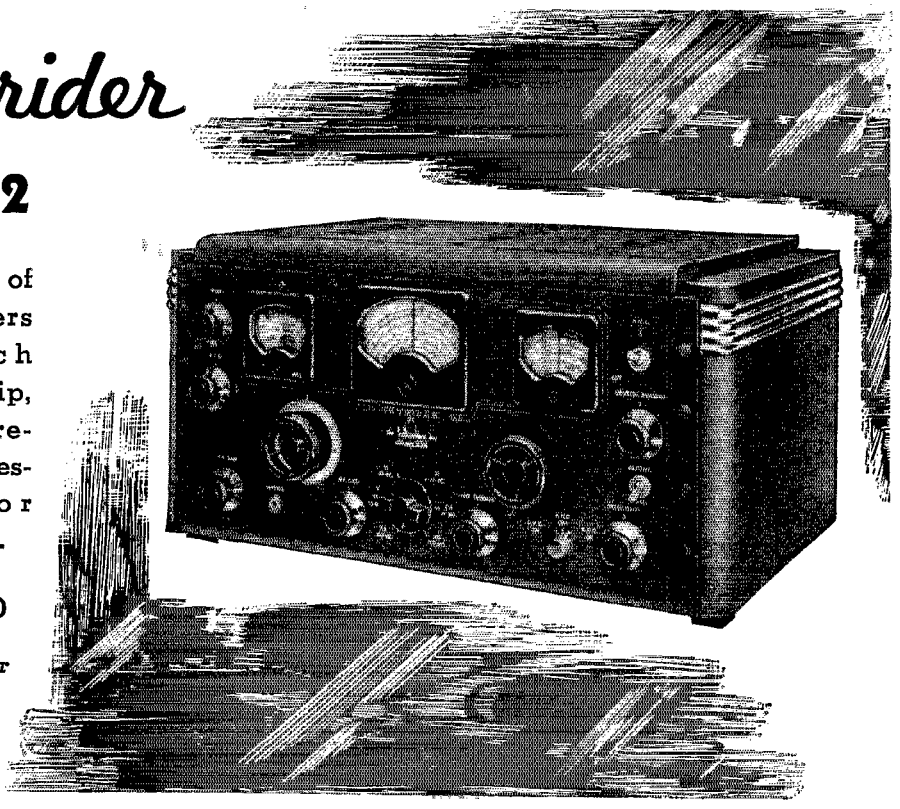
less speaker



- 13 tubes.
- Frequency coverage 500 kc to 40 mc.
- Six bands.
- Two R.F. stages on bands 3, 4, 5, 6.
- Separate temperature-compensated, high frequency oscillator and mixer tubes.
- Two I.F. Amplifier stages.
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- Amplified AVC action.
- Six-step variable selectivity from CW crystal to broad I.F.
- Crystal filter.
- 6H6 automatic noise limiter.
- Standard 19" x 8¾" x ⅛" thick panel. Set can be mounted in a relay rack.
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ON OPERATING MATTERS

Norfolk Navy Yard, Portsmouth, Va.

Editor, *QST:*

It may not be long before Uncle Sam will need you, and you, and you. Take your choice: Army, Navy or Marines. No matter which, gents, you'll be called upon to pick a specialization. And what'll it be? Mess cook? No! "Captain of the Head"? Oh no! Well, what? Why, *radio,* of course. Radio? Sure, aren't we all hams? Yes! Well, we'll all be radio operators. Mmmmmmm! Then let me give you a bit of advice, son — *learn to copy on a mill!*

— *Abraham A. Goldberg, W2HKU, RM3c USNR.*

U.S.S. *Semmes,* New London, Conn.

Editor, *QST:*

. . . To be able to use break-in and answer immediately, or break into a message for "that last word . . ." is to train for efficient circuit handling in the armed forces. Much time is wasted because the other fellow waits too long for some reason or other.

I suggest that this subject be brought before the potential operators of the armed forces of our country and try to teach everyone the importance of fast operation of a traffic circuit. It is important to the government, and if we can cultivate the use of break-in it will not only make QSO's more enjoyable, but provide for better government communications.

— *Francis J. Gardner, W1MJY, RM1c USN.*

---

532 Valley Avenue, Yonkers, N. Y.

Editor, *QST:*

I note with great interest your information regarding . . . commercial code practice for the amateur. . . .

In this respect, I would like to recommend the Transradio Press Service stations, WCX and WJS. KJH and KOQ are also perfect stations to copy when it comes to code practice. Here and now, however, strict adherence to the Transradio phrase, "unauthorized use strictly forbidden," must be stressed.

WCX and WJS are the only stations I know of which make proper use of punctuation marks. Their "stuff" is the finest and the most grammatically correct "material" you ever laid your ears to. It has to be for the simple reason that their transmitted data . . . is used just as it is received. . . . You will also lend thine ear, quite restfully, to the rhythmical "swing" of WCX and WJS's automatic. You will never tire copying their "stuff." . . .

Hams might benefit a great deal by listening closely to the system used by WCX and WJS, in their transmissions. If all hams only tried to use a similar system, wouldn't it all sound a whole lot more pleasant to our ears? . . . .

— *Carl Begich, W9ORQ/W2*

Torrance, Calif.

Editor, *QST:*

. . . I want you to know of the appreciation I have for the A.R.R.L. and all it has done for the radio amateur and commercial technician. As a broadcast technician for fifteen years and as an amateur for twenty years, I feel that your representation has been splendid.

Particularly, do I commend your editorials and the present program of encouraging the amateur to better his operating ability. In this connection, your stand for national preparedness is admirable. You may be interested to know that many of my friends among the broadcast men are putting telegraph rigs on the air. The general feeling is to "brush up on the code." Most of us are ex-ship operators who need little practice to again put ten on a line.

Your contests and code awards are good and undoubtedly create enthusiasm. However, may I make a suggestion? Specifically, I should like to see dummy messages routed around the country which contain word counts of fifty or more. What the amateur needs is practice in message handling where the message material is comparable to commercial practice. Contests, where the message material is merely an exchange of signal reports, while contributing to enthusiasm and superfluous signals, does little to equip a man for the actual conditions encountered in commercial work. What the average amateur needs is a session or two a week where he *must* handle several hundred or a thousand words

through QRM and QRN. The amateur bands will provide the necessary conditions. . . .

— *Warren Birkenhead*

Canby, Minn.

Editor, *QST:*

. . . I am not a ham, but those who are seem to infest forty meters. Why is it that every night somebody has to "climb on" W1AW's frequency and spoil it for the rest of us?

A few nights ago somebody was having a lot of fun "slopping" his e.c.o. signals all over the place. Tonight W4— broke in on the twenty-word per minute transmission. Surely that anonymous W4 could have waited until W1AW had got through.

. . . W1AW's code practice sending has helped me along considerably, and I don't relish the idea of having somebody break in on headquarters that way. You who are around W1AW, shut down for a few minutes so the rest of the United States can hear the transmissions. It isn't going to spoil your evening, but you can spoil that of many others.

— *Harry Kiplinger*

SEC. 324

Gettysburg, S. D.

Editor, *QST:*

It seems that a lot of amateurs have forgotten Sec. 324 of the radio laws which says that all radio stations in the United States shall use the minimum amount of power necessary to carry on the communication desired.

On February 19, 1941, while participating in a S. D. net on 1904 kc., we were very badly QRMed by an operator in St. Paul, Minn., talking to another in Minneapolis and using 650 watts input. If it requires 650 watts input to talk 15 miles it seems to me that somebody must need a new receiver or better yet should use the telephone.

Because we are permitted to use power up to 1000 watts, does that make it necessary to use 650 watts to talk 15 miles?

With the amateur bands as crowded as they are, some of the fellows with the means and equipment to use 650 watts should have a little consideration for the other fellows. After all, for every big rig there are at least ten fellows with low-powered outfits.

American amateur radio has reached its present high plane by coöperation, not coercion. One amateur with high power talking fifteen miles can very easily ruin an evening for a dozen others over a wide area. And after all, in a democracy the idea is the greatest good for the greatest number.

— *Theodore F. Anderson, W9GLK*

SELF-EDUCATION AND SELF-PRESERVATION

9 Oak St., Dover, N. H.

Editor, *QST:*

The adoption of F.C.C. Order No. 72, prohibiting foreign contacts, had two effects upon certain of our amateur populace. One effect is a minority one, and that is the disinterest in amateur radio evidenced by the disappearance of certain popular "DX hounds" from the air, except for an occasional toot. The major effect, however, has been in having many of the died-in-the-wool DX go-getters enter various other activities. Many have returned to 80 meters for nets, emergency preparation and friendly U.S.A. QSO's, the fine interest shown in proficiency certificates being a splendid example of this healthy condition. This is one time when I believe a restriction placed upon us has been to our advantage.

Don't get me wrong on this point; there is one grand and glorious moment that I, too, await, and that is the moment I can return to 14,398 for even a "C." However, I feel that under present circumstances we are far better off with the presently-imposed regulations, which do force us to turn to the many self-educational activities of our hobby.

I may have been one of the worst trangressors but I know there were many hundreds more that fell in the same classification. I admit I lolled around in my hobby happy to fight for a new country, winking at my WAC certificate and promising that before the year closed I'd have the remaining countries necessary to jump on the DX CC bandwagon. I was content with WAS and an occasional SS Contest to polish off my brother W's.

Since winding up the "battle" with Jugoslavia and Bulgaria, I have returned to 80 meters. There I have learned

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JUST OUT!

AMATEUR NET
$149.50
Less Speaker

Another smashing Hallicrafters triumph! This 13 tube, 6 band communications receiver offers top quality performance at a moderate price at a time when material costs are continually on the uplift. Embodying all the finer principles that have come to lend universal acceptance to the Hallicrafters name the new Skyrider 32 merits the praise of even the most critical observer. Each control has been designed with rare skill for a definite function, resulting in effortless tuning and smooth reception. Two R.F. stages on four of its bands offer favorable signal noise ratio and increased selectivity. The receiver is furnished complete with tubes and crystal but less speaker.

NOW IN STOCK!
READY FOR IMMEDIATE DELIVERY

Features Galore!

- 13 Tubes — 6 Bands
- 500 Kc. to 40 Mc. coverage
- 2 R.F. Stages on bands 3, 4, 5, 6
- Temperature compensated h.f. oscillator and mixer tubes
- 2 I.F. Amplifier Stages
- P.P. 6V6GT's in audio output stage
- Amplified AVC action
- Six step variable selectivity from CW crystal to broad I.F.
- Crystal Filter
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- PRICE — only $149.50 less speaker

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SX-28 Receiver	$159.50	Sky Champion	$49.50
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S-31A Amplifier	49.50	HT-8 Radiotelephone	283.50
S-19R Receiver	29.50		

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ESTABLISHED 1922

that "Ur RST 589 hr in Tunis" at 65 w.p.m. isn't a string of messages at 40 w.p.m. on the mill. My present activities have included securing a 35 w.p.m. code proficiency certificate; joining the A.A.R.S. and occasionally acting as net control; working NAA and WAR; participating in the Navy Day copying activity and receiving a winning letter; receiving ORS, RM, OBS, and EC appointments from A.R.R.L. I am once again getting full enjoyment out of my hobby and feeling much more patriotic in knowing that I have reliable schedules to meet with any emergency that might arise.

Moreover, those hundreds who have done the same thing know that they have likewise increased their own knowledge, improved their operating ability, enlarged their technical knowledge, and learned that the "rest of the mob" really had something on the ball, after all. . . . We know that when this tender innermost desire of ours to work DX is again filled many of us will return to 14,398 with a much broader education that will be our salvation and preservation in these trying days.

— Ernest L. Bracy, Jr., W1BFA/W1MOF

They Serve, Who Stand and Wait

THE severe storm of March 25th that visited the central and northern portion of Maine did great damage to communication lines. The wind was of considerable velocity, and much of the damp snow froze and caused destruction of many telephone and telegraph poles. On the morning of March 26th, there was apparently little wire and 'phone communication to any part of northern Maine. Postal Telegraph and Western Union contacted W1BAV at his work in the Portland Post Office. He went home and soon established communication with Presque Isle while the wire service men made inquiries and gave instructions through him to service men there. This amateur work proved to be of great help. By night, conditions were such that single lines were available to several parts of the State.

At 7:30 P.M., March 26th, the Pine Tree Net came on the air. We had practically all points of the State hooked up and standing by. We then had W1BAV inform the wire services of this setup and they gave instructions as to what was needed. Practically every man on the net was in some kind of communication with the local telephone and telegraph company. It was found that the N. Y. wire chief wanted contact with Easton and Stockton Springs. While we stood by, a few round about circuits were made to work and our hook-up was not needed. There was no service between Rockland and Belfast. We got W1CBU at Stockton Springs, and Jim took his car and drove to W1KNJ, who got on 1.75-Mc. 'phone and, through the facilities of W1CBU, W1RU and W1EJS, we had service open for the officials of the telephone company if they needed it between these two places. By this time the telephone company had relieved the situation, and no actual transmissions were made for them. The stations standing by were W1BAV, W1BTY, W1EJS, W1IBR, W1IIE, W1LYK, W1KTT, W1LRQ and W1CBU. It happened that Lewiston circuits were all right, but W1LYK was right there ready. He was not asked to do a thing, but he did render helpful service by standing by and refraining from any sending. By 9:30 P.M., officials of the Postal Telegraph, Western Union and the telephone companies notified us that all places were taken care of and the net was excused.

W1IIE, the S.C.M., was acting control of the net, and I wish to commend all the boys for their excellent spirit of helpfulness. I had a feeling of security as I directed this activity, knowing that every man was ready and willing, and from net experience we found it easy to proceed with speed and efficiency. Net "Q" signals effected much speed and avoided a great deal of lost time. Except for the excellent work that W1BAV did through the day, there were no actual transmissions for the various wire services that were crippled, but the important point is that amateur radio was right there, ready and waiting. "They serve, who stand and wait."

— H. W. Castner, W1IIE, S.C.M., Maine

To those interested in boosting their code speed, we recommend the automatically-sent code practice transmissions of W9HCC, Wayzata, Minn., sent simultaneously on 3538, 7058 and 14,312 kc. each Tuesday and Thursday at 8:30 P.M. C.S.T., at speeds of 20 and 25 w.p.m.

Strays

In using the bias supply shown in Hints and Kinks in November *QST*, I eliminated a very bad modulated signal which peaked at about 1200 kc. by placing an r.f. choke in the lead from the positive terminal to ground. — *W9CGZ*.

★ NEW APPARATUS ★

Sprague Products Co., North Adams, Mass.

BULLETIN describing new De Luxe Tel-Ohmike Condenser and Resistance Analyzer with switch and pin jacks for external measurements. Meter ranges cover 15 to 1500 volts d.c. and 1.5 to 50 ma. d.c. Designed for testing of all condenser and resistor characteristics. Capacity range 10 $\mu\mu$fd. to 2000 μfd. and resistance range 0.5 ohms to 5 meg.

Allen B. Du Mont Labs., Passaic, N. J.

NEW technical bulletins covering 3-in. and 5-in. teletrons. Various characteristics are given in considerable detail, together with installation notes, typical power supply, positioning circuit, base connections and dimensions.

★ BOOK REVIEWS ★

Vacuum Tube Voltmeters, by John F. Rider. Published by John F. Rider Publisher, Inc., 404 Fourth Ave., New York City. 179 pages (including topical index and 6-page bibliography), illustrated. Price, $1.50.

Undoubtedly the most comprehensive compilation of information on this subject ever assembled between two covers. Not only are the various basic types of vacuum-tube voltmeters described, but considerable space is devoted to their design, construction, calibration and testing, as well as to practical applications. Commercial examples are given, including those used in the widely-marketed commercial service equipment designed by the author. Thoroughly recommended for anyone, professional or amateur, having need to design or use the *v-t-v-m* principle in the measurement of *E*, *I* or *R*.

— *C. B. D.*

Make Radio Your Hobby, by Fred H. Stiening. Published in Braille by the American Printing House for the Blind, Louisville, Ky. 88 pages, illustrated.

A unique Braille Book has just been made available to blind readers interested in the mechanics of radio, and in amateur radio as a hobby.

The first book of its kind to be written especially for the blind student, this unusual volume contains within its 88 Braille pages plans for building several experimental radio receivers. There are numerous "raised-line" drawings to assist in explaining tubes, tuning circuits, a crystal detector radio receiver, a one-tube set, etc. These diagrams can be felt with the fingers in the same manner in which Braille is read.

Fred H. Stiening, W8FIP, the author of this work, is

himself partially blind, and the presentation of the lessons is based upon his own experience in meeting the difficulties encountered by the handicapped person. Mr. Stiening has long been active in radio work, both as operator of amateur station W8F1P and as a teacher.

Brailled for the Library of Congress by the American Printing House for the Blind, copies may now be borrowed at all Regional Libraries for the Blind throughout the United States, or purchased, at cost, from the American Printing House for the Blind.

I Live on Air, by A. A. Schechter with Edward Anthony. Published by Frederick A. Stokes Co., New York and Toronto. 454 pages and 64 full-page reproductions of photographs. Price, $3.75.

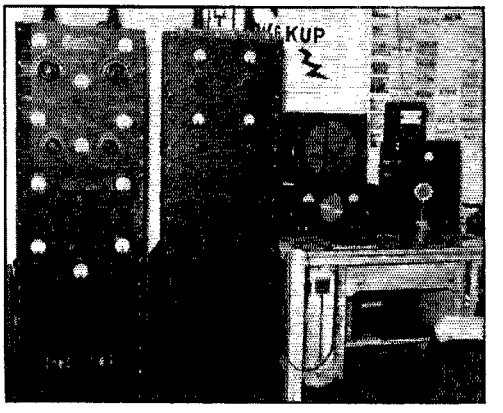
The popular appeal of this "at once lusty and important" book has been well set forth in general newspaper and magazine reviews. We refer you to them for details, adding only that Schechter's remarkable book is even more compelling to anyone inside radio than to the lay reader, for essentially it is nothing more or less than reminiscent shop talk. Ham radio gets a few flowers in Chapter XI ("The Floods Came") and practically a whole chapter in "Battle of Pitcairn Island" (Chapter XX). Many amateurs, too, will add mental background notes while reading about the MacGregor expedition, the Hughes 'round-the-world flight, and other incidents where hams shared the inside story. You should read it. — *C. B. D.*

You're On the Air, by William Heyliger. Published by D. Appleton-Century Co., New York. 262 pages, illustrated. Price, $2.00.

The well-known author of *American Boy*, etc., stories tells the story of eighteen-year-old Joe Carlin's efforts to break into broadcasting. Nothing to do with amateur radio, but a better-than-average juvenile. — *C. B. D.*

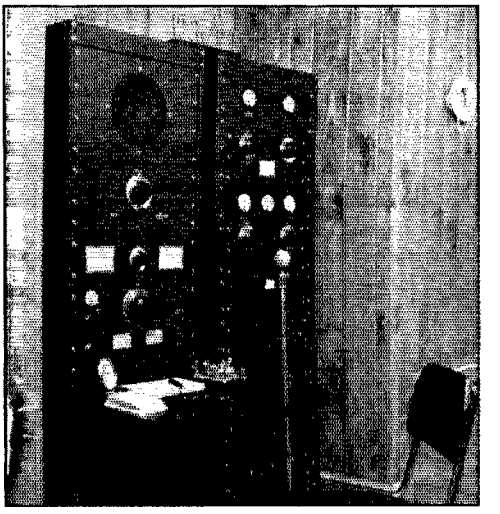
How to Make Good Recordings. Published by Audio Devices, Inc., 1600 Broadway, New York City. 128 pages, generously illustrated. Price, $1.25.

Elementary but valuable semi-technical information for the uninitiated, this book begins with the fundamental mechanics of recording and goes on to cover every phase of recording technique. Well worth while for anyone interested in the subject. — *C. B. D.*



W6KUP, Ruth, Calif.

Operator — T. E. Terral, rancher. A 7½-kw. water-driven a.c. generator supplies power for heating and cooking as well as for operation of transmitter and other equipment. W6KUP holds a Public Service Certificate for his work during the California flood disaster of 1938.



W3CPN, Portsmouth, Va.

Operator — Kenneth P. Roberts, Jr. The transmitter is a 500-watt job with either crystal or v.f.o. control. Receiver is the HRO. W3CPN operates both 'phone and c.w., principally on 14 Mc., for which he has a half-wave vertical antenna 80 feet above ground.

★ NEW ★ TRANSMITTING TUBES

RCA HAS just released technical data on two new transmitting types which should be of particular interest to amateurs.

The first of these is the type 8005 which is a medium-μ triode. Because of improvements in design, it has been possible to produce a tube with a plate-dissipation rating (ICAS) of 85 watts in the same physical size as that of the lower-power types 809 and 812.

8005

(ICAS ratings)	
Filament voltage	10
Filament current (amperes)	3.25
Amplification factor	20
Maximum plate dissipation (watts)	85
Grid-plate capacity, $\mu\mu$fd	5
Grid-filament capacity, $\mu\mu$fd	6.4
Plate-filament capacity, $\mu\mu$fd	1

The 8005 may be operated at full plate voltage and power input at frequencies up to 60 Mc., and at reduced input to 100 Mc. Base connections are the same as for the types 809 and 812.

The RCA type 8001 is a beam pentode transmitting tube of high power-sensitivity with a power-output rating of 230 watts in Class-C telegraph service. It may be operated at maximum ratings at frequencies as high as 75 Mc. and up to 150 Mc. at reduced ratings. Neutralization is generally unnecessary in properly-shielded circuits.

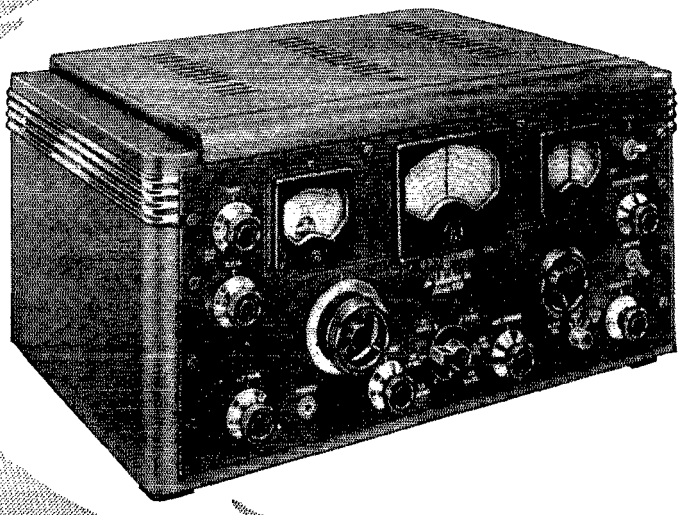
(*Continued on page 86*)

★ ★ ★ ★ ★ TERMINAL FOR HALLICRAFTERS ★ ★ ★ ★ ★

TOPS IN QUALITY ★ TOPS IN PERFORMANCE

hallicrafters SKYRIDER 32

TERMINAL FOR HALLICRAFTERS



TERMINAL FOR HALLICRAFTERS

SKYRIDER 32 Net Price $149.50
Less Speaker

"Hams" the world over appreciate the fine quality and excellent performance of Hallicrafters receivers. They know that these sets embody every desirable feature available. They know, too, that here at Terminal they get that "extra" that goes with every purchase. Terminal "extras" include: personal attention by trained experts, and understanding of your problems, and the kind of service you can get only from a firm which has spent many years dealing exclusively in radio.

Here are some outstanding features of the new Hallicrafters SKYRIDER 32:

● 13 tubes ● Frequency coverage 500 kc to 40 mc ● Six bands ● Two R.F. stages on bands 3, 4, 5, 6 ● Two I.F. amplifier stages ● Push-pull *audio* ● Amplified AVC action ● Six step variable selectivity ● Crystal filter ● Noise limiter ● Standard 19" x 8¾" x 1/8" thick panel

★ ★ ★ ★ ★ TERMINAL FOR HALLICRAFTERS ★ ★ ★ ★ ★

IN STOCK—FOR IMMEDIATE DELIVERY

You are invited to visit either of our two New York stores where you can see and hear any or all of the Hallicrafters communications receivers and transmitters.

Sky Buddy — Built-in speaker..... $29.95
Sky Champion — Built-in speaker..... 49.95
Skyrider 5-10 — Built-in speaker..... $69.50
Skyrider Marine — Built-in speaker..... 64.50
Skyrider Defiant — less speaker..... 69.50
Super Defiant — with speaker..... 99.50
FM/AM TUNER with panel and cover.... 69.50
FM/AM high fidelity amplifier..... 49.50

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8001

(CCS ratings)	
Filament voltage	5
Filament current (amperes)	7.5
Transconductance for plate current of 75 ma. (μmhos.)	2800
Grid-plate capacity with external shielding ($\mu\mu$fd.)	0.1
Input capacity ($\mu\mu$fd.)	11
Output capacity ($\mu\mu$fd.)	5.5
Maximum plate dissipation (watts)	75
Maximum screen input (watts)	20

New Transmitting M.V. Rectifier

The United Electronics Co. of Newark, N. J., now produces a new high-voltage mercury-vapor rectifier known as the type Z-225. Its characteristics and ratings duplicate those of the 866/866A, but its size is reduced so that it occupies only one-half the cubic space of the 866. Its overall height is 5½ inches and overall diameter 1¾ inches.

RCA announces four new types of tubes for receiver service.

The 12H6 is similar in characteristics to the 6H6, except for heater voltage and current.

The 12SN7GT is similar in characteristics to the 6SN7GT, except for heater voltage and current.

The 6SS7 is similar in characteristics to the 6SK7, except that the heater current is 150 ma. instead of 300 ma.

The 117P7GT is a combination rectifier and beam power amplifier similar to type 117N7GT, but having somewhat lower power output. Operating voltages are the same as the 117N7GT, but normal plate current is 43 ma., conductance 5300 μmhos, load resistance 4000 ohms and power output 0.85 watt.

Strays

Committee member noticing visitor inspecting display of QSL's in Club booth at Milwaukee Hobby Exposition: "Those are verifications from foreign countries."

Visitor: "Oh, is that what they are? I thought they were labels from cans."

W6JXK told me of a stunt I think rather good. My receiving antenna is quite close to the transmitting antenna and, as a result, considerable r.f. is developed on the receiving antenna when the transmitter is operated. Two neon bulbs are shunted across the input terminals of the receiver and the center grounded and these prevent damage to the receiver.

— *W6PGB*

Break-In System

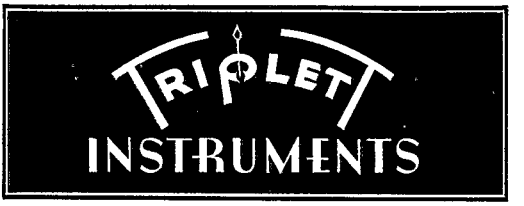
(Continued from page 41)

the high-frequency oscillator in the receiver inoperative during the periods when the key is closed. This is accomplished by a blocking voltage which is automatically applied to the control grid of the high-frequency oscillator whenever the key is closed. This negative voltage is obtained from the drop across a resistance, R_1, placed in the grid return lead of one of the buffer

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

ALBANY, N. Y. Uncle Dave's Radio Shack 356 Broadway
ATLANTA, GEORGIA 265 Peachtree Street
Radio Wire Television Inc.
BOMBAY, INDIA Eastern Electric & Engineering Company
BOSTON, MASS. Radio Shack 167 Washington Street
BOSTON, MASS. 110 Federal Street
Radio Wire Television Inc.
BRIDGEPORT, CONN. 177 Cannon Street
Hatry & Young, Inc.
BRONX, N. Y. 542 East Fordham Rd.
Radio Wire Television Inc.
BUFFALO, N. Y. 1531 Main Street
Dymac
BUTLER, MISSOURI 211–215 N. Main Street
Henry Radio Shop
CHICAGO, ILL. 833 W. Jackson Blvd.
Allied Radio Corp.
CHICAGO, ILL. 901–911 W. Jackson Blvd.
Radio Wire Television Inc.
CINCINNATI, OHIO 1103 Vine Street
United Radio, Inc.
DETROIT, MICH. 325 E. Jefferson Ave.
Radio Specialties Co.
DETROIT, MICHIGAN 11800 Woodward Ave.
Radio Specialties Co.
HARTFORD, CONNECTICUT 227 Asylum Street
Radio Inspection Service Company
HOUSTON, TEXAS 1021 Caroline Street
R. C. & L. F. Hall
INDIANAPOLIS, INDIANA 34 West Ohio Street
Van Sickle Radio Supply Co.
JAMAICA, L. I. 90–08 166th Street
Radio Wire Television Inc.
KANSAS CITY, MO. 1012 McGee Street
Burstein-Applebee Company
LITTLE ROCK, ARKANSAS 409 W. 3rd Street
Beem Radio Company
NEW HAVEN, CONN. 1172 Chapel Street
Hatry & Young, Inc.
NEW YORK, N. Y. Harrison Radio Co. 12 West Broadway
NEW YORK, N. Y. 100 Sixth Ave.
Radio Wire Television Inc.
NEWARK, N. J. 24 Central Ave.
Radio Wire Television Inc.
READING, PENN. 404 Walnut Street
George D. Barbey Company
SCRANTON, PENN. 519–21 Mulberry Street
Scranton Radio & Television Supply Co.
WASHINGTON, D. C. 938 F Street, N. W.
Sun Radio & Service Supply Co.



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ATLANTA, GEORGIA 265 Peachtree Street
Radio Wire Television Inc.
BOSTON, MASS. Radio Shack 167 Washington Street
BOSTON, MASS. 110 Federal Street
Radio Wire Television Inc.
BRIDGEPORT, CONN. 177 Cannon Street
Hatry & Young, Inc.
BRONX, N. Y. 542 East Fordham Rd.
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JAMAICA, L. I. 90–08 166th Street
Radio Wire Television Inc.
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Radio Wire Television Inc.
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Radio Wire Television Inc.
READING, PENN. 404 Walnut Street
George D. Barbey Company
SCRANTON, PENN. 519–21 Mulberry Street
Scranton Radio & Television Supply Co.
WASHINGTON, D. C. 938 F Street, N. W.
Sun Radio & Service Supply Co.

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

or doubler stages. The value of this resistance may be determined from Ohm's Law by dividing the blocking voltage required (usually about 10 volts) by the grid current in decimal parts of an ampere. In my case, the grid current is 15 ma., so a 1000-ohm, 1-watt resistance for R_1 gives a blocking voltage of 15. Receiver and transmitter chassis must be tied together and a 2.5-mh. r.f. choke connected in series with the wire to the control grid right at the tube. Since a 6J7 tube is used in the h.f. oscillator of my receiver, connection was made simply to the grid cap without disturbing any of the receiver wiring. If a single-ended tube is used in the h.f. oscillator circuit, it will be necessary to run the wire for the blocking voltage underneath the chassis to the oscillator socket.

Tests were made with the blocking voltage applied to the grids of other tubes in the receiver, but blocking of the h.f. oscillator seems to remove the racket from the transmitter most completely. If it is desired to prevent possible damage to r.f. tubes, the blocking voltage may be applied in a similar manner to the grids of these stages as well, but I have not considered this necessary nor worth the added complications.

A monitoring signal for checking keying may be obtained from either an audio oscillator coupled to the headphones or an i.f. oscillator coupled to the i.f. amplifier.[1] Plate voltage for either type of monitor may be obtained from a second resistor, R_2, connected in the plate return circuit. The value for this resistor may again be determined from Ohm's Law by dividing the plate voltage desired (usually 30 to 50 volts) by the combined plate and grid currents. My buffer draws 30 to 40 ma., so a 1000-ohm, 5-watt resistor gives 30 to 40 volts for the audio or i.f. oscillator.

The resistances should not be of higher value than required to obtain the necessary voltages for proper operation. This will be particularly important in case a very high-μ tube, such as the zero-bias type, is used in the transmitter stage, since the combination of resistances and fixed bias for plate-current cut-off may cause overbiasing of the transmitting tube. With low-μ types, the added bias from the resistance drops will not be of consequence.

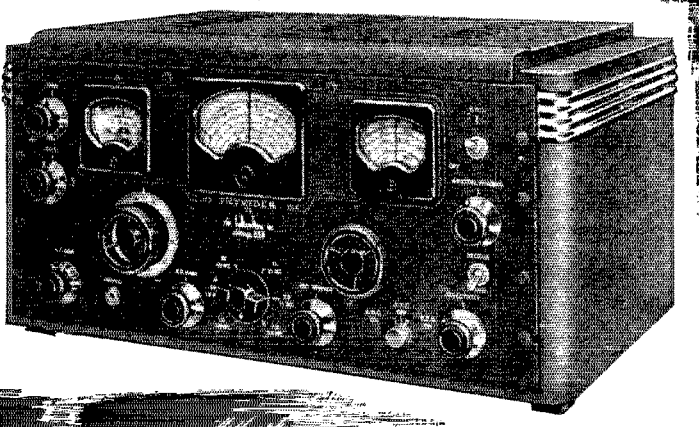
Blocking of the h.f. oscillator in the receiver prevents blocking of the i.f. amplifier by the strong signal from the transmitter, so that a monitoring oscillator operating at the i.f. of the receiver will work satisfactorily. In case an audio oscillator is preferred, I would suggest that it be coupled to the headphones through a transformer as shown in Fig. 4B. Simple capacity coupling will sometimes result in a.c. modulation of the received signals.

Since both voltage for blocking the h.f. oscillator in the receiver and plate voltage for the monitoring oscillator are developed automatically whenever excitation is applied to the buffer amplifier, no relays are required.

— *R. R. Rosenberg, W8NCJ.*

[1] See Mix, "Keying Monitors," *QST*, Jan., 1941.

Presenting
THE SKYRIDER 32



THE LAST WORD IN HIGH-QUALITY HAM RECEIVERS

Check these features of the new sensational Skyrider 32

★ 13 tubes.
★ Frequency coverage from 540 kc to 31 mc.
★ Six bands.
★ Two R.F. stages on bands 3, 4, 5, 6.
★ Separate temperature-compensated, high frequency oscillator and mixer tubes.
★ Two I.F. amplifier stages.
★ Push-Pull 6V6GTs in audio output stage.
★ Amplified AVC action.
★ Six-step variable selectivity from CW crystal to broad I.F.
★ Crystal filter.
★ 6H6 automatic noise limiter.
★ Standard 19" x 8¾" x ⅛" thick panel. Set can be mounted in a relay rack.
★ Rigid, heavy, cadmium-plated, flame-welded chassis.

NET PRICE **$149.50** Less Speaker

ECHOPHONE EC-1

The model EC-1 is priced to fit any purse and gives real 1941 communications receiver performance.

Now at this sensationally low price you can have ALL really important features.

NET $19.95

ECHOPHONE EC-2

Preselection on all bands. Calibrated bandspread. Automatic noise limiter. The most amazing value ever offered in a communications receiver! Eight tubes. Three bands. Electrical bandspread.

NET $29.95

ECHOPHONE EC-3

Crystal Filter Four Position Variable selectivity Calibrated Bandspread ● Automatic Noise Limiter ● Preselection All Bands ● Two Stage I.F. Amplifier ● Fly Wheel Tuning ● Separate Speaker ● CW Monitor.

NET $49.95

RADIO ELECTRIC SERVICE CO. INC.

MAIN STORE: N.W. COR. 7th and ARCH STS., PHILA., PA.

BRANCHES:

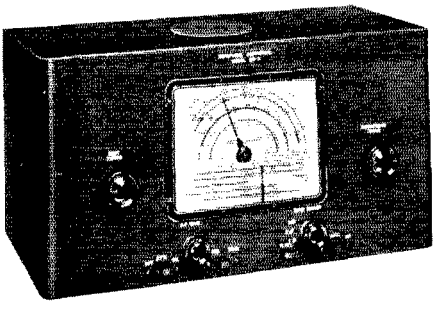
3145 N. Broad St.	5133 Market St.	811 Federal St.	219 W. 8th St.	9 N. 2nd St.	1042 Hamilton St.
Phila., Pa.	Phila., Pa.	Camden, N. J.	Wilmington, Del.	Easton, Pa.	Allentown, Pa.

SWEEPING THE COUNTRY!

Echophone COMMERCIAL IS THE COMMUNICATIONS BUY OF THE YEAR!

Here is the biggest buy in communications receivers! Three bands, tunes from 550 kc. to 30 mc. Electrical bandspread on all bands. Six tubes. Self-contained speaker. AC/DC 115–125 volts (Model EC-1) at the low price of $19.95.

$19.95

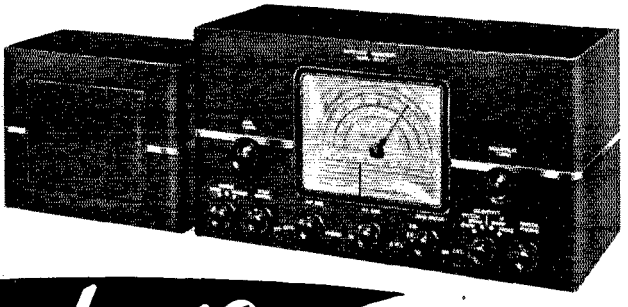


Now you can have all these amazing features at this sensationally low price! 8 tubes; 3 bands; tunes from 550 kc. to 30 mc.; 5" PM dynamic speaker; preselection on all bands; calibrated bandspread scale on 80/40/20/10 meter amateur bands; automatic noise limiter; electrical bandspread; operates on 115 volts AC/DC. (Model EC-2) for only $29.95.

$29.95

$49.95

All these communications features at this incredibly low price! Crystal filter (four position variable selectivity); calibrated bandspread; automatic noise limiter; preselection on all bands; 2 stage IF amplifier; fly-wheel tuning; separate 6" PM speaker; CW monitor; 10 tubes; 3 bands; covers 550 kc. to 30 mc; electrical bandspread. Operates on 115 volts AC/DC. (Model EC-3) priced at only $49.95.



Echophone COMMERCIAL

"The Ears of the World"

Echophone Radio Co., 201 East 26th Street, Chicago, Illinois

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.
(3) The Ham-Ad rate is 15¢ 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 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

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 advertised

QUARTZ — direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

QSL'S. Cartoons. Albums. Free samples. Theodore Porcher, 7708 Navahoe, Philadelphia, Pa.

CALLBOOKS — Summer edition now on sale containing complete up-to-date list of radio hams throughout entire world. Single copies $1.25. Canada and foreign $1.35. Radio Amateur Call Book, 610 S. Dearborn, Chicago.

COMMERCIAL radio operators examination questions and answers. One dollar per element. G. C. Waller, W5ATV, 6540 Washington Blvd., Tulsa, Okla.

CRYSTALS: police, marine, aircraft. C-W Mfg. Co., 1170 Esperanza, Los Angeles.

QSL'S — Brownie, W3CJI, 1725 Frankenfield Ave., Allentown, Pa.

TELEPLEXES, Instructographs bought, sold. Ryan's, Hannibal, Mo.

QSL'S, SWL's. 100 — 3 color — 75¢. Lapco, 344 W. 39th, Indianapolis, Ind.

FOR sale: Composite broadcast transmitter FCC rating 250 watts, Class B modulation, temperature controlled crystal oven, excellent for 160 meter phone. Write for particulars. WGNY, Newburgh, N. Y.

QSL'S — Fritz, 1213 Briargate, Joliet, Ill.

NATIONAL 600 watt factory built transmitter complete, practically new. Less than one-half net ham price. W3DQ, Wilmington, Del.

CRYSTALS, AT cut, 160–80 in attractive, heat dissipating, dust proof holders, $1. R9 Crystals, 338 Murray Ave., Arnold, Pa.

RCA 800's, new, $6.50 each. W8TCL, 124 Lexington Ave., Buffalo, N. Y.

SELL complete station — $300 — 600 watt CW and fone NC100X receiver. No junk. Stamp for description. Earl Eggers, R. 2, Box 170-A, Ft. Worth, Texas.

SELL 150 watt transmitter $50. W2KI, 1422 Beverly Rd., Brooklyn, N. Y.

REMOTE control interlocking motors. 345 N. Formosa Ave., Los Angeles, Calif.

QSL'S? — SWL's? Get more replies. Free samples? W8DED, Holland, Mich.

BARGAIN — 400 watt 10–20 fone in deluxe Par Metal, grey cabinet — xtal mike — HRO rcvr — freq. meter — motor drive & 100 ft. Bassett cable for 3 element beam — $375. J. Brennan, 3604 Spring Garden St., Philadelphia, Pa.

NC101X for sale — best bid. Don Hein, W8LXE, 4013 Harding, Detroit, Mich.

SELL Bliley mounted xtals, $2 each: 14336, 14244, 7191, 7156, 3956, 3912, 3545. W8QXM.

COMPLETE 120 watt CW transmitter; ECO; used FBXA receiver for cash or trade on HQ120X. Description; photographs. W8UPS, 509 Highland Ave., South Charleston, W. Va.

SELL — Hallicrafters HT-1 transmitter complete with tubes and coils for 10, 20, 160. Worked WAS within four months. New cost $220. First $150 cash gets it. Guaranteed to operate like new. William A. Geer, Damascus, Ga.

RADIO operators wanted for the Merchant Marine must have six months previous marine radio operating experience big pay ranging from $150 to $200 per month call or write The Radio Officers Union, Room 1511, 265 West 14th St., New York, N. Y. Phone WAtkins 9–6709.

WANTED — Vibroplex. Cash, or trade 100TH or pair 35T's. W6QNW.

SELL complete station, 250 watt fone transmitter and RME–69. Also Hammarlund Comet Pro. W8RLB.

SELL — 400 watt, 4 stage, 2 band xmtr in rack, $175. W1GRK.

QSL'S. Finest. Samples. Maleco, 1805 St. Johns Place, Brooklyn, N. Y.

TRADE used National PW-O drive unit for NPW-O. George Blaha, 36 Virginia, Johnson City, N. Y.

SELL or trade, CB105 oscillograph, Johnson Q, Parmetal cabinet, ten meter beam, RK20, CR913, 801, crystals, meters, relays, transformers. Anthony Huber, Patton, Pa.

WRITE Bob Henry, W9ARA, for best deal on all amateur receivers, transmitters, kits, parts. You get best terms (financed by myself); largest trade-in; personalized service; lowest prices. SX32's, NC-200's, all other latest receivers in stock. Let's get acquainted. Write us for anything. Henry Radio Shop, Butler, Mo.

RECEIVERS wanted: Cash or trade-in. Best deal. Typical allowances: S19R's $22.50, Howard 430's $20, S19's $17.50, S20's $30, S20R's $40, SX-24's $52.50. Write. W9ARA, Butler, Mo.

BARGAINS: Brand new in factory sealed cartons: Howard 435's $24.95, Howard 436's $29.95; RCA AR-77's and other models at bargain prices. W9ARA, Butler, Mo.

RECONDITIONED guaranteed amateur receivers and transmitters. All makes and models cheap. Lowest prices. Free trial. Completely guaranteed. Terms. List free. Write. W9ARA, Butler, Mo.

QSL'S — A new deal. Samples. 24-hour service. Edw. Reider, Pleasant Hill, Mo.

SELL — 400 watt, modern, push-to-talk 'phone. In 72" steel cabinet. Complete ready to run. Cash or trade for house trailer. W8NPZ, 1992 Kenton St., Springfield, Ohio.

CRYSTALS; commercial and amateur. Police, aircraft, marine and defense projects. A complete line of reasonably priced crystal units is available for all commercial services. Over a period of years Eidson commercial crystals have a record of 70.7% repeat sales — this carries a real meaning. Send for commercial catalog. Amateurs: buy those T9 40 and 80 meter crystals for $1.60, T9 spot frequencies $2. COD's accepted. Sold by Eidson's, Temple, Texas, and dealers previously listed.

SELL — SX17 receiver $75. Cash. W3HWB, Lynchburg, Va.

BEST offer takes new Meissner 4 tube noise silencer. W9GKH.

WANT high power phone — CW transmitter. Cash. Send details Carl Steavenson, RM2C, U.S.S. Saratoga, San Diego.

CRYSTALS — good active power oscillators mounted in dustproof plug-in polystyrene holders. Low drift AT 160 — 80 M $1.25. Pacific Crystals, Box 6679, E. Los Angeles Branch.

QST'S — Cloth bound in volumes 1925 to 1929 inclusive $3.50 each. Also 50 issues 1923 to date. W9MCX.

SELL — NC-101 rcvr $45, oscilloscope, $7.50. W8TDP, Camden, Ohio.

CRYSTALS, mounted in dustproof, low-loss, plug-in holders. 160M 80M low drift, $1.20; 40X, $1.70. COD's OK. Copple, 344 So. Fetterly, Los Angeles.

LEO, W9GFQ, offers the hams more and a better deal always. Lowest terms, no red tape, (as finance own paper) on all new and used equipment. Free trial, personalized service. Write for big Ham Bargain Catalog and get acquainted. Wholesale Radio Labs., Council Bluffs, Iowa.

TRANSMITTING headquarters on latest Stancor, Thordarson and other kits — commercially wired at low cost. New 70 watt transmitter kits complete only $35 — speech amplifier modulator up to 80 watts at $25 — up to 150 watts $49.50. Genuine Utah ham transformers at less than ½ original cost. New HY25's at 99¢. New HY51's at $2.95. Easy terms. Write Leo, W9GFQ, today.

CRYSTALS: famous P.R., mounted in latest Alsimag 35 holders — 40, 80 meter PR-X, 160 meter PR-Z $3, 40, 80 meter PR-Z (low drift) $3.50; 20 meter PR-20 $4.50; unconditionally guaranteed. Immediate shipment. Quality blank 70¢. Wholesale Radio Labs., Council Bluffs, Iowa, W9GFQ.

RECEIVERS: All makes and types new and reconditioned. New SX-23 Hallicrafters with crystal $79.50. Get acquainted with Leo, W9GFQ, today.

FB7, 80, two sets bcl coils, power supply, perfect $20. Supreme 502 tube tester voltohmmeter, perfect $20. Orlan, Second Signal Service, Ft. Shafter, Honolulu, T. H.

SALE — FBX receiver, homemade power unit, two old commercial longwave receivers, low-power d.c. transmitter, vibroplex, desk mike; 16 mm. projector. Settling estate for former ham owner. Make offer. W2BRB, Bellmore, L. I., N. Y.

Your Nearby Dealer Is Your Best Friend

Your nearby dealer is entitled to your patronage. He is equipped with a knowledge and understanding of amateur radio. He is your logical source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

One of these dealers is probably in your city — Patronize him!

ATLANTA, GEORGIA
Radio Wire Television Inc.
265 Peachtree Street
"The World's Largest Radio Supply House"

BALTIMORE, MARYLAND
Radio Electric Service Co.
3 N. Howard St.
Everything for the Amateur

BOSTON, MASS.
Radio Wire Television Inc.
110 Federal Street
"The World's Largest Radio Supply House"

BRONX, NEW YORK
Radio Wire Television Inc.
542 East Fordham Road
"The World's Largest Radio Supply House"

BUFFALO, NEW YORK
Radio Equipment Corp.
326 Elm Street
W8PMC and W8NEL — Ham, service and sound equipment

BUFFALO, NEW YORK
Dymac Radio
1531 Main Street — Cor. Ferry
Owned and operated by Hams for Hams GA. 0252

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Radio Inspection Service Company
227 Asylum Street
What do you want? We have it. Radio exclusively

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Hatry & Young, Inc.
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Stores also in Bridgeport and New Haven

HOUSTON, TEXAS
R. C. & L. F. Hall
1021 Caroline Street (C 0721)
"Specialists in Amateur Supplies"

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Radio Wire Television Inc.
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NEW YORK, N. Y.
Radio Wire Television Inc.
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NEW YORK, N. Y.
Harrison Radio Company
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Harrison Has It! Phone WOrth 2-6276 for information or rush service

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Complete Stock of Quality Merchandise

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W. H. Edwards Company
85 Broadway
National, Hammarlund, Hallicrafter, Thordarson, Taylor, RCA

SCRANTON, PENNSYLVANIA
Scranton Radio & Television Supply Co.
519-521 Mulberry Street
Complete Stock of Quality Amateur Supplies

YOU CAN BE SURE WHEN YOU BUY FROM QST ADVERTISERS

"Advertising for *QST* is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

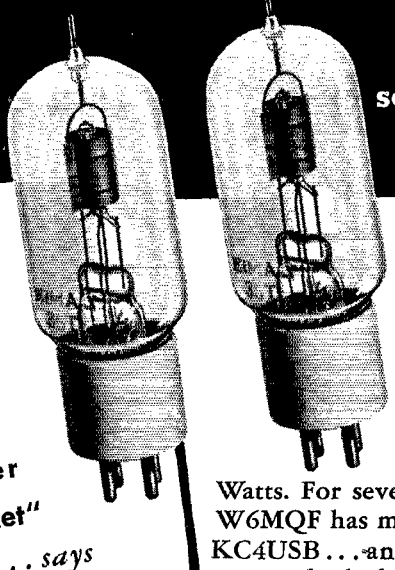
Quoted from QST's *advertising rate card.*

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. *And you will know the product has the approval of the League's technical staff*

Index to Advertisers

W6MQF w.a.c. on 20 meter phone with a pair of Eimac 35T's

R9 (plus) signal... **sounds like a kilowatt**



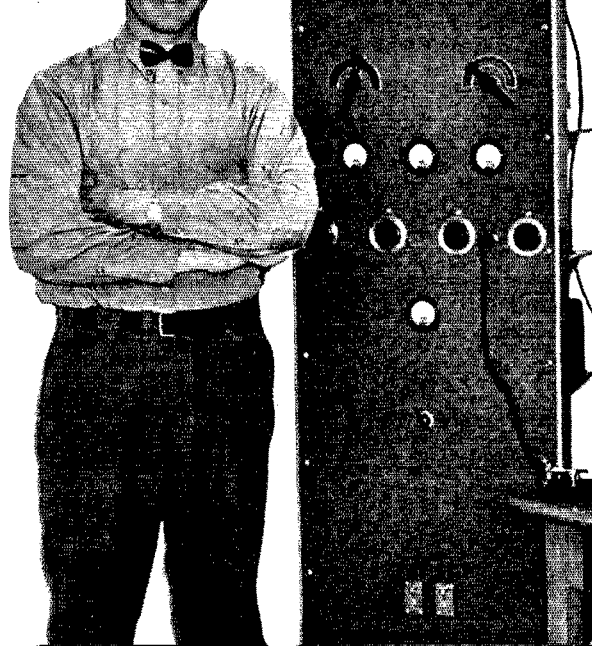
"I have had over 5000 contacts on 35T's and I know they are the finest tube for the money that has ever been put on the market"

... says

Earle F. Kent, W6MQF

The pair of 35T's have been in Earle's rig for about four years... operating with an input of 300 Watts. For several months during the past year W6MQF has maintained a weekly schedule with KC4USB ... and it was never necessary to cut the contact for lack of signal strength.

It's performance like this that has made Eimac tubes famous throughout the world ... not only among the amateurs but for commercial and military devices of all kinds. You too can enjoy this extraordinary performance, long life and downright economy. See your nearest Eimac representative today... or write direct for information.

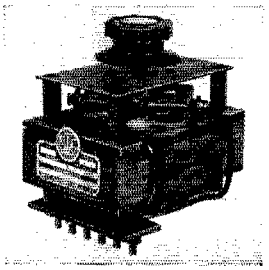


Follow the leaders to

Eimac TUBES

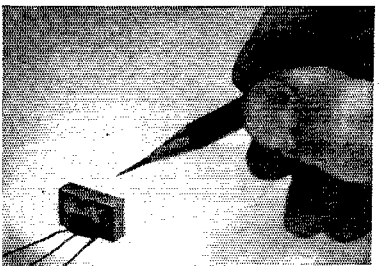
Eitel-McCullough, Inc.
San Bruno, California

It is surprising to most people to find out that by far the bulk of U.T.C. production is on special units not normally catalogued. It is impossible to describe all these thousands of special designs as they become available. The solutions to three typical customers' problems are shown below.



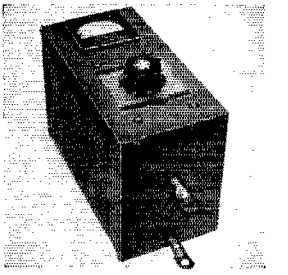
FULL WAVE VARITRAN

● In one full wave rectifier application, our customer was employing a standard varitran with a step-down transformer having a center tapped secondary. The U.T.C. design division simplified this construction by developing a special varitran unit with an insulated secondary and a double contact structure, permitting a continuous variable voltage to be obtained each side of center. The step-down transformer is now entirely eliminated.



THE SMALLEST

● In one special application the requirements call for the smallest output transformer possible, size and weight being of paramount importance. The design developed by U.T.C. has dimensions only 7/16" square by ¾" high. Almost ten thousand turns are employed in the coil of this unit. Ten of these transformers weigh only three ounces.



600 AMP. VARITRAN

● In bending some types of tubing, it is desirable to heat the tubing to a highly ductile point, thus preventing kinking. A special U.T.C. varitran was developed for this application. This unit combines a standard varitran with a step-down transformer. The output current, for any type of load normally encountered, can be varied continuously from zero to 600 Amps. with direct meter calibration.

MAY WE ASSIST YOU IN YOUR PROBLEMS?

The design ingenuity used in these applications has helped many users in other problems. The cumulative experience acquired in such development makes U.T.C. an ideal source for transformers to specifications.

UNITED TRANSFORMER CORP.

Write: COMMUNICATIONS DIV. ★ 150 VARICK ST. ★ NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"

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RUMFORD PRESS
CONCORD, N. H.

FEATURES

Series valve noise limiter with automatic threshold control

Improved AVC Circuit

Eight tube superheterodyne circuit

Full vision dial with separate bandspread condenser

Tone control

CW Oscillator

Four range coil switch, 550 KC to 30 MC

Three models for batteries, for AC-DC and for AC only

New! NC-45

Based on the proven performance of the NC-44, the new NC-45 has new features added. A series valve noise limiter with automatic threshold control gives remarkably effective noise suppression. A tone control has been added to provide still further control of background noise. The NC-45 is housed in a handsome two-tone cabinet with speaker to match. Other features are similar to the NC-44, but with one additional tube in the circuit. More complete details of this fine new receiver are given on Page 47 of this issue. Net Price $57.50, including speaker and tubes. See it at your dealer's.

NATIONAL COMPANY, INC., MALDEN, MASS.

Here it is!

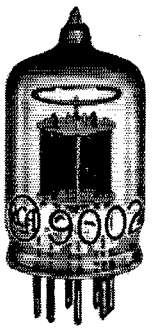
Transmitting Tube and Rig Construction Data You Can't Afford to Miss!

- **The finest, most complete amateur and engineering Guide on transmitting tubes RCA has ever published.**
- **Includes comprehensive data on RCA Air-Cooled Transmitting Tubes as well as several important types not previously announced.**
- **50% bigger than last year's Guide, it is illustrated with more than 100 photos and 57 circuit diagrams.**
- **Demonstrates typical use (with circuits) of individual tube types.**
- **Includes complete construction data on new transmitters such as a plate-modulated RCA-815 rig operating from 2½ to 20 meters; a high-power, single-control RCA-813 rig; an economy RCA-809 transmitter, and others.**

Available through your RCA Tube and Equipment Distributor or from RCA Commercial Engineering Section, Harrison, N. J. Ask for the new RCA GUIDE for Transmitting Tubes. Amateur's net price, 25c.

NEW RCA MIDGETS for UHF

Exceptional Performance at Lower Cost



ACTUAL SIZE

RCA-9001, 9002 and 9003 are the answer to the need for economical tubes designed particularly for applications requiring high-efficiency, high-gain circuits at unusually high frequencies. (*For example, the triode 9002 may be used as an oscillator in superheterodyne receivers up to 500 Mc.*)

Electrically, the 9001, 9002 and 9003 correspond to the Acorn types 954, 955 and 956 respectively. Mechanically, the new Midgets utilize bulb and base structures similar to those of the Miniatures. Their convenient button-type 7-pin bases permit mounting of these tubes in a minimum of space. Double cathode leads in each type complete the plate and screen r-f circuits with a minimum of circuit inductance common to the grid circuit.

RCA-9001
(Detector Amplifier Pentode)
Amateur Net, $2.50

RCA-9002
(Detector Amplifier Triode)
Amateur Net, $2.00

RCA-9003
(Super-Control R-F Amplifier Pentode) Amateur Net, $2.50

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