QST

november, 1944
25 cents
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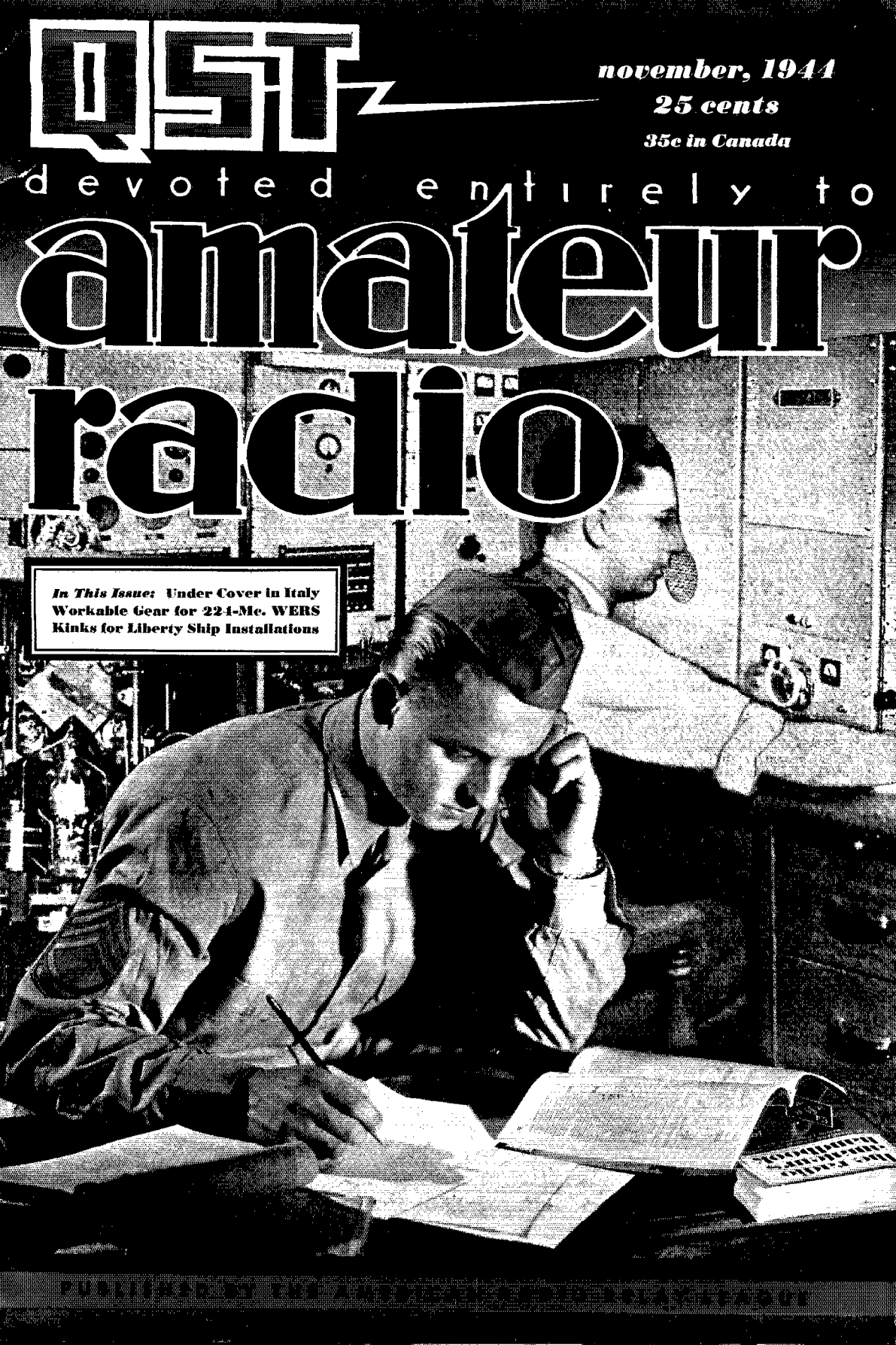
devoted entirely to

amateur radio

In This Issue: Under Cover in Italy
Workable Gear for 224-Mc. WERS
Kinks for Liberty Ship Installations



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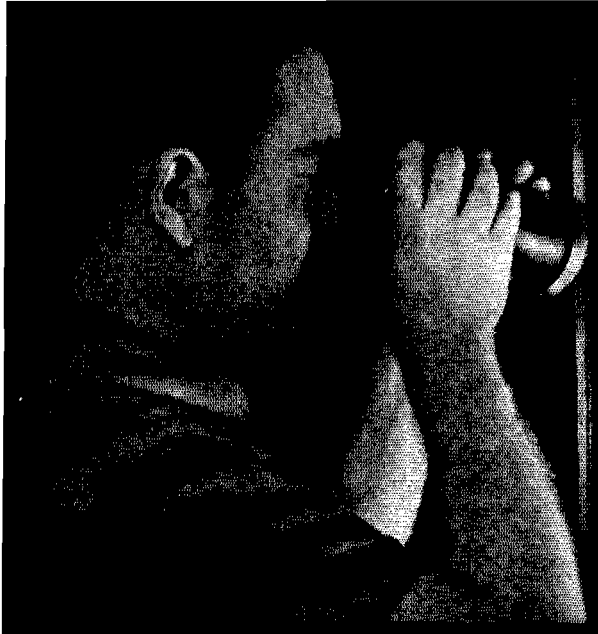

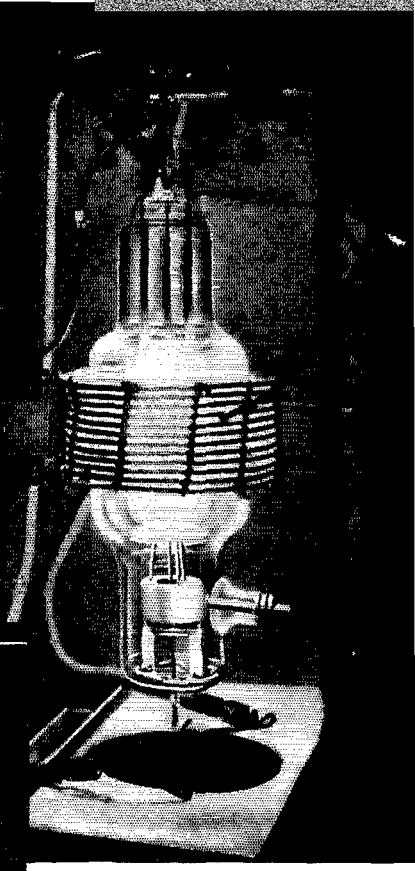

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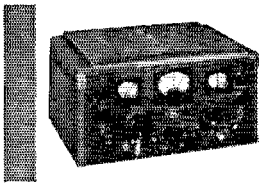
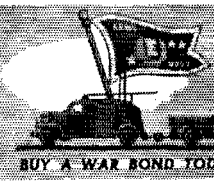


Service men all over the world are learning that the name "Hallicrafters" stands for quality in radio equipment. In peace time Hallicrafters will continue to build "the radio man's radio." There will be a set for you in our postwar line.



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hallicrafters RADIO

THE HALLICRAFTERS COMPANY, MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 16, U.S.A.

NOVEMBER 1944

VOLUME XXVIII

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QST *devoted entirely to*

AMATEUR RADIO

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

CONTENTS

¶ All material appearing in *QST* conforms with the "Code of Wartime Practices for the American Press" of the U. S. Office of Censorship.

¶ All text and pictorial content, both editorial and advertising, is submitted for prepublication examination by the Office of Censorship.

¶ All material involving military security has been reviewed by appropriate military, naval or other competent authority.

Section Communications Managers of the A.R.R.L. Communications Department

Reports Invited. All amateurs, especially League members, are invited to report communications activities, training plans, code classes, theory-discussion groups, civilian-defense building or planning each mid-month (16th of the month for the last 30 days) direct to the SCM, the administrative official of ARRL elected by members in each Section whose address is given below. Radio Club reports and Emergency Coördinator reports representing community organized work and plans and progress are especially desired by SCMs for inclusion in *QST*. **ARRL Field Organization appointments**, with the exception of the Emergency Coördinator and Emergency Corps posts, are suspended for the present and no new appointments or cancellations, with the exception named, will be made. This is to permit full efforts of all in Emergency Corps plans.

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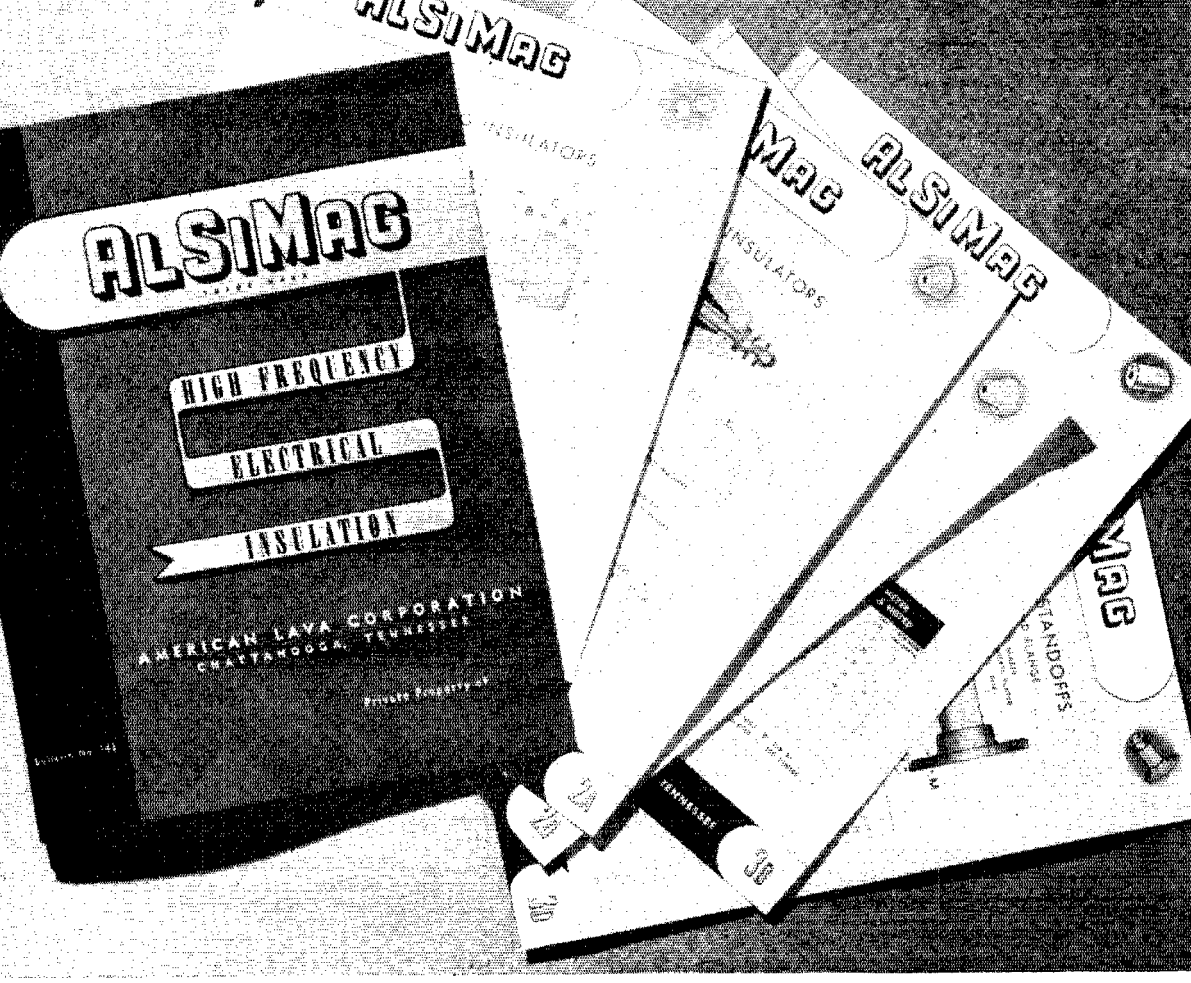

ANNOUNCING BULLETIN NO. 143

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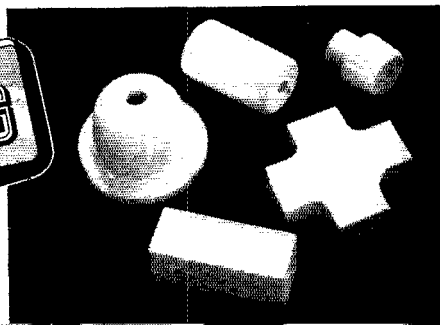

THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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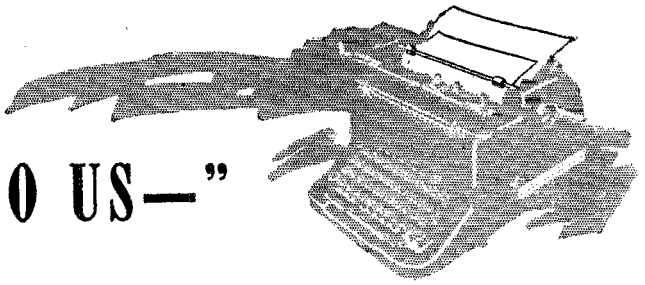

"IT SEEMS TO US—"

CYCLES & KILOCYCLES

THESE are busy times for us at Headquarters. The thing that's in the back of all our minds is frequencies. We ourselves are living an exaggerated sort of commuter's life, shuttling forth and back to Washington or New York for committee meetings, hearings and more meetings, as the country tries to make up its mind about frequencies. (We figure that by now we ought to have at least a half interest in the Federal Express — the night train to Washington — although fellow-passengers these days don't seem to realize it.) Several hundred other people in the radio science and industry are doing the same thing. It is the familiar story of countless meetings, of seemingly endless sessions with hours of talk, mimeographs by the bushel, small net progress. Yet these are the ways of democracy and we know that eventually we shall have a solution, and a solution that makes adequate provision for amateur radio. On the factual developments of the month we have given you a report in another department of this issue. The activity is at white heat now. All the things the League has worked toward during the past couple of years are up for decision this autumn. In another month or so there should be more definite news. Although the situation is difficult and the outcome visible only in broad outline, we are confident that it will be good news.

THE other day in Washington there wasn't a taxi in sight, so we grabbed a street car, on our way to a committee meeting on Capitol Hill. The car stopped before a stately building and we craned our neck to get a look upward to identify it. Archives of the United States of America, it said. But what had first caught our eye was an inscription on a pedestal at the base of the steps: WHAT IS PAST IS PROLOGUE.

We reflected on that a moment, on how fittingly that simple statement set the perspective in which we file the historical records of our nation. And then, as is usual with us, we went through the same thinking process in terms of amateur radio. We amateurs are prone to think that we were pretty hot stuff in the days before the war. If we could have things just that way again, how happy we would be, we say. Well, it seems to us that our hiatus during the war draws a clean line between the old existence and the new. We shall not want to live in the past nor to dwell too long on that past. It's our opinion that we shall have a marvelously better and more interesting and more useful amateur radio when we are reëstablished after the war. All that happened in our art in our unbelievably active years before Pearl Harbor serves simply to set the stage for the great and exciting scenes that will unfold in our postwar life.

THE frequencies above three hundred megacycles have never been allocated to services in this country. Now they are about to be — for the brave new postwar world. Put a bunch of men together in an allocation committee room, arm them with blank allocation tables, and you get a funny spectacle. The tables have figures — hundreds, thousands, tens of thousands of megacycles. The men try to get the names of their services written down opposite certain megacycles of their selection. They argue why they have to be in a certain range, they clamor, trade horses. What impresses itself most on us is the inescapable feeling that most of them don't know what they are talking about. The megacycle figures have become mere numbers and they only know that they want some of them. If they stopped to think that a half-wave antenna for some of these magic numbers is only a few inches long, they'd probably be quite startled. We've been glad that it was the amateur service for which we were speaking. We would be hard put to it to explain how we propose to generate power on some of these frequencies, or why we feel we must have a certain band for a certain distance in a realm where man's knowledge is decidedly limited. Fortunately for us, such considerations don't enter the amateur matter. It has already been proved that it's worth the nation's while to give amateurs assignments about an octave apart, right through the spectrum. This new field will be much the richer for the ham's restless curiosity and his indisputable ability to make things work. We don't have to know in advance. We'll find out by doing, licking the problems as we come to them, and passing on our information for the good of the art.

IF YOU listen-in much these days you're aware that we are at or near a sunspot minimum and that most DX frequencies are work-

ing at their longest possible range. You hear some wierd stories: the police all over the country yelling bloody murder because their communication is being periodically wiped out by long-distance QRM in the thirty-megacycle band, short-range military stuff in the European theater coming over to this country, signals from "down under" breaking up northern traffic, and so on. Somewhat similar has been the reception — via sporadic *E*, of course — of New York City television programs in Indiana. DX on what used to be the popular amateur frequencies has been grand, in other words, and we've missed a couple of swell years for DX Contests.

The sunspot half-wave is something over eleven years, the full cycle about twenty-three years. Twenty-three years ago was 1921. It was in December of 1921 that Paul Godley, at Ardrossan, Scotland, during the ARRL Trans-Atlantic Tests, succeeded in copying so many American amateur signals on 200 meters. The following December saw our fantastically successful Third Trans-Atlantic Tests, again on 200 meters. And the first two-way trans-ocean amateur working occurred in November of 1923, on about 2700 kilocycles. What a break it was for us that we were at a sunspot minimum then, or we should never have been able to do it! We didn't know, of course — nobody did. Considering the elementary technique of those days, we would probably have tried for years without success if we had been at a midpoint on the cycle. It was a fortunate thing for the whole science of radio that the time at which we made our effort was the one time at which success was possible — for all the complex high-frequency technique of today has flowed from the inspiration of that amateur success.

K. B. W.

★ SPLATTER ★

OUR COVER

HE may be in uniform — but he still can dream, can't he?

This cover may seem a bit premature — but a high proportion of our correspondence recently establishes that this scene depicting a GI ham dreaming up a glorified ham rig for postwar days is a fairly general one these days.

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FOOTNOTES

OUR roster of authors this month reads more like an in-the-services listing. The first one on our roll call is **Captain J. Wm. Hazelton, W8UBN/4,** of the Signal Corps. While he is a newcomer to the pages of *QST*, W8UBN is an old-timer in the field of amateur radio, having first become interested in 1910 while attending dental school in New York City. Now we'll let him continue: "I never did become a dentist, but physics intrigued me to the extent that I became a regular visitor to the salesroom and factory of Mr. Gernsback's Electro Importing Company down on West Broadway. On one of my visits to this shop I must have been badly bitten by the radio bug as I have broken out with the fever on several occasions after believing a cure to have been effected. I built and operated about all the several types of radio equipment of the day, both transmitting and receiving. I also built on a piece-time basis many of the gadgets then being offered the ham through the pages of his Bible, the catalog of the Electro Importing Co. However, motion picture photography became my career and, until sound was put to film, I thought the radio fever was cured. But along with the sound came tubes and, with the necessary handling of the glass bulbs in the day's work, I again contracted the disease — no doubt from the tube lice. Considerable treatment was of no avail and I took the exam for my ham ticket in 1939, renewing it in 1942, right after Pearl Harbor. During this time I had been a member of the New York National Guard, served in Mexico with Madero's Army as a captain, then on the Mexican border and got back from chasing Villa in time to go overseas in World War I. As a captain in the Signal Corps I am now with the State of Florida as their communications officer." It is this last phase of his work that he describes on p. 45 in this issue.

Samuel J. Semel, S1c, whose 224-Mc. WERS equipment is described on p. 9, has exchanged WERS drills for Navy drills. For eighteen months before entering the service all of his spare time was taken up in WERS work in New York City. He was on the staff of the Queens Boro control station and in one seven-month period he operated during every scheduled drill. In addition to operating, he built and had licensed three other WERS units besides the rig described in this issue. This building program was called to a halt when he joined the Navy under the radio technician program. Receiving the immediate rating of seaman first class, he took boot training at Great Lakes, and returned home on leave just in time to operate and do maintenance work in his WERS network during the September 14th hurricane. At present he is back in Chicago completing "pre-radio" before going on to "primary." Before entering the Navy he had completed two years of electrical engineering at Pratt Institute, where he was vice-president of the amateur radio club and trustee of its station, W2NOD.

Having accounted for both the Army and the Navy, our other newcomer this month, **R. H. Whittaker** (p. 22), is a member of the merchant

(Continued on page 98)

Compact Gear for 224-Mc. WERS

One Way to Solve the 112-Mc. QRM Problem

BY SAMUEL J. SEMEL,* SIC

It is nice to have a frequency band to fall back on when the regular 112-Mc. band becomes crowded. Sometimes in a thickly populated area like the Queens Borough of New York City, there is QRM enough to slow up WERS traffic. Even in much smaller cities, ham activity may be great enough to produce the same QRM problem. Much of the "short-haul" traffic can be handled in an "overflow net" using 224-Mc. gear similar to that described in this article.

IT MAY seem strange to many of the WERS gang in outlying districts to talk about QRM. This, of course, is natural enough since the 112-Mc. band provides enough room for a network of the proportions usually found in the average town with a population of several thousand. But in the larger metropolitan areas, interference between stations and between local nets is becoming a serious handicap in the efficient handling of emergency traffic. For instance, in the concentrated New York area there are over 350 licensed WERS units!

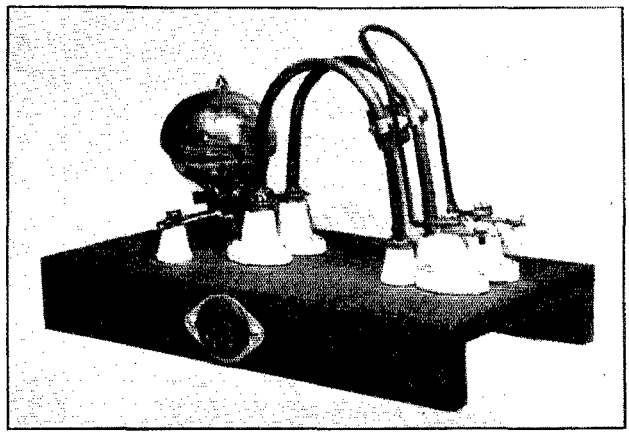
The problem is one which has been recognized for some time and a considerable amount of progress has been made in the improvement in design of both transmitters and receivers for greater frequency stability and higher selectivity. However, both the cost of better gear and the lack of skilled operators to handle it impose practical limits upon the amount of relief which may be obtained in this manner. What we need is more frequencies. The solution to this problem is not so difficult as it might seem at first. It is quite probable that many have forgotten that the 224-Mc. band also is assigned for WERS work.

While it cannot be denied that there are obstacles to be overcome in putting this band to practical use, it should not be too difficult to iron them out. The chief trouble is that only a handful of WERS hams have had any experience in working the band. Since there is much to find out about it, it offers an excellent field for the experimenter who has had his fill of the usual run of 112-Mc. gear and who is looking for new fields to satisfy his natural curiosity. Thus far, we don't know a great deal about what can be expected in the way of practical results. Increased shadow effects with a corresponding decrease in range over some paths must be expected, but it is certain that many of the circuits now helping to crowd the 112-Mc. band can be covered just as effectively at 224 Mc.

So far as gear is concerned, it is unfortunate that 224 Mc. comes somewhat outside of the limits of the frequencies where reasonably good performance can be obtained from the standard receiving tubes around which most 112-Mc. WERS gear is built. However, we have had no particular difficulty in picking up several factory rejects of the WE 316-A type as well as plenty of acorns. HY75s and 615s also work well at this frequency and it seems probable that by the time this article appears in print the market on other h.f. tubes may be eased appreciably. This will eliminate many of the headaches connected with 224-Mc. gear, since proper tubes are most important for satisfactory results.

Design Considerations

In physical size, the transmitter unit shown in the photographs is small and compact. The receiver is in a separate unit which contains audio equipment for use both in the transmitter and receiver. By this arrangement, the receiver and transmitter may be placed in different locations and the transmitter operated remotely when desirable. A separate antenna is used for each unit, chiefly as an operating convenience. The outfit in this form is suitable for fixed, portable, or even portable-mobile operation.



A side view of the 224-Mc. oscillator unit. The inverted "U"-shaped grid and plate resonant rods are tuned by means of a sliding fixed condenser. On the left end of the chassis is the WE 316-A "doorknob"-type tube. On the opposite end, a hairpin loop is coupled inductively to the tank rods for antenna pick-up.

*Comp. 1508, USNTS, Great Lakes, Ill.

The circuit of the transmitter, shown in Fig. 1, is an ultraudion with a linear tank. A WE 316-A "doorknob"-type tube is coupled to the parallel resonant line which is bent in the shape of an inverted "U" to conserve space. The 316-A requires a filament transformer which will provide 2 volts at approximately 4 amp.; or a 2.5-volt transformer can be used with a 10-watt 200-ohm resistor in series with its primary, as shown at R_1. A hairpin loop for antenna pick-up is coupled to the grid and plate lines. R.f. chokes are essential in each filament lead because the filament is not at r.f. ground potential. When the circuit is oscillating, grid bias is obtained from the voltage drop across the grid leak, R_2. This resistor is connected between ground and the grid line, L_2, at a point which is "cold" so far as r.f. is concerned. In the plate circuit, current is fed through the metering resistor, R_3, and RFC_2 to a similar "cold" point on the plate line, L_1. The mica condenser, C_1, is fitted with metal clamps so that its position may be changed, like the customary shorting-bar, for tuning purposes. The reactance of this condenser at 224 Mc. is so low that it is virtually a direct connection for r.f. but it blocks d.c. from the power supply from flowing across the bars to ground through R_2.

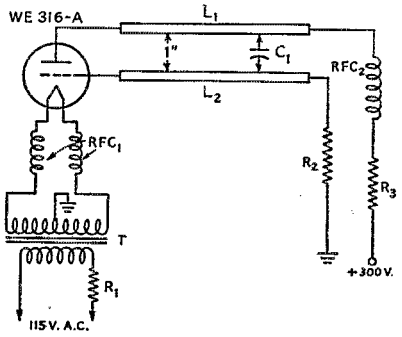


Fig. 1 — Circuit diagram of the 224-Mc. transmitter.

C_1 — 250-$\mu\mu$fd. mica.
R_1 — 200 ohms, 10 watts, wire-wound.
R_2 — 10,000 ohms, 10 watts.
R_3 — 100 ohms, 1 watt.
L_1, L_2 — ¼-inch copper tubing, 8 inches long (see text).
RFC_1 — Filament r.f. chokes. 30 turns No. 16 enamel wire, ¼-inch diameter, self-supporting.
RFC_2 — Plate r.f. choke, v.h.f. type rated at 50 ma.

The self-quenched superregenerative circuit of the receiver is shown in Fig. 2. A type 955 acorn tube is used, but an HY615 or a type 9002 tube can be used with satisfactory results by proper adjustment of tank dimensions. Tuning is done with the 7-$\mu\mu$fd. variable condenser, C_1, which can be made by taking off two of the plates of a regular 15-$\mu\mu$fd. midget variable. Regeneration is controlled with the potentiometer, R_2. A two-stage audio amplifier is coupled to the detector output through one winding of the dual-primary transformer, T_1. Gain control both for the receiver and transmitter is accomplished with the potentiometer, R_4. For microphone current, the battery, B, may be used, but it is possible to tap the "mike" current off the 6L6 cathode resistor. In this case, the line for mike current goes to the juncture of R_8 and R_9 instead of to the negative side of the battery. The output transformer, T_2, is shown to be of the push-pull type because one of this type was easily obtainable, but a single-ended transformer is perfectly all right provided that it will properly match the 6L6-plate and speaker impedances.

The change-over switch, S, is a four-section ganged arrangement with a s.p.d.t. unit in each section. The function of all sections is evident from the diagram except perhaps that shown near the speaker in Fig. 2. Here it will be seen that the positive side of the power supply is connected constantly during operation to the two stages of the audio-amplifier so that they are ready at all times either to boost receiver output or to plate-modulate the transmitter. The switch then serves

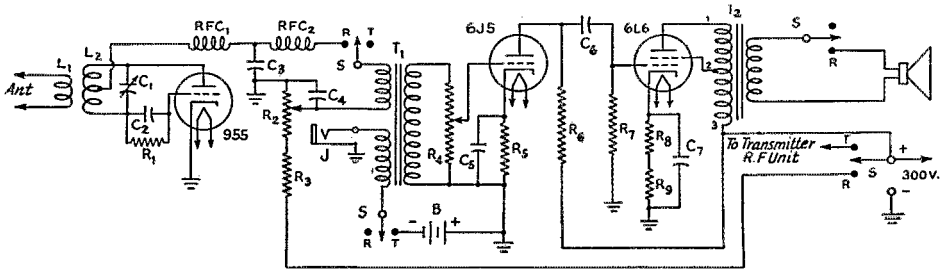


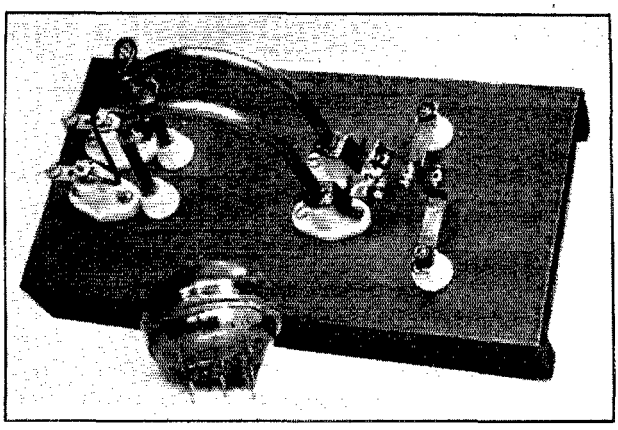
Fig. 2 — Circuit diagram of the 224-Mc. receiver and audio amplifier.

C_1 — 7-$\mu\mu$fd. variable air condenser, cut down from a 15-$\mu\mu$fd. unit (see text).
C_2 — 50-$\mu\mu$fd. mica.
C_3 — 0.001-μfd. 450-volt paper.
C_4 — 0.1-μfd. 450-volt paper.
C_5, C_7 — 10-μfd. 25-volt dry electrolytic.
C_6 — 0.5-μfd. 450-volt paper.
R_1 — 7 megohms, ½ watt.
R_2 — 50,000-ohm potentiometer.
R_3 — 50,000 ohms, 1 watt.
R_4 — 0.5-megohm variable.
R_5 — 1500 ohms, 1 watt.
R_6 — 0.1 megohm, 1 watt.
R_7 — 0.5 megohm, 1 watt.
R_8 — 300 ohms, 1 watt.
R_9 — 200 ohms, 1 watt.
L_1 — One turn, No. 16 wire, ¼-inch diam., self-supporting.
L_2 — 3 turns, No. 14 wire, ¼-inch diameter, self-supporting.
RFC_1 — V.h.f. choke, solenoid-wound.
RFC_2 — 80-mh. receiver-type r.f. choke.
S — 4-pole, double-throw gang switch.
T_1 — Transceiver-type coupling transformer.
T_2 — Pentode-plate-to-speaker-coupling transformer. (Push-pull shown but single primary is satisfactory.)
B — 4½-volt "C" battery.
J — Jack for single-button carbon microphone.
A permanent-magnet type loudspeaker is used.

the purpose of changing this positive lead from the 955 receiver circuit to the WE 316-A transmitter, as desired.

Construction

The dimensions of the transmitter chassis are 5 × 9½ × 1½ inches. This small size is accounted for partly by the inverted "U" shape of the grid and plate tuning rods, as shown in the photographs. Since the WE 316-A tube does not have a standard base, the socket which was built for the purpose is shown at the right in the top-view photograph. The binding posts which hold the tube pins are mounted on spring-metal strips which in turn are mounted on stand-off insulators. The metal strips not only act as shock absorbers for the tube, but may be bent slightly to fit individual tube pin dimensions. However, care must be exercised not to rupture the glass at the base of the tube by placing a mechanical strain on the pins. Soldering at the tube pins therefore should be avoided in order not to crack the glass.



Top view of the 224-Mc. oscillator unit. The homemade socket using binding posts for the WE 316-A "doorknob"-type tube is shown at the right. Coupling to the antenna is obtained from the hairpin loop mounted on stand-off insulators at the left. The fixed condenser shown clipped to the bars at the left is used for tuning.

The plate and grid lines, L_1 and L_2, are bent so that their ends fit into the screws in the stand-off insulators used for mounting. The ends are then sweated onto the screws. With such short lines, rigid support is obtained in this manner. The same is true of the antenna-coupling loop which is made of a piece of No. 10 solid copper wire, four inches long.

Photographs of the receiver unit are not available, but the following description is given to aid those who may want to build a similar rig. The receiver and modulator are built into a can 7½ × 7½ × 7 inches. With these dimensions the parts are not jammed together. They are mounted compactly enough, however, so that wiring may be "shorter than short." For example, the 955 acorn tube is mounted in a vertical plane so that the plate pin of its socket touches the stator section of the variable condenser.

If a dual-primary transceiver coupling transformer cannot be found to use at T_1 in Fig. 2, some measure of success can be had by winding 30 turns of No. 34 magnet wire over the existing winding of a common 3-to-1 audio interstage transformer. The output lead from the modulator to the transmitter is brought out on the side of the cabinet through a feed-through insulator. On the other side of the cabinet, the permanent-magnet speaker is mounted. The four-pole, double-throw, ganged change-over switch, *S*, is mounted in the top right-hand corner of the cabinet, and all wiring to the switch is cabled for neatness. A large vernier-type dial is coupled by means of a shaft-coupling link to the rotor of the variable condenser. Binding posts are brought out in the rear for the external 4½-volt microphone battery. Insulation in the r.f. circuit of the receiver should be of either ceramics or polystyrene in order to reduce losses.

Antennas

As mentioned previously, separate antennas are used for transmitter and receiver. Constructional drawings of two types which have been used with

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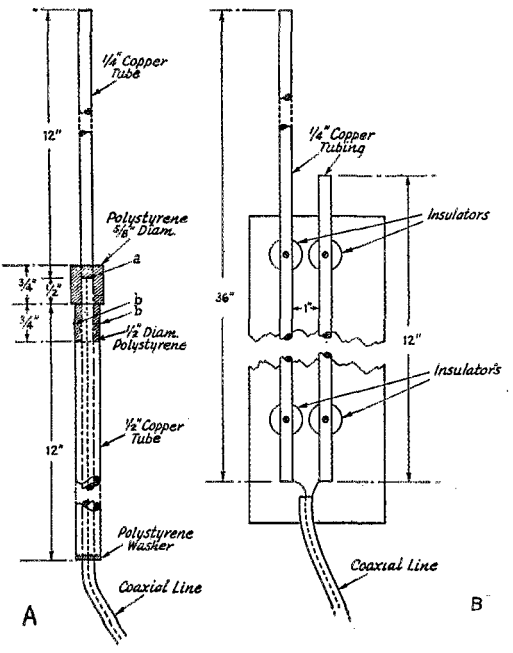


Fig. 3 — 224-Mc. antennas. The coaxial antenna at (A) is fed at the center with a 72-ohm concentric line. The center conductor of the line connects to the ¼-inch copper tube, which forms the upper ¼-wave antenna section at *a*, while escutcheon pins through the ½-inch tube forming the lower antenna section make contact with the outer conductor of the line at *b*. The two sections are separated by the polystyrene insulator which fits into the end of the ½-inch tube. The mounting details and method of feeding the modified "J" antenna are shown at (B).

Radioteletype in the AACS

Putting Radio Signals to Use to Operate Teletypewriters

BY CPL. GEORGE HART,* W1NJM

PRACTICALLY everyone has seen in operation the kind of teletype equipment which makes use of a direct line between two or more points to operate printers and keyboards at each end. This equipment is operated by means of electrical pulses sent over a metallic conductor; these pulses cause a printer at the receiving end to reproduce the exact intelligence transmitted from the keyboard at the transmitting end. No technically skilled operators are required. It is simply a matter of running a teletypewriter in one place and having it print in another.

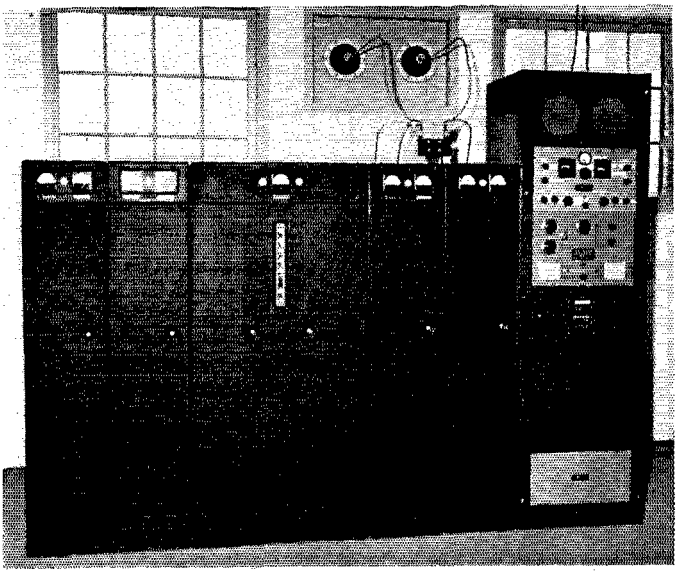
There is nothing very new about this. It has been in use for years, and it is by no means becoming obsolete. However, over long distances, especially distances separated by large bodies of water over which direct wire communication is not possible, it has become necessary to use radio more and more as a means of military communication, particularly to and from remote points which suddenly, in the course of the war, have become locations of vital military installations and operations.

Prior to the advent of radioteletype, there were several ways of communicating by radio which, for the purpose of this discussion, can be divided into three categories as follows: (1) direct voice; (2) manually-operated c.w. circuits, and (3) c.w. circuits using automatic code transmission and reception to the extent that the received signals are printed on inked slip in the form of dots and dashes, which then must be copied manually at a slower speed by a skilled operator.

The unavoidable disadvantage of all three of the above methods of transmission and reception are more or less obvious. Voice operation is effective only when signal strength is at a comparatively high level. Manual c.w. circuits require a signal that can be heard and understood by the human ear in addition to trained operators at both ends. Automatic c.w. circuits, while probably the most effective of the three methods listed, still require trained operators at the receiving end, and these operators are subject to fatigue and exhaustion not characteristic of machinery.

The Army Airways Communications System was among the first military organizations to recognize the value of the newly developed radioteletype for military communication, and has been the first to put it to actual use on a worldwide scale. At its headquarters in Asheville, N. C., a hard-working detachment of the 107th AACS Squadron conducts a radioteletype school and operates a training station for radioteletype operators and maintenance men. The personnel of this detachment consists of specialists variously at work instructing classes, analyzing and testing new equipment proposed for AACS uses, and maintaining and operating all equipment, mostly for instructional purposes. A radioteletype station has been set up for student training purposes, complete with receiver and transmitter sites three miles apart and six miles from the headquarters building, at which is located the operating position which remotely controls both transmitters and receivers. This installation is an exact duplicate of the type installed in the field, even to the equipment inside the buildings, so that students trained to operate and do maintenance work here will be familiar with all radioteletype equipment used

*Sec. V, Sqd. D, Class 44L, OCS SAACC, San Antonio, Texas. (Formerly acting communications manager, ARRL.)



A four-channel 400-watt-output radio transmitter used in radioteletype operation. The unit just below the Hammarlund receiver is used as the exciter for the transmitter and provides a system of frequency shifting to produce the signals required for radioteletype operation.

by AACS. As a result of this standardization, radioteletype men trained by the detachment at Asheville have given a good account of themselves when out in the field.

Transmission

As mentioned above, the conventional teletype machine utilizes electrical impulses which are transmitted over a wire to the receiving point. The problem of its adaptation to radio transmission consisted mainly of finding a means of transmitting a signal which, upon being received, could be converted into pulses which would operate a polar relay. In other words, it was not considered desirable to alter the teletypewriter machines themselves, nor has this been found necessary. All that has been necessary is to substitute a radio signal for the metallic conductor which ordinarily carries the teletype pulses. These pulses, in order to operate the polar relay which actuates the teletype printer, must consist of two values, called "mark" and "space." The simplest way of accomplishing the operation is to use a keyed carrier, a signal causing the relay to "space" and no signal causing it to "mark." Such a system is known as "neutral signals." While it has been used with some success, there has been one important drawback: that atmospheric noises or interference frequently caused the relay to make space contacts when there was no signal, thus giving a garbled text on the printer.

In order to overcome this difficulty, a newer and more successful method of sending mark and space signals is to use a constant-carrier signal which shifts its frequency to another point less than a kilocycle away in accordance with the pulses transmitted by the teletypewriter. Thus the pulses, instead of keying the transmitter carrier, simply change its frequency. One frequency, the normal transmitter frequency, represents a mark while the shifted frequency, slightly less than 1 kc. lower, represents a space. Of course, there are a number of ways of effecting this frequency shift, the one mainly used being a system of condensers across the crystal controlling the transmitter frequency. Separate oscillators can be used. The extent of the shift is important in that it must be great enough to enable the receiving equipment to make a differentiation between the two frequencies and still not be so great that the two frequencies cannot be received without retuning the receiver. On frequencies generally in use by AACS the shift utilized is slightly less than 1 kc. On higher frequencies the shift could be greater, while on lower frequencies it would probably be necessary to decrease the amount of shift. The transmitter itself can be any conventional circuit operating at any power.

Reception

Reception, however, is somewhat more difficult. The two main problems at the receiver can be summarized briefly as follows: (1) to discriminate between frequencies, and (2) to use signals obtained from this discrimination to operate a polar relay.

While the emphasis in this article is on the application of frequency-shift transmission to commercial radioteletype operation, potential advantages may be found in amateur postwar use minus the automatic equipment — requiring in lieu thereof perhaps only a modified electronic key at the sending end and a relay-keyed audio tone for reception.

Frequency discrimination is accomplished first of all by the high-frequency oscillator which beats against the incoming signals to produce i.f. frequencies, one for mark and one for space, centering around 465 kc., the space signal exactly as far above 465 kc. as the mark signal is below it. Note that the space signal is now the higher of the two due to normal frequency inversion in the first detector. The output of this stage is beat against the second b.f.o. which produces the correct audio tones for the receiver output of the mark and space signals, but the frequency of the second b.f.o. must be lower than that of the i.f. stage in order to prevent a second frequency inversion. The two resulting mark and space frequencies, as long as they are the correct number of cycles apart, are not necessarily critical. However, since the band-pass filters following the receiver output are standardized in equipment used by AACS, two certain audio frequencies are always adhered to.

These signals are passed through a band-pass filter which passes only the two signals and all frequencies between them, thus eliminating much noise. They then go through a limiter (which is a *real* limiter) that keeps the signals at constant

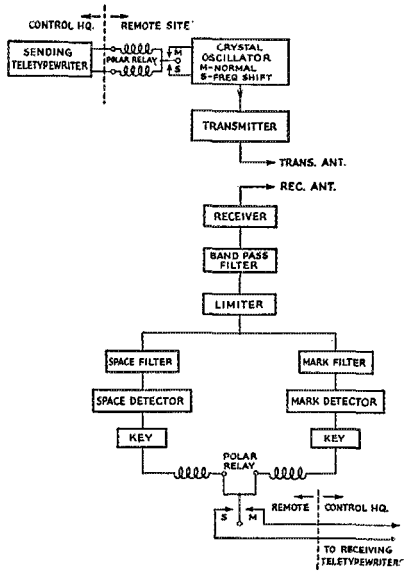


Fig. 1 — Transmission and reception of polar signals. Note that the receiver itself is but the first of many steps in the receiving process.

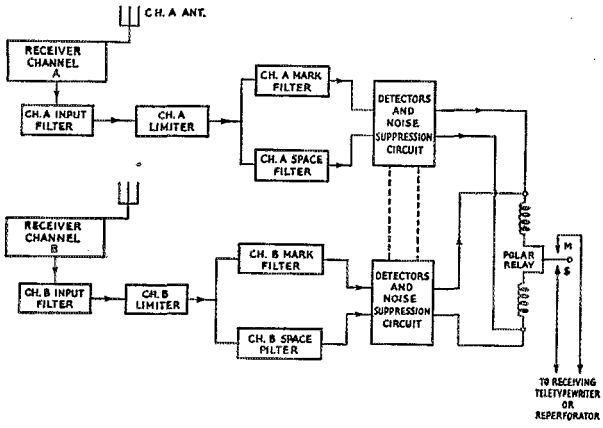


Fig. 2 — **Arrangement of equipment for diversity reception. The noise suppressors deliver the greatest output from the channel having the best signal-to-noise ratio. For single-channel reception the noise suppressors must be eliminated from the circuit.**

strength. After that the mark and space signals are separated by means of two finely discriminating filters. One, the mark filter, will pass only signals at the frequency of the mark part of the incoming signal. The other does likewise for the space part of the signal. Each filter has a tolerance of only plus or minus 300 cycles. These two signals must always stay the same number of cycles apart, both in radio frequency at the input of the receiver and in audio frequency at the output. From this point on the two signals travel separate paths through similar equipment until they converge at the polar relay at the end of the process. After passing through the mark and space filters, the signals pass into mark and space detectors, which convert their audio energy into direct current to actuate the polar relay. The block diagram of Fig. 1 is a simple representation of the way the system works, a mark signal pulling the armature of the polar relay one way, a space signal pulling it in the opposite direction. The polar relay operates the teletypewriter.

Diversity Reception

Since the operation of radioteletype equipment is adversely affected by fading and generally poor receiving conditions, it being necessary to maintain the strength of the signals at a constant level, diversity reception is usually resorted to, along with two directive antennas spaced far enough apart to effect (theoretically) a phase shift. Rhombic antennas terminated in the direction from which reception is desired have been found to be the most satisfactory.

When diversity reception is used, two receivers with common beat oscillators are utilized and the signals coming through them directed through separate sets of filters and limiters. One receiver is designated Channel A and the other Channel B. These two channels are each identical to that described in the preceding paragraph with the addition that each contains a noise-suppression circuit following the detectors for the purpose of measuring the signal-to-noise ratio in each channel and by an interpolating action decreasing the current supplied by the poorer channel and increasing the current supplied by the better channel to actuate the polar relay.

Operation

Radioteletype circuits can be operated either simplex or duplex, depending upon whether or not the two transmitters are on frequencies far enough apart to avoid interfering with each other. If they are on the same frequency (simplex operation) it is impossible to send and receive at the same time because the local signal would blot out the one from which reception is desired. In this case, therefore, it is necessary that the carrier at one end of the circuit be cut in order to receive signals from the other end.

Here a bit of trouble arises. Teletypewriters which are running "open," which is to say that they are not being controlled by mark and space signals, have a habit of chattering and printing garble, which makes a mess out of otherwise neat

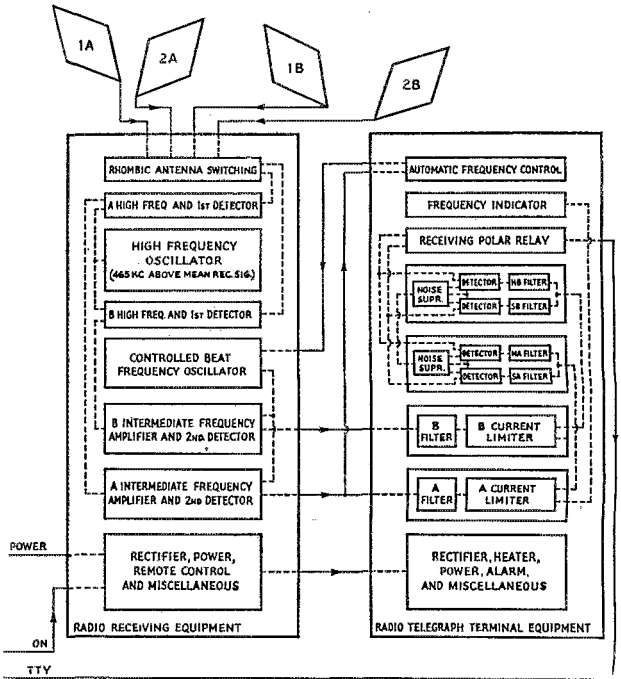


Fig. 3 — **The complete layout of radio teletype receiving equipment using dual-diversity reception.**

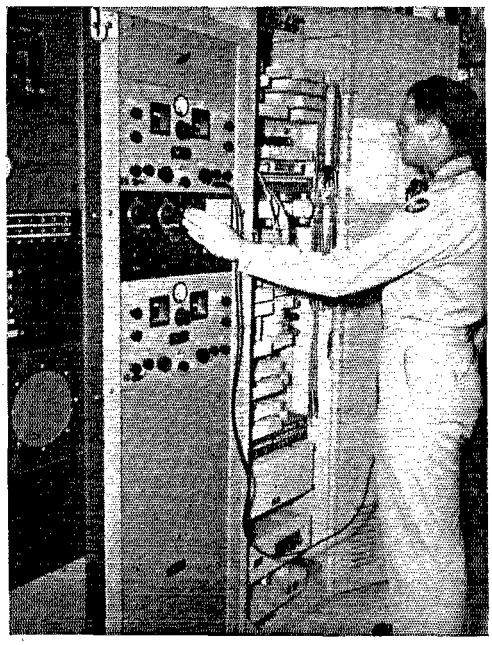
copy. In the case of simplex operation, then, the printer would be running open from the time one operator switched his carrier off until the other switched his on, for during this time there would be no controlling signal and the printer would be operated spasmodically by whatever noise happened to be coming in over the circuit. Thus it is essential that a steady mark signal be sent out to the receiving equipment in order to render the printer inoperative when there is no controlling signal; yet the receiving equipment must continually monitor the frequency and commence operation immediately as the transmitting carrier comes on the air.

The system of relays which accomplishes this operation is known as the "monitor lock-up." The relays are operated manually from the remote operating position to close, or lock, the equipment so that it will not operate without a signal, but once the signal returns to the air the monitor relays are released automatically and the receiving equipment put into normal operation. When a transmission begins, a period of ¼ second must elapse before the monitor lock-up circuit will be broken. In this way noise will not disturb the monitor circuit since noise will seldom be of more than ¼-second duration.

Duplex Operation

For duplex operation, when separate frequencies are used, the monitor circuit is not generally used for the simple reason that the carriers of both transmitters can be left on the air continuously and it is at no time necessary to supply an artificial mark signal to keep the receiving equipment inoperative. When one transmitter is not transmitting anything its carrier is automatically set on a mark, which will render the receiving printer inoperative until the frequency again shifts. Duplex operation, of course, is preferable to simplex for, given the proper amount of equipment at both ends, it is possible to transmit and receive simultaneously. Where two frequencies far enough apart to avoid local interference are not available, however, simplex operation with a monitor circuit is mandatory.

The versatility of radioteletype is further enhanced by the fact that perforated tape can be, and more often than not, is used to actuate the polar relay which does the transmitter keying. While the use of tape is not mandatory, its use gives more speed and accuracy of transmission. The teletypewriters in use are capable of a speed of 60 w.p.m., and when tape is used can transmit continuously at this speed. Manually, it would not be possible to attain this speed for the obvious reason that the human element does not allow a constant speed to be maintained; in other words, even though a given typist may be capable of typing at 60 w.p.m., or even higher, neverthless his depression of the keys would not be steady enough to allow him to maintain a constant speed of 60 w.p.m. over any great length of time. The perforated tape, however, does accomplish this steadiness and allows the equipment to operate at its highest possible speed.



Lt. G. V. Dawson, jr., W9ZJB–W3JSL, adjusts the controls of the external crystal-controlled oscillator which is used to supply the necessary injection frequency to the two Hammarlund superheterodyne receivers in a radioteletype installation. The receivers are connected for space-diversity reception.

Automatic Relaying

Messages can be relayed automatically through a radioteletype station by means of a "reperforator." The signals are received and directed to the perforator which, in addition to printing the message on a tape as it comes in, perforates the same tape with that message. The "reperforated" tape then is fed into a sending head which is connected to a transmitter, usually remotely controlled, which automatically repeats the same message that has been received. Since the reperforated tape can be fed directly into the sending head, a message received can be retransmitted from five to ten seconds after reception. By means of reperforation, a receiving station also may repeat back to a sending station the exact message received for checking purposes, assuming, as is generally the case, that both transmitting and receiving equipment are available at both ends of the circuit.

Summary

From the above somewhat elementary explanation of the equipment used by AACS in radioteletype, it should be clear that much can be accomplished by radioteletype that has not been or cannot be accomplished using other means of radio communication. Unfortunately, much has had to be left unsaid, for security reasons. The publication of schematic drawings and detailed technical analysis of the equipment are, for the time being, out of the question.

The principal causes of failure in radio circuits are interference, noise and fading. Since the system employed in radioteletype requires the use of a very narrow frequency band, interference is not much of a problem since it usually can be eliminated by sharp selectivity in the receiver. Directive antennas also help to eliminate interference and at the same time minimize noise. The balanced, two-tone system further minimizes the effects of noise. In practice, *the equipment will print perfect copy when the noise level is so high and the signals so weak that they cannot be heard by the human ear.* Failures due to fading are cut down by the use of diversity reception. Two-tone operation, diversity reception and directive antennas are the principal means employed to obtain the very high degree of dependability.

Personnel

The personnel who are AACS specialists in radioteletype work are mostly former amateur operators; in fact, it is generally conceded that amateurs are the backbone and nucleus of the AACS. Of the 107th AACS detachment in Asheville which operates the demonstration station and conducts the radioteletype school, the officer in charge is an amateur, the non-commissioned officer in charge is an amateur and the non-commissioned officer in charge of the transmitter site and his assistant are both amateurs. Other members of the group have expressed their intentions of becoming amateurs after the war and "getting on the air with my own rig."

The detachment officer in charge is 2nd Lt. G. V. Dawson, jr., W9ZJB–W3JSL, who was well known in the amateur world for his meritorious achievements on 56 Mc., particularly the feat of being the first ham to work all U. S. districts on that band. He has been with AACS for over a year and is a newly-commissioned officer, having risen from the ranks via OCS at Miami, Fla.

Directly under Lt. Dawson as the non-commissioned officer in charge of the detachment is an old timer with 18 years of active service in the Army, M/Sgt. Thomas J. Broderick, W9NJL, who has attained considerable communications experience background in his many years with AACS. M/Sgt. Broderick does a good job of keeping the detachment on its toes and operating efficiently.

M/Sgt. Cecil Harris is our installation specialist and does some instructing on the side. He also is in charge of the supply room. He has no amateur aspirations that we know of, but he does know his radio.

In charge of the remotely controlled transmitter site, which is located about six miles from the controlling point at the City Building in Asheville and three miles from the receiver site, is T/Sgt. Harold I. Johnson, W9JGQ, who previously served with United Airlines and the Iowa State Police as an operator and mechanic. Working under T/Sgt. Johnson is another amateur, Cpl. Ralph J. Porrazzo, W1LLW. "Haggy" and "Poggy" make quite a team at the transmitter installation.

T/Sgt. Robert H. Hansen is in charge of the receiver site and has expressed his intention of becoming a ham after the war. Bob is an excellent technical man with extensive training and experience in electronics and will, we know, make a good amateur.

The writer, himself a neophyte in the technique of radioteletype, wishes gratefully to acknowledge the assistance of the above-mentioned in preparing this article.

The detachment of the 107th AACS Squadron which conducts the Radioteletype Training School at AACS Headquarters at Asheville, N. C. *Left to right, kneeling:* T/Sgt. H. I. Johnson, W9JGQ; Cpl. R. D. Mardis; Cpl. R. J. Porrazzo, W1LLW; T/Sgt. R. H. Hansen; Sgt. J. O. King, and Sgt. W. J. DeFormato. *Standing:* 2nd Lt. G. V. Dawson, jr., officer in charge, W9ZJB–W3JSL; M/Sgt. T. J. Broderick, NCO in charge, W9NJL; S/Sgt. G. W. Berry, W2CFX; Cpl. E. H. Richey; Pfc. J. H. Chislow; Cpl. G. Hart, W1NJM; M/Sgt. C. M. Harris; Cpl. J. S. Yermack, and Sgt. J. P. McKeough.

HAPPENINGS OF THE MONTH

FREQUENCIES

IT IS immensely difficult to make any sensible reporting, in a monthly magazine, of the confused and complex progress of the American study of postwar allocations. Each item we write seems dated before it appears. But we do want to keep our members informed on what's happening as well as we can, so we'll try again.

The Planning Committee of the ARRL Board (Messrs. Blalack, chairman, Caveness, Dosland, Noble and Norwine, plus Bailey ex-officio) met for two days in Washington in September, reviewed our whole situation, checked our course for the immediate future, reported to the Board.

RTPB's allocation panel worked hard throughout September on the part of the spectrum that lies above 30 Mc., trying to get agreements to present at the FCC hearings. (RTPB, in a way, is a creature of FCC, since it was set up at the suggestion of the latter's chairman.) It made no particular progress, demands greatly exceeding the available frequencies. RTPB will have a prominent part in the FCC hearings. Allocationwise it will only be able, at the outset, to report the frequency requests it has collected. As the hearings progress it hopes to have further meetings and to be able to report some agreements and recommendations when it takes the stand again near the end of the hearings in early November. ARRL is represented in the RTPB work by Secretary Warner, Technical Director Grammer and Assistant Secretary Read.

FCC's ponderous hearings opened Sept. 28th and are scheduled to last into November. It hears both RTPB and the individual agencies of the art and industry. ARRL will speak for amateur radio. The League has prepared comprehensive testimony, approved by the Planning Committee. President Bailey and Secretary Warner are our witnesses, with George Grammer as technical adviser; and with our presentation stage-managed and advised by Acting General Counsel P. J. Hennessey, jr., member of Segal's firm. In November FCC is expected to get up its proposed postwar allocations, based on the hearings, and to attempt reconciliation with the plans of other branches of the Government.

The study committees organized by the Department of State have been carrying on but deferred consideration of allocation matters until after the opening of the FCC hearings. They are expected to get down to frequencies during October, with the so-called IRAC proposal as the basis for discussion. The result will at least serve to show the Department what the public reaction is to the proposals. ARRL representation in these studies is being handled by Messrs. Warner and Read, with President Bailey participating as the situation requires.

In all this work ARRL pursues one uniform policy, originally laid down by the Board of Directors and approved in its detailed application by the Board's Planning Committee. You can see just what it is in the article on amateur frequency requirements on the following page.

Precisely what happens after the above-described phases are completed is still uncertain as we write. The matter will lie pretty much between IRAC, appointed by the President to look after Government frequency needs, and FCC, legally responsible for the administration of civilian radio. Final determination of the U. S. plans and point of view is to be expected to be put into the hands of the Department of State some time in December. The amateur position remains definitely strong as of this writing.

A word about this so-called IRAC proposal, which is causing some reverberations in amateur circles. A subcommittee of IRAC, acting as a subcommittee of the Dellinger technical subcommittee of the Department of State's special committee on communications, got up a proposed allocation ladder last June. The Department put it forward as a basis for discussion in the public phase of its preparatory work which began in August. It is a "classified" document, restricted to those directly concerned with the work; and in all the agencies dealing with postwar radio planning the attendance is restricted to U. S. citizens. The classification of this paper as restricted prevents our publishing it or discussing its details, even though it has had so large a circulation that some impression of its contents has leaked all around the country. If the classification is removed, we shall report and discuss its contents with you.* Meanwhile, disabuse yourselves of the idea that it has been conceived in a spirit of hostility toward amateur radio, as some of you think. Quite the contrary, most other radio services are very jealous of the protecting arm which the Government services have thrown around amateur radio and we have reason to be grateful, although disagreeing with the plan in

*Just at our deadline the classification was removed, to permit discussion of the document at the FCC hearings, but with insufficient time for writing up the matter in this issue of *QST*. We shall report next month.

ARE YOU LICENSED?

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.

spots. It is not true, as some of you report to us, that IRAC proposes the elimination of four amateur bands. Some changes and shifts are proposed, also some additions to our frequencies. Many worse things could happen to us than to have to live under the IRAC plan. But in any event it is only a proposal, a target for discussion; there has to be a start somewhere. Before this job is done there will be dozens of proposed allocation ladders. It just happens that this was the first one. We believe that the eventual U. S. allocation will bear a strong resemblance to the IRAC plan, but unquestionably there will be modifications. Don't permit yourself to get excited over what you hear about it.

WAR SERVICE RECORDS WANTED

DESPITE the fact that the form at the bottom of this page should by now be familiar to every *QST* reader, we continue to get many hundreds of them back for our files every month. Are *you* registered with us?

ARRL, as the amateurs' own association, is compiling at its headquarters a card-file record of the war services of United States and Canadian amateurs, to supply the statistics necessary to defend the amateur position. We believe our form is self-explanatory. It will take you only a moment to fill it out. Be sure that the data on your wartime employment of your amateur talents is on file at ARRL headquarters!

NOTICE TO MEMBERS DISCHARGED FROM THE MILITARY SERVICES

THE requirement of continuous membership in the League for eligibility to ARRL offices has been waived for members serving in the uniform of the United States. See particulars on page 23 of *QST* for July last. Those desirous of taking advantage of this arrangement are asked to claim the right when renewing membership, stating the beginning and ending dates for their military service.

"THE FREQUENCY REQUIREMENTS OF THE AMATEUR RADIO SERVICE"

WOULD you like to know exactly what position ARRL is holding in the matter of postwar frequencies for amateurs? This is it.

This is part of the testimony which the League offered in the formal hearings on allocation begun by FCC on September 28th. It represents only about a third of our total testimony but is the portion dealing with frequency requirements. It was preceded by extensive testimony on the nature of amateur radio and its contributions to the security and welfare of the nation, data which you'd find interesting reading but for which we can't find publication space right now in this time of paper rationing and smaller issues; and even this part we must give you in small type.

Fundamental League policy in the matter of frequencies has been laid down by the Board of Directors. In the details of the application of that policy to the Government planning activities of this autumn, the Planning Committee of the Board has approved the present document. It presents the position which the League is uniformly taking not only before FCC but in RTPB and in the study committees of the Department of State's teleplanning.

The Frequency Requirements of the Amateur Radio Service

This portion of our testimony relates to the frequencies needed by the amateur service to permit its activites in aid of the national life. At the outset, it seems desirable to review briefly the history of amateur allocations in this country so far as they are pertinent to this hearing.

When the first comprehensive radio law was adopted in 1912 it provided that, except for what were called special-license stations, no amateur station should use a transmitting wavelength in excess of 200 meters — that is to say, a frequency below 1500 kilocycles. The entire spectrum from 1500 kilocycles upward was at the disposal of the amateur. This condition arose through no great magnanimity but because it was desired to banish the amateur — in those days regarded as more of a nuisance than otherwise — to frequencies that no one else valued. For many years amateurs congregated as close to the 1500-kilocycles frontier as

AMATEUR WAR SERVICE RECORD

Name

Present mailing address

Rank or rating

Branch or bureau: Signal Corps, AAF, BuShips, WAVES, etc.
If civilian industry, give title and company.

Call, present or ex; or grade of op-license only

SERVICE

- ☐ Army
- ☐ Navy
- ☐ Coast Guard
- ☐ Marine Corps
- ☐ Maritime Service
- ☐ Merchant Marine
- ☐ Civil Service
- ☐ Radio industry, 100% war

possible and eventually, as we have reported to you, attained considerable ranges, so that their signals were occasionally reported at transcontinental and transocean distances. Then, beginning in 1923, as we have already detailed to you in previous testimony, amateurs discovered the value of the higher frequencies and in a brief period had linked up the continents of the world with inexpensive low-power stations. So startling was the demonstration, so manifest the advantages of the despised high frequencies once the way had been shown, that there was an immediate gold-rush as the commercial and government stations of every civilized nation clamored for a similar opportunity to enjoy their benefits. The amateurs did not need all of this high-frequency spectrum and indeed were incapable of occupying very much of it with their then numbers. They were perfectly willing to share.

These developments occurred at a time in this country when the effectiveness of the Radio Act of 1912 had been broken down by court decisions and when the de facto radio administration of this country was a series of annual national radio conferences at which the various American radio groups met and, by voluntary agreement, worked out plans which were then promulgated by the administration and which were workable because they had received unanimous advance acceptance. Under this strictly American arrangement, the amateur service received frequency allocations which were entirely adequate for its needs at that time and which, by virtue of technical progress since, would be regarded as generally adequate today and possibly for the visible postwar future. It was at that time that the concept of even-harmonic allocations first arose, serving both to give a radio service a diversification of assignments of different characteristics and causing any even harmonics to fall into the higher assignments of the same service. Thus for the first time we had a multiplicity of amateur assignments separated into frequency bands an octave apart in the spectrum. It is interesting to examine what these assignments were. They consisted of the following bands:

1,500 to	2,000	kilocycles
3,500 to	4,000	"
7,000 to	8,000	"
14,000 to	16,000	"
28,000 to	32,000	"
56,000 to	64,000	"

The American amateur continued in the enjoyment of these frequency bands until the first of 1929. In Washington in 1927 there was held the first international radio conference since the one which had resulted in the London Convention of 1912. This conference made the first international determination of high-frequency assignments, its provisions becoming effective January 1, 1929. The delegation of the United States fought hard to maintain the current allocations of amateurs but was unable to do so in the face of foreign objections; and, as a result, the amateur bands were cut to approximately half their former values.

These reduced allocations have remained substantially unchanged since that date. The Government of the United States, firmly convinced of the value of the amateur institution, has successfully defended the amateur allocations at international regulatory conferences at Madrid in 1932 and at Cairo in 1938, and at the two inter-American regional radio conferences held in Habana and Santiago. These are the American amateur allocations of today, consisting of the following frequency bands:

1,750 to	2,050	kilocycles
3,500 to	4,000	"
7,000 to	7,300	"
14,000 to	14,400	"
28,000 to	30,000	"
56,000 to	60,000	"
112,000 to	116,000	"
224,000 to	230,000	"
400,000 to	401,000	"

And shared rights above 300,000 kc.

With this bit of history behind us for background, we are now in position to examine the future.

Amateur Stations Operate in Bands

It is neither feasible nor desirable to assign individual channels or frequencies to individual amateur stations. It is world practice to allocate certain bands of frequencies to amateur radio. Every amateur is then authorized by the terms of his license to operate at will anywhere within any of these bands, under the strict requirement of confining the entire effect of his radiated signal within the limits of the band and of complying with certain fundamental stipulations in your regulations concerning the quality of the signal. Thus, referring to the Commission's call for the adducing of certain technical data at this hearing, we wish to point out that there is no applicability to the amateur service of such questions as the width of a communication band, the frequency tolerance, etc. The basic principle in the allocation of facilities for the amateur service is the assignment of bands of frequencies, available to all amateur licensees for their varying purposes and interests, with the details specified in your amateur regulations.

The Bands Must be Diversified

Amateurs are experimenters and investigators — of roving, divergent and changing interests, and with many subdivisions of specialization. It is therefore necessary to assign to the amateur service bands of frequencies useful for all types of emission, from telegraphy and telephony to facsimile, television and pulse transmission. It is also necessary that these allocations be distributed throughout the spectrum above the standard broadcast band to permit what might be called the sampling of the performance of all kinds of frequencies.

From our brief review of the history of amateur allocations you will have noticed that, in practice, this desired distribution has always taken the form, since the frequencies above 1,500 kc. were first subdivided among the various radio services, of assigning to amateur radio bands of frequencies not over an octave apart. That is to say, the amateur allocations in principle are a family of harmonic bands having different performance characteristics and useful for operating by different modes, at different distances, at different times of the day and at different seasons. Thus another basic principle in providing for the amateur service emerges: the amateur allocation should consist of test portions from each octave of the spectrum above the standard broadcast band, these successive allocations preferably harmonically related, so that amateurs may investigate their potentialities and have at their disposal frequencies for any given undertaking. It is essential that frequencies capable of operation over all practicable distances, independent of diurnal or seasonal conditions, be available. Considering the usefulness of the amateur body in gathering data on the performance of the whole spectrum as determined by experience with small separated assignments, it is also of great importance that there be no gaps n the family series.

The Location of These Amateur Bands

Strictly from a technical standpoint, there is nothing particularly sacred about the present specific locations of the amateur bands in the spectrum. We have pointed out that the actual beginning figures for each amateur band were the chance determination of an American conference, later becoming the basis for the international agreements. From engineering considerations alone, the whole amateur family of bands could be shifted a modest distance up or down in the spectrum without serious consequence.

But from practical considerations we believe there are compelling reasons why the present locations are the best. Entirely additional to the present investment of American amateurs and their suppliers in apparatus and tools for the present bands, it is of the utmost importance to observe that these bands have been allocated to amateurs since the very beginning of international treaties on the subject, and that therefore the other radio services of the world have been built up around the existing amateur bands. Any endeavor to shift the amateur bands, as a whole, up or down in the spectrum would inevitably prove difficult and costly to the other services involved, as well as to amateurs, and it is therefore indicated that the present locations are the most desirable.

It will be of interest to the Commission to know that, without a single exception of which we are aware, the present amateur allocations are bands of frequencies that in the history of this country have never been assigned to any service other than amateur. They constitute test slices reserved for the amateur from his one-time assignment of all frequencies above 1,500 kilocycles. With the exception of the small temporary assignment at 400 megacycles, they are all the subject of international treaties to which the United States is party, in addition to their exclusive assignment to amateurs in your regulations.

The Needs of the Amateur Service Below 60 Megacycles

In coming now to the frequency needs of the amateur service in the future we shall discuss the subject in two sections, dividing the spectrum at 60 megacycles. Our selection of that figure is dictated by amateur technical practice. Below 60 megacycles it is of very great technical desirability that the amateur allocations be in harmonic relationship, at least as concerns a portion of each band. This facilitates rapid change-over from band to band and makes for much economy in equipment. Above 60 megacycles the principle is of much less importance. We shall treat first the frequencies below 60 megacycles.

When the provisions of the Washington Convention took effect in 1929, halving our assignments to the present values, there were 17,000 licensed amateurs in this country. At the outbreak of war we numbered 60,000. Despite technological improvements our congestion was nothing short of terrible, seriously reducing our capabilities for optimum service to the art and country, and we regarded ourselves as in desperate need of further assignments. We now look forward, as we have told you, to an increase in our numbers to 250,000 in the United States in five years after the war. Our existing congestion plus our anticipated growth would plainly warrant a several-fold increase in the allocations to amateurs.

We have given this subject much thought in our own councils. If more space in the high-frequency spectrum is available in extension of our present bands, we not only need an increase but believe that we can better warrant additional assignments to amateurs than can any other service. However, as students of the radio art we are conscious of the general congestion and the difficulties of allocation, and are of the belief that the postwar progress of American communications is dependent upon mutual recognition and forbearance. We have therefore determined to take a position which you will possibly find unique at these hearings: The oldest radio service, the most congested radio service, asks for no increase in the widths of its present bands and, with one exception, asks for no expansion of its allocations in this part of the spectrum. Relying more heavily upon technological advances than we can justify, we request simply that our present bands be continued in their present dimensions and that we be given one new band. Our present bands are temporarily in use by the military services; they represent frequencies that already exist, frequencies that have never been assigned by you to any other service. In view of the greatness of our needs, and of the value to the nation in providing amateur allocations that will encourage productive results, we emphasize that their present widths represent absolute minimums.

As indicated, we do wish to ask you for one additional band in this part of the spectrum. Several of the amateur bands are long-distance ones, of worldwide effect, occupied by the amateurs of every nation, as well as serving us for the longer distances within the United States. It is to be expected that the same factors that make for a great increase in our own numbers will be operative in many other countries and that in many of these nations, particularly the English-speaking ones, there will be a comparable percentage of growth in the number of amateurs after the war. We are thus led to expect that our greatest congestion and interference problems will be in the bands for long-distance work. While our studies do indicate to us that it would be difficult to widen any of our present long-distance bands, we believe that space can be found for a new amateur band beginning at 21 megacycles. Such an assignment would be harmonically related to the amateur band which begins at 7 Mc., permitting operation by tripling frequency from that band. Frequencies of the order of 21 Mc. are marginal in value, rated as of only sporadic long-distance performance, and consequently are of less commercial worth than lower frequencies. For this reason this part of the spectrum has never been heavily occupied. Yet for amateur purposes such an assignment, midway in the octave between our 14- and 28-Mc. assignments, should provide a useful supplementation of our congested long-distance facilities, relieving some of the pressure of occupancy in the 7- and 14-Mc. bands in all the countries of the world and being of value for our purposes over a considerably longer portion of the solar cycle than is our 28-Mc. band. We therefore ask the Commission to provide in its postwar plans for the assignment to amateurs of a new band of frequencies from 21,000 to 22,000 kilocycles.

To make the record perfectly clear, we here restate the bands of frequencies below 60 Mc. which we are requesting for amateur radio:

1,750	to 2,050	kilocycles
3,500	to 4,000	"
7,000	to 7,300	"
14,000	to 14,400	"
21,000	to 22,000	"
28,000	to 30,000	"
56,000	to 60,000	"

Before leaving the frequencies below 60 Mc. we wish to make a further reference to our band from 1,750 to 2,050 kc. During the past year our representatives have encountered in several Government circles the feeling that the national interest after the war will require the diversion of part of this band for the operation of a certain war-born development that will have continuing national value after peace returns. The service in question has been established on some of our frequencies in that band by the military services during their wartime employment of our frequencies. When this device was invented and a search was made for frequencies for its operation, our band was standing comparatively idle and the service was established therein. Originally contemplated only for the purposes of the war, it is now perceived to be of similar usefulness in peace. We of course fervently hope that it will be found possible to transfer this service to other frequencies, to permit restoration of the band to our use, since it plays an important part in our short-distance operations. But in the event it is decided that it is impossible to restore it in its entirety to amateurs, we urge that at least some remaining portion of it, preferably beginning at 1,750 kc., be continued as an amateur assignment, so that the band will not be completely canceled from the amateur family.

Such a provision is of considerable importance. The major portion of our organized short-range telegraphy, with its complex networks and trunklines, occurs in the band 3,500 to 4,000 kc. This is the band most used for telegraphic record communications during emergencies brought about by acts of nature. But there are times in the solar cycle when frequencies in this band skip out and interrupt communication, making a shift to a lower-frequency band necessary to re-establish contact. Your amateur regulations contain special provisions for amateur operation in this band during emergencies, including designated calling channels and listening periods, and some amateur groups have constructed considerable special apparatus for operation in this band. A secondary reason for our request is to make available some frequencies of this lower order for the use of amateurs who are investigating the performance of radio waves and who need access to as many octaves of the spectrum as possible. For these two reasons we believe it would be much in the national interest to retain some provision for amateurs in this band, and we so request. We would suggest, for example, 1,750 to 1,800 kc. as a practical minimum. But we repeat that we do need the whole band and we hope that arrangements can be made to transfer the present wartime operations to other frequencies.

The Needs of the Amateur Service Above 60 Megacycles

It has been the policy of the Commission, each time you allocated a higher portion of the spectrum to radio services, to make additional assignments to amateurs in extension of our harmonic family. You now have before you the question of extending general allocations from 300 Mc. up to 30,000 Mc.

Between 60 and 300 Mc. there are at present two amateur bands, one from 112 to 116 Mc. and the other from 224 to 230 Mc. You will note that they are harmonically related to our lower bands. In the region from 300 to 30,000 Mc., pending specific allocation to services, we have shared rights with other experimental services but only one exclusive amateur allocation, the small assignment at 400–401 Mc. This allocation was made many years ago, for a special purpose, and has always been regarded both by Commission engineers and by ourselves as subject to change whenever a general allocation to services was made in the range above 300 Mc.

You will understand our immense enthusiasm to get hold of the ultrahigh frequencies and the superhighs after the war. It has been the constant history of amateur radio that its pioneers explore and open new territory at successively

higher-frequency frontiers for the use of the amateur body generally and to the benefit of the whole art. We want a chance to apply, to the problems of amateur communication at such frequencies, some of the new knowledge born of this war. Although there has been a great increase in man's knowledge of such frequencies in the last few years under the impetus of military necessity, we can be certain that the surface has hardly been scratched, that much work remains to be done, that there are untold treasures to unearth to the subsequent benefit of mankind. This art definitely needs the application and ingenuity of the amateur in this part of the spectrum.

We believe that in such an allocation the same major principles should apply as in the amateur allocations below 60 Mc., namely, that the amateur should be assigned what we have called test slices at frequent intervals, so that for investigational and experimental purposes he may be able to sample the performance of frequencies throughout this brave new world. It seems to us inevitable that there will be found to exist progressive differences in the performance of frequencies through this region, after the general fashion of the behavior of the lower portion of the spectrum, and again the amateur should have at his disposal some of these frequencies of every type of performance. That will be a wise arrangement to set up, because the amateurs can be counted upon to contribute new knowledge. Some of these allocations should be of sufficient width to accommodate experimental work in wide-band methods of emission, since we amateurs have a definite interest in expanding our work with television and in applying facsimile to amateur communication and in determining to what extent we can adapt pulse technique to our work.

When, from the above considerations, we come now to the point of asking the Commission to allocate to the amateur service specific bands of frequencies in this part of the spectrum, the arrangement that immediately commends itself from the standpoint of logic is to extend the present harmonic family upward by the addition of new bands an octave apart. Our needs would be satisfied by such an arrangement. It indicates where the amateur bands logically ought to be located. Therefore, picking up the two amateur bands already existing above 60 Mc., we now ask the Commission for the following specific assignments:

112 to	116	megacycles
224 to	230	"
448 to	480	"
896 to	960	"
1,792 to	1,920	"
3,584 to	3,840	"
7,168 to	7,680	"
14,336 to	15,360	"
28,672 to	30,720	"

And shared rights above the last-named figure.

We are aware that these figures seem to embrace a very large number of megacycles. But we wish to point out to the Commission that at a fixed percentage of instability, these increasing widths in megacycles serve only to maintain the bands at the same effective width in terms of the number of stations which may operate simultaneously in them. All of the proposed bands above 448 Mc., in other words, are of the same effective width, and in these terms are of precisely the same width as the present amateur allocations from 28 to 30 Mc. and from 56 to 60 Mc. Despite the large number of digits appearing in some of these figures, each proposed band above 448 Mc. is 7.14 per cent of the octave at which the amateur band would begin.

This, then, as concerns the new region above 300 Mc., is a proposal to assign to the amateur service 7.14 per cent of all frequencies above 448 Mc. This is a modest request in a portion of the spectrum not yet appreciably occupied. If, in the years to come, the technique progresses to a point where the percentage instability of transmitters is not the determining factor in the number of stations that can be accommodated in a given band — if, in other words, we reach the point where a constant arithmetical separation between stations is a feasible method of allocation as is now possible with c.w. telegraphy in the lower portion of the high-frequency range — it should be found possible to reduce the width of these proposed assignments, particularly in the upper brackets. In that event the amateur would be found willing to share, as he always has in the past. And in that event, the assignment to amateurs meanwhile of bands of a width of seven per cent of each octave will have created a valuable and fortunate reserve for the future needs of the art.

Now although the specified figures for these requested bands commend themselves from engineering considerations and from the standpoint of logic, some information has been disclosed on postwar planning by various Government agencies, particularly the military services, which would indicate that some of our requested assignments for amateurs would be in conflict with Government postwar intentions, and that from the Government standpoint there may be other more logical locations for these amateur bands. As we have previously remarked, the preservation of harmonic relationship is only a convenience and not a necessity to our operations in this part of the spectrum. Other locations for the amateur bands would be acceptable to us. We therefore wish to state that if it be found that military plans make it difficult to provide the requested harmonic family as an amateur allocation, and if it be found easier to provide for us in a manner that takes account of the postwar planning that has been done by the military services, our needs would be equally satisfied by the following alternative allocations:

144 to	149	megacycles
218 to	225	"
420 to	460	"
840 to	900	"
1,125 to	1,225	"
2,500 to	2,700	"
5,200 to	5,750	"
10,000 to	10,500	"
21,000 to	22,000	"

And shared rights above 30,000 Mc.

Thus we conclude our statement of needs. Under your administration there exists in this country an increasing body of eager and skillful amateur investigators and communicators. It has been the policy of this country to protect and encourage the amateur, in the confident knowledge that this was in the national security and welfare. There is admittedly great demand for frequencies. But the amateur allocation is so small a portion of the spectrum that if, in any given octave, the entire width of the amateur band were diverted toward the relief of the frequency problems of some other radio services, no service's problem would be solved for longer than a very brief while. Yet there is no employment of radio frequencies that contributes more to the welfare and security of the nation as a whole than do the allocations to the amateur service.

New Weather Maps for Making DX Predictions

With the partial lifting of military restrictions on the publication of domestic weather information a new type of weather map is being published in some morning papers. In addition to the usual isotherms and isobars outlining temperature and barometric pressure conditions, the U. S. Weather Bureau daily maps now chart the positions and daily movement of continental air masses. The symbols employed show the locations of cold fronts, warm fronts, stationary fronts and occluded fronts. These boundaries between differing air masses generally develop the conditions of temperature inversion which make possible extended ranges of v.h.f. wave propagation by tropospheric refraction and reflection. Postwar v.h.f. operators who scan the new weather maps probably will be able to predict coming DX with at least the degree of accuracy possible to the forecaster of weather conditions.

Subscriptions by individuals to the daily weather map (Map C, 19 by 24 inches) are being accepted by the Superintendent of Documents, Government Printing Office, Washington, D. C. The cost is 30 cents per month, $3.60 per year.

So You're On A Liberty Ship

Some Hints on Improving Standard Cargo-Ship Radio Installations

BY R. H. WHITTAKER*

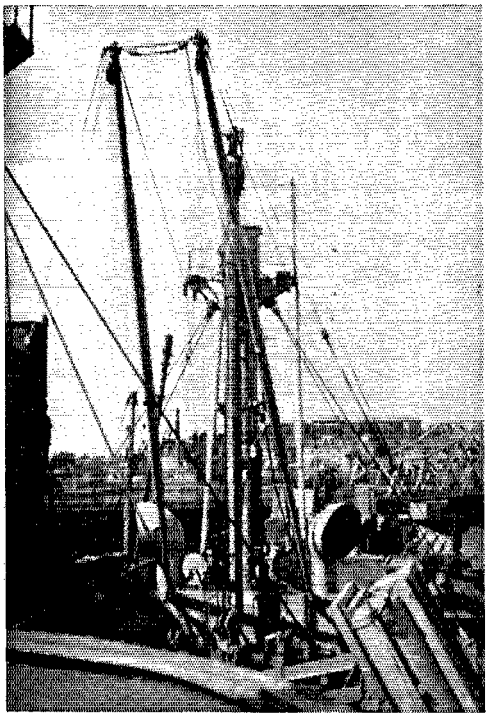
The job of holding down the assignment of "Sparks" on a sea-going cargo ship is not entirely one of pounding brass, copying press and listening for distress signals. This story, written by an op on a Liberty ship, describes some of the other chores which fall to his lot and offers some suggestions for making them as light as possible.

So FAR in all my reading of *QST*, there has been no mention of how the marine ops, or Sparks, many of whom are hams, overcome the difficulties of keeping the radio equipment humming while at sea. To those familiar with only Caribbean pleasure cruises in peacetime (boy — they're nice!), the question may arise as to why the gear on a wartime cargo ship doesn't always keep humming at sea. The most realistic and lasting answer to that question can be obtained by shipping out on a Liberty.

Antenna Troubles

First of all, after a particularly windy day, Flags, the Navy signalman, is about to cry since most of his pennants now are flying partially from the signal-flag halyards and partly from the main-antenna lead-in, with both sections well disconnected. The main antenna lead-in usually runs from the antenna trunk, which is located on the port side of the flying bridge in such a position as to make it necessary for the lead-in to be within a few feet of all five signal-flag halyards. Some operators overcome this trouble by changing the type of feed to the main antenna. However, it is desirable to operate the rig as designed, i.e., with an end-fed flat top, and it is a relatively simple matter to add about 10 feet to the main antenna feeder and then bring the feeder aft to the port side of the engine-room smoke stack where there are several suitable places for attaching a type "CBO" high-voltage insulator. From the stack, there is a clear path to the antenna lead-in trunk. This change increases the antenna capacity which necessitates a new setting of the antenna variometer (loading inductance). An antenna rigged as described does not interfere with the d/f sense antenna nor with any of the flag halyards and complies with the FCC order which rules that main and emergency antennas shall not cross each other so that should one fall down, it would not ground the remaining transmitting antenna.

*Chief Radio Operator, Merchants and Miners Transportation Co., 5243 Ellsworth Ave., Pittsburgh 6, Pa.



It is quite obvious from this photograph, showing two of the loading booms in position for working cargo, why antennas must be taken down when the ship is in port.

Dismantling Antennas

Because they interfere with the maneuvering of the jumbo (35-to-50-ton capacity) and main cargo booms, it is necessary almost always to take the antennas down while the booms are in use in port. The forward portion of the main antenna is coiled on top of the flying bridge wheel house when such is necessary. The lead-in still remains attached to the stack and antenna trunk, while the aft portion is coiled on the deck aft of the stack on the flying bridge. All antennas will last infinitely longer if they are put up and taken down by the operators. It cost me a new flat top to learn that the bos'n and deck gang are adept at putting no less than seven kinks in a newly made job.

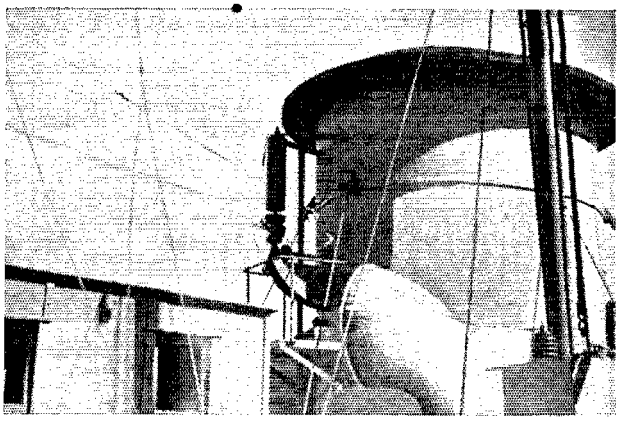
The auxiliary antenna, which is used on the main receiver when using the d/f, and the emergency antenna can be conveniently coiled, tied, and hoisted up the signal-halyard mast so as to be out of the way when the booms are in operation. If you are not sure each time how tight to make the antenna halyard before taking a turn on a mast cleat, a few turns of scrap wire wrapped

around the halyard at the point where it should bend around the cleat will serve as a good marker and won't disappear when the ship is painted.

The B. C. Receiver

The first time I saw the Scott broadcast receiver I said to myself, "There's a job that'll keep the news hounds from pestering us in the operating room." Fortunately for the dial twisters our b.c. receiver is located in the officers chow, rather than in the chart room. However, during a three-month trip, I was convinced that the E. H. Scott Laboratories had sold to the WSA the best reason for continuing the manufacture of 2-ampere fuses. An investigation showed that the electric refrigerator was responsible for this trouble. When the refrigerator motor starts it draws some 70 amperes. This results in an excessive dimming of lights unless the generator output voltage is boosted to around 123 volts. Then, when the ice machine cuts off, the voltage takes a momentary leap, and — exit one fuse and frequently one or more dial lights.

Since the ship supply is d.c., a.c. for operating the receiver is obtained by the use of an electronic converter. Some operators overcome the difficulty by altering the spacing of the vibrator points. This remedy is all well and good so long as the vibrator lasts, but the procedure usually results in a drastic reduction of vibrator life. A better arrangement consists of placing a 50-watt, 16-ohm, 1.82-ampere rheostat in series with the d.c. input line to the vibrator. In the past four months not a single fatality among fuses or dial lights has occurred, but previously a screw driver and a spare fuse were standard equipment when heading for breakfast in the salon after the 4 to 8 watch. The line voltage supplied to the vibrator was tried at 115, (normal operating voltage for the receiver), 110, and 105 volts and no difference was noticed in receiver performance. Therefore, it now operates at 110 volts and draws approximately 0.82 ampere which causes the rheostat to operate relatively hot, but with plenty of safety factor. Vibrator points last much longer now than before installing the rheostat.



The antenna lead-in trunk is in the lower right-hand corner with the lead-in bushing for the main antenna emerging from the top. In the original installation, the main antenna lead-in passed close to the signal halyards at the right. By first running the lead-in to an insulator attached to the stack at a point near the whistle, and thence to the lead-in trunk, the wire is swung out far enough to avoid interference with the signal halyards without adding appreciably to the antenna length.

As for mounting the rheostat, the most suitable thing that could be found was a new bracket intended for supporting a life-saver light in the inverted position (thanks to the second mate). With a little time in the engine room it was converted into a very broad-bottom "U"-shaped device which had flanges extending in opposite directions and at right angles from the top side of the "U," as shown in Fig. 2. The flanges, with the assistance of a couple of wood screws, serve as a means of supporting the bracket on the bulkhead. The rheostat is mounted through the hole in the central and bottom portion of the "U." At the time of installation, the idea of slotting the shaft so that a screw driver could operate the rheostat reared its ugly head, but was rapidly turned down since it seems to be second nature to Americans to turn knobs and a drawer full of table knives is only an arm's reach away. Now it is just a plain round shaft and operates quite well with the application of gas pliers, or by pushing the moving contact from behind the rheostat, when no voltage is present. So far the need for adjusting the voltage from the initial 110-volt position has not occurred. Before it was possible to obtain a rheostat (at sea), two 200-watt light bulbs, easily obtained from the chief engineer upon informing him that without them there would be a strict QRT on the b.c. receiver, were connected in parallel, and the whole combination placed in series with the a.c. line to the b.c. receiver for convenience. This combination resulted in a 7-volt drop which cured the fuse trouble, but the job didn't look neat.

Another rather common fault with the 2-ampere fuse holder on the receiver is that a side contact may spread with the same results as a blown fuse; new fuse holders of this type have the side contact welded and not soldered.

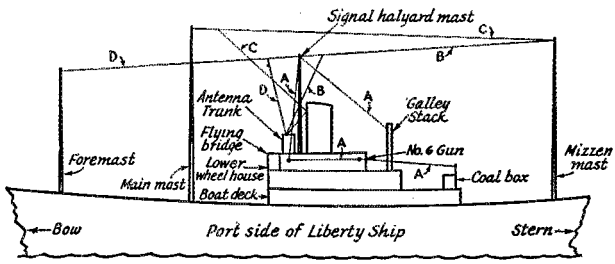


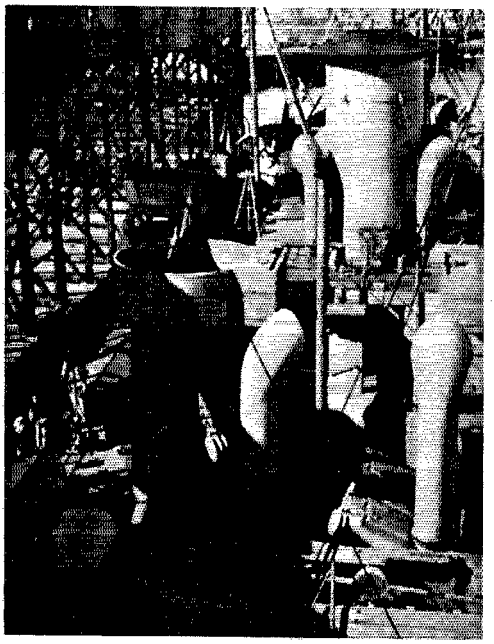
Fig. 1 — Sketch showing the port side of a Liberty ship with all antennas in a sea-going position. *A* — B.c. receiver antenna. *B* — Auxiliary antenna. *C* — Main antenna. *D* — Emergency antenna.

An Antenna for the B. C. Receiver

The Scott instruction book states that a model "SDD" antenna (double doublet) is part of the required paraphernalia for the receiver, and that each receiver is shipped with one in the case. It seems that the shipyards must have an infinite number of these model "SDD" jobs, as I have yet to see or hear of a Liberty or other ship which has one, nor have I seen the broadly tuned transformer which is supposed to be used in conjunction with the double-doublet antenna, although I don't doubt that through a misunderstanding some probably have been utilized.

The b.c. antenna installed at the shipyard is a straight-wire job which runs from the lower port bridge wing (forward bridge lookout position) and thence aft 35 feet to the No. 6 gun tub, which is aft on the port side of the flying bridge. This arrangement is definitely n.g., as well proved by a six-month Far-East trip, since it is below most of the midship house.

The new replacement is made of regular emergency antenna wire (7 strands of No. 18), and is a "V" type which has been the object of considerable experimentation (again thanks to the captain for tolerating us while in the process, and to the other two ops who assisted materially). The vertex of the "V" is at the port wing of the flying bridge, one leg going aft to the No. 6 gun tub, and thence to the port side of the coal box which is located aft on the boat deck, two decks below the flying bridge. The other leg goes up to the end of the halyard holding the auxiliary listening antenna, which runs aft, and thence aft to the galley smoke stack (alias, Charlie Noble). This arrangement is well clear of the decks either when the auxiliary antenna is in operating position or when it is coiled and heaved up in port.



Looking aft from the mizzenmast on a Liberty ship. The port wing of the flying bridge is behind the No. 6 gun tub just to the left of the center of the picture. The galley smokestack is the small-diameter pipe at the center, while the coal box is in the foreground. Apparently, proper space for antennas is the last thing to be considered on a modern cargo ship!

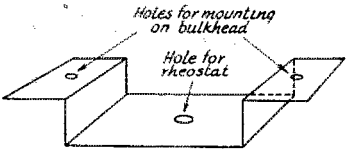


Fig. 2 — Simple bracket for holding voltage-dropping rheostat for b.c. receiver.

On ships having the Scott in the chart room, a very good "V" antenna could be made with the vertex of the "V" at the outboard and aft side of the starboard bridge wing. One leg may run to the starboard side of the stack and thence to the galley smoke stack, while the other leg could run to the No. 7 gun tub and thence to the starboard side of the coal box. Either type will work R5/S5 on the three bands. The lead-in used in getting to the salon mess is attached to the overhead of the lower port bridge wing. From there the lead-in goes down to a pipe which is pointing in the general direction in which the antenna lead-in runs, with the top portion of the pipe located several feet above the reach of a stevedore (these blokes are certain death to an antenna, as well as to numerous other items). This arrangement offers complete protection to the lead-in. Another 1-inch pipe is welded horizontally across the midship house, and runs from the elbow where the antenna enters the officers' mess to the pipe which points toward the lower port bridge wing. The idea of all these pipes may seem a bit out of line, but just try getting up for three days running to find that the lead-in has failed while serving admirably as a handrail for some stevedore and it won't seem so funny. Running the antenna for about 15 feet through a pipe does not seem to impair in any way the performance of the receiver. This was verified by operation both with and without the pipe, but in this section of the lead-in the shielding is not grounded.

Inside the officers' mess the lead-in connects to a lightning arrester and then to a two-wire lead-in which has the shield grounded. The lead-in should be soldered to the antenna plug, since this makes an appreciable difference in signal level.

Just one more thing remains to be done with the antenna circuit, and that is to look in the instruction book and find the antenna tuning condensers for each band and give them a try, noting the results on the tuning eye. This is necessary since the receiver is adjusted for an "SDD" antenna at the factory. The opening for this adjustment is at the back of the receiver. A metal screw driver may be used.

Noise on the b.c. band was quite serious, so the vibrator case was grounded with a pleasing decrease in the QRM, which is particularly desirable when several days out of port and running across.

A Time-Tick Line

Unfortunately this ship was not equipped with a time-tick line to the chart room. (The ship's chronometer is checked daily with radio time for accuracy of navigation.) The mate did not like listening for the tick with full volume on the receiver, and the shack and chart-room doors open, and the ops didn't enjoy holding the face full of air necessary to activate a speaking-tube whistle on the minute. I might also say that a sneeze at the right instant could utterly confuse the mate taking the tick. Therefore it seemed worth the time required to install a time-tick line between the radio shack and the chart room where the chronometers are located. About 55 feet of any two-conductor line will be more than sufficient for this circuit.

Placing a plug on one end of the line involved very little difficulty, but making a neat job of the box to house the jack in the chart room involved more hunting around in the engineer's workshop and electrical locker. But even that was not too difficult since the ship happened to be in port and the relief engineer with a little persuasion usually can be seduced into giving up anything you may need. As a hint, it pays to snoop around, so when you need something you don't have to accept someone's "we don't have it" because you can tell him where it is.

A waterproof switch complete in a box (Type 9-S-4581-L) was found and appropriated for the cause. The cover was removed by taking out the four screws, and then the push-button switch was removed to make room for the jack which is attached to the cover instead of the rubber disc. Since the opening in the cover was too large to permit attaching the jack directly, it was necessary to make another trip to the workshop and get a washer of suitable dimensions so that it could be secured in place by the threaded ring. The switch box includes a bracket for mounting on a bulkhead and, if the chart room is green, the box is already painted for the occasion. Hereafter when the time-tick transmitting tape breaks, the mates will hear it, and the op will not be accused of trying to "shuteye" on watch, as they can be depended upon to do whenever anything goes wrong in the radio shack.

A final and very important precaution to be observed when running the line into the chart room is to drill a separate hole in the chart room wall. I was about ready to pack up and leave when I found my nice job of enlarging ended up perfectly in the center of the gyro wires which made a right angle bend on the other side of the wall. Whew!! However, I stayed with the job as it is most difficult to sign off while sitting out in the anchorage ready to sail.

After installing the b.c. antenna, you can let the other op enjoy some music on the band while you go topside and take the portable blinker light, which has an internal buzzer, and send a "wartime SOS" in close proximity to the antenna lead-in and the other op will immediately report distress much to his later chagrin.

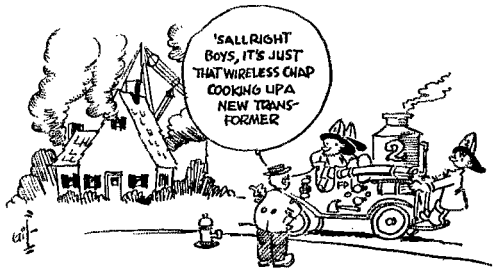
Vindication

A "Hey Marge!" Story

UNLESS your memory is of the "convenient" type, you may recall that:

You dumped the Quaker Oats in a mixing bowl and threw away half a package of corn meal so that you could start your 3,000-meter loose coupler. You smoked up the house with melted parafin and pitch. You ruined her rolling pin when you wound your first tank coil.

You sneaked down cellar every evening and left her to play solitaire. You invented all kinds of excuses to avoid movies, visiting friends and attending church socials so that you could keep a sked with a guy up in East Beuhla — whom you'd never seen and probably never would see.



You borrowed her knitting needles on which to wind v.h.f. chokes, and her darning needles to scratch chassis layouts. You confiscated her embroidery scissors to cut scotch tape, and then ruined them on lead foil and 20-gauge wire.

You cleaned out her stamp box repeatedly to mail QSLs.

You allowed the family radio set to go on the rocks and stay there while you spent three successive nights tuning up a brother ham's rig.

You jammed the neighbors' radio reception and when they phoned she had to sit and take it.

You neglected her and to most people seemed to go to extremes to exasperate her.

But you still have an undeserved chance to redeem yourself. You can once more be her hero; the man she thought she was marrying. Once more she can hold up her head and let it become known at the Red Cross sewing meeting that you are little less than a genius.

And how, you ask, can this miracle be accomplished?

Do you know what she misses most since the war started? It isn't avocado pears, or bobby pins, or nylon hose. It isn't whipping cream, chocolate bars, or butter. What she misses most are those copper pan scrubbers! She has tried steel wool, plastics, scouring powders and sand. They simply don't work. The result always is slivers or frayed fingernails, or pans that can't be cleaned.

Happily, you have the solution in your junk box. That burned out audio transformer contains thousands of feet of very fine copper wire which, when unwound and matted into a loose ball, makes an ideal pan scrubber.

— *Whit, W8IBX*

IN THE SERVICES

THIS department has undergone another change in ownership. John Huntoon, W1LVQ, assistant secretary, sired ITS in 1941. Charles Service, W4IE, also assistant secretary, took over when John answered the Coast Guard call, passing ITS on to Barbara Messinger, secretarial assistant, till her departure for the altar, and thence to Ethel Burnham, who added the department to her duties as secretary to KBW. An increase in her secretarial work makes necessary its return to W4IE. Tinker to Evers to Chance.

Ethel's thanks go to the thousands of amateurs who, during her management of the department, have submitted their war service records and to those amateur-minded individuals who have compiled long lists of fellow hams in military and commercial radio work, swelling the AWSR roster to over 12,000 names.

Your new manager is especially and selfishly interested in additional registrations. As a licensed ham, he has a stake in the future of amateur radio — together with some 100,000 postwar prospective brass pounders — and wants to return to 40 and 20 as rapidly and painlessly as possible. How can ITS help do the job? Listen.

Every month, month after month for three years, this column has chronicled the names of licensed amateurs in the armed services, in the merchant marine and Maritime Service, in Civil Service, and in industry devoted 100 per cent to the war effort: tangible evidence that radio knowledge and skill learned the hard way in peacetime is now paying our government big dividends in wartime — a powerful argument for the restoration and permanency of the institution of amateur radio.

Those in Washington who will determine the shape of postwar radio see and remember these lists, not as individual names but as thousands of amateurs in the war effort. These lists *are* impressive. Will you help keep them so by sending in your AWSR? Fill in and mail the blank on page 18, or a post card copy thereof. It takes only a minute. Reach for your pen or mill *now*.

NAVY—SPECIAL DUTY

1KCL, Carter, RT2c, North Beach, Md.
1KJP, Curtis, CRT, Bellevue, D. C.
1KNX, Schreiber, CRT, Portsmouth, Va.
2KNY, Kirby, RT1c, Whitestone, N. Y.
3GSS, Hampton, RdM1c, foreign duty
3ON, Ridgway, RT1c, Cumberland, Md.
4GUF, Latta, CRT, Chicago, Ill.
5DZF, Barrett, RT1c, foreign duty
5KAE, Gillett, CRT, foreign duty
6IRV, Reid, Ens., Mare Island, Calif.
ex-6JVU, Eldred, CRT, Chicago, Ill.
ex-6NGZ, Dill, CRT, foreign duty
K6PQ, Woolverton, Lt., foreign duty
6TYP, Child, RT2c, foreign duty
7FBO, Smartt, CRT, foreign duty
7INH, Evans, RT2c, Gulfport, Miss.
8IX, Furrow, Lt. Comdr., foreign duty
8PBX, Haller, RT3c, Staten Island, N. Y.
8QC, Daymon, RT1c, address unknown
8TOI, Pastor, RdM3c, foreign duty
8UPZ, Jacobsen, RT3c Washington, D. C.
ex-9BGN, VanAtta, RT2c, Ft. Lauderdale, Fla.
9CFL, Hodge, Lt. Comdr., foreign duty
9ENC, Burmeister, RT3c, Washington, D. C.
9JKC, Blanchard, RT1c, foreign duty
9KOT, McDonald, RT2c, Treasure Island, Calif.
9RWZ, Gardner, RT2c, Treasure Island, Calif.
9ULF, Miller, RT1c, address unknown
9YFY, Ewing, RT1c, Washington, D. C.

Operator's license only:

Tocarsic, RT1c, foreign duty

ARMY—SIGNAL CORPS

1IAP, LaRue, 2nd Lt., foreign duty
1JDS, Holt, T/Sgt., foreign duty
1JPK, Bent, T/4, foreign duty
ex-2AEL, Sawyer, Col., foreign duty
2AYS, Clark, S/Sgt., Alexandria, Va.
2GBW, Santucci, Pfc. foreign duty
2HVN, Ritter, Major, Orlando, Fla.
2IZD, Racz, 2nd Lt., Fort Monmouth, N. J.
2JQB, Wardell, Camp McCoy, Wis.
2KXB, Farber, 2nd Lt., Cambridge, Mass.
2LZQ, Pfeiffer, Pvt., Baltimore, Md.
2MAF, Frey, T/5, foreign duty
2MGM, Lee Pvt., Baltimore, Md.
2MJP, Mulberg, T/5, Boston, Mass.
2NUY, Margolis, Sgt., foreign duty
2NZN, Peters, Major, Wagontown, Pa.
3AOJ, Skowronski, Pvt., Fort Monmouth, N. J.
3EPV, Stoner, Pfc., foreign duty
3GRE, Ischinger, Sgt., foreign duty
ex-3HUQ, Apfelbaum, T/5, Fort Monmouth, N. J.
3ICJ, Hinkle, Sgt., foreign duty
3IVB, Delean, Pvt., Fort Monmouth, N. J.
3JLF, Forrest, Lt., foreign duty
3JLO, Gorskowski, M/Sgt., Fort Meyer, Va.
3JVT, Zieger, Pvt., Fort Monmouth, N. J.
4EZP, Deloach, 2nd Lt., Fort Monmouth, N. J.
4GNY, Gosey, Cpl., Fort Monmouth, N. J.
4GSG, Macali, Capt., foreign duty
4HLB, Cooley, Major, Fort Benning, Ga.
ex-6AGX, Penther, Capt., Long Branch, N. J.
6QDN, Goranson, Sgt., Anchorage, Alaska
6SZW, Anderson, Sgt., address unknown
6TJZ, Moore, Cpl., Robins Field, Ga.
7CUQ, Irion, Pvt., foreign duty
8BAW, Davis, S/Sgt., foreign duty
8HAC, Webster, Lt., Drew Field, Fla.
8QIJ, Mulhern, Lt., foreign duty
8QZE, Nash, S/Sgt., foreign duty
8SEE, Becker, 2nd Lt., Fort Monmouth, N. J.
ex-8STB, Studt, W/O (jg), foreign duty
8SWV, Robinson, S/Sgt., foreign duty
8UNF, Alway, Pfc., Fort Monroe, Va.
8UNH, Burner, Capt., foreign duty
8UWI, Choszik, T/4, foreign duty
9ATX, Behrends, Cpl., foreign duty
9CRZ, Laycock, Capt., foreign duty
ex-9CTF, Allen, T/3, Washington, D. C.
9DAK, Farley, Lt., foreign duty
9DTT, Stambaugh, Pvt., foreign duty
9EJP, Alde, 2nd Lt., Arlington, Va.

NSS, the Navy's high-power station at Annapolis, Md., is fortunate in having a representative group of eight amateurs among its personnel. *Left to right, front row:* RT1c Poteet, W9NLN; RM1c Irving, W1BFR; RM1c Johnson, W6QIE, and RM1c Stoner, W8IMS. *Rear row:* RE Johnson, K6NSD; CRT Goveia, W1LQB, and CRM Parten, W8BWC. Not appearing in the picture is the eighth ham, RM1c Schreiber, W2MGL.

Two ARRL Sweepstakes veterans and frequent QSOers in prewar days meet on the barren coast of Kiska. T/4 William Lando, SC, W2DXL, *left*, makes plans to disturb the ether in the postwar era with 2nd Lt. David C. Goggio, AC, W9GHD.

ex-9EPX, Nickles, T/Sgt., Fort Myer, Va.
9HFA, Larkin, S/Sgt., New Orleans, La.
9LAA, Justus, T/5, Fort Monmouth, N. J.
9LWD, Van Arman, Capt., foreign duty
9MTF, Fisher, T/5, Camp Crowder, Mo.
9OXD, Joswik, Cpl., foreign duty
ex-9PAO, Given, 2nd Lt., Fort Monmouth, N. J.
9PKT, Koeffler, Cpl., foreign duty
9TBZ, Anderson, Lt., foreign duty
9VHW, Maier, T/5, Alexandria, Va.
9WJV, Fadner, 2nd Lt., Fort Monmouth, N. J.
9WMN, Twining, Cpl., Fort Monmouth, N. J.
9ZBD, Hoog, Cpl., foreign duty

Operator's license only:
Barkis, T/Sgt., Camp Bowie, Texas
Bookman, Sgt., Bainbridge, Ga.
Johnson, Sgt., foreign duty
Pittman, Cpl., foreign duty
Santucci, Sgt., foreign duty
Sween, Cpl., Camp Crowder, Mo.
Tyminski, Pvt., Camp Campbell, Ky.
Weidman, Cpl., foreign duty
Zimber, Capt., Camp Van Dorn, Miss.

NAVY—AERONAUTICS

1DMH, Galvin, ART1c, Cecil Field, Fla.
ex-1FZ, Munroe, ART2c, Corpus Christi, Tex.
2AUD, Garnier, ACRT, Patuxent River, Md.
2EIC, Slack, Lt.(jg), address unknown
2JNK, Hart, ART1c, foreign duty
ex-2KQX, Spitler, ACRM, foreign duty
2LSX, Hall, S2c, Ayer, Mass.
2LTK, Kooker, ARM1c, Atlantic City, N. J.
2NBV, Makahon, RE, foreign duty
3AVL, Hanger, Lt., Washington, D. C.
3IFD, Kimball, ACRM, foreign duty
4GCV, Weidlich, Lt., foreign duty
4GMP, Thompson, ART1c, Gainesville, Ga.
ex-5DVE, Taylor, Lt., Arlington, Va.
5HVQ, Robertson, ART2c, Norfolk, Va.
6KRM, Dunann, Lt., Hutchinson, Kans.
6PBJ, White, Lt., address unknown
6QIL, Furlong, ART1c, foreign duty
6RDI, Alves, ART1c, foreign duty
6UCQ, Parish, ART3c, foreign duty
6UFU, Gosnell, ART1c, foreign duty
6UR, Schroeder, ACRM, foreign duty
ex-8DNL, Onusconage, ART2c, Patuxent River, Md.
8SKM, Garner, ART1c, foreign duty
8VHU, O'Connor, ART1c, Corpus Christi, Texas
ex-9CNV, White, Lt.(jg), foreign duty
9DAO, Hilts, ARM3c, Jacksonville, Fla.

ARMY—AIR FORCES

1FQ, Hearts, Capt., foreign duty
2HPD, Barris, Pfc., foreign duty
2MIL, Barber, T/Sgt., Mitchel Field, N. Y.
2NXR, Rice, Pvt., McCook, Nebr.
2OHX, Lohman, S/Sgt., Scott Field, Ill.
2OP, Mead, Lt. Col., foreign duty
3HQV, Lewis, Pvt., Scott Field, Ill.
3HYC, Keller, 2nd Lt., Sedalia Field, Mo.
3IUK, Patterson, Sgt., foreign duty
4EHC, Coffee, Lucerne Valley, Calif.
4HIJ, Tondee, Cpl., address unknown
5EUL, Essington, Lt., San Antonio, Texas
ex-6FKC, Perkins, T/Sgt., foreign duty
6JAT, Barton, Lt., Randolph Field, Texas
6KYN, Thorpe, Lt., Kirtland Field, N. M.
6LDF, Slavin, Capt., foreign duty
6LQZ, Staucliff, 2nd Lt., New Haven, Conn.
6QEU, Onnigian, 2nd Lt., Santa Monica, Calif.
6UGG, Sevy, 2nd Lt., foreign duty
7FDQ, Nelakog, A/C, New Haven, Conn.
7GVR, Hoppe, Sgt., foreign duty
ex-8CIC, Sendelbach, 2nd Lt., New Haven, Conn.
8QUQ, Miller, Pvt., Truax Field, Wis.
8QVM, Roarabaugh, T/Sgt., foreign duty
8RAI, Wallace, Pvt., Sheppard Field, Texas
8VAC, Scott, A/C, Aloe Field, Texas
8VCH, Foy, Pfc., Tyndall Field, Fla.
8WTJ, Kramer, A/C, Lubbock Field, Texas
9EHC, Drumeller, Capt., Alexandria, Va.
9IPA, Powell, Pvt., Truax Field, Wis.
9LQV, Kunath, 2nd Lt., Eglin Field, Fla.
ex-9NJL, Broderick, M/Sgt., Asheville, N. C.
9QLE, Freimark, S/Sgt., foreign duty
9YJH, Pemberton, Pvt., Asheville, N. C.
9ZAR, Petersen, Lt., Eglin Field, Fla.

Operator's license only:
Carnon, S/Sgt., Drew Field, Fla.
Cohen, A/C, Maxwell Field, Ala.
Craig, Pfc., Scott Field, Ill.
Dasch, Cpl., Richmond, Va.
Elzig, A/C, New Haven, Conn.
Gilbert, 2nd Lt., Boca Raton Field, Fla.
Greenwood, 2nd Lt., Cambridge, Mass.
Jacob, Cpl., Bedford, Mass.
Morrill, Sgt., Tampa, Fla.
Walker, A/S, Victoria, Texas
Weigand, T/Sgt., foreign duty

ARMY—GENERAL

1GRA, McBournie, Fort Banks, Mass
1IHP, Dahl, S/Sgt., foreign duty
1KWP, Sanborn, Capt., Boston, Mass.
1MGS, Lassen, Pvt., foreign duty
1MND, Camire, Pvt., Camp Blanding, Fla.
2BTY, Merrigan, Lt., foreign duty
2DRM, Bogart, T/5, foreign duty
2GWR, Hunter, Pfc., foreign duty
2MGU, Johnson, S/Sgt., Camp Haan, Calif.
2OJB, Shapiro, Pvt., Camp Atterbury, Ind.
3DXO, Weir, Capt., foreign duty
ex-4AFM, Purdy, Capt., Huntsville, Ala.
4DNG, Oldham, Pvt., Ft. Bragg, N. C.
4FCW, McArthur, Major, foreign duty
4GDF, Adams, Pfc., Camp Shelby, Miss.
5EWV, Woosley, Lt., Edgewood Arsenal, Md.
5FPE, Conway, Cpl., Camp Shelby, Miss.
ex-5GMN, Miller, 2nd Lt., foreign duty
5ICE, Johnson, Sgt., Fort Sam Houston, Texas
5JIG, Nixon, Pvt., foreign duty
5KAW, Bender, Sgt., Minneapolis, Minn.
5KKG, Jameson, Pfc., foreign duty
6LWH, Miyama, T/5, Camp Shelby, Miss.
6NNJ, Eno, Pvt., Camp Shelby, Miss.
6PQZ, Akiyama, Cpl., Camp Shelby, Miss.
6QCZ, Robertson, 2nd Lt., foreign duty
6SXN, Waltner, T/4, Camp Carson, Colo.
7BEY, Iki, Pfc., Camp Shelby, Miss.
7DLN, Sakura, T/Sgt., Camp Shelby, Miss.
7HAH, Shepard, Sgt., Anchorage, Alaska
7IFT, Tsukui, T/Sgt., Camp Shelby, Miss.
7JEA, Walling, Capt., foreign duty
8NNP, Obrufta, T/4, Camp Gordon Johnston, Fla.
8OIS, Meermans, Major, Fort Monroe, Va.

AACS is represented pictorially this month by T/Sgt. J. P. Camp, W8UFN, *left*, and S/Sgt. M. Z. Silverman, W9GZB, who were serving in the Aleutians last summer. Notice the sun *does* shine up there, contrary reports notwithstanding.

8QKC, Krakawskas, M/Sgt., North Camp Hood, Texas
8QOW, Isker, Fort Knox, Ky.
8SUO, Wolf, T/Sgt., foreign duty
ex-8TCE, Clapper, T/5, Camp Gruber, Okla.
8TMK, Burns, Pvt., Wyandotte, Mich.
8UUO, Betot, M/Sgt., foreign duty
8WVI, Smith, Pvt., Camp Rucker, Ala.
9ACY, Hitt, Pvt., foreign duty
9ARX, Reynolds, Lt. Col., foreign duty
9JNO, Emlen, T/5, Camp Davis, N. C
9NQJ, Loshmandy, address unknown
9PHK, Minkowski, Pvt., foreign duty
9RAK, Moline, Capt., address unknown
9UND, Kitchuck, Pvt., foreign duty
9URX, Vaughn, Sgt., foreign duty

Operator's license only:
Amber, Pfc., Camp Rucker, Ala.
Bosworth, Cpl., foreign duty
Flaherty, Pvt., foreign duty
Haube, Cpl., Fort Benning, Ga.
Miller, Cpl., Camp Robinson, Ark.
Munson, Cpl., foreign duty
Widdows, Pfc., foreign duty
Wurman, T/4, Camp Butner, N. C.

NAVY—GENERAL

1GKZ, Canedy, Lt.(jg), foreign duty
ex-1HZA, Taylor, Lt.(jg), Brunswick, Me.
1ITK, Swift, Lt., Washington, D. C.
ex-1JC, Hay, Comdr., foreign duty
1JFX, Awramik, Ens., Washington, D. C.
1LJW, Pilafian, A/S, Hartford, Conn.
1NRA, Rider, S1c., Great Lakes, Ill.
2DEJ, Pavitt, Ens., address unknown
ex-2HLJ, DeBaun, Lt., address unknown
2NCD, Wilson, A/S, Hoboken, N. J.
2NLF, Eisenberg, S1c, Great Lakes, Ill.
2NWB, Goodhines, Chicago, Ill.
2OBD, Moreira, S1/c, foreign duty
ex-3CHZ, Koch, Lt. Comdr., foreign duty
3EKY, Roadknight, S1c, Bethesda, Md.
3ELC, Bradford, Lt.(jg), Norfolk, Va.
3FIV, Cassman, Lt., Atlantic City, N. J.
3FYW, Tate, S1c, Staten Island, N. Y.
3HER, Wagner, CRM, foreign duty
3HWU, Lewis, Ens., Key West, Fla.
3IZL, Loria, CRE, foreign duty
3JCJ, Simpson, RM2c, foreign duty
3JMG, Bardon, RE, Washington, D. C.
3JWZ, Daniels, Lt.(jg), Norfolk, Va.
3KAC, Morrow, S1c, College Station, Texas
4CPV, Baker, SP2c, Greenbelt, Md.
4DPM, Ford, CRE, Washington, D. C.
4EPI, Diggs, RE, foreign duty
4ERC, Roseman, foreign duty
4EZT, Beall, CRM, Washington, D. C.
4GUS, Collette, address unknown
4HDF, Anderson, Midshipman, Ithaca, N. Y.
4HGC, McCallum, S1c, Chicago, Ill.
4JH, Lawrence, Lt. Comdr., foreign duty
ex-5EZX, Rogers, EM1c, address unknown
5KMO, Wood, AS, Arlington, Texas
ex-5UG, Baxter, S2c, San Diego, Calif.
6FAL, Hudson, QM3c, foreign duty
6FVL, Swearingen, Lt., foreign duty
ex-6GGW, Perkins, Ens., Allston, Mass.
6LQS, Phillips, Lt. Comdr., Bainbridge, Md.
ex-6OWE, Clark, Ens., foreign duty
6QBS, Wold, RM1c, foreign duty

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6QVZ, Powers, Lt.(jg), foreign duty
6UOK, Dettinger, CRM, foreign duty
6UQF, Barker, RM1c, Hoboken, N. J.
7HIN, Butz, RM1c, Chicago, Ill.
7HTT, Helder, Louisville, Ky.
7HXW, Bystedt, S1c, Great Lakes, Ill.
8APX, Steinbach, CRM, foreign duty
8IPL, Mauk, Y3c, foreign duty
8KUL, Montague, QM2c, foreign duty
8LJQ, Wall, Lt. Comdr., Washington, D. C.
8MCI, Alm, S2/c, Sampson, N. Y.
8RRE, Bedard, S1c, address unknown
8SDH, Swigert, Lt., foreign duty
8SKV, Stoner, Ens., Williamson, N. Y.
8WKS, Thorne, A/S, Providence, R. I.
8WTX, Hall, RM2c, foreign duty
9AFE, Wylie, S1c, Great Lakes, Ill.
9BCA, Schafer, Lt. Comdr., Washington, D. C.
9BXB, Bertalot, CSp., Great Lakes, Ill.
9CIB, Chaplan, CSp., Jacksonville, Fla.
9DKV, Schurkamp, RM2c, foreign duty
9EHE, Stedman, S2c, Washington, D. C.
9ESY, Steidley, Lt., Annapolis, Md.
ex-9FEQ, Smith, RM2c, address unknown
9FTQ, Hooker, Lt., Washington, D. C.
9FWX, Johnson, S1c, College Station, Texas
9GJU, Riddle, S2c, San Francisco, Calif.
9HJO, Freng, S2c, foreign duty
9KMN, Steinke, S1c, Chicago, Ill.
9LOE, McLeod, CRM, address unknown
9MAV, Saretsky, EM1c, Washington, D. C.
9MBA, Touw, CRM, Sampson, N. Y.
9NYH, Thorson, S1c, Del Monte, Calif.
9OAW, Poplosky, foreign duty
9SEM, Mann, M2c, foreign duty
9TMM, Martin, SM2c, San Diego, Calif.
9TVN, Tidemann, RM3c, foreign duty
9UDJ, Anderson, Ens., Bremerton, Wash.
9WGZ, Bucksbaum, S1c, address unknown
9WQT, Cross, Ens., address unknown
9YSL, Morrison, S1c, Great Lakes, Ill.

Operator's license only:

Barr, S1c, Jackson Heights, N. Y.
Blasdel, Lt. Comdr., Annapolis, Md.
Day, A/S, Lawrence, Kansas
Fuller, A/S, Worcester, Mass.
Gold, Ens., New York, N. Y.
Hallack, S1c, Dallas, Texas
Marchese, A/S, Sampson, N. Y.
Moore, S1c, Stillwater, Okla.
Roberts, A/S, Ames, Iowa
Robinson, RM2c, Norfolk, Va.
Shott, S1c, Clarksville, Ark.
Snider, A/S, Rochester, N. Y.
Stone, S2c, foreign duty

MERCHANT MARINE AND MARITIME SERVICE

1DFJ, Viall; 1DHH, Grimes; 1GCL, Cote; 1NAN, Bosse; 2DCI, Levine; 2KUL, Johnson; 2MLV, Dublanica; 2NEN, Stender; 3IGX, Huggins; 3ISS, Gelles; 4FVR, Hingle; 4UX, Sheppard; 5HKH, Frank; 5MN, Biddy; 6MJY, Beardsley; 6PGJ, Lamb; ex-7DOE, Finch; 8JTH, Stevens; 8VZT, Zellner; 8WJT, Zetler; 9EWN, Roberts, and 9PZJ, Malmquist. Bagicidis, Callihan, Herbstman, Kadish and Pease hold operator's license only.

A good example of prompt Navy medical attention to sick personnel occurred when Howard M. Huckabay, W5HSH (what a callful of dits!), RT1c on a mine sweeper in the Aleutians, was stricken with rheumatic fever and was immediately flown to a Naval hospital in Corona, Calif., for treatment. HSH missed being made chief by six days due to his illness.

CIVIL SERVICE

1AZL, Miglin, radio tech., Boston, Mass.
1BAC, Falconer, Dept. of Commerce, Gorham, N. H.
1DBF, Kemper, SC, radio repairman, Philadelphia, Pa.
1DJT, Bassett, War Dept., engineer, Syracuse, N. Y.
1DLT, Doorakian, FCC, monitoring officer
1JEI, Bombria, AAF, radio mechanic, Rome, N. Y.
1NAR, Chapman, AAF, radio mechanic, Beverly, Mass.
1NBK, Scott, AAF, Houlton, Maine
2AGL, Drougalis, SC, engineer, Fort Monmouth, N. J.
2BDH, Schwartz, engineer, Bronx, N. Y.
2BUU, Forman, Navy Dept., Brooklyn, N. Y.
2CTT, Turnbull, FCC, radio inspector, New York, N. Y.
2CYM, Michael, radio mechanic, New York, N. Y.
2EDJ, Clossey, radio mechanic, Belmar, N. J.
2ETN, Leibowitz, Brooklyn, N. Y.
2FYW, Hayman, FCC, monitoring officer
2HNP, Kemp, CAA, Augusta, Maine
2LCG, Federing, Navy Dept., radio engineer, Brooklyn, N. Y.
2LPM, Smith, Navy Dept., radio inspector, Bronx, N. Y.
2MXG, Rothstein, Navy Dept., New York, N. Y.
2OOY, Mathews, SC, insp., Clifton, N. J.
3CJR, Steinberg, SC, radio technician, Washington, D. C.
3DXI, Schomer, Denville, N. J.
3HXL, Horton, Navy Dept., radio mechanic, Norfolk, Va.
3IEG, Manning, SC, engineer, Newark, N. J.
3INX, Kemper, Navy Dept., Washington, D. C.
3ISN, Heilbron, radio repairman, Philadelphia, Pa.
3IUN, Hayes, NRL, radio physicist, Washington, D. C.

Lt. Col. "Chuck" E. Grogan, W8RSZ, *left*, and Major Guy A. Stewart, W2JRG, are two amateurs who get around. The former was operations officer, the latter communications officer of the famous 79th Fighter Group with Montgomery and the RAF, which fought across North Africa from El Alemein to the final drive on Tunis, April, 1943. The plane is Col. Grogan's P-40 Warhawk; the insignia that of the 87th Fighter Squadron, which he formerly commanded. Major Stewart was last reported to be serving with General Chennault in China.

3LE, Bremer, SC, radio engineer, Baltimore, Md.
4DPB, Truesdell, Navy Dept., Portsmouth, Va.
4HKO, Metcalfe, instr., Camp Stewart, Ga.
5EKV, Groves, engineer, Atlanta, Ga.
6LBI, Pichetto, SC, radio engineer, San Francisco, Calif.
6OZF, Schnell, radio mechanic, Los Angeles, Calif.
8CNM, Miller, CAA, aircraft communicator, Columbus, Ohio
8DCE, Probst, SC, inspector, Hamilton, Ohio
8GER, Allen, SC, radio engineer, Patterson Field, Ohio
8IIL, Theil, Navy Dept., radio mechanic, Norfolk, Va.
ex-8KVM, Kearney, SC, radio technician, Camp Coles, N. J.
8LCO, Lawrance, radio engineer, Wright Field, Ohio
8LEC, Cotton, FCC, Detroit, Mich.
8ONN, Gardner, AAF, Syracuse, N. Y.
8SPE, Beattie, SC, radio engineer, Ft. Monmouth, N. J.
8TBN, Gilleo, Navy Dept., engineer, Washington, D. C.
8VDS, Burley, SC, Detroit, Mich.
8WHR, Dimmick, SC, insp., Newark, N. J.
9AZE, Strege, SC, radio engineer, Wright Field, Ohio
9CIT, Lincoln, inspector, Norfolk, Va.
9FDY, Ellington, CAA, aircraft communicator, foreign duty
9FGI, DePew, SC, radio engineer, Dayton Ohio
9FOQ, Strauss, AAF, Sioux Falls, S. D.
9GCL, McKnight, CAA, radio engineer, Cheyenne, Wyo.
9HDU, Murray, radio instructor, Colorado Springs, Colo.
9HLS, Bisk, radio instructor, Chanute Field, Rantoul, Ill.
9LUC, Brzuszkiewicz, inspector, Milwaukee, Wis.
9NMT, Garriott, SC, mech., Salisbury, Md.
9PQW, Carufel, SC, radio engineer, Seattle, Wash.
9SLX, Schmidt, CAA, aircraft communicator, St. Ignace, Mich.
9TZH, Douglas, AAF, instructor, Scott Field, Ill.
9UBN, Wagner, CAA, radio electrician, North Platte, Nebr.
9UJC, Hanselman, AAF, instructor, Truax Field, Wis.
9YEP, Sulak, CAA, aircraft communicator, Columbus, Ohio
9YOO, Hart, SC, radio engineer, foreign duty

Operator's license only:

Kurdeka, FCC, monitoring officer
Merrill, War Dept., Marblehead, Mass.
Washco, SC, engineer, Philadelphia, Pa.

100 PER CENT WAR WORK—INDUSTRY

Sylvania Electric Products Company

1BVL, Briggs, address unknown
1CVM, Kennedy, address unknown
1HBG, Baker, address unknown
1HJR, Crowell, Mill Hall, Pa.
1HMC, Dunn, address unknown
1HMH, Moses, Salem, Mass.
1IWB, Hanson, address unknown
1KZK, Dodge, address unknown
ex-6IV, West, address unknown
6PBR, Shaw, Williamsport, Pa.
8CCQ, Anderson, Williamsport, Pa.
8CID, Freeman, Williamsport, Pa.
8FCD, Vergason, Williamsport, Pa.
8GLH, Lovett, Williamsport, Pa.
8GMZ, Stormer, Emporium, Pa.
ex-8GUU, Maloy, Williamsport, Pa.
8KUN, Nester, Emporium, Pa.
8LIG, Fenstermacher, Emporium, Pa.
8LUA, Maiolo, Williamsport, Pa.
8MPC, Ostrander, Williamsport, Pa.
8NQL, Canaan, Williamsport, Pa.
8OYG, Mueller, Williamsport, Pa.
8OYK, Palmer, Williamsport, Pa.
8RFN, English, Williamsport, Pa.
8RNW, Maneval, Williamsport, Pa.
8TNK, Petts, Williamsport, Pa.
8WHY, Day, Williamsport, Pa.
8WUH, Pennington, Mill Hall, Pa.
9SUK, Schneving, Mill Hall, Pa.

CANADA

CREDIT for the excellent lists of Canadians in service and 100 per cent industry goes this month to a group of faithful amateurs, who have kept us constantly supplied with additions and changes. We would like to point out the desirability of continuing these listings: the same reasons apply for their appearance as for the names of hams in the U. S.

In addition to recognition among ourselves of amateur participation in the war effort, the ITS column furnishes proof to the authorities of the value of amateur radio. Canadian amateurs are doing a splendid job by virtue of their peacetime training and are entitled, therefore, to the resumption of their prewar status when that job is done.

If this column helps bring that about, it will have served its purpose. Help us to help you by mailing the blank on page 18, and asking other Canadian amateurs to do likewise.

RCAF

1ES, Hart, LAC, Sackville, N. B.
1LN, McKay, F/Sgt., foreign duty
2JD, Barry, R/O, Elizabeth City, S. C.
2QU, Dorais, LAC, foreign duty
3ABW, Thibadeau, LAC, Bagotville, Que.
3AMS, Schlifer, Sgt., Delbert, N. S.
3ARH, Valeriote, Sgt., foreign duty
Butler, 3AXM, LAC, foreign duty
3AYE, Chiswell, P/O, Gaspe, Que.
ex-3AZX, Viney, LAC, Glace Bay, N. S.
3AZZ, Day, Sgt., Ancienne Lorette, Que.
3IY, Dunstall, foreign duty
3LS, Wilson, Sgt., Charlottetown, P. E. I.
3NJ, Doddridge, address unknown
4ABS, Smith, address unknown
4ABT, Thompson, address unknown
4ACG, Wood, LAC, foreign duty
4AEU, Savage, foreign duty
3AKH, Frantsi, LAC, foreign duty
4AOH, Musselman, LAC, foreign duty
4AQY, MacLean, LAC, foreign duty
4ASL, Crandall, LAC, address unknown
4BD, Stemshorn, address unknown
4GZ, Moffat, foreign duty
4HP, Dunham, F/Sgt., Winnipeg, Man.
4KG, Snelgrove, foreign duty
4OR, Took, address unknown
4XM, Butler, foreign duty
5OS, Stott, LAC, foreign duty

Operator's license only:

Kail, F/O, Edmonton, Alta.

RCA

4OH, Furnell, address unknown
4VQ, Mitchell, address unknown
5AFV, Gansner, Pvt., Courtenay, B. C.
5AHP, Bouchard, Sgt., foreign duty

RCN

2QH, Miles, Lt. Cmdr., St. Hyacinthe, P. Q.
3ANY, Coleman, W/O, Ottawa, Ont.
ex-3FT, Welch, Petty Ofcr., Prince Rupert, B. C.
ex-4ADS, Young, Chief Petty Ofcr., address unknown
4AEK, McLellan, Petty Ofcr., address unknown
ex-4SZ, Curtis, Petty Ofcr., address unknown
ex-5AIX, Wilkinson, W/O, address unknown
5AJV, Baxter, RA, address unknown

Operator's license only:

Ramsay, L/W, address unknown

RAF

2DO, Braithwaite, Dorval, P. Q.
2IL, McMullen, foreign duty
5ACE, Jones, Cpl., foreign duty
5HC, Wightman, address unknown

100 PER CENT WAR WORK—INDUSTRY

1AB, McCarthy, Drummondville, P. Q.
2AX, Bowkett, Toronto, Ont.
2BD, Lewrey, Ottawa, Ont.
2BF, Walker, Montreal, P. Q.
2CS, Hudson, Ottawa, Ont.
2EM, McAteer, Montreal, P. Q.
2FO, Macdonald, Ottawa, Ont.
2FQ, Walker, St. John, P. Q.
ex-2GG, Montreal, P. Q.
2HP, Little, St. John, P. Q.
2II, Sargent, Montreal, P. Q.
2IX, Lewery, Montreal, P. Q.
2JZ, Rugg, Ottawa, Ont.
2PZ, Lynn, Dorval, P. Q.
3AAK, Burland, Toronto, Ont.
3ACR, Erdeley, Dorval, P. Q.
3AFY, Scott, Toronto, Ont.
3AKN, Thompson, Toronto, Ont.
3ALC, Humphreys, Toronto, Ont.
3AMM, Braley, Peterboro, Ont.
3ASV, Valler, Toronto, Ont.
3ATI, Sandbrook, address unknown
3ATZ, Rupple, St. Thomas, Ont.
3AXQ, King, Peterboro, Ont.
3AZY, Kinch, Toronto, Ont.
3DO, Fletcher, Hamilton, Ont.
3EU, Mulanney, Dorval, P. Q.
3FN, Lewis, Toronto, Ont.
ex-3FY, Choat, Toronto, Ont.
3HP, Ferguson, address unknown
3JV, Derumaux, Oshawa, Ont.
3OO, Coombs, Toronto, Ont.
ex-3RZ, Brammer, Dorval, P. Q.
ex-3SP, Sturrock, Hamilton, Ont.
3VA, Dawley, Dorval, P. Q.
4ALO, Addeman, Dorval, P. Q.
4AOZ, Bruce-Marsden, Milo, Alberta
4AQM, Harding, Dorval, P. Q.
4DK, Brereton, Winnipeg, Man.
4IY, Lewis, address unknown
4MU, Meeds, address unknown
4OD, Gjernes, address unknown
4QW, Albulet, address unknown
4RL, Grant, Mount Royal, P. Q.
4TA, Edwards, address unknown
4TO, Salome, Toronto, Ont.
4TX, Holland, Saskatoon, Sask.
5AIL, Hardham, Dorval, P. Q.
5AJT, Risbey, Sea Island, B. C.
5JD, Phipps, Dorval, P. Q.
5WQ, Taylor, Vancouver, B. C.
9FI, Bisson, Dorval, P. Q.

Do you know these men? Last June we received this photo of Canadian hams in the services, who attended a hamfest at the YMCA in Northcamp, Farnborough, Hants, England, early in 1940. Unfortunately, names, calls, ranks and branch of service were not given except for two of the group. We need more VE registrations and hope that men in the group or their friends will come forward with the missing data. How about it?

The Leghorn Gang

An Account of Ham Radio in Italy Under the Fascist Regime

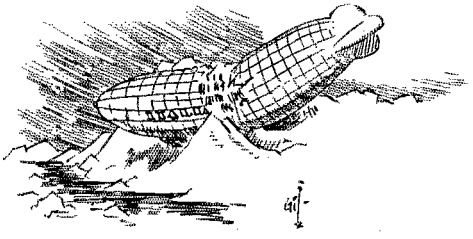
BY IIKW*

When the airship *Italia* crashed onto the icecap on her ill-fated cruise to the North Pole in 1928, the only equipment in working condition left to radioman Biagi for sending out an SOS was an emergency transmitter using a Philips B-405 oscillator, whose "B" supply was obtained from a 4-volt storage battery through a buzzer and a step-up transformer. Operating with only a few watts output and under sub-zero Arctic conditions, no answer was received for days, but Biagi continued sending out his distress call. To make sure he was getting out he moved the receiver as far as possible from the transmitter for testing. That meant long hours of dangerous crossing over the ice. The transmitter was working all right, yet there was no answer! What had happened? Simply this:

On board the base ship, *Città di Milano*, dials were turning and ears were straining in a frantic search, yet no one thought of that particular emergency transmitter and the frequency on which it operated (around 40 meters). The search was being made on different frequencies. Moreover, the signal of such an emergency transmitter as the one used by Biagi does not send out a real note at a distance, but sounds more like a scratch, or static.

Heard by Amateurs

But Biagi *had been heard.* U. S. hams heard him first. That fact is certified by an editorial written in those days by Luigi Barzini, one of the foremost Italian newspapermen, then owner of the Italian daily, *Il Corriere d'America*, edited in New York City. He flatly stated that no credit could be given to the claims of American hams of having heard distress calls from the airship *Italia* because it was materially impossible that radio signals originating from the North Pole could be heard as far as the United States!

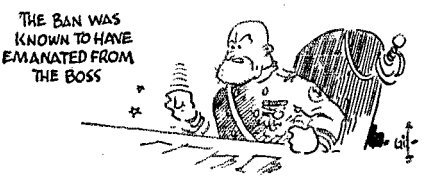


Bedlam broke loose soon afterwards. Almost everyone was hearing SOS calls from the *Italia*. The whole world was tense and excited, stories and rumors of every description were running wild. Some fool sent out fake radio distress calls impersonating the airship, thus adding confusion. Fools can be found everywhere and radio, as with everything else, cannot be made foolproof. Finally the *Città di Milano* heard Biagi's signals and the story ended with the rescue of the explorers.

One of the most astounding and appealing features in radio history had been accomplished and hams had a prominent part in it. Biagi was invited to the States where he was decorated.

Italian Hams Banned

But Mussolini, none too pleased with the outcome of the expedition, decided that hams deserved punishment and that Italy could get along without them. Consequently, all ham licenses were revoked overnight. No reason was given, no government statement was issued, and asking



questions would have meant "undiscipline" under Fascist rule. Nor was the ban to be taken lightly, for it was known to have emanated from the boss. Italian hams were forced to abandon all activity and dared not do anything underhanded as their names, addresses, and station equipment were only too well known by the police.

B.c. radio in Italy at this time also was struggling for an existence. It already had been subjected to a tremendous amount of red tape for revenue purposes at the hands of a special revenue corps, the much dreaded "Finanza," whose fines were so flat and irrevocable that the average dealer or store owner eventually was so hard hit as to be forced out of business. Not only radio sets but even parts such as condensers, headphones, etc., were taxed. A radio repairman needed a special license, another license was required for radio sets or parts manufacturing. Both were quite expensive and hard to get and capability or technical knowledge did not matter; anyone could obtain the licenses if he paid the fees. Then he was permitted to decorate his store with the special sign, "Radio Store Authorized by Government," even if he did not know the first thing about radio — which was usually the case.

To mention another instance: A fellow who had the brains, the money and a bulldog's grip as to will power wanted to open a laboratory with the purpose of manufacturing radio tubes. He had to fight a real battle, and even his vacuum pump

*Name withheld by request.

was under strict and constant control of the "Finanza"!

From the above it easily can be assumed that not only ham activity but radio as a whole was by no means encouraged by the Fascist government. Radio was considered an amusing toy somewhat useful for propaganda purposes. As long as these propaganda purposes were fulfilled, no further development was looked for, or encouraged.

Hams Resurrected

The ban on ham activity was never lifted, but nothing shall discourage a ham, so hams were resurrected in Italy, ban or no ban.

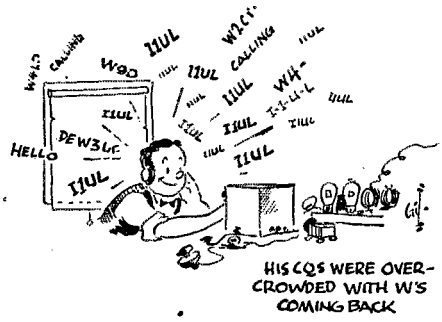
Leghorn's example is typical. There had been no pre-ban duly licensed hams in Leghorn, yet by the end of 1931 a gang of five new members had been established. It began with I1XX, a lawyer hard hit by the radio bug, and I1IY, a ham-in-the-making since his childhood. I1KW, just back from the States and helping along with English, joined in soon afterward, followed by I1KI, released from Navy service, and I1UL, a radio repairman. None of them was rich and radio parts were limited, but underhanded radio repairing practiced by the gang helped a lot to secure the necessary material. Ham spirit was running high, and the other fellow was always given a helping hand to enable him to get on the air.

Hartley oscillators using 45 tubes, with a respectable record of regular b.c. hours of service, and 47 modulators were the best equipment that could be hoped for. Crystals and other items were only to be seen in American catalogues or magazines, along with other wondrous things. T.r.f. receivers were the limit even later on, as it was impossible to get the necessary parts to attempt building a good superhet.

As for antennas, anything using feeders or separators had to be discarded as it looked too "queer" and attracted attention. Single-wire-fed Hertz antennas were adopted and gave full satisfaction, besides looking perfectly "innocent" to the layman.

Locations in town were not exceptional. K owned the house where he was living and could erect a high mast on his roof, but IY and KW were at a loss as their "roof owners" did not want any pole or mast, fearing lightning. KW, to his despair, could not raise his antenna more than ten feet above the roof.

It was a different story with UL. The lucky dog was living in Montenero, a suburb of Leghorn, right on top of a hill facing the sea. At a certain distance to the rear of the house lay a rocky cliff, which must have played some part in his success.



The fact is that as soon as the 20-meter band opened up for DX, UL invariably was landing a solid signal in the U.S.A. His CQs were overcrowded with Ws calling him back. The thing was too appealing to UL not to make a 'phone hound out of him, but he did not speak English and had to resort to a prearranged list of sentences "made to order" which at times did not exactly fit. The best fun the gang ever had was in listening in to UL's debates with the W boys who were gently kidding him or were baffled by the funny bird possessing such an objectionable modulation and such an astounding signal.

It must be added for the benefit of the fellows who remember having worked him, that a visit to UL's shack would have been highly surprising to them. A 45–47 extremely haywire rig, a carbon telephone unit and a power pack, sadly in need of better filtering, was about all it contained.

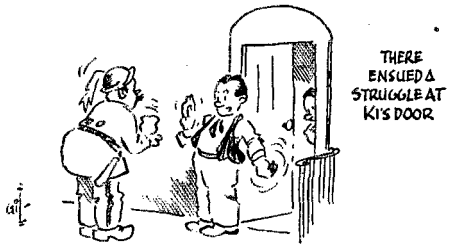
"Questura" Interferes

In the beginning the gang overestimated the ability of "Questura" (police) to detect unlawful radio transmitting and was accordingly extremely careful. However, when it became apparent that "Questura" could only rely upon eventual complainings of third parties or squealings of spies, members of the gang became a bit careless and the trouble began.

One day KI was working his first LU on 20 meters and, being anxious to get his QSL card as soon as possible, he dared to send out his name and address so that the other fellow could mail it direct instead of following the usual ARI (Associazione Radiotecnica Italiana) route. KI was not aware that his single-wire-fed Hertz was at the

Under the Fascist rule in Italy, radio as a whole was by no means encouraged and amateur radio specifically was prohibited. Ham spirit nevertheless ran high and, undaunted by the government ban, by the lack of equipment and various other handicaps, amateurs continued to operate their stations. This is their story — the history of amateur radio in Italy over the past fifteen years. Written by I1KW (whose home, incidentally, was bombed to the ground by planes of the American Air Force), it reached Headquarters via a W2 ham who met I1KW while serving in Italy with a U. S. Army signal battalion. The W2, himself, worked all five of the "Leghorn Gang" on 20 meters in the days before the war. Because of the circumstances under which they operated, it is imperative that none of the hams concerned be identified here.

moment putting out a strong harmonic and that the harmonic was landing in Rome where a big shot in Italian official radio, Admiral P., chief of the department of communications, was doing some high-brow experimenting on 10 meters. Did the Admiral realize it was a harmonic? That was not known, but it became known afterward that he got awfully sore and ordered the police after the fellow.



Two days later there ensued a struggle at KI's door. KI defended his castle while his brother guided the transmitter in a nose dive from a rear window (third floor)! When the police finally entered the shack disappointment was easily seen on their faces. Orders in that particular case had come from Rome and something big was expected. Instead they saw only a lot of "junk" lying around. Where were the motors, the generators, the big panels and switchboards? KI was brought before the chief of police and given a thorough quizzing, but, of course, even the police had to admit that no motors were hidden in the house. Their report to Rome must have been disappointing to the Admiral. . . . The case soon faded out and KI was back on the air shortly thereafter.

But the "Questura's" suspicions had been awakened and the gang often had additional trouble. To tell the truth, none of the gang was ever really arrested, nor fined, nor his equipment confiscated for keeps. But such hamperings were hard felt: no usual display of QSL cards on the wall, no permanent station arrangement — the different items were lined up just before operating and scattered again when closing down. Sometimes the closing down was hastened by an unexpected ringing of the doorbell. IY discovered that the best hiding place for the transmitter was to hang it out of a rear window like a bird cage and he passed the hint along with success.

But he was the first to experience another source of trouble which was developing — parent trouble. If the ham could stand the emotional effects of a domicile search by "Questura," it was a different story with fathers, mothers and other relatives. One day upon returning home, IY found that his enraged father had dumped *all* of the radio gear out of the third floor rear window, thereby hoping to cure his son of such a dangerous hobby.

It didn't work — IY was back on the air as soon as new material could be secured.

Later on crystals and other parts were available, but the 6L6 tube marked the limit. Too many reasons prevented the gang from getting high-power tubes and equipment. The results, though, were quite gratifying with low power.

Local work was started on five meters with good results. The gang got in touch with other hams located in Florence, Milan and other Italian cities.

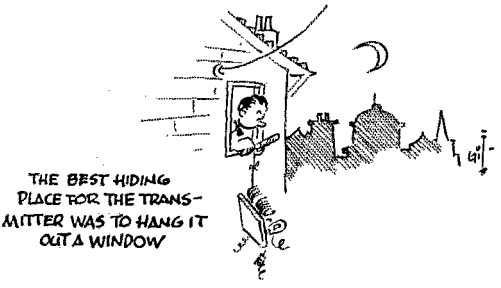
Duty Calls

In 1935 the gang began to dissolve. KW and IY had new jobs on the sound staff of movie studios which had been opened in Tirrenia. In 1936 KI and KW, both reserve officers, were called to active service in the Navy and Army respectively. KI was soon released and had a job in Milan at Marelli Radio Transmitter Factory. KW was retained for four years in Rome.

KW and KI had a chance to probe the radio situation of the Italian Army and Navy and found it very queer. The higher-ups seemed to be anything but radio minded. Five meters was scoffed at as utterly unreliable for real war service. KI was recalled to the Navy. About 1940 he and KW were building 5-meter equipment privately and out of their own funds "just to show them."

But destiny decreed otherwise. When the war broke out, KI went to the bottom with the cruiser *Fiume*, and with him went his equipment. For all that has been known in Italy, the cruiser *Fiume* was sunk in a few minutes during the night by point blank 16-inch gun shelling. The ship was steaming to a high sea "rendezvous" — only the order it received by radio had originated from the British.

IY had been ordered to the anti-aircraft artillery of the "Milizia." At that time an Italian firm was manufacturing 5-meter equipment for the air-raid alarm networks, but of course the personnel lacked utterly. The firm asked the government to have the most intelligent men sent to the factory for training. IY was one of the number and never came back. He was retained by the firm as a research engineer.



Shortly before Mussolini's downfall a ham was in charge of the Italian Air Force radio communications. It is known that the "Consiglio di Stato," which is the supreme authority of the state, was asking technicians to produce 2½-meter equipment as soon as possible.

But it was, luckily, too darned late!

A Versatile WERS Mobile Station

District-Wide Communication By Means of Dual Installation

BY PHILIP S. RAND,* W1DBM

Real efficiency is possible when the district aide can break into local networks as need-be, from any location in the district. An approach to such an ideal operating arrangement has been made in Middletown, Conn., where the district aide's automobile is equipped with the transmitter and transceiver units described in this article. The equipment was assembled from parts taken from a few prewar ham rigs and junk boxes.

SOMETIMES one well-designed transceiver is all that is required for communication at a WERS station. Sometimes that is not enough. Where a district aide needs to contact a local station for example, the job can be done well enough with a good transceiver, but if he needs to contact someone out in the district at more than local distance, he most likely is lost without an additional transmitter of higher power than the transceiver provides. After all, a transceiver must be operated part of the time as a receiver, which means that receiving-type tubes are required throughout. If more power is needed, the only practical solution to the problem is to separate the receiver and transmitter circuits. In this way, higher power may be available from the transmitter. However, a disadvantage of even this arrangement is that more power than is required will be on the air each time the transmitter is turned on, unless a means of reducing power is provided, and this adds just one more switch or knob to worry about. Another difficulty is that the transmitter must be reset rather carefully to the assigned district frequency for certain communications. This can be done, of course, but it is an added operating procedure and therefore more or less of a burden.

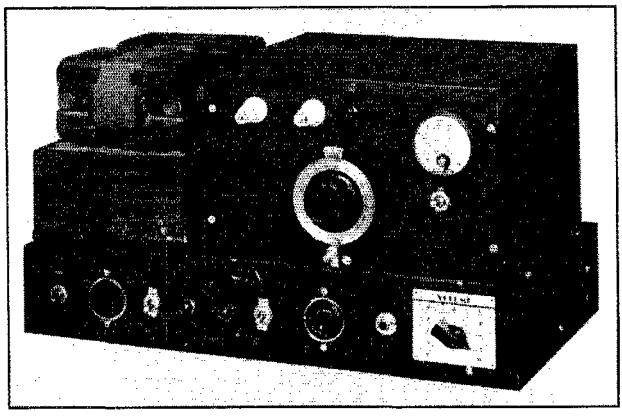
In the more ideal set-up, a transceiver is used for local contacts, plus a separate transmitter of somewhat higher power for district-wide work. In this way the transmitter may be set on the assigned district frequency and left there. It is not used for anything except district work, because the transceiver is sufficient for local communications.

On first reading, it may appear that a lot of equipment is required for this more ideal set-up. Actually, not as much is needed, nor is it as hard to get, as one might at first think. By looking at the photographs, we recognize at once that nearly everything that is used is familiar ham equipment. In Middletown, Conn., the equipment problem was solved by robbing some prewar ham rigs and, of course, the junk box. Where one rig and one junk box was not enough, more of them were plundered. Isn't that kind of coöperation old stuff among hams anyway?

The finished units are mounted in a Chrysler Royal six-passenger coupe, meaning of course that any car of the same general design is satisfactory if this equipment is duplicated elsewhere. The transceiver is in the glove compartment near the operator. On its panel are switches which the operator can use to control operation of the main transmitter which is back in the trunk space at the rear. In order to make operation more foolproof, a separate storage battery is used with the radio equipment and it is charged by floating it across the car battery and generator. There is ample space for it near the main transmitter.

The use of a storage battery immediately suggests that some form of generator or vibrator power supply is used. This is true — in fact both types are used — two genemotors for the main transmitter and the vibrator supply for the transceiver. Filaments are run directly off of the battery, which also works the three control relays and panel-indicator lights.

Separate antennas are used with each unit. For the transceiver there is a rod-type vertical mounted on the right side of the hood. In the rear, projecting approximately six feet through



The main transmitter unit is enclosed in the metal box on top of the chassis. The dual genemotor unit, with its smoothing and hash filters underneath, is to the left. Controls, indicator lights and connector sockets are arranged along the front edge of the chassis.

*Remington Rand, Inc., Electronics Division, Middletown, Conn.

the body of the car, is a "J" vertical for the main transmitter. This antenna is tuned and left at precisely 112.1 megacycles, the assigned frequency in the Middletown district. Tuning equipment for the two units is controlled from their front panels.

Circuit Details

If anything is mysterious in the photographs, perhaps a little circuit-study will clear it up. Those genemotors, for example, why are there two of them and for what are they used? The two are connected in series in order that approximately 350 volts may be obtained for plate supply for the main transmitter. Enough output voltage cannot be obtained from one, since each produces about 175 volts. The HY75 r.f. and the 6N7 modulator plate circuits operate at the full voltage output of the two genemotors. Adjustment of antenna coupling to the HY75 circuit permits the plate current to be held down to 65 ma., so that the legal maximum power input of 25 watts will not be exceeded.

Carter dual genemotors are used in the Middletown rig and they carry the load nicely. They pick up quickly as soon as they are turned on, which is important in quick-comeback WERS work. By breaking the motor circuits, we get away from the need for a high-voltage plate relay and for a heavy filter across its contacts to take care of inductive arc. Output filters for the two machines are built into the base on which both of them are mounted.

The main transmitter circuit shown in Fig. 1 consists of a conventional oscillator using an HY75 tube which is plate-modulated. Sufficient audio power for the purpose is obtained from the output of a 6N7 dual triode tube in a push-pull circuit. A single-button carbon microphone is coupled to a 6C5 to form the speech-input stage. Current for the mike comes from a "C" battery in one corner of the main transmitter cabinet.

The 6N7 and HY75 plate currents are separated from one another by the output transformer, T_3, but each may be measured by the milliammeter shown on the face of the main transmitter.

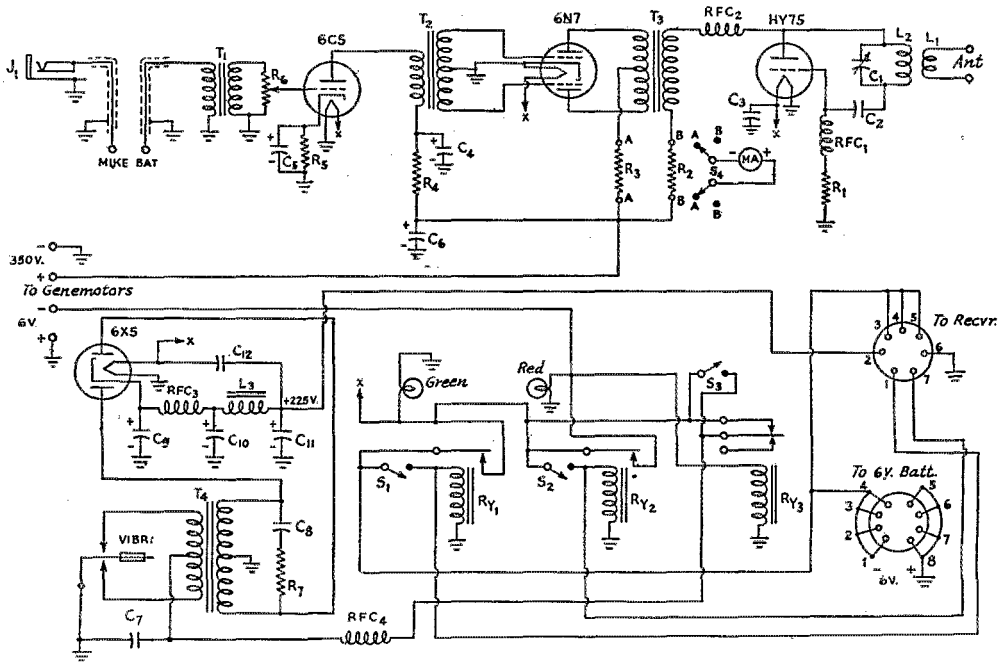
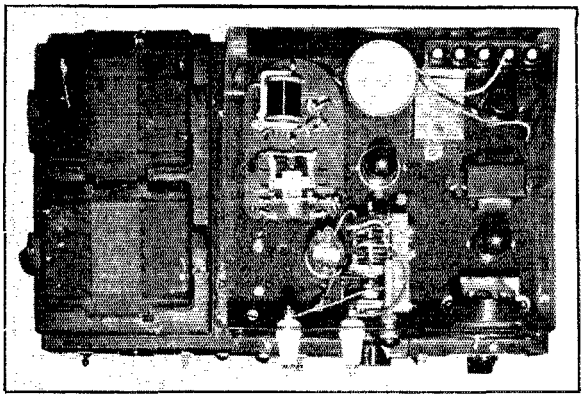


Fig. 1 — Circuit of the WERS main transmitter and control system.

C_1 — 35-$\mu\mu$fd. variable.
C_2 — 100-$\mu\mu$fd. mica.
C_3 — 0.001-μfd. paper.
C_4, C_5, C_{10}, C_{11} — 16-μfd. 450-volt dry electrolytic.
C_6 — 25-μfd. 25-volt dry electrolytic.
C_7 — 0.5-μfd. paper.
C_8 — 0.015-μfd. 1600-volt paper buffer condenser.
C_9 — 0.01-μfd. paper.
C_{12} — 100-$\mu\mu$fd. paper.
R_1, R_7 — 5,000 ohms.
R_2, R_3 — 25 ohms.
R_4 — 10,000 ohms.
R_5 — 1,000 ohms.
R_6 — 1-megohm potentiometer.
L_1 — 2 turns, ½-inch inside diameter, copper tubing or stiff wire.
L_2 — 1 turn, as above.
L_3 — 8-henry 150-ma. choke.
RFC_1, RFC_2 — 1-mh. r.f. choke.
RFC_3 — 2½-mh. r.f. choke.
RFC_4 — 50 turns of No. 12 enamelled wire on ½-inch diameter form.
T_1 — Microphone transformer for s.b. mike.
T_2 — Driver transformer to match a 6C5 tube.
T_3 — Output transformer to match a 6N7 tube to speaker voice coil.
T_4 — Power transformer for vibrator power supply.
S_1, S_2, and S_3 — S.p.s.t. toggle.
S_4 — D.p.d.t. toggle.
Tubes — First speech amplifier, 6C5 or 6J5. Final speech amplifier and modulator, 6N7. Rectifier, 6X5.
Meter — 0–100 milliamperes (flush-mounting preferable).
The upper outlet socket is for connections to the transceiver.

The meter may be switched into the 6N7 or HY75 plate circuits at points *AA* and *BB*. Across each set of points is a 25-ohm resistor, the purpose of which is to maintain a closed plate circuit for each tube whether or not the meter is plugged in. The meter readings are not appreciably affected, since the 25-ohm resistors represent relatively a much higher resistance than that of the meter itself. On the panel just under the instrument is a switch with which this change-over may be made. Neither plate circuit is broken when the switch is manipulated because the resistances at *AA* and *BB* are permanently connected.

The main transmitter cabinet contains more than the components for the HY75 circuit. The vibrator power supply circuit shown in Fig. 1 is strictly part of the transceiver layout. So is the vibrator control relay and both of the tube sockets which are used along with the power cables. This is not a bad idea, however, because there is relatively unlimited space in the rear of the car, compared to that in the glove compartment. Confinement of the vibrator, filter, and relays to the rear part of the car also helps to reduce stray contact and vibrator "hash" interference in the receiver. It is helpful also to have the battery in the rear so that the 6-volt leads to the relays and vibrator are short.



Top view of the transmitter unit showing the HY75 and its tank circuit in the upper center. The relays are mounted on a sub-panel in the lower right-hand corner of the transmitter box while the audio equipment occupies the left-hand side. The vibrator for the transceiver supply is to the left of the relays.

We cannot, however, depend upon location and shielding alone to take care of the "hash" problem, and so the vibrator and 6X5 rectifier circuits are thoroughly filtered. The heavy r.f. choke, RFC_4, is by-passed by C_7 at the center-tap of the vibrator transformer primary for the purpose of killing a large portion of the hash immediately after it has been manufactured. Across the secondary is the series combination, C_8 and R_7, to keep vibrator sparking to a minimum. Now we start work on the output hash with RFC_3 by-passed by C_9 at the rectifier cathode. Ordinary filtering of the rectified output voltage is done with the pi-section filter composed of L_3, C_{10}, and C_{11}. No more hash is supposed to be in the output at the junction of L_3 and C_{11} but some occasionally gets through via the heater of the 6X5, and so C_{12} is used as shown. With this circuit no hash interference has been noticed in the transceiver.

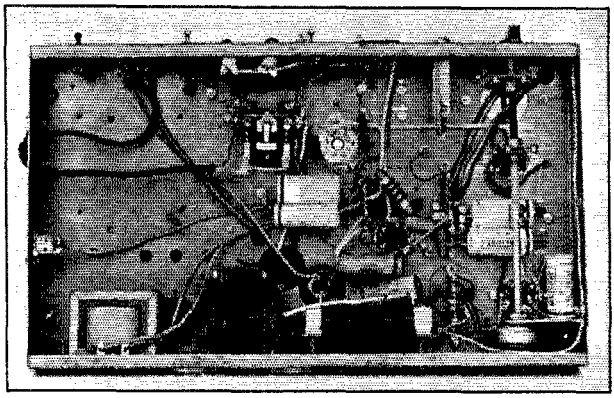
Comparison of Circuits

A few comparisons are in order at this point. It is seen that there is no basic difference between the circuit of the transceiver and that of the main transmitter. A self-excited oscillator is plate modulated, in each case, through a two-stage speech amplifier. The only noticeable difference in the r.f. circuits is that the transceiver plate is fed in series while that of the main transmitter is parallel-fed. There also are differences in details. The main transmitter and modulator plate circuits are transformer-coupled, while impedance coupling between modulator and r.f. oscillator plate circuits of the transceiver is achieved through the primary of the 6V6 output transformer.

There also is a difference in final speech amplifier tubes. A 6V6 for the transceiver provides plenty of "push" for its purpose, but a 6N7 is required in the main transmitter.

Also, T_1, the speech input transformer in the transceiver, has a dual primary so that the speech amplifier circuit can be switched over to the receiver output to provide audio gain.

More switching circuits are required for the transceiver circuit than for the main transmitter. The reason is that the whole circuit of the transceiver must be converted quickly from that of a transmitter to that of a receiver, or vice versa. The main transmitter, however, only has to be turned on and off. Therefore, S_1, a four-pole double-throw affair shown at several places in Fig. 1, transfers the plate connection to the HY615 at the lower end of RFC_1, to the modulator output for transmission, or to one of the primary windings of T_1 for reception. The grid connection of the same tube, from the lower end of RFC_2, is returned to ground through a series circuit composed of R_2, one primary winding of T_1 and a portion of R_9 for reception, or more directly through R_1 for transmission. The speaker or 'phones also must be cut off during transmission, or on during reception, and this function is performed near the speaker jack, J_1, by a part of S_1. The microphone circuit must be cut in and out also, and this is done by S_1 on the lower primary winding of T_1. The other side of this same winding is changed over from transmission to reception by one part of S_2, a d.p.s.t. switch. In this action, the shielded microphone connection which runs between the transceiver and main transmitter panels is switched off to an open circuit during reception and then the circuit is completed during transmission. The other part of S_2 permits the main transmitter to be turned on through relay Ry_2, or this relay is left off during reception. S_3 on the trans-



Bottom view of the transmitter chassis showing the placement of the vibrator-supply components. The relay near the top of the photograph is the plate relay, Ry_2.

ceiver operates the filament current through relay Ry_1.

On the main transmitter, there are only three simple s.p.d.t. switches. S_1 opens or closes the winding of the filament relay, Ry_1. S_2 does the same with the plate relay, Ry_2. If it is desired to listen on the transceiver while the main transmitter is on, S_3 can be thrown on to short the two active contacts of Ry_3 and thereby start the vibrator. The action of S_3 may raise the question, why can't the relay be made to do the job of turning on the vibrator, instead of the switch? The reason is that the relay Ry_3 acts differently from the other relays. Its upper contacts *open* when it is operated. This happens when relay Ry_2 goes on and puts the main transmitter in operation. In this way plate current for the receiver is cut off during operation of the main transmitter. However, when it is desired to listen to the main transmitter for testing purposes, S_3 may be thrown on to cause the vibrator to operate. By this method a separate monitor is not required. The signal in the receiver will be broad, of course, but at least the operator will be able to tell whether the main transmitter is radiating and approximately in what part of the band it is set.

A green dial light on the main transmitter panel shows when the filaments are on. A red one indicates whether the plate relay is on or off. None is provided for the vibrator relay, but it would be easy to include one by simply connecting it between the bottom (now unused) contact of Ry_3 and ground. Indication then would be given of a *magnetized* Ry_3 winding and of inaction of the vibrator, as far as its control by the relay is concerned. This light would come on with the red and green ones during normal operation. If indication of the action of S_3 were desired, then the light could be connected between ground and the upper contact of Ry_3. No duplicate lights are located on the transceiver panel because extra lines would be required in the cables and furthermore, the operator has the use of a receiver at this position to tell him whether or not the equipment is functioning.

Construction

The photographs indicate the relative positions of the parts of the main transmitter on a 17 × 10 × 3 inch chassis. The tuning cabinet to the right of the two genemotors measures 10 × 9 × 7 inches. A uniform height thereby is provided across the entire top of the unit.

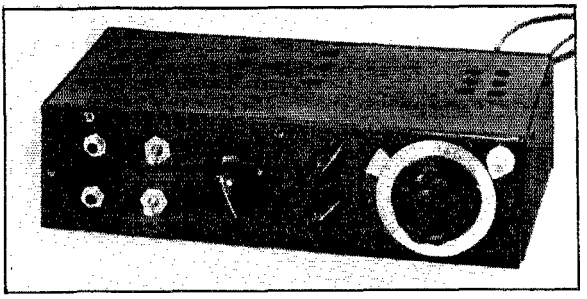
The controls which require manipulation for a quick test are located on the front edge of the chassis. For tuning adjustments, the main dial is located up where there is elbow room and there is a dial-lock provided for the purpose of setting the frequency of the transmitter at that assigned to the WERS district. The antenna coupling control knob is just above the main dial. The plate meter to the right is not as far from the same line of sight so that resonance and speech amplifier adjustments may be observed quickly during the tune-up job. The antenna comes in conveniently to the stand-off insulators at the upper left.

The top-view photograph shows two of the relays, those for the filament and vibrator, located in one corner of the cabinet on a common base. The relay which controls the genemotors is underneath the chassis. The HY75, with two top-caps, is placed next to the tank coil and condenser. Also, the 6X5 rectifier is placed close to the vibrator, shown in the cylindrical can, and the power transformer to which they connect is underneath the chassis at the same place. The plate meter and speech amplifier components are lined up vertically, in the photograph, at the left of the cabinet.

In the under-chassis view of the main transmitter, the volume control at the right has its shaft extended for the width of the chassis. Here, the idea is to put the volume control connections near the control grid of the 6C5 speech input tube. Thereby a long shielded lead from some other location is not required and the possibility of hum pick-up is greatly reduced. Otherwise, except for what has been mentioned above, the under side of this unit contains only the usual assortment of filter and by-pass condensers required in the circuit shown in Fig. 1.

The front view of the transceiver shows a cabinet with dimensions of approximately 9 × 6 × 4 inches. This allows ample space on the panel for the gain and regeneration controls which are shown with pointer knobs, and for the adjacent send-receive switch with its circular knob. The two toggle switches at the left control the filament and main transmitter plate supplies through two relays, the circuits of which have been described. A speaker is plugged into one of the jacks at the left and the single-button mike goes into the other. Cables to the power supply from the panel of the main transmitter are shown in the rear. Several half-inch holes drilled in the top of the case provide ventilation for the tubes

inside. Tubes are mounted horizontally. This arrangement places the terminals of the sockets right at the connections to component parts which are mounted within the front section of the unit. Exceptions are the microphone and interstage transformers, T_1 and T_2. They are mounted at the opposite ends of the top section and as far from one another as space will permit. All of the r.f. equipment is confined to the compartment at the right. Fairly close coupling between the antenna and tank coils is provided in the transceiver, although variable coupling is used in the main transmitter.



Front view of the transceiver. This unit fits into the glove compartment of the car. The toggle switches remotely control the filament and power supply circuits, both for this unit and for the main transmitter in the rear compartment.

Operation

Suppose that we wish to test receiver operation of the transceiver. The first step is to throw on the filament switch. Relay Ry_1 then goes into action and simultaneously the vibrator starts, through the action of relay Ry_3. The familiar background hiss should then be heard and some stations might come in as the main dial is rotated. Sometimes, just manipulation of the regeneration control will cause the receiver to "come alive," if it seems dead at the start. As a simple test of operation, touch the antenna. The receiver noise should diminish instantly as an indication that the circuit is operating properly. In order to set the tuning so that the bandspread condenser can cover the band properly, condenser C_1 is fixtuned like a trimmer condenser. The adjustment screw may be reached from the top of the cabinet and is just to the left of the HY615.

Since no receiver, other than perhaps an external one, is available when the transmitter section

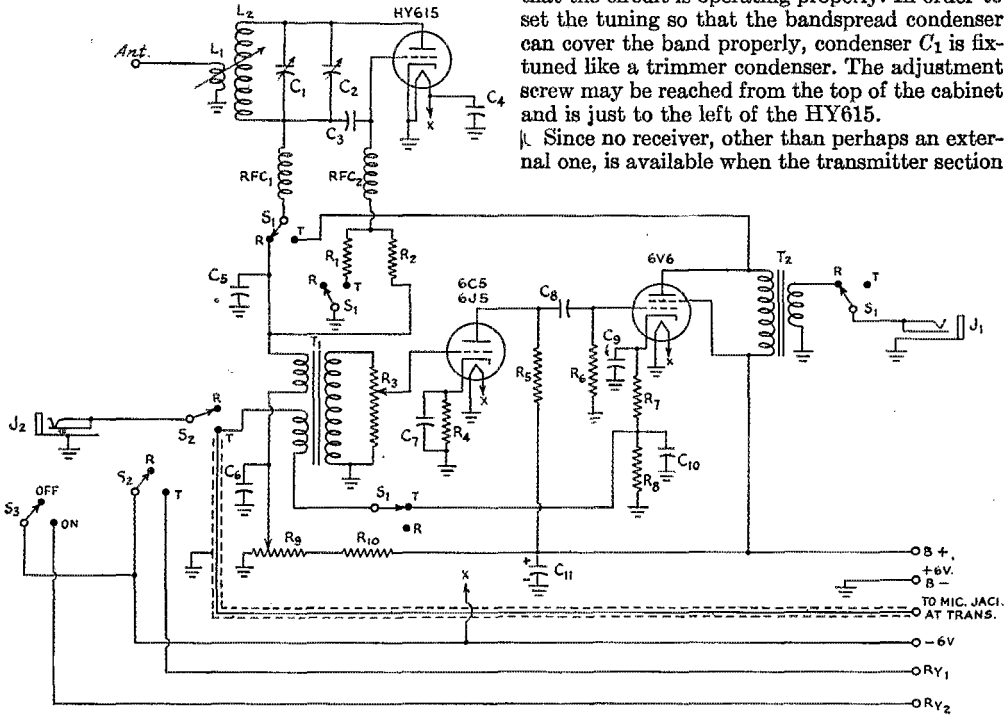
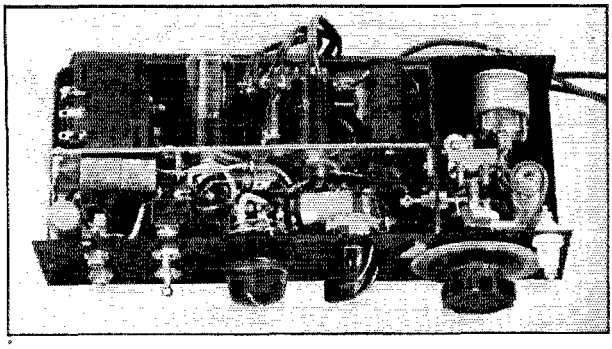


Fig. 2 — Circuit of the transceiver and control switches.

C_1 — 3-30-$\mu\mu$fd. variable trimmer.
C_2 — 10-$\mu\mu$fd. bandspread variable.
C_3 — 50-$\mu\mu$fd. mica.
C_4, C_7, C_8 — 0.01-μfd. paper.
C_5 — 0.003-μfd. paper.
C_6 — 0.1-μfd. paper.
C_9, C_{10}, C_{11} — 50-$\mu\mu$fd. 450-volt dry electrolytic.
R_1 — 20,000 ohms.
R_2 — 10 megohms.
R_3 — 1-megohm potentiometer.
R_4 — 10,000 ohms.
R_5, R_{10} — 0.1 megohm.
R_6 — 0.5 megohm.
R_7 — 250 ohms.
R_8 — 500 ohms.
R_9 — 50,000 ohms.
L_1 — 2 turns, copper tubing or stiff wire, ½-inch diameter.
L_2 — 4 turns, made as for L_1.
RFC_1, RFC_2 — 1-mh. choke coil.
Ry_1, Ry_2 — 6-volt s.p.s.t. relay.
Ry_3 — 6-volt, s.p.d.t. relay.
J_1 — Speaker voice coil or 'phone jack.
J_2 — Microphone jack.
S_1 — Sections of 4-p.s.t. switch.
S_2 — Sections of d.p.s.t. switch.
S_3 — S.p.s.t. gang switch.
T_1 — Audio-input and mike transformer.
T_2 — Output transformer.
Tubes — HY615 for r.f. oscillator, 6C5 or 6J5 for speech or audio input, 6V6 for modulator or speech amplifier.



Top view of the transceiver showing the horizontal tube mountings for short leads. The oscillator-detector and associated r.f. components are in the shielded compartment to the right. The audio equipment is arranged along the rear.

of the transceiver is being tested, the above adjustments for the receiver section should be made first. If the receiver is oscillating, then it is almost a sure thing that the transmitter also will work since it uses the same oscillating circuit with only the addition of modulation. Even proper performance of the audio section of the receiver circuit, which is easily determined by listening, makes it unnecessary to carry out more than a minor check or two on this part of the circuit in order to be almost certain that the transmitter section is okay. The adjustment of the main transmitter will be described later but when this transmitter is working right, there is then no further doubt about performance of the microphone itself. Since the speaker will have been proved to be all right when the receiver is tested, there is nothing left to give trouble in the transceiver except the usual run of bad contacts, faulty connections, etc. Therefore, a few actual contacts over the air at authorized periods, or of course listening on a near-by monitor, will reveal whether the transmitter section of the transceiver is working right.

Main Transmitter Tuning

Now to the main transmitter. To the left of the green panel light is the filament toggle switch. First, we turn this switch on, and then in due time the plate voltage toggle switch to the right of the red panel light is turned on. The plate-current meter will show some reading, unless there is a fault in the circuit, whether the meter switch is set to read plate current for the 6N7 modulator or the HY75 oscillator. In fact, the principle purpose of the meter is simply to show that current is flowing. The resonance dip does not occur for the self-excited oscillator of this transmitter, as it would with a crystal oscillator. However, some change in plate current usually will show up throughout the full range of the tuning dial, which is not the case with the 6N7 plate current. This is one way in which it may be known that the meter is in one of these circuits or the other. Antenna coupling next is made tight by turning the knob to the right just above the main dial. This should cause an increase in plate current. Now adjust the antenna length until a maximum increase in plate current occurs. This will be the adjustment for maximum power output at the particular frequency to which the transmitter is tuned. One practical point to consider is that the metallic lid of the rear car compartment will have some effect on the antenna capacity so that the lid should be left down, with the transmitter running, when the antenna length is adjusted. Another caution — for close frequency adjustment one should stay clear of the antenna when each change of its length is made so that body-capacity will not enter into the picture. In this case we can use the transceiver to listen to the signal, but a better check of modulation quality can be made with a receiver or monitor farther removed. Flickering of the meter will indicate something about modulation, since violent changes are anything but the best and a simple change of the gain control will set the speech volume to the right amount.

Results

Results with this mobile installation in the Middletown area are very pleasing. Except where buildings or similar large structures block transmission in a given direction, or except for occasional unexpected reflections of waves, contacts with local and district stations can be made at will. Where longer distances must be covered we drive to the top of one of the near-by hills, thus attaining an elevation of about 200 or 300 feet above sea level. From there we can work New Haven, 27 miles by air lines; New London, 33 miles, and Hartford, 17 miles away. Weather, we find, does make some difference. A warm air mass between stations helps a lot in making a contact. Considering such results as these, and the convenience with which the mobile rig can be operated, we consider the job well worth our time and effort.

Strays

Somewhere in the jungles of New Guinea there is a small studio in a native-built grass hut. Radio programs emanating from it travel along two miles of landline through dense jungle growth to be transmitted by "RAAF Radio — the Voice of the Islands" to thousands of Australian and American servicemen stationed in that area. Chief technical engineer for the station is Flying Officer Ralph Turner, VK5RT, who had to overcome such problems as designing and hand-winding transformers and then redesigning them to overcome the effect of humidity. Today, eight months after its inception, RAAF Radio offers top-notch programs and boasts a transmitter output of 250 watts.

Practical Applications of Simple Math

Part VII—Push-Pull Operating Characteristics

BY EDWARD M. NOLL,* EX-W3FQJ

THE push-pull audio amplifier is versatile. It can be readily adapted to varied operating requirements of signal input, power output, and electrode potentials. It is not necessary to restrict the push-pull amplifier to one mode of operation (Class-A linear) to obtain an output sufficiently free of distortion. This point was brought out in the construction of the composite characteristics in the previous installment. It was noted how linear (straight) the composite characteristics were at low plate-current values. This fact permits an increase in the input signal which swings the plate current to a very low value (extended Class A) and causes a corresponding increase in power output. A further increase in power output may be obtained by permitting the plate current to swing to zero and remain there for a portion of the grid input cycle (Classes AB and B). Thus the plate current of one tube may be cut off for a portion of the positive alternation of the input cycle while the other tube draws no current for a portion of the negative alternation. Still the composite load line remains reasonably linear since the mutual inductance between the two sections of primary winding of the output transformer tends to sustain the plate-voltage variations when one tube is conducting and the plate current of the other is cut off.

The four classes of operation employed in push-pull audio circuits are as follows:

1) Class A, where the plate current flows for the entire grid cycle and the grids are not driven positive.

2) Class AB_1, where the plate current flows for less than the entire grid cycle but for more than half. Here again, the grid does not swing positive at any time.

3) Class AB_2, where the plate current flows for less than the entire grid cycle but for more than half. The grid swings positive for a portion of the grid cycle.

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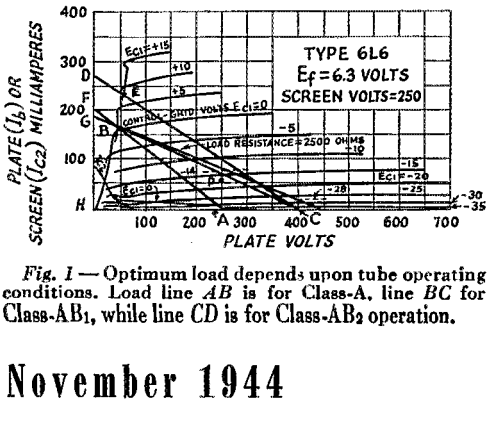


Fig. 1 — Optimum load depends upon tube operating conditions. Load line *AB* is for Class-A, line *BC* for Class-AB_1, while line *CD* is for Class-AB_2 operation.

4) Class B, where the plate current flows for only half, or slightly more than half, of the grid cycle. The grid may or may not swing positive.

The percentage of distortion gradually increases as the percentage of the grid cycle over which plate current flows decreases, particularly so when the grid is driven positive, but for any class of operation the push-pull amplifier, if properly designed, has less distortion than a single-ended stage which is being driven to its limit. The versatility of push-pull operation is demonstrated in the following chart showing the various operating conditions for push-pull 6L6s.

Class	*Input Peak Grid-to-Grid Voltage*	*Signal Power Output Watts*	E_{bb}	E_{ss}	*Bias*
A	32	14.5	250	250	Fixed
	35.6	13.8	250	250	Self
AB_1	40	26.5	400	250	Fixed
	43.8	24	400	250	Self
AB_1	50	34	400	300	Fixed
	57	32	400	300	Self
AB_2	57	40	400	250	Fixed
	80	60	400	300	Fixed

The following procedure is employed in the design of a push-pull Class-A amplifier using a pair of 6L6 tubes operated at a plate and screen voltage of 250.

1) Construction of load line. The construction of the push-pull load line is a simple operation, since we know that one point must lie on the plate-voltage coördinate at the applied-voltage point. This is point *A* in Fig. 1. Since maximum output is obtained when the grid signal swings to zero on the peak of its positive alternation, a second point is located on the zero-bias line. To obtain maximum output without distortion, this second point is located just ahead of the "knee" in the zero-bias line (point *B*). A line drawn between *A* and *B* represents the push-pull load line. As explained in the preceding installment, this load line represents the load presented to one tube when the other tube is not conducting. The actual load line for each tube is curved as shown in the last installment and curve *ZW* in Fig. 2. The plate-to-plate load is four times this value. Therefore, in Fig. 3,

$$R_{pri} = (4)\left(\frac{HA}{HF}\right) = (4)\left(\frac{250}{0.200}\right) = 5000 \text{ ohms}$$

2) Since we are employing Class-A operation, the plate current swings almost to zero during the negative alternation of the input signal applied to

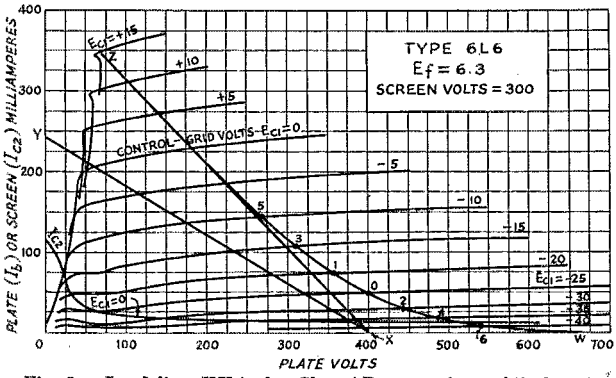


Fig. 2 — Load line XY is for Class-AB_2 operation, while line XZ is for Class-AB_1 use.

each tube. With a plate voltage of 250 the minimum plate current occurs at a grid voltage of approximately −32 volts. Thus our d.c. bias point is at −16 volts and the peak grid signal is 32 volts.

3) The d.c. component of plate current per tube is located at the intersection of −16-volt E_c curve and the +250-volt plate-voltage ordinate, point P in Fig. 1. Point P represents a plate current of 60 ma. per tube or 120 ma. for both tubes.

4) The d.c. component of plate current, as found by using the above procedure, is the same with or without signal only when the plate-current variation is a perfect sine wave. This condition is approached only when the tube is operated Class A over the *linear* part of the characteristic curve. However, in the case of extended push-pull operation the plate-current variation *per tube* is not a perfect sine wave; in fact, the current alternation during the negative swing of the grid cycle is considerably compressed. Consequently, the average signal content on each side of the level set by the d.c. component of plate current is not the same. As a result, the d.c. component of plate current shifts so that the average plate current is the same on each side of the zero-signal level. Since the average signal content is less on the negative alternation, because of compression of the plate-current characteristics at high grid-voltage points (gradual crowding of the high bias lines), the d.c. component of plate current increases. The larger the grid signal the greater will be the increase in the d.c. component because the signal is driven farther into the region of compressed plate current. It is well to note at this point that although the plate-current characteristic for each tube is compressed and therefore distorted, the actual plate-voltage variations (useful output) are not distorted because of the combined action of both tubes through the mutual coupling of the primary windings of the output transformer. The only ill effects resulting from the non-symmetrical plate current are the rise of the d.c. component of plate current and the consequent increase in plate dissipation. The plate dissipation (tube heating) of the push-pull amplifier at no signal is (I_p) (E_{bb}), or in the case of the 6L6s,

$$W_{pd} \text{ (zero signal)} = (0.06)\ (250) = 15 \text{ watts per tube.}$$

However, when a signal is applied, the plate dissipation is increased by the addition of another d.c. component, called a rectified component, which is caused by the non-symmetrical plate current. The stronger the signal the greater the dissipation becomes. Thus the operating point must be set where excessive plate dissipation is prevented when maximum grid signal is applied. The plate current (as shown in Fig. 4) flowing from the power circuit into the center tap of the transformer (mid-branch current) consists of a steady d.c. component plus a pulsating component which varies with the signal voltage. Since the plate current is not symmetrical (less amplitude on negative side of I_{bo}) the plate-current waveform consists of a steady d.c. component plus the resultant pulsating d.c. with a single tube (Fig. 4) receiving alternate pulses. The total current drain from the power supply per tube consists, therefore, of an additional current which increases from I_{bo} with no signal to I_{dc} with maximum signal. For practical calculations the total current is

$$I_{dc} = \frac{I_{bo} + \frac{I_1 - I_2}{2}}{2},$$

where I_{bo} is the no-signal plate current for a single tube, I_1 the current at the peak of the positive grid alternation and I_2 the current at the peak of the negative grid alternation for the second tube. The quantity $\frac{I_1 - I_2}{2}$ represents the approximate average current between the zero-signal point, I_{bo}, and the peak of the plate-current pulsation. The d.c. component of each individual 6L6 tube is

$$I_{dc} = I_{bo} + \frac{I_1 - I_2}{2} = \frac{60 + \frac{160 - 10}{2}}{2} = 67.5 \text{ ma.}$$

and the plate dissipation with maximum signal becomes

$$W_{pd} = (0.0675)\ (250) = 16.9 \text{ watts}$$

which is less than the maximum rated value of 19 watts for a 6L6 tube.

5) In using cathode bias for Class-A push-pull operation, it must be remembered that the increase in the d.c. component of plate current with applied signal also increases the bias from the no-signal point. Therefore, to reach the zero-bias line from a −16-volt bias requires more than a signal of 16-volts per tube. The value of the cathode-bias resistor is

$$R_k = \frac{\frac{E_c}{I_{bo}}}{2} = \frac{16}{(0.06)\ (2)} = 133 \text{ ohms}$$

However, when the full signal is applied, the plate current increases to 67.5 ma. and the bias consequently rises from −16 to (0.067.5) (133) (2) = 17.96 volts. Thus, to swing the signal near to the zero-bias line, a signal of (2) (17.96) = 35.9 volts peak must be applied to the push-pull stage. The remainder of the circuit components can be calculated in the usual manner. For complete information refer to previous installments of this series appearing in past issues of *QST*.

To design push-pull stages for Class-AB_1 or AB_2 operation, the procedure is much the same.

1) In constructing the AB_1 or AB_2 load lines the same method is used in locating the two points through which the load line is drawn. In general, when maximum output is desired the plate and screen potentials are set at the maximum permissible values. Thus, in Fig. 2 the plate voltage is 400 and the screen 300. In constructing load lines for pentodes it is important that use be made of the set of characteristic curves which correspond to the correct screen voltage. Fig. 2 is for a screen voltage of 300 while Fig. 1 is for a screen voltage of 250. The screen potential of 250 volts is used for less output and less grid drive. The plate voltage may or may not be reduced, depending upon output desired. In the interest of obtaining less distortion and less critical operating conditions it is best to choose a class of operation which will do the job satisfactorily with a little power to spare, and not to extend operation beyond this point.

In Fig. 2 one point on both the AB_1 load line (XY) and the AB_2 load line (XZ) is at point X at the intersection of the zero plate-current coordinate and the supply-voltage point. For the AB_1 curve the other point is just before the "knee" on the zero-bias line; for the AB_2 line, just before the "knee" on the most-positive bias line. If less output is desired, the AB_1 line, BC, is drawn on Fig. 1 in the same manner. In the case of less output with AB_2 operation, the load line, CE, is drawn on Fig. 1. Point E on this load line is approximately on the 8-volt bias line because with the lowered screen potential the effect of the positive grid on the electron stream is more noticeable and it is not advisable to permit the grid to swing too far positive.

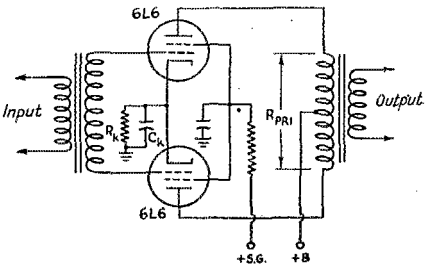


Fig. 3 — Push-pull circuit discussed in text.

2) The slope of the AB_1 and AB_2 load lines in Fig. 2 are respectively $\frac{400}{0.24} = 1667$ ohms and $\frac{300}{0.315} = 952$ ohms, or the plate-to-plate impedance across the primary of the output transformer is 6670 ohms and 3800 ohms, respectively.

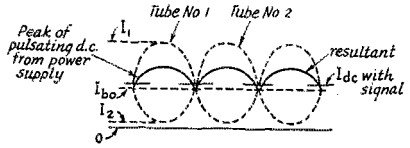


Fig. 4 — Curves showing individual-tube and resultant d.c. plate currents in a push-pull amplifier.

3) The operating point for AB_1 and AB_2 operation can be found by trying various operating points until one is found which does not exceed the plate dissipation limits set by the manufacturer. For minimum distortion it should be brought as close to this point as possible.

4) The remainder of the circuit values are found in the usual manner except for the case where the grids draw current. This point will be discussed in detail, in conjunction with Class-B operation in the installment which will follow in a subsequent issue.

As mentioned previously, although the composite push-pull load line suffices to make all practical calculations for a push-pull circuit, the actual load line of each individual tube is a curved line. During the time when one tube is cut off, the load is $\frac{R_{pri}}{4}$ for the conducting tube. When both tubes are drawing the same current the load for each tube is an impedance of $\frac{R_{pri}}{2}$ because of the reflections between primary windings. This load gradually increases as the plate current falls toward zero until it reaches infinity at cut-off. The load line ZW in Fig. 2 will substantiate this fact. The method for drawing the curved load line was given in the previous installment; however a very simple method of accomplishing the same result is outlined below.

1) Since the slope of the load line at the operating point, O, is $\frac{R_{pri}}{2}$, set a ruler at the operating point at an angle which has a slope of $\frac{R_{pri}}{2}$ with respect to the plate-voltage coördinate.

2) Slide the ruler upward from the operating point (always maintaining a slope which is $\frac{R_{pri}}{2}$ with respect to the plate-voltage ordinate) until a position is found on the − 20- and − 30-volt bias lines which sets off equal plate voltages on either side of the operating plate voltage. This position locates points *1* and *2*.

3) Now slide the ruler up farther until a position is found on the −15- and −35-volt bias

(*Continued on page 90*)

Wright Field's Ham-Built Direction Finder

A Homemade Beam Antenna Guides Lost Planes to Safety

A ham can always be depended upon to come through in the pinches — usually with a simple but effective answer to any radio problem. This is the story of how standard amateur practice was put to use in developing a simple homing device for lost aircraft not equipped with the standard radio compass.

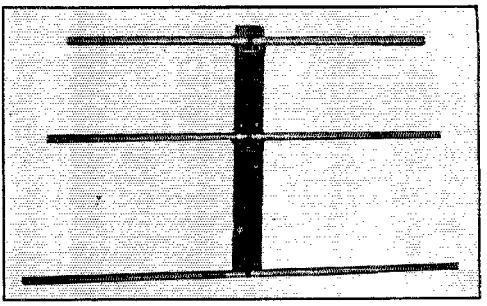
HIGH in the heavy overcast over Ohio one morning last summer, an Army fighter plane was lost. The pilot, Lt. Cecil Albright, well aware of the nearly exhausted gasoline supply, called frantically for help in locating Wright Field. The Signal Corps radio laboratories on the field were called for aid. Although the signals from a dozen planes were picked up on receivers, there was no way in which they could be used to guide Lt. Albright's plane to safety. So he crashed, and, although the pilot escaped with only minor injuries, his plane didn't.

Over in the radio hangar on the flight line, Virgil Faught, W9POE, operator in charge of the Signal Corps radio station, 09V, and Ed Spears, a radio operator, had picked up Lt. Albright's transmissions directed to the control tower and had tried unsuccessfully to find some way of helping the flyer locate the field. When the news of the crash came, they determined to do something about this inability to be of assistance.

The Experimental Antenna

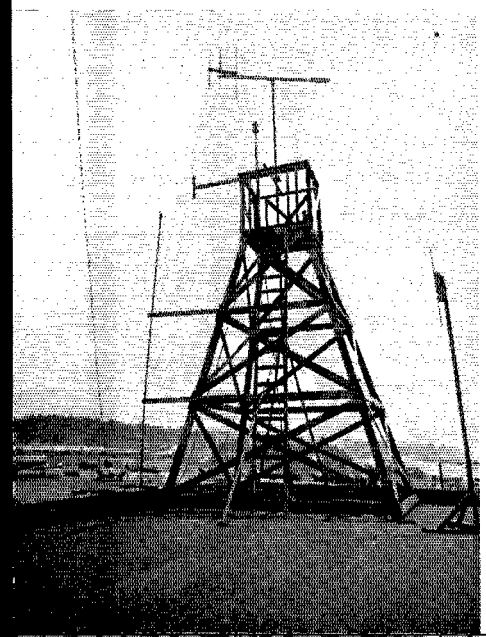
A homing device to guide lost planes, especially fighter planes which carry no radio compass, was the object of their determination. The two men, with the full coöperation of their division officers, set to work to develop a system by which the transmissions from flyers lost or unfamiliar with the area could be used to guide the plane to a spot over the field. Once there, the control tower could take over with landing instructions.

Beginning with a homemade antenna based on the loop principle used in the present radio compass, W9POE and Spears made many experiments and test flights. Fundamentally the model of the homing device, now in use successfully, involves the application of the three-element rotary beam antenna so familiar to hams. It is a combination array consisting of a half-wave dipole antenna with one director element and one reflector element. The construction of the antenna is shown in the accompanying detail photographs. The band of frequencies covered is that standard for AAF communications receivers.



The assembled v.h.f. array unit, showing the shorting straps at the centers of the director and reflector.

First consideration was the physical lengths of the director, antenna and reflector. The length of each was made somewhat shorter than that required for the highest frequency. Provision then was made to extend the element lengths by means of sliding sections so that the array might be tuned to any frequency down to the lowest in the band. The director, antenna and reflector elements are similar except as to length. Each consists of two equal lengths of aluminum tubing which are held together, end to end, with an insulator made from a piece of solid phenolic rod turned down to fit snugly inside the tubing. The two sections are held apart by a shoulder at the center of the phenolic rod, as shown in the photograph of the disassembled elements. The antenna elements are then secured to a piece of phenolic board by means of two metal cable clamps. The spacing between elements is based upon a frequency near the middle of the band covered. The two sections of the director and reflector are tied together with a jumper wire, as explained later. The outer ends of each element are split with a saw cut for a few inches and then compressed so that the tuning extensions which slide inside the ends will have a good friction clamp.



The bearing-indicator three-element rotary array in operation on top of the radio hangar at Wright Field.

The phenolic board on which the antenna is mounted is bolted to a wooden bar which is mounted, by means of two pieces of angle stock, on top of a vertical pipe which may be rotated, as shown in the view of the completed installation. A weight which acts as a counterbalance is fastened to the end of the rotating bar opposite the antenna.

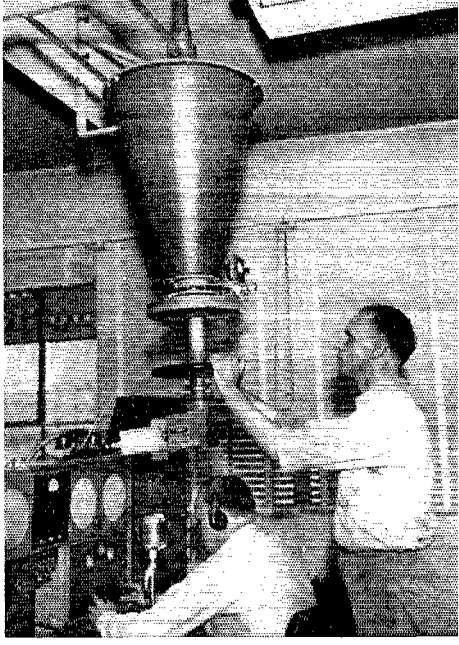
The Transmission Line

The antenna transmission line consists of two parallel lengths of coaxial cable. The center conductors of the two cables are connected to the inside ends of the two antenna sections, while the outer conductors are connected together at the antenna end and grounded at the other end. It will be noted that the antenna is "floating" with respect to ground. This arrangement has proved to be very satisfactory and does not affect the operation of the antenna.

When the antenna was first put into operation, it was mounted for horizontal polarization. Since this did not give the desired results, it was then mounted in a vertical position which gives better results for this particular location. A simple rotating mechanism with a scale on which the operator could read the direction in which the antenna pointed was designed. Since it was not desired to use sliding contacts for the transmission line, the shaft was blocked from turning continuously to keep from twisting and eventually breaking the transmission line. This simple rotating mechanism served satisfactorily until it was possible to obtain a regular antenna-rotating mechanism from a mobile direction-finding set. This equipment provides an excellent calibrated control for the array. The rotation control and bearing indicator are mounted immediately above the operator's table in the station, with the rotating antenna support going through the roof of the hangar. This shaft was extended so that the antenna is 30 feet above the roof of the hangar. With this newer arrangement, inductive coupling between the transmission line and the antenna permits the antenna to be rotated continuously without the necessity for sliding contacts.

Tuning Procedure

The procedure in tuning the array follows standard practice and, with one exception, needs no explanation. When tuning the director the jumper between the two sections of the reflector is disconnected, and the director jumper is disconnected when tuning the reflector. This breaks up the element which is not being tuned so that critical adjustments can be made.



The control and indicating mechanism for the three-element array. W9POE communicates with the pilot while Ed Spears rotates the antenna.

When the directive array was first installed, a standard v.h.f. radio set, the SCR-522, was used both for transmitting and receiving. This is the same set used in airplanes and was satisfactory except that it did not have the power output desired on transmitting. The transmitting equipment now in use is a 50-watt v.h.f. transmitter and the receiving equipment is a separate v.h.f. receiver. Maximum signal-strength reading is used for bearing indications in operating the system. This is done because the radio station is situated on the top floor of the hangar, which is a steel structure, and is surrounded by near-by steel buildings. In addition, a large amount of noise is picked up from trucks and other machinery. For these reasons, the use of a null reading, following normal practice, has proved to be unsatisfactory. The output-level meter of the receiver is used for the more accurate readings.

Results

Very satisfactory results have been obtained over distances up to 150 miles from the station, depending upon the altitude of the plane. In application, radio communication first is established with the lost plane. The antenna array is then swung for maximum received signal strength by which the compass bearing of the plane in relation to the field may be determined. When the airplane pilot has been given the first bearing and is headed in the direction of the field, bearings are repeated regularly until the plane arrives over the airport. As the plane comes

(*Continued on page 90*)

A set of antenna and director elements with their fittings. At the top is the phenolic insulating spacer which fits between the two quarter-wave sections of the antenna. The clamps at the bottom are for mounting the elements on a phenolic board.

25 YEARS AGO THIS MONTH

THE November, 1919, issue is the "liberty number," the cover illustration showing an amateur triumphantly arising from what looks suspiciously like an oversized trash-can which has contained him, lifting "the lid" and proudly brandishing his new licenses. Since resumption was authorized only on October 1st, and this issue went to press in early October, there is almost no news of actual activity but there is a tremendous bustle of preparation. Everyone must get new licenses and we are not going to get our old calls back. There are instructions on how to proceed, and the first lists of new calls make their appearance. A new department is started in *QST*, "The Junior Operator," to teach the fundamentals of amateur radio to newcomers. As amateur radio gets its feet under itself once more, we're out to see that every ham becomes a member of the League. The lead article on "The Importance of our ARRL," by Hiram Percy Maxim, points out the benefits of organization; and at the same time *QST* begins a subscription contest, with prizes in amateur apparatus for the winners.

On the technical side, that master of spark technique, M. B. West, prewar 8AEZ, has a helpful article on "Transmitter Efficiency," while Harold Tyzzer describes the adjustment of the Amrad quenched gap. The editor inquires whether anybody is working c.w. on 200 meters and seeks a description of any successful rigs, saying, "We're afraid we're going to have lots of trouble with 200-meter undamped. The frequency is so high that an extremely precise adjustment of the heterodyne frequency must be made at the receiver." In the ad section, the DeForest wireless telephone is offered, employing four hard receiving tubes in parallel, 'phone range 10 to 20 miles, c.w. range 50 to 75 miles, price $200. Storage "B" batteries also make their appearance in the advertising pages of this issue. In response to the editor's recent plea, The Old Man reports on "Rotten Impulse Excitation" and, as you can imagine from the title, it's a decidedly negative report. "Who's Who in Amateur Wireless" resumes in this issue, the first victims being Mathews of 9ZN, Central Division Manager, and Schnell of 9AH, his assistant for the eastern section and Chicago City Manager. Herbert E. Metcalf has a very interesting article on "The Photo-Electric Cell and Its Possibilities in Radio Communication." Commonly employed in the scientific world in the photometry of stars it has been tried as a detector in place of a crystal and very good results obtained, provided a strong light was allowed to fall on the tube: in direct sunlight the signals are fully as good as the best crystal detector. The author points out that the cell would make a wonderful detector for telephonic transmission over a beam of light and foresees many future possibilities for it in radio communication. . . . There are now two kinds of Marconi tubes for amateurs, Class I for use as a detector, gaseous and requiring critical adjustment of plate voltage; and Class II, a hard tube for use as an amplifier. The price is $7, plus an additional $1.50 for a socket. The prewar unmounted tubular audion has practically disappeared.

New Tubes

AS CERTAIN of the "lighthouse" series of v.h.f. tubes have been declassified by the military services we are able to add the following characteristics to the general description published in October *QST*, page 42.

The GL-599 is a high-vacuum diode for use as a transmission line switch or as a detector at very-high frequencies. Its filament is rated at 6.3 volts, 0.75 ampere. The cathode-plate capacitance is approximately 2.45 $\mu\mu$fd. The base is a 6-pin octal.

In typical operation the plate voltage is 5, with a plate current of 24 ma., maximum 30 ma.

The GL-446-A and GL-446-B are triodes designed for use as oscillators, amplifiers or converters at the higher radio frequencies. The 446-B is the highest frequency oscillator. Their filament ratings are 6.3 volts, 0.75 ampere. The approximate direct interelectrode capacitances are: grid-cathode, 2.2 $\mu\mu$fd.; grid-plate, 1.6 $\mu\mu$fd.; plate-cathode, 0.02 $\mu\mu$fd.; shell-cathode, 50 $\mu\mu$fd. The grid-plate transconductance is 4500 μmhos, and the amplification factor is 45. The bases are 6-pin octal.

Typical operation of these tubes at 250 volts on the plate will show a plate current of 15 ma. when a bias resistor of 200 ohms is used. The plate dissipation will be 3.75 watts.

In oscillator service the maximum allowable plate voltage is 400, and the absolute maximum plate current, 20 ma. A grid-leak bias resistor of 10,000 to 20,000 ohms is recommended for oscillator service.

The GL-2C44 is a high-vacuum triode receiving tube for use as an amplifier or converter at the higher radio frequencies. Heater voltage and current are 6.3 volts and 0.75 ampere. The approximate interelectrode capacitances are: grid-plate, 2.0 $\mu\mu$fd.: grid-cathode, 2.7 $\mu\mu$fd.; plate-cathode, 0.1 $\mu\mu$fd.; shell cathode, 50 $\mu\mu$fd. The grid-plate transconductance is 7000 μmhos.

Under typical operating conditions the plate voltage is 250 (max. 500) and the plate current 25 ma. (max. 40 ma.). A cathode bias resistor of 100 ohms is recommended for a plate voltage of 250. The plate dissipation is 5 watts at 250 volts, 9 watts at 300 volts and 13 watts at 500 volts.

When the tube is operated at maximum ratings, a heat conducting connector which will keep anode temperature within maximum ratings of 150 to 175 degrees Centigrade should be used.

WERS in the Florida State Guard

Operation of the State-Wide WKRW Net

CAPTAIN J. WM. HAZELTON,* W8UBN/4

We are glad to be able to give some publicity to State Guard WERS organizations, a branch of radio activity in which many amateurs have been engaged since the beginning of the war. Through this presentation, it is hoped that many stay-at-home amateurs will find an answer to their question, "What is the State Guard, and where can I fit into it?" as well as gain some idea of the activities and purpose of the State Guard in general.

ALTHOUGH many people have known about the National Guard organization and its functions, not as many know about the organization which sprang up to take its place in 1941, when the entire National Guard personnel was inducted into the Army of the United States.

After the mass induction of National Guardsmen, the authorities in the various states deemed it wise to create some sort of a volunteer military group which would be on hand to assist the civilian defense authorities in protecting state borders and coast lines in the event of enemy attack. In many states this led to the formation of State Guard organizations, which were to consist of civilian personnel, trained and operating under Army supervision, to take over in all emergencies in which the National Guard normally would have been expected to participate.

Because of the particularly vulnerable coast line which characterizes Florida, the officials in this state were among the first to see the value of maintaining such an organization. Accordingly, the Florida State Legislature officially passed an act on April 22, 1941, which brought into being the Florida State Guard.

Plans for the new organization progressed rapidly after that, and these plans included the reactivation of the radio transmitters which had belonged to the National Guard, and which had been left to gather dust and mildew in armories throughout the state. Just prior to the completion of these plans, however, the Japs pulled their "fast one" at Pearl Harbor, and all such transmitters were silenced by the government.

The newly organized State Guard carried on without the benefit of the accustomed radio communications for about a year afterward, but it then became apparent that some form of radio contact was necessary within the group to enable it to reach its maximum preparedness and value in time of emergency or disaster. It was this situation which prompted the organization of the First Signal Company, Florida State Guard, whose primary objective was to secure permission to install radio equipment and, when installed, to operate it.

*Signal Corps, State Communications Officer, FSG, P. O. Box 958, St. Augustine, Fla.

The First Signal Company was authorized to enlist one hundred and eleven men, who were to serve under five officers — a captain and four lieutenants. The company itself was divided into small detachments, each of which was commanded by a non-commissioned officer called the senior-in-charge, who also serves as deputy communications officer in his area. The detachments were assigned to serve with infantry units located strategically throughout the state, and with the communications division of the state civilian defense organization.

The captain of the company is responsible for the proper training of all enlisted men. Even though their final duties are concerned with the establishment and maintenance of radio communications, they must be schooled first as soldiers. They are uniformed, and then put through a training course which teaches them such things as how to handle a gun, a gas mask, etc. The captain prepares training schedules and issues training memorandums from time to time. He is assisted in this work by the lieutenants of the company, who remain in the field and visit units and detachments in their own areas at infrequent intervals. Since the detachments never know when to expect one of these "surprise" visits,

On maneuvers near Miami, Fla., members of the First Signal Company, FSG, keep headquarters advised of "enemy" activity from a foxhole. Through coöperation with the Army, many walkie-talkies and handie-talkies are made available to the First Signal Company detachment for use in maneuvers to acquaint the men with the equipment and its operation.

they keep eagerly on the job at all times to avoid being caught napping.

Following the organization of the company, many headaches were experienced in an effort to secure a station license from the FCC. It was found that application after application, and plan on top of plan, was returned from the FCC. Time after time this occurred, until it was doubtful that the First Signal Company ever would get radio communication. Finally, it was decided to appoint a full-time state communications officer, whose job would be to establish radio communications and work out plans for a state net. The man selected for this job was an amateur, W8UBN, and an ex-Army officer, into whose lap fell these immediate problems.

The original plan had been to operate two-way radio equipment on the special emergency police frequency of 2726 kc. When it was discovered that the possibility of operations on any low frequency such as this was prohibited, plans immediately went forward to work under the War Emergency Radio Service.

The procurement of radio equipment was the next worry. Many factory-built sets were bought outright, but many more were constructed by the ham members of the First Signal Company. The hams knew from their experience gained on the amateur bands that transceivers were the least desirable apparatus to be used on the very-highs, so plans went foward for construction of radio units of the transmitter-receiver type only. Frequency-measuring equipment and power supplies also were obtained in similar manner.

In addition to securing a station license for the Florida State Guard from the FCC, the state communications officer had other functions to perform, similar to those a radio aide has in connection with a CD-WERS licensee. It became his job to see that all FCC and State Guard rules and regulations governing operations were adhered to, that all apparatus was kept in shape for operation on a moment's notice, that all equipment was maintained on proper frequency, and that all the personnel were properly examined and licensed as WERS operators. At first glance this would seem to be a gigantic task, but fortunately the assistance given by the deputy communications officers with each of the detachments renders the task much less difficult.

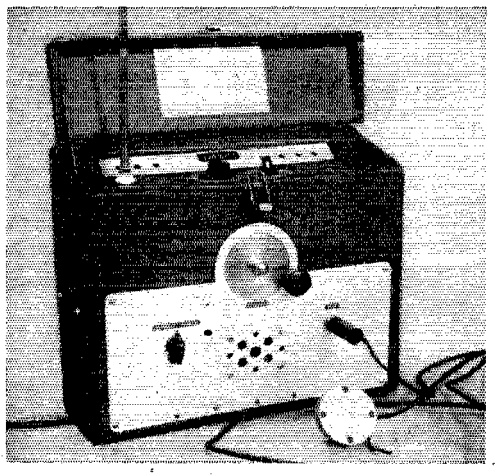
Net Operation

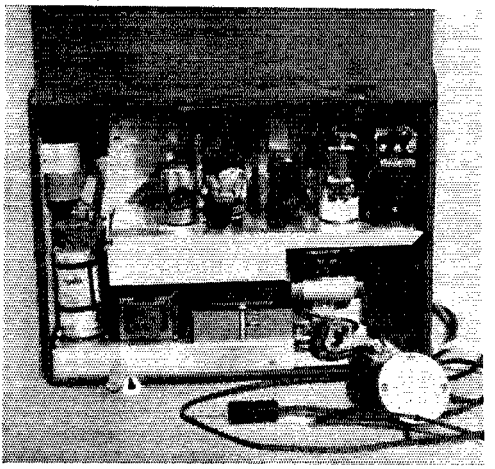
After the Florida State Guard became licensed as WKRW on June 17, 1943, with fifty-six units authorized for operation among the detachments, the problem of net operation presented itself.

A special set of rules and regulations was drawn up for all the First Signal Company members. Nets were established within the areas covered by each detachment, and regular weekly drills were started. The routine was established and the men learned quickly.

Coded messages and cryptography are used in the net practice, with emphasis on the former because it is simpler to use and harder to decipher. State-wide drills are held periodically by relay from one area to another, on 112 Mc. when possible. Since each detachment operates as a separate organization or net within its immediate area, this form of drill is important in coördinating activities throughout the state.

Week-end maneuvers and periodic bivouacs, which are conducted as a part of the training for





One of the Hollister-built ER-4 transmitter-receivers, used in the Florida State Guard WERS network. The cabinets and exterior arrangement of controls are alike on all of WKRW's transmitter-receivers. The layout and assembly within the units was dependent upon the components available at the time of construction. All the sets were built for operation with either 6-volt storage batteries and vibrator power supply, or with dry "A" and "B" batteries. A handle is provided to carry the sets, or to sling them over the shoulder of the operator. In each case, the battery is carried by an assistant. Part of the three-quarter wave (72-inch) collapsible antenna is visible. Provision is made for open-wire leads to any other type of antenna, should it be necessary. At the right is a rear view of the Hollister ER-4, showing the transmitter on the right side of the upper shelf, the vibrator power supply in the bottom (removable), and the "C" battery wedged in above the vibrator unit of the power supply. The circuits used are all of the conventional, ultraudion type.

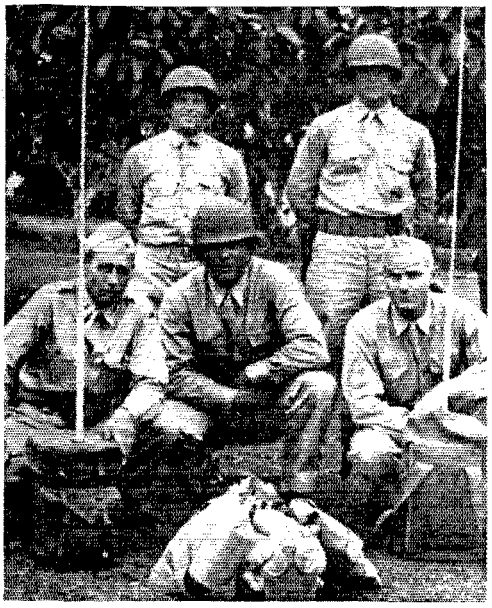
infantry companies, are always participated in by the local First Signal Company detachment, which supplies radio communication from outposts and maneuvering groups to the command post or headquarters — wherever established.

Local detachment commanders, who are normally in charge of the control station within an area, also maintain contact and establish friendly relations with officials of civilian defense, fire, police, forestry, Red Cross and other emergency service organizations. In addition, the local signal company units coördinate activities and coöperate whenever possible with Army and Navy establishments within the area. This insures mutual aid and benefits in an emergency of any nature that might occur. Tie-ins, in many instances, have been established with these agencies by an exchange of receivers. In this way the radio facilities of each group are broadened and extended for use in an emergency, in spite of the fact that the two organizations are operating in different nets and on different frequencies. Mapping of the area normally served by a net, indicating the best points and locations for radio transmission and reception, constitutes a part of regular drill periods.

Additional training in radio operation for members of the First Signal Company is given during the monthly drill schedules by a participation in drills with the Florida Highway Patrol. This Patrol operates an f.m. police radio net, which covers the state. Key relay stations, in constant radio communication with many roving patrol cars, offer the State Guard another outlet for state-wide emergency radio service during any disaster. All Highway Patrol men are deputy State Guardsmen, but have no power of arrest. The State Guardsmen do, however, when on duty. In actual emergencies, the State Guard takes over. The training the signalmen receive in operating the Patrol radio stations fit them to be experienced Highway Patrol radio personnel in an emergency.

Experience has shown that communications on 112-Mc. amateur radio may be maintained generally throughout Florida. Working with a portable WERS transmitter-receiver set, equipped with a whip-type antenna attached to the set in walkie-talkie fashion, one can cover a distance of from two to five miles to another portable or portable-mobile rig. Working from a station with an antenna some thirty-five or forty feet in the air, one can cover about ten or twelve miles to a portable set operating in the field with a whip-type antenna. About fifteen to twenty-five miles can be covered, with good communication both ways, to another station having an antenna of about equal height. Two-way communication has been maintained at distances from thirty-five to fifty miles, without difficulty, between two stations with antennas one hundred feet or more in the air. Portable masts around forty feet high are part of the equipment of many of the First Signal Company detachments.

With but few exceptions, directional antennas are not used in the First Signal Company. It is generally desired to transmit or receive signals in all directions. The whip, "J," and vertical with counterpoise are the types found most satisfactory to use and the easiest and quickest to erect. (The latter is generally one-quarter to three-quarter wavelength long, and fed with open line spaced two inches, or with 72-ohm coaxial line when available.)



Some of the members of the Miami detachment of the First Signal Company, FSG: *Left to right, standing:* Pfc. Emil Page and Pfc. R. C. Cooper. *Kneeling:* Lt. F. J. Norton, W4MD, commander of the Miami area; Pfc. O. R. Mathis, and Sgt. C. O. Whitney, W4AZJ, senior-in-charge of the detachment.

The First Signal Company also boasts of the use of two privately owned airplanes, belonging to members of the company, which are used in drills. Two-way communication on 112 Mc. has been held over a distance well in excess of one hundred miles. This generally is governed by the altitude attained by the planes.

It would not be fitting to close the story without a word of the work of W4FWZ, who is the commander of the First Signal Company and a major in the Florida State Guard. He has been designer, inventor, improvisor of parts and head mechanic since the beginning, when the initial procurement problems were toughest. The equipment which he constructed, some of which is illustrated, has proven to be very satisfactory and of good range.

While the members of the First Signal Company hope that low-frequency radio operation will be permitted in the State Guard in the near future, it is certain that a very definite place has been made for the 112-Mc. equipment now in use. Its use for emergency communications in time of disaster could easily become an important adjunct to all other types of operation which may be used in the future.

Hams in Combat

His ship entered the haborr with Japanese dive bombers zooming in at mast-height level.

The K6s Come Through

BY WILFRED HO,* K6THD

As early as the fall of 1941, even earlier perhaps, when the calamitous clouds of world conflict crossed the Pacific from the west and first cast their shadows on the Hawaiian Islands, — months before those same ominous clouds burst into a downpour of unforgettable death over Pearl Harbor — most Islanders had become not only apprehensive of war on our side, but aware, also, of the strategic importance of our home as a defense bastion.

This was particularly true of four "salty" K6 hams — Herbert Chang, K6DSF–ex-KF6DSF; Alexander Wong, K6NVJ–ex-KG6NVJ; Wallace Choi, K6RYR, and Wilfred Ho, K6THD. Both Herb and Alex were hams of long standing. As KF6DSF and KG6NVJ, the two blazed a DX path from the Phoenix Island (Howland, Baker, Jarvis and Canton) across the Pacific during 1937 and 1939. Along about the same time Wallace Choi was "colonizing" Johnston Island, but was unable to obtain permission to operate from there. After returning to Honolulu he attended a radio school in Los Angeles before joining Herb and Alex. As K6THD, I completed the quartet while still in my teens and, after completing radio courses with RCA Institutes and CREI, obtained my telegraph first-class ticket. As sea-going ops we had the vantage point of a deck rail aboard merchant ships plowing the frequently white-crested channels between the Hawaiian Islands from which to sense the growing tension.

The Selective Service Act already had called many of our native sons to training camps, the territorial legislature passed mobilization bills to gear the government for any catastrophe, and the lights throughout the island group went out several times during blackout drills. Everywhere there were unmistakable signs that the slow pulse of life in the Islands was being quickened by one thought — preparedness for defense.

Despite the tenseness of life in the daytime, many Islanders found it easy to retire to their homes for an evening of quiet relaxation. For most of them a motion picture show and an automobile ride constituted all there was to Hawaiian "night life." Thus, at the stroke of midnight which was to herald in that day of infamy, December 7, 1941, the greater part of Hawaii resembled its old self, tranquil in its sleep.

At that very moment a ship left port on her return trip to Honolulu. Aboard her in the radio room were Chief Radio Officer Kent and me, serving as his assistant. One might describe the chief as a strictly commercial man, genial in

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every respect — except for an apathy toward hams who somehow invited themselves into the shack with the well-worn greetings, "I'm K6.--- . . ." Little wonder that the chief was apathetic.

Getting back to that fateful night, the chief had decided to take the first radio watch, so I lay in my bunk tossing around the tiresome thought of awakening in the wee hours of the morning. It seemed quite long before a prod in the back made me grunt, and then groan, as I got up to clamp on the headphones, in the meantime still retaining that state of somnambulism which any old salt would insist is the one earmark of any "Sparks" in the merchant marine. Naturally, it would not be ethical for me to admit I was half asleep on my watch, conducive as such times are to slumber. In any case, the hellish nightmare of the attack on Pearl Harbor a few hours later was enough to keep me fully awake for many months thereafter.

At daybreak on December 7th my ship was off Pearl Harbor, but by 7:15 A.M. we were secured to the pier in Honolulu harbor. The Japanese had not yet unleashed the full fury of their treachery, although by then the Island was under attack.

When I did see the dawn of war, I felt very fortunate indeed that I was still alive, that the Japanese had set the time of attack not a second sooner, that there was not even another hour's delay in our arrival. Actually, our return to Honolulu that Sunday was one day later than scheduled. Why our ship was not torpedoed that morning is hard to say. Perhaps it was because of the unpredictable Japanese mind.

Wallace, K6RYR, also returned to Honolulu that morning. His ship entered the harbor with Japanese dive bombers zooming in at mast-height level to blast near-by installations. At the time, the customary docking place for K6RYR's ship was in the very shadows of the city's powerhouse, so throughout the morning attack he found himself in an exceedingly hot spot. Fortunately, the USCG cutter *Taney* was moored on the other side of the same pier, and her guns repulsed the aerial attack on the powerhouse, only 75 yards away.

K6RYR was among the first to go on a war footing as his ship was immediately chartered for a war mission. Radio silence naturally became the order of the day, but Wallace found himself more than busy handling the blinker lights, as we all had to during the first three months of war. Eventually the four of us became quite adept at reading semaphore and flag hoist signals, a big task the deck officers passed on to us as a challenge which had to be met. Of course, we were equal to the occasion, but to their dying days the mates will never understand where we got the capacity to store the letters in our heads.

When asked about the close shaves he had, Wallace told this story which, so far as the others are concerned, still remains an "unconfirmed truth." According to him, something jarred hell out of the aft end of his ship, where the radio room is located. Whatever happened, it laid up his vessel in dry dock for repairs. The propeller was in very bad shape, the blades having been sheared off by some metallic object which, K6RYR deduced, was a dud tin fish.

Anyway we look at it, the best story still belongs to Alex, K6NVJ. To start from the very beginning, let's pull out our war maps and put ourselves in the position of armchair admirals. Someone focuses our attention on the strategic importance of certain islands which form a defense arc running from Midway, south through Johnston, to Canton, and then northeast to Christmas and Palmyra. These islands obviously are outposts of our Hawaiian fortress, and they undoubtedly proved extremely important in the first phases of our defensive comeback, as the battles of Midway and Guadalcanal testify.

When war with Japan seemed imminent, hurried preparations were made to strengthen these islands, and so it was that one week before Pearl Harbor Alex and his ship were headed south with a load of defense workers and their supplies. We all envied Alex the break of a South Sea cruise, but we wished him good fishing just the same.

Then came December 7th. Alex was more than 1000 miles from home and the nearest safe harbor —if Honolulu could have been called safe at that time! Our envy changed to hope for his return. One week passed, and still no sight of Alex. Fifteen days later his vessel came steaming into Honolulu, painted a somber gray throughout.

As could be expected of K6NVJ, he was right on the job to pick up the shocking news that morning. One would think that would have been enough to worry hell out of any man, but Alex found himself in for a hair-raiser. A submarine was spotted surfacing not far from his ship, which was anchored off one of the previously mentioned atolls. As it was impossible to get under way, the order to abandon ship was given. Alex and the skipper remained aboard. Fortunately, the sub turned out to be one of ours on patrol, but I'm sure he'll never forget that scare!

Herb, K6DSF, was caught at an undefended port that tragic Sunday morning, and he also pitched in with the painting, preparatory to making a dash for Honolulu. He arrived two weeks later feeling that he had missed a lot!

The task at hand for our four ships was tremendous, as we constituted nearly all the shipping available in the area immediately after December 7th. There were troops, munitions and

A submarine was spotted surfacing not far from his ship. . . .

U. S. War Bonds for Stories of War Service

***QST* wants reports on the experiences of radio hams in active service on the battlefronts — for immediate publication in this section, where feasible, or to be held confidential where security considerations so require.**

Do *you* have a story of war service to tell — either your own or that of someone you know? Then write us a letter giving full details, including photographs, clippings and other substantiating data where available. If your story is published in *QST*, you will receive a $25 U. S. War Bond. Please indicate clearly on the report if it is available for publication in its entirety, if names, dates or places should be deleted, or if all information must be held confidential.

supplies to be moved all over the Central Pacific. For a while our time in port was limited to only that needed for loading and unloading.

In the ensuing months the four of us witnessed and took part in events which, while thrilling, could hardly be called spectacular, and ending in an anticlimax with the battle of Midway. We felt the threat to our freedom, we saw our homeland fade into something of the past under the impact of war, and we knew the task that was ours. True, we faced the Japanese submarine menace at its peak, but there is nothing heroic in that till you're sunk.

Then, too, we owe a lot to the Navy boys who gave us perfect protection. Herb reminded me of one of his escorts, the *USS Porter*. He has a lasting memory of that gallant fighting destroyer which went down in the battle of the Coral Sea.

During the spring of 1942 the threat to the Hawaiian Islands was still very real, and the threat to Australia was mounting fast. The tiny atolls to the south of us became even more important as guardians of the supply route to Australia, as well as air stops to the embattled continent. Our one mission was to strengthen them while the larger convoys from the United States carried the sorely needed reinforcements to the Southwest Pacific.

It was while carrying out one such mission that Herb and I found ourselves away from home during the heat of the Midway battle. Actually, we didn't see a single Japanese plane, but, nevertheless, we couldn't help realizing the significance of that struggle on the outcome of the entire war. What happened at Midway is now immortal American history.

With the defensive phase of the war ending at Midway, our work has become less significant. The little that we have done, and still are doing today, seems even less to us after what others have done on Guadalcanal, Tarawa, the Marshall Islands, Saipan, and Guam. It is not for us to claim even an infinitesimal part of the glory which rightfully belongs to them.

★ ★ ★ ★ ★ ★ ★ ★

Gold Stars

T/Sgt. William F. Hazelrigg, W9LVE, was killed in air action which occurred over Biak Island on August 30, 1944.

W9LVE entered the Army Air Forces in February, 1943, at Scott Field, Ill., and received basic training at St. Petersburg, Fla. He returned to Scott Field to study radio and from there went to Kingman, Ariz., for gunnery training. He left for overseas duty in February, 1944, as a radioman-gunner on a B-29 bomber. T/Sgt. Hazelrigg was awarded the Air Medal after his plane, the "Little Thumper," had destroyed two Japanese craft in Ambon Bay at Ambonai Island in August and then shot down two of six Zeroes which attacked his plane.

While W9LVE had held his amateur license only since 1940, he possessed a code proficiency certificate for 25 w.p.m. and was well known as "Hank" on the 7-Mc. band. A member of the Piasa Radio Club of Wood River, Ill., he also was active in WERS until he entered military service.

T/Sgt. Thomas J. Harrigan, W1JQQ, was killed on April 7, 1944, by the accidental discharge of a service revolver while he was on duty as a meteorologist with an AAF weather squadron stationed in North Africa.

T/Sgt. Harrigan enlisted in the Army Air Forces in September, 1940, and received radio training at Selfridge Field, Mich., and Chanute Field, Ill. He then was transferred to Maxwell Field, Ala., and after graduating from the meteorology school was sent to McDill Field, Fla., where he had the honor of clearing Major General James Doolittle across the country to Texas. From there he was sent to England and later participated in the North African invasion, entering with the first units of General Doolittle's 12th Air Force. He later received a Citation of Honor from Lt. General H. H. Arnold, commander of the U. S. Air Forces.

W1JQQ operated on the 1.7-, 3.5- and 7-Mc. bands, both 'phone and c.w., and was a member of the South Shore Radio Club.

★ ★ ★ ★ ★ ★ ★ ★

STRAYS

Historic Liberty Bell, which proclaimed the liberty of this country following the signing of the Declaration of Independence, will ring again for our entire nation and the world on V-E Day in Europe. The suggestion of recording and broadcasting the ringing of Liberty Bell was made by Dave Moore, W1BBL, to ARRL Hq. and it was then forwarded to *Broadcasting*. This magazine endorsed it editorially in their July 17, 1944, issue. The NAB now has made pressings of a recording of the Bell, which are being sent to all member stations for broadcasting when victory is achieved in Europe. The recording was made using a rubber mallet for striking the Bell in order to guard it from damage, and the volume was built up by amplification.

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Radio amateurs in Belgium aided in the accomplishment of a notable feat in communications by the Belgian underground. Last December the Belgian government-in-exile sent into their homeland a three-man military commission whose assignment was to set up transmitters through the underground to maintain communications with London. Of the eight transmitters dropped by parachute, only one fell into German hands.

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When fire destroyed the administration building and all telephone lines at the Douglas Aircraft Company at Chicago on July 17th, production in the plant continued without delay through the use of handie-talkies for emergency communications. Supplied by the Signal Corps, the handie-talkies were strategically located throughout the rambling plant and eight stations were placed in operation, ranging in distances from less than 100 feet to over a mile.

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During the recent hurricane quite a few of the New Jersey towns were without lights for several days. However, I noticed a slight glow in the smaller wattage lamps and, grabbing the voltmeter, I found the line voltage to measure 6.5 volts. The junk box being handy, a few bayonet-base sockets and some automobile lamps were employed to provide light while the power was off. Of course, when the line voltage came back to normal the automobile lamps behaved like photo-flash bulbs, but the convenience was worth the small cost. — *W2DRA*

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The nose section of the B-29 Superfortress, America's newest air weapon, contains all facilities for the bombardier, pilot, co-pilot, flight engineer, navigator and radio operator. Included in the items of equipment are 14 different radio systems. The nose section also takes four of the eight *miles* of electrical wiring in each ship.

It is interesting to note that according to a report from Dr. W. Gleissberg of the Istanbul University Observatory, the next period of sunspot maximum probably will come early, the number of pockmarks on the sun for the present cycle being greatest sometime before May, 1948. The last sunspot maximum occurred in April, 1937, and while on the average 11.1 years elapse between successive periods of sunspot maximum, Dr. Gleissberg believes that the present interval will be shorter than usual.

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A new family of synthetic resins, called silicones, now provides waterproofing flame-resisting service in radio sets, planes and other machines operating on our war fronts. The new substances, which are a cross between slippery organic compounds and the gritty components of sand and glass, promise a greatly extended useful existence of electrical equipment.

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At Westinghouse Lamp Division, the steel piece previously used to support a wire tube coil while it was being welded has been replaced by a tiny piece of uncooked spaghetti which can be readily burned out later. This step has reduced by 75 per cent the time required to assemble filaments for certain tubes and also has reduced the need for critical steel.

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As the new SCR-300 walkie-talkies become available for Army troops, soldiers at signal depots are salvaging virtually "everything but the squeal" from the older SCR-194 and 195 models. The squeal, caused by re-radiation from the old-model receivers, is missing in the new FM SCR-300. Parts from the old models are inspected and reconditioned and then used for other Signal Corps equipment.

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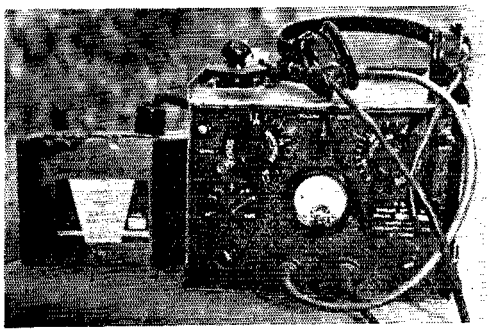

One of the Australian-made transceivers now in use by American troops. The set weighs approximately 7½ pounds and operates excellently over a radius of 20 to 25 miles, with a possible range of 50 miles.

HINTS AND KINKS FOR THE EXPERIMENTER

FILTERING GENEMOTORS USED TO SUPPLY RECEIVERS

IT IS possible to install a genemotor and filter for use as a receiver power supply with a minimum of commutator ripple appearing in the receiver output, even though no method has been devised, thus far, to eliminate the "whine" from the background.

Methods employed in present day aircraft receivers in mounting the genemotor should be the amateur's guide. The support should be in the form of rubber mounting blocks, or their equivalent, to prevent the transmission of vibration mechanically. The frame of the genemotor should be grounded through the use of a heavy flexible connector.

The brushes on the high-voltage end of the shaft should be by-passed with 0.002-μfd. mica condensers to a common point on the genemotor frame, preferably to a point inside the end cover, close to the brush holders. Short leads are essential.

Sometimes it is necessary to shield the entire unit, or even to remove the unit to a distance of three or four feet from the receiver. Shielded leads seem to be of little or no help.

A filter for the genemotor should be designed in very much the same manner as filters for vibrator supplies, shown in *The Radio Amateur's Handbook.*

A 0.01-μfd., 600-volt (d.c.) condenser should be shunted across the output of the genemotor, followed by a 2.5-mh. r.f. choke in the positive high-voltage lead. From this point the output should be run through a "brute force" smoothing filter using, say, 8-μfd. electrolytic condensers on each end of a 15- or 30-henry choke of having low d.c. resistance.

Such methods proved to furnish adequate filtering for superregenerative receivers used in units of the Dayton (Ohio) WERS network. — *Harris C. Haines, W8IBQ.*

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MULTIBAND ANTENNA COUPLING UNITS

ANY amateur who likes to jump bands the way I used to will find either of the two multiband antenna coupling units described here a handy piece of equipment. Only a small amount of material and but little labor in construction is needed. Convenient tables are provided as guides for quickly setting up the switch positions for a variety of applications, without the necessity of consulting a circuit diagram each time a change is made.

Fig. 1 shows the circuit of the simpler of the two units, which uses a minimum of parts. The circuit shown in Fig. 3 is more flexible, and is especially well adapted to the matching of 160-meter trans-

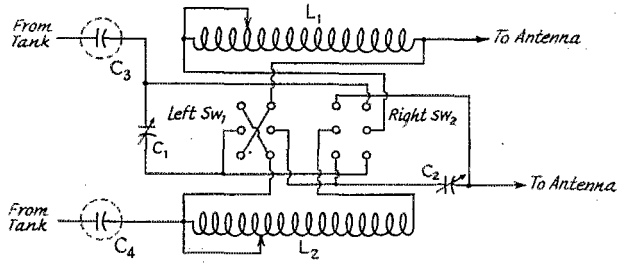


Fig. 1 — Diagram of simple circuit for a wide-range multiband antenna coupler.
C_1, C_2 — 150- to 300-μμfd. double-spaced variable.
C_3, C_4 — 0.01-μfd. mica 5000-volt, not required when link coupling is used.
L_1, L_2 — 33 turns No. 12, close-wound on 3-inch diameter ribbed isolantite forms.
S_1, S_2 — D.p.d.t. porcelain knife switches.

♦

	LEFT SW_1	RIGHT SW_2	CONNECTION
1 =	UP	UP	PI SECT
2 =	OPEN	DOWN	SERIES "C"+"L"
3 =	DOWN	DOWN	SERIES "C"
4 =	DOWN	UP	SERIES // PAR
5 =	UP	DOWN	SERIES FILTER
6 =	OPEN	UP	"L" ONLY
7 =	UP	UP	CONN FOR UNTUNED LINE, CLIP OUT COILS
8 =	UP	UP	PAR "C" (CLIP OUT COILS) FOR UNTUNED LINE SET BOTH "C" AT ZERO

Fig. 2 — Table of connections and switch settings for various applications of the simple multiband antenna coupler.

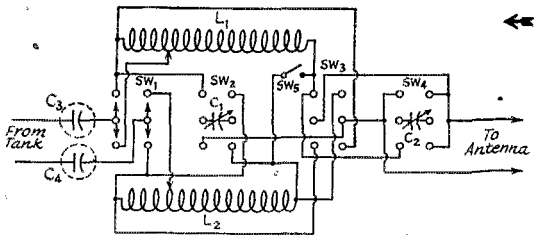
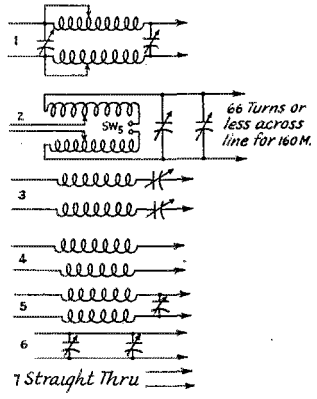


Fig. 3 — Circuit diagram for a flexible wide-range multiband antenna coupler.
C_1, C_2 — 150- to 300-$\mu\mu$fd. variable, spaced 0.07 in.
C_3, C_4 — 0.01-μfd. mica 5000-volt, not required when link coupling is used.
L_1, L_2 — 33 turns No. 12, close-wound on 3-inch diameter ribbed isolantite forms.
S_1 — D.p.d.t. change-over switch with two sets of throw arms to make contacts at top and bottom at same time.
S_2, S_3, S_4 — D.p.d.t. porcelain knife switches.
S_5 — S.p.s.t. porcelain knife switch.

Fig. 4 — Table of switch settings for various connections obtainable with the flexible multiband antenna coupler.

	SW_1 TOP THROW	SW_1 BOT THROW	SW_2	SW_3	SW_4
1 *Pi Section*	UP	DOWN	UP	UP	UP
2 *Impedance Matching Transformer*	OPEN	DOWN	UP	DOWN	UP
3 *Series L + C*	UP	DOWN	DOWN	OPEN	DOWN
4 *Series L*	UP	DOWN	OPEN	UP	OPEN
5 *Ser. L + Par C*	UP	DOWN	OPEN	UP	UP
6 *Par. C*	UP	DOWN	UP	OPEN	UP
7 *Untuned Line*	UP	DOWN	DOWN	DOWN	DOWN



mitters with various antennas, as both coils may be placed in series across the line.

Both units are built around the ribbed isolantite forms, 3 inches in diameter, used as supports for L_1 and L_2. The coil forms are mounted on stand-off insulators on the back of a masonite panel 7 by 15 inches. All switches are mounted on the ends of the coil forms by means of 1-inch angle supports.

Rectangular openings in the panel facilitate reaching the switches, although the back of the unit is left open when the assembly is placed in a cabinet so that switches can be thrown from the rear if desired. This arrangement also provides clearance for the leads from the transmitter tank and the antenna leads from the porcelain stand-offs provided for output connections.

Copies of the tables of switch settings are mounted on the fronts of their respective panels for ready reference. The keying of the various positions by numbers is a feature which makes it unnecessary to consult a schematic diagram in order to set up the coupler for each change.

These units have been tried in long service at W1CQR and have proved their worth. — *Arthur R. Boeder, W1CQR.*

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SUBHARMONICS

CLASS-C oscillators with fixed bias are unstable. Decreasing the feed-back below a certain level results in a sudden cessation of oscillation. This trait is sometimes troublesome, but may be useful for certain purposes.

Occasionally a subharmonic of a given frequency is desired. It is possible to "lock" an oscillator near one of its harmonics, if the oscillator has a stable frequency. Control of such a condition is, however, uncertain.

If the negative fixed bias is increased until oscillation ceases, then a high frequency applied to any of the electrodes of the oscillator tube will renew oscillation at a subharmonic of the exciting frequency.

Strong feed-back gives good output but requires a large negative bias and a high excitation voltage. These conditions are necessary for foolproof operation when the ratio of frequency division is as high as one to ten. — *2nd Lt. Herbert Brooks, ex-W9SDG.*

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L.C. ON YOUR SLIDE RULE

WITH slide rules available at very moderate prices and increasing in popularity among amateurs, it is believed that a method of computing LC values would be welcome, since instruction books seldom if ever contain this information.

A method is described here whereby LC products may be read directly against frequency, or vice versa. If your rule has A and B scales only one setting of the slide and one adjustment of the indicator are necessary.

Before going into the procedure, let's go into the reasons back of it. Referring to the chapter in *The Radio Amateur's Handbook* entitled, "Electrical and Radio Fundamentals," we find the formula for resonant frequency:

$$f = \frac{1}{2\pi\sqrt{LC}} \times 10^6$$

where f = frequency in kc., L = inductance in μh., C = capacity in $\mu\mu$fd. Since the product of L and C is constant for a given frequency, the frequency of a resonant circuit varies inversely as the square root of the inductance and capacitance. Let's transpose the formula to give the LC product for a given frequency,

$$LC = \frac{1}{(2\pi f)^2} \times 10^{12}$$

(Continued on page 92)

CORRESPONDENCE FROM MEMBERS

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

ACTIVE SUPPORT

Box 557, Kirksville, Mo.

Editor, *QST:*

Nations and individuals change their viewpoints as time goes by, especially in times like these. Our country learned at Pearl Harbor the disastrous results of a policy which leads us strictly along paths of self-interest and attempted isolationism. . . . The day of "rugged individualism" may be on the decline, but the day of coöperation between free individuals in order to secure advancement and happiness for each is dawning.

I have been a radio amateur for eleven years. Until the U. S. entered the war, my station hardly missed a day on the air. . . . During all of that time I never joined the ARRL. I thought I had a good reason for not joining. It seemed to me, then, that the main benefit of membership in the organization was the subscription to *QST*. Since I cannot see, I thought I would get little good out of the magazine.

Since that time I have changed my mind. I have learned that all of the privileges we enjoy carry with them the responsibility that we must actively support the organizations which maintain and protect those privileges. This responsibility is present during times of apparent quiet and safety as well as being urgent during times of stress and strain.

There are many thousands of hams, who, like myself, are looking forward with eagerness to the future, when they shall once more be able to turn on the rig. There are many thousands of new potential hams being trained by our armed forces. I hope they all will get and stay firmly behind the American Radio Relay League.

— *W. R. Brannan, W2NPX*

PROSPECTIVE MEMBERS

2 Mitchell Ave., Poughkeepsie, N. Y.

Editor, *QST:*

. . . I have a thought that I would like to pass along regarding new members for our organization in the future.

I know from experience in selling that we cannot live on the customers we have had for years, but that we must constantly get new customers. It also is true with our amateur organization. Therefore, if it could be mentioned in *QST* that we should remind the present members of ARRL when writing to their brothers, sisters, fathers or friends in the service who have become radio operators since Pearl Harbor, that there is an organization at home such as the ARRL and urging them to join now or to keep it in mind when they come home, it would bring our organization to the attention of many prospective members.

I wish that someone had done this when I was in service in World War I. It took this war to bring the ARRL to my attention and I lost better than twenty years of a wonderful association. . . .

— *D. J. MacLean*

QSLs FROM ITALY

799 Juana Ave., San Leanro, Calif.

Editor, *QST:*

Here is a letter which speaks for itself. Enclosed with it was a QSL card which, as far as I know, is the first QSL card to come out of Italy since the war started.

— *Larry J. Barton, W6OCH*

Rome, Italy

Dear Friend:

June 4, 1944, was the most beautiful day in my life, when I embraced the first American soldier in Rome. With his coming I finally have regained the liberty that I, and all the Italian people, lost twenty years ago.

Until now it has been impossible for me to answer you because all the Italian OMs worked without licenses and it was very hazardous for us to send our QSLs.

I very well remember our last QSO on 'phone on January 28, 1939, and I was very happy over it, because our QSO was a record for me, also.

I am enclosing my QSL card. . . . I have more than thirty cards to send to American OMs to confirm our 1938–1939 QSOs. . ..

My house in Rome was bombed and almost destroyed on July 19th, 1943, by American Liberators, but every sacrifice made for liberty is always too little.

———— ————, *I1NQ* *

INTERNATIONAL LANGUAGE

1138 Hayward Ave., Bremerton, Wash.

Editor, *QST:*

In these days of planning for the future postwar world and the building of a permanent peace, we should not ignore a factor which we as amateurs could use to advantage for selfish reasons and at the same time contribute materially to international understanding and coöperation. This factor is an international auxiliary language.

Amateur literature is largely technical in nature, and is seldom translated into another language. If translated, the languages involved are

* Name withheld by request.

major languages — the minor language groups are ignored. Suppose, for instance, that *QST* and the *Handbook*, or all technical literature for that matter, were published in an auxiliary language. A wealth of valuable information would become available to amateurs throughout the world without delay. Through this medium the amateur could share his experiences with others without the barrier of language.

Social relationships among hams ordinarily are carried on through the medium of radio and hamfests. Here again, the amateur can exchange technical information and become acquainted with other hams throughout the world merely by the process of using in conjunction with his radio contacts a simple and easily learned international medium of expression. Another aspect to consider is the possibility of some highly successful hamfests unrestricted by language difficulties. With the inexpensive and rapid transit envisaged for the future, the possibilities are enormous!

So far, nothing has been said about which language to use, and I do not claim to be an expert on the subject since my only language is English. However, I recently have read an interesting book entitled "The Loom of Language," by Frederick Bodmer,[1] in which this subject is discussed at length. . . .

Bodmer points out that previously constructed languages have been one-man affairs. In his opinion, he believes that an international committee of language experts should be delegated the job of constructing a language acceptable to all nations. Only in this way can the mistakes and prejudices of a single mind be avoided and a product be made acceptable to all the major powers. He argues, also, that acceptance of such a language must be a political affair and must be taught in all the schools of the world in order to be successful. Bodmer makes the logical observation that, while a common language would not eliminate war, it would aid the cause of peace.

The amateur is interested primarily in radio — not language (except perhaps, on occasion, profane) — but here is a valuable adjunct to the art of communication and a valuable tool as such. In order for the amateur to benefit, he should use what influence he has, both as an individual and as a member of an organization, to promote the construction and adoption of an international auxiliary language. Prominent and influential men and organizations should have their attention called to the desirability of such a language, and the fact that one should be demanded at the peace table and included in postwar plans. With all the world planning now going on, let us include some language planning!

— *Maurice V. Gowdey, W7DZZ*

LEARNING SPANISH

Forestville, Conn.

Editor, *QST:*

The letter from W8UPH, "Postwar Service to the Nation," published in the Correspondence section in the October issue of *QST*, p. 62, deserves wide reading and thoughtful consideration by amateurs and responsible government officials. The future peace and welfare of all American nations surely depends upon creating and maintaining understanding and good will on a wide basis among the individual citizens of these neighbor nations. Neither State Department nor business agencies can accomplish this on the scale possible to amateur radio.

I was much interested in the comments made by W8UPH with respect to the relative ease of learning the Spanish language, and resolved to take the first opportunity offered for study and instruction, hoping for a fluent command of the language, and anticipating wide contacts and countless new friendships among our Central and South American neighbors. It is to be hoped that the government of our own and the neighbor nations will make ample provisions for citizen radio contacts at the earliest possible date.

— *Hollis M. French, W1JLK*

[1] Published by W. W. Norton. Price, $3.75.

"DARNED GOOD HOBBY"

APO 534, c/o Postmaster, New York City

Editor, *QST:*

. . . Uncle Sam, through the Signal Corps, has "bounced" me around quite a bit of the world — from England down the U. S. Atlantic seaboard, the Caribbean area, northeast South America and parts of Central, West and North Africa. Sometimes a place was pleasant, sometimes rough. Sometimes the work was done in a leisurely manner, but more often we worked our "pants off."

I started in Signal Supply Service and am now in the Army Communications Service. The work of installing radio communication systems is interesting indeed, even though it always does keep us dragging our "fannies" from pillar to post in getting the job done and on the air by the deadline date. . . .

Seems like everywhere I have been stationed I've run into enlisted men and officers who at one time have been hams in civilian life. If I had kept a list of the names of all those men, it would be as long and as impressive as the lists of calls heard that once upon a time were published in *QST*. . . .

I came in contact with these men in the various branches of the Signal Corps and in the Army Airways Communications Service — all of them grand guys. They take care of getting signal supplies where they are needed, installing or operating radio communication systems and air navigation aids, maintaining equipment and stations, and doing a million and one other communications and supply jobs as they come up. I do not necessarily mean that the reason these men are doing such a good job is because of their amateur radio background, but they are the men who seem to show a keener interest and enthusiasm in their jobs and in what they do. Usually, too, these men are tops in their work and have top ratings in their units.

In the past two years and some months I have worked with so many different types of radio

equipment and under so many different field and operating conditions that I almost became fed up with radio. In fact, in my mind I pictured a quiet lake, a boat, a fishing rod in my hand and odds and ends of ham radio gear tied to a rope being used for a boat anchor. Hi! Several weeks ago in a Red Cross club I ran into an old battered copy of *QST*. After thumbing through the pages, and "goggling" at some of the advertising, I knew what would happen to the radio equipment back home. It's going to be the same old story — the OW will again be saying, "If you didn't fool with that radio all night, you'd be able to get up in the morning." Hi!

Here's hoping for an early end to this mess and a quick return home to a darned good hobby.

— *Lt. E. C. Hudowalski, SC., W2HGM*

ENCOURAGEMENT

APO 650, c/o Postmaster, New York City

Editor, *QST:*

. . . The purpose of this letter is to lend a little encouragement to the fine work hams have been and are doing.

During my five years of service I have supervised the training of several hundred operators and have seen them work under fire, both on the ground and over enemy territory. Without exception, the hams have shown that "key sense" which always squeezes the message through.

In the event of future wars, I feel that an ARRL program to make military procedure the standard in amateur work will help both the ham and national interests.

— *Major Cyrus B. Stafford, AC., ex-W9KWP*

SIGNAL CORPS ARTICLES

138 South Virginia Ave., Atlantic City, N. J.

Editor, *QST:*

I just want to let you know that the articles on the U. S. Army Signal Corps appearing in the September issue were about the finest presentation I have yet read in *QST*. They show an earnest effort to furnish readers with significant and interesting information.

I believe your efforts are really being appreciated — I know they are here. . . .

— *RM1c Robert L. Brewster, USCG, W8WDQ*

2269 Summer St., Berkeley 7, Calif.

Editor, *QST:*

. . . Congratulations on the fine work you are doing. . . . The Signal Corps articles are among the best of the sort I have ever seen. . . .

— *Robert H. Weitbrecht, W6NRM*

PANEL LETTERING

1108 St. Viateur Ave., W.,
Outremont, Montreal 8, Que.

Editor, *QST:*

I was very much interested in the article on instrument panel lettering which appeared in the August issue of *QST*, p. 38.

For the benefit of those amateurs interested in such work, may I suggest the use of the "Wrico" lettering guide and pen made by the Wood-Regan Instrument Co., Inc., of New York City. Any size and style of lettering stencil with the appropriate pen can be purchased at a small cost in any store selling drawing instruments. Different sizes of points can be used with the same pen. . . .

The only drawback in this method is that such lettering cannot be done on crackle-finish panels, as the surface must be smooth. However, name plates can be made on aluminum cut to the right size, dipped in flat black paint and baked in an oven. . . .

— *G. Gosselin, VE2AO*

PRACTICAL MATH

APO 948, c/o Postmaster, Seattle, Wash.

Editor, *QST:*

Just a word concerning Mr. Noll's articles on practical math.

I passed up the first two articles of the series without too much interest, but after reading parts three and four I obtained a great deal of valuable information, so I pulled out my back issues and started a separate file. Now I hope that Mr. Noll is good for the duration and that he keeps up the good work.

— *Sgt. K. Digre*

THE FINISHING TOUCH

124 West St., Stillwater, Okla.

Editor, *QST:*

. . . *QST* has been the finishing touch on all of the radio engineering courses I have taken here at Oklahoma A&M College. As you may know, courses in college neglect the many practical points which an engineer should have. *QST* shows how such theory may be applied, and for that reason I highly recommend *QST* to anyone.

— *Robert C. Burns*

NORTH ATLANTIC RESCUE

47 Tilley Ave., Newport, R. I.

Editor, *QST:*

Now it can be told — how RM1c Ed MacCarthy, W2NAK; RM1c Herbert Schwartz, W2FAD; RM1c F. A. Munro, W8WRK, and several other Coast Guard operators came to the aid of HMS *Empire Knight* in February of this year when that 7000-ton British merchant ship went aground and broke up on Boon Island Ledge off Portsmouth, N. H., during a driving blizzard.

The boys at NMF were doing extra special listening on 500 kc., as the North Atlantic was raging with a howling gale. When the *Empire Knight's* SOS came in, we surely went to town on rescue work. It is customary when an SOS comes through to intercept it and forward it to the proper authority and open up only if ordered — which we were ordered to do later on. When we got the OK to send traffic we really delivered the goods FB.

(Continued on page 88)

OPERATING NEWS

CAROL K. WITTE, W9WWP
Acting Communications Manager

LILLIAN M. SALTER
Communications Assistant

WERS On the Job During the 1944 Hurricane. Early in the week of September 10th, the first warning of an approaching hurricane was sent out to the residents of the Atlantic seaboard. It struck fear and apprehension into the hearts of those who remembered the ravages of the 1938 hurricane, and preparations were begun almost immediately to alert all emergency disaster facilities. Included in these facilities were the units of the War Emergency Radio Service licensees in the coastal area. Amateurs and other radio operators in the War Emergency Radio Service responded nobly to the call, and it is with pride that we recount herein a few of the reports of activities of members of WERS networks during the hurricane.

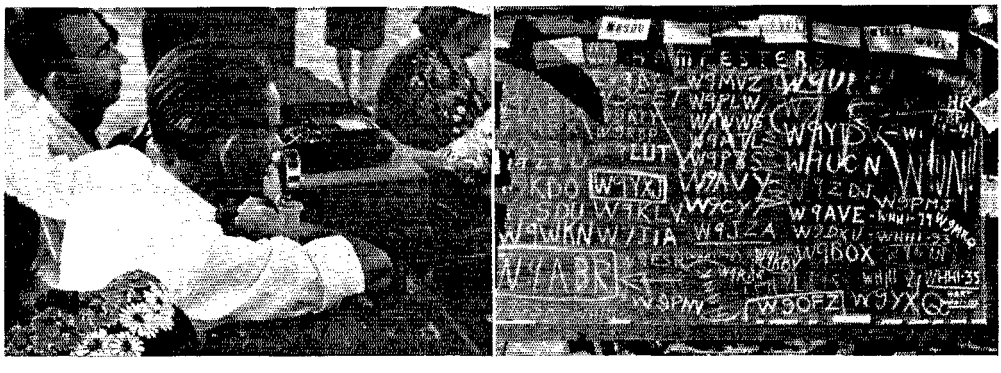
Fortunately, the 1944 hurricane was of a different character and of less severe intensity than its forerunner of 1938. This time it progressed upwards along the Atlantic Coast more rapidly, and the force of the gale increased as it moved along. Beginning with an initial velocity of about 50 m.p.h., the "big wind" moved up past the Virginia Capes, and then on to Delaware, Maryland and Eastern Pennsylvania at 70 m.p.h. The peak of its destruction was wrought in the New Jersey coast area, on Long Island, and along Connecticut to Cape Cod, for it was here that the center of the storm struck before it veered eastward into the Atlantic Ocean. Fortunately, in each locale the hurricane seemed to end abruptly, but there were numerous commercial power failures, and knockouts of telephone communication where falling trees and flying debris caused line breaks and pole fallings.

It was in these instances that the personnel of the WERS were able to assist other relief organizations. For example, on the evening of September 14th, the WERS gang in Roselle, N. J., sprang into action with all the mobile units which were available. Using two fixed stations as "base units," WKVR took over communications between the Borough Hall and the firehouse, as the telephone and power lines came down. The mobile units were used to report fallen-tree blocks, hot wires, etc., and to act as liaison agents between the various defense units in operation.

Further north, in Leonia, N. J., the units of WJWY also functioned creditably. Three hours before the alert given in New York City, the operators of WJWY were on hand at three points, working in conjunction with three police cars. Through the medium of WERS, information was relayed to police headquarters (where one of the WJWY units was located) concerning road conditions, dangerous blockings by fallen tree and debris, and other situations needing police help. The other two units of WJWY were used to cruise the town and relay messages to workers and to police headquarters. As a result, all county roads in the borough were cleared by the following morning. Close tie-in with police headquarters during previous test periods helped make this alliance a satisfactory and efficient one during the emergency.

Elsewhere in the state, the Hillsborough Township WERS, WKXQ, was placed on emergency alert on September 14th, and the entire personnel stood by for any necessary action for the duration of the storm. Since the hurricane missed that section, they were not required to go into actual operation.

Further north, in the state of Connecticut, all emergency services were alerted at noon on Sep-



Left — Joe Nakutis, W9AVY, and Les Morey, W9KBO, operated net control station WHHI-144 during the WERS drill held at the 11th annual picnic of the Hamfesters Radio Club (Chicago). At this point they were in contact with a CAP plane carrying WERS equipment, one of the highlights of the afternoon drill. *Right* — The "call-board" at the Hamfesters' picnic showed a number of out-of-district calls and WERS unit numbers interspersed with regular member calls. Total attendance at the picnic was over 250 persons.

tember 14th. By 4 P.M. New York City was experiencing high winds and heavy rain, and by 6 P.M., the rain, together with fairly strong winds, reached the New Haven area. All local radio aides were told to alert their operators for possible operation. These included the radio aides in New Haven, West Haven, Branford, East Haven and Guilford. At this time word was received from W1EAO, the state radio aide, that the center of the storm was expected to pass somewhere between New Haven and New London, accompanied by very high tides and strong winds.

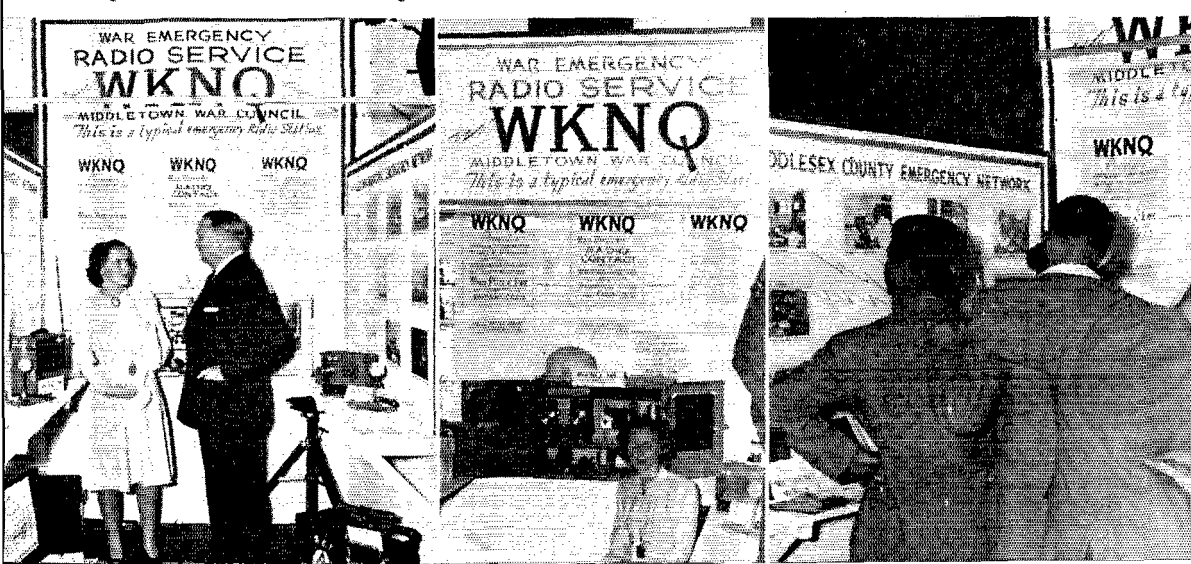
Word was then received from Hamden, New Haven and West Haven that all WERS units were prepared for the worst. WJLH-23 had been moved to a location on the Long Island shore, and was minus an emergency power supply. At about 7 P.M. two operators went out to this point, in the face of strong winds, heavy rains and high tides. and hooked up an emergency power supply so that this unit would be prepared. The WJLH units that were in operation that night included: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 16, 17, 18, 19, 20, 22, 23, 25, 26, 32, 35, 41, 44, 53, 54, 62 and 71. Special commendation goes to Elizabeth Doyle, operator at WJLH-6, who handled heavy traffic concerning live wires which had been blown down, uprooted trees on roads, etc. W1JQD, a blind operator of WJLH-8, made his way over to the station in the thick of the storm and handled many messages of importance. In West Haven, Peters and Collins covered control center units WJLH-16 and 17, and handled a great number of messages. When phone communication was disrupted at WJLH-20, Peters made his way over there to handle several important messages requesting dispatch of auxiliary police and doctors. W1LTZ, after quite a few accidents en route due to falling trees, etc., established contact with the control center in East Haven from WJLH-54 in the Momauguin shore area. This area had been hard hit, and power and phone communications were completely out during the entire evening. Families had been evacuated to the fire house there, and all available facilities of the local Red Cross had been utilized. About ten messages of importance were handled by WERS for assistance in this area.

Also in Connecticut, WKJA units in Torrington, WJQA units in Stamford and Norwalk, and WMHC units in Hartford, were alerted, but their services were not needed. The WKNQ network in Middletown was on the air, and maintained communication with battery-powered apparatus until the early morning hours, when the possibility of danger had passed. The Bridgeport, Conn., WERS network, WKAO, really went to work on the night of the hurricane. Twenty-five of the units reported into the control station, and 75 per cent of these units were required to operate on d.c. current since the power lines were down in many sectors. Units 1, 20, 23, 42, 48, 55 and 75 stayed on the air from 9 P.M. to 3 A.M. until the worst of the storm had passed. Units 60, 61, 62, 64, 66 and 70, located in Milford, deserve a great deal of credit for the great job they did in their area. They were the only means of communication for that locality, and handled a volume of traffic. In addition, they assisted in the evacuation of 65 adults and 58 children from seaside homes to safer places.

In Massachusetts, all WERS stations were activated on September 14th by the Massachusetts Committee on Public Safety. Units were on in Cambridge, Boston, Winthrop, Weymouth, Needham, Newton, Belmont, Walpole and Wellesley. Traffic was not heavy for the most part, but the stations in Winthrop handled one fire alarm incident.

The Fall River WERS was on the job and ready to go when needed. At 7:30 P.M. on September 14th, the Massachusetts State Guard liaison officer to CD headquarters contacted the radio aide of WJSU and asked that a station be placed in operation at the State Armory, to be manned by one of his operators under the radio aide's direction. Since five operators with the local CD-WERS are also members of the State Guard, several of these operators were assigned to this station. Actual operation of all the Fall River

Left — Connecticut's Governor Baldwin and Mrs. Rand, one of the operators at WKNQ-1 and the wife of Radio Aide Philip Rand, W1DBM, discuss the WKNQ exhibit at the Victory Garden Fair held at Middletown, Conn., on September 8th. *Center* — A close-up of station WKNQ-16, feature of the display. *Right* — A few of the interested spectators who viewed the WKNQ WERS exhibit.



units began at 8 P.M. Both portable and fixed stations remained on the alert until dismissed at 2:15 A.M. Although no actual breakdown of telephone communication occurred, a number of messages were routed by radio to State Guard officers who found that their own telephone lines were busy or overloaded at the time they had to dispatch a message. It was the first actual test of WJSU's efficiency, and though a great volume of traffic was not handled, it helped prove that the group could be mobilized and the equipment put into operation on a moment's notice. The units in Swansea and Somerset were the only ones of the group who had to operate on emergency supplies because of commercial a.c. power failure.

In Fitchburg, Mass., WLSO was put to the test, and the results were very satisfactory. Members of the group stayed on duty until 4 A.M. the morning of September 15th, and maintained communications with all sectors. The storm damage was not serious there, however, and railroad ties, power, lights and telephones were not completely put out of commission. Provisions had been made for additional power for a.c.-d.c. stations, in preparation for the long seige which, fortunately, did not become a reality. The two women operators of the group proved as capable and rugged as the men operators during this alert.

In general, WERS operation during this hurricane emergency has clearly demonstrated the following points: (1) That there is a necessity for having efficient and regular test periods within WERS nets, with emphasis in operation being placed on message handling; (2) that ties should be established with other emergency services, and combined operations be held from time to time, so that the actual procedure in an emergency is well defined in the mind of each operator within the WERS group; (3) that well-trained fleets of portable-mobile units are a valuable asset in any emergency, and (4) that all units should be equipped with a source of emergency-power, and that storage batteries should always be kept charged.

How does your WERS unit rate in a score of these points?

Wanted! Code Instructors for CAP in N. Y. At this time we are informed of the need for competent code instructors for the Greater New York Cadet Training Group of CAP. The Bronx squadron is particularly short, since there are nearly 700 cadets awaiting training at the present time. Those who qualify as instructors are entitled to wear Army officer uniforms, and are in line for rapid promotion to the rank of warrant officer. The work will involve sessions at high schools, two evenings a week, two hours per evening, using Army playbacks and code records for instruction equipment. It is not necessary to hold an amateur license. For those who are interested in additional information, we suggest addressing a card to Lt. M. J. Becker, W2NFB, Bronx Headquarters, Civil Air Patrol, 2 E. 45th St., Bronx, N. Y.

—*C. K. W.*

WERS of the Month

Philadelphia, Pennsylvania

Each month under the above heading we shall publish the story of an outstanding WERS organization as an item of general interest to all WERS participants. Contributions are solicited from any radio aide or WERS participant, whether he be an amateur or a WERS permittee. Descriptions of organizations which have already been featured in *QST* articles will not be considered. The story may describe the organization in general, how it came into being, how it was set up and how it operates; or it may describe some particular phase of the organization which makes it unusual or unique. Contributions should be brief (two or three typewritten pages, double-spaced, is maximum) and may include photographs if desired, although only one photograph will be printed with each story. Each story must be released for publication by the radio aide of the licensee, in writing. Address your contribution to the Communications Department, ARRL, and mark it: "For WERS of the Month."

AMATEURS and the other men and women of Philadelphia who have labored so hard to give their city an efficient means of communication during any emergency or disaster, can be rightfully proud. The WERS organization of Philadelphia has been proven a definite success.

In the short space of slightly more than eighteen months, through the efforts of a small group of men and in coöperation with Police Inspector Thomas Burns, a simple and flexible system has been built around six control centers and a main control. In that time the system has been tried again and again, both in practice alerts and in actual instances such as the disastrous Broad Street station fire.

The tremendous job of organizing the amateurs of Philadelphia and setting up WERS was given to George Hautenschild, W3KD. He was selected as radio aide for the city because of his extensive knowledge of the problems confronting the amateur on the very-high frequencies, and because of his contacts with the army of operators WERS would need. He immediately called a general assembly.

From this meeting stemmed the present set-up of zone control. For each zone or control center an assistant aide was appointed, upon whose shoulders rested the responsibility of complete mobilizing and the securing of equipment.

A seemingly impossible job loomed ahead. The armed forces had drawn heavily from the ranks, leaving at the most 250 men with whom to work. It developed that about fifty per cent of that number would not be available because of employment or other duties.

Finally the six aides, who also acted as advisors with the coöperation of WPDP, the city's police radio system, surmounted all obstacles and now have 111 units distributed among the six controls.

As the controls were equipped and manned, a constant monitor of main control was required. Portable-mobile units were then added and finally walkie-talkies were employed. Two portable-mobile units were kept at main control at all times.

The monitoring of main control required two receivers. In some cases, as at the fifth control, two regenerative receivers were kept side by side. Some of the other controls were more fortunate in having superhets.

In every control center there were zone headquarters where fixed units were situated, and from these zones portable-mobile units have been operated. Walkie-talkie transmitters, which have proved their worth on numerous occasions, had difficulty in getting their messages through on test drills because of the interference from the control center.

This was overcome by assigning them a frequency 100 kc. higher than that of the control center.

Before setting the frequencies a meeting was called, with all municipalities sending a representative. Each man had a chance to set forth his views regarding the frequencies in use or to be used. As a result, each municipality has carried on its drills on the frequency allotted, with no hindrance from its neighbors.

From the first, each radio aide in WKIB has been required to maintain apparatus to accurately measure the frequency of each unit under his supervision.

Although the main control's frequency was set on 112.1 Mc., to minimize interference between the two sets at the district controls, the frequencies used by the Philadelphia WERS ranged from 114.0 Mc. to 115 Mc., with absolutely no interference between controls or other services.

To enable main control to know at a glance who was on duty during any test or alert, a system of numbers was worked out, giving each operator a number. Thus if WKIB-5, located in the sixth control, was to report for duty he would call WKIB-5-13, or whatever number had been assigned by the assistant aide in that particular control.

At the start of an alert or test the prime requisite of each control was to forward its mobilization report along with the number of each operator on duty.

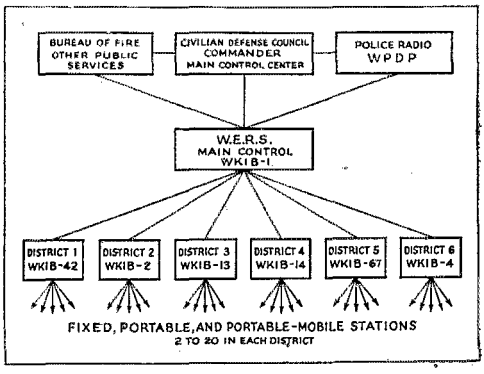
To discourage "hamming" and other infractions of the Rules and Regulations, a working system was instituted and the following plans were drawn up: Zone stations may communicate with main control, but no two district control centers may contact each other without gaining the permission of main control, thus keeping the channels clear for urgent business.

Portable-mobile units are not restricted to their control districts but may be, and on occasion have been, sent to other areas where there has been a need for additional equipment.

To show the interest of city officials in WERS and its possibilities in activities beyond the range of civilian defense, their reactions after WERS had played a prominent part during a recent fire are described.

One Sunday, a short time before the regular test drill, the Broad Street station train shed and baggage room was razed by fire. The fire was in that portion of the station surrounded by brick walls with the tracks overhead. Racing along practically underground, the fire caused situations which showed a definite need for efficiency communication. Two portable-mobile units were dispatched to the location of the fire from the sixth control. Under the direction of W3GQK, the two units, handled by W3GJU and WKIB-41, took up positions at opposite ends of the scene of the fire and supplied the direct communication urgently needed by the fire and police departments.

The high praise received from the two service departments served as an added incentive to the members, and they resolved to further improve the organization. To that end we have decided to carry on our classes of instruction. For those men and women who wish to secure a restricted radiotelephone license, which will enable them to apply for a WERS license, all control centers have been holding regular classes of instruction. Also, some of our high schools have included a set of fifty questions, drawn up by the radio aide and Inspector Burns, in their regular radio curriculum.



This chart pictures the organization of Philadelphia's WERS network, WKIB.

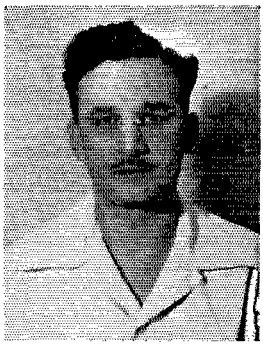
For the benefit of the residents of the Greater Philadelphia area who would like to help in this vital work and who are interested in War Emergency Radio Service, the following list of assistant aides and their telephone numbers is given:

Radio Aide....Geo. Hautenschild, W3KD, 950 Marcella St. Jef. 1768
Control #1....Fred Craven, W3ERV
Control #2....Jack Murphy, W3IMJ, 1945 Ashley St. Wav. 8114
Control #3....Horace Needhamer, W3FSM, 1631 E. Berks St. Neb. 2426
Control #4....Geo. Nicholson, W3IXU
Control #5....William F. Romen, W3ITZ, 5333 Pine St. Gra. 7388
Control #6....Jack Sterner, W3GQK, 6949 Rodney St. Han. 9214
Main Control..Merle Ekas, W3IND, 320 S. Iseminger St. Pen. 7832

— William F. Romen, W3ITZ
Assistant Radio Aide, WKIB

Meet the SCMS

It seems that one good term deserves another, because this month we are introducing to you the newly reëlected SCM for Louisiana, Eugene H. Treadaway, W5DKR. Having served previously as SCM for a three year period beginning in 1937 and ending in 1940, Gene has been a popular and active amateur since he received his ticket in May, 1933.



He first saw the light of day in New Orleans, on October 21, 1905, and not long after, in 1920, he became interested in amateur radio. In the meantime, the major portion of his attention was directed to his high school work, and after graduating he attended the Delgado Trades School. He then began work for the Southern Bell Telephone and Telegraph Company, where he is at present employed as a toll testboard man.

Always an active participant in operating contests, W5DKR also possesses an ARRL Public Service Certificate for assisting in communication work during the flood days in early 1937. He also has held the appointments of ORS, OPS, RM, PAM, QSL manager for the fifth district and alternate director for the Delta Division of ARRL.

In addition to his regular work, W5DKR has found time to be president of the Short Wave Amateur Club of America, secretary-treasurer of the New Orleans Radio Club, and a member of the Laplace (La.) Chamber of Commerce, Telephone Pioneers of America and Perfect Union Lodge #1, F. and A. M. For recreation, he indulges in fishing, baseball, football and motion picture operating.

Although all his radio equipment is at present doing a job for Uncle Sam, we'll bet that Gene won't lose any time in getting back on the air when it's all over. A salute to you, W5DKR, one of hamdom's real leaders!

BRIEF

W9FUZ suggests that hams in the services place their amateur calls after their names when signing Red Cross, Salvation Army, USS and other registers here and abroad. In this way it would be possible for ham clubs and groups to get in touch with visiting amateurs, and for individual amateurs to locate other hams who may be in the same locality.

AMATEUR ACTIVITIES

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — 3DJD, operating WKIB-5, says he has heard the following out-of-town calls: WJOR-1, Allentown; WKRV-1, Reading; WJWE-1, Erie; WMDD, Baltimore; WMJO-1, Oaklyn, N. J. The following could not be identified: WLCY, WJOY, WJRE-16, WLOM-1. WJQM and WJSH, heard regularly, are suburban Phila. 3IBB (WKIB-32) says his old sidekick, 3GHG (WKIB-66) is now on the high seas as second operator on a new Liberty ship. We received a letter from 3EVH the other day, wanting to know how the gang is making out in the 5th control. Archie was one of the original gang to get that control center working. He says he might be home shortly on furlough. Pvt. 3FSM, ex-assistant radio aide of the 3rd control, writes us from Camp Crowder, Mo. Horace says he's getting some new ideas for his postwar rig. I'm sure Horace would be glad to hear from his old gang of the 3rd control. 3ACV has taken over the job of assistant aide of the 3rd control. 3IXU, assistant aide of the 4th control, is doing a swell job of reorganizing that center. How about some news, George? It is beginning to look like the 6th control has its neck of the woods pretty well covered. The assistant radio aide of that district tells me they have 30 fixed units and nearly 30 portable-mobiles. Most of these units are on Sun., Mon. and Wed. 3IXC (WKIB-60), operating portable-mobile in the 5th, did well the other Sun. in getting into main control, as control station. Ces is using a TR-4 with a "J" antenna. The foregoing is from a report on Phila. WERS submitted by 3ITZ, for which we are appreciative. 3IJN sends us a V-mail from the West Coast. He has just finished traveling 12,000 miles and has touched almost all the continents. 3ISS and Bob Stevens (LSPH) have just returned from the Persian Gulf, where the temperature gets up to 160. 3GYV, writing from Italy, tells us he has built himself a short-wave receiver after much collecting of scarce parts. 3DMQ, on a trip to Ohio, Illinois and Michigan, had FB chats with 8DDC and 9FD. 3FRY is taking treatments in a Detroit hospital for a brain tumor. He gets a 1000-kv. x-ray squirted at him every now and then. WJSO, Lower Merion, cooperated with the Red Cross in the recent hurricane disaster. 3DOU and 3HFD took their portable-mobiles to Ocean City, N. J. 3IXN operated from the main control center. The Red Cross radio disaster unit went into action under the call WKIB-136. 3HRE, of Easton, states that the 2½-meter band went haywire one night and the band was covered with DX stations. WJMN-1, Somerville, N. J., worked 120 miles into E. Pa. Simultaneously, N.Y.C. FMs were R-9 in Phila. WKRV, Reading, has a six-element Yagi beam aimed at Phila. 3ITZ is now making a special effort to collect data on Phila. WERS. You may send your WERS reports to him at 5333 Pine St., Phila. Phone: GRA7388. 73.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Hermann E. Hobbs, W3CIZ — The Washington Radio Club held a picnic Sept. 11th at Pierce Mill picnic area. There were about 30 on hand and there was no lack of firewood as the "wolves" brought in enough to keep the pots boiling. CQS is back at his new home in Silver Spring after an extended business trip. The WERS of Maryland is rebuilding equipment. JJN and family have moved from Phila., Pa., to 728 East Biddle St., Baltimore 2, Md. 73.

SOUTHERN NEW JERSEY — SCM, Ray Tomlinson, W3GCU — Regional EC for So. N. J., Technical Radio Advisor for N. J. State Defense Council, State Radio Aide for N. J. WERS and Radio Aide for Hamilton Twp. WERS, ASQ; EC for Somerville and vicinity, including Southbranch, and Radio Aide for Hillsboro/Branchburg Twps. WERS, ABS. The N. J. state radio aide reports that Hamilton Twp. WERS is planning installation of an r.f. stage on all their receiving equipment to be added to existing receivers as quickly as time and material become available. ITS has a new transmitter ready to go, using an 815 in the final of an m.o.p.a. job, which will be utilized wherever it is needed to replace a rig removed for repairs or remodeling. Amendment of WKPX license is pending FCC approval for operation of 32 active units. A few more restricted 'phone tickets have been received by new applicants, who will become active members of Hamilton Twp. organization as soon as WERS permits are received. Radio Aide ASQ praises very highly the non-amateur WERS permitees who have been participating in various tests and drills conducted during official periods. Quite a few of these plan on going after amateur licenses after the war. Monday evening test skeds with WJMN and WKXQ have been producing very excellent results at WKPX control. With the low power limit of WERS station equipment, this looks very favorable for postwar 2½-meter communication when higher power becomes available. We are very glad to hear again from Major Lawrence Silverborg, who, State Aide ASQ reports, is at present located at a special school at Ft. Monmouth awaiting reassignment. Major Silverborg has been of great assistance to our WERS and we hope that he will be assigned to this territory permanently. Hamilton Twp. WKPX was host to a visiting delegation from Hillsboro/Branchburg Twps. WKXQ on Sept. 3rd, which included Radio Aide ABS, ACC and several operators, including one YL operator, from WKXQ. A general tour of the WKPX network was enjoyed by all. We hope more of our New Jersey organizations will avail themselves of an opportunity to visit WKPX. Radio Aide ABS reports WKXQ's license is awaiting FCC approval of modification to cover additional units. Regular periodical rehearsals are in progress for the public demonstration to be held in October. The Sept. meeting of Hillsboro Defense Council was turned over entirely to WERS during which final arrangements and plans were completed for this demonstration wherein the public will be invited to "ride" the mobiles and see the network in actual operation. Their "J"-type antennas are being replaced with ground plane coaxial-fed radial antennas, and those already replaced have produced very gratifying increases in signal strength, both in receiving and transmitting, on the mobile units. The entire personnel of WKXQ was placed on emergency alert during the Sept. 14th hurricane and stood by for the full duration of the storm, but were not required to go into operation as that storm missed their section. ABS reports for Bridgewater Twp. WJMN that there are 4 hams, 1 commercial and 6 restricted 'phone permittees participating in this set-up. They hold regular test drills, and equipment consists of a total of 11 operators, 3 fixed units and 4 mobile units. One fixed unit is being installed in the fire house at Raritan, and another is being installed in the fire house at Martinsville. UK is in charge of control unit which consists of an m.o.p.a. transmitter utilizing a pot oscillator into an 832 amplifier, with superhet receiver. Mobile units include one walkie-talkie and balanced superregens and modulated oscillator units. EEQ, formerly with IBM in Omaha, is reported having been transferred to the IBM New York Labs. JJX is also with the IBM New York branch. Chic is an optimist; he is busy building himself a brand-new postwar 2½-meter portable rig. ASQ has just returned from Manasquan, where he enjoyed a much-needed vacation. GCU spent his vacation at home tearing out one of the walls to allow more space in the living room. ITS has also just returned from vacation. GEV, who has seen action in several theaters of war, including the Fiji Islands, Guadalcanal and Villa La Villa, was injured during an engagement, hospitalized in New Zealand and later returned to Shoemakerville, Calif., for further hospitalization. He has been granted an honorable medical discharge from the Navy Seabees and is now among the old gang at home again. IOW was home on furlough recently and returned to duty at Atlantic City Replacement Center and later transferred to Drew Field, Tampa, Fla. Tony, now m/sgt., writes that he feels as though he is back in the tropics as it is hotter where he is now than some of the places in the Canal Zone and So. Pacific where he has been. AFH lost his 10-meter beam mast and two willow trees, to say nothing of his 160-meter antenna in the recent hurricane. GCU had a willow tree go on a "bender," but stuck it back in the hole again. FTU is spending some more leisure moments on his farm somewhere near Waldoboro, Me., with several acres directly on the ocean front. Bet he will have a few to tell us about that storm up there! Bill is resting prior to taking up duties as professor of electronics at Peddie Institute at Hightstown. Steve Czorga is still at Boca Ratan, Fla., but is now doing maintenance work since being transferred from instructing. GNU is chief instructor at civilian trainee school at Longbranch. Doc may be seen almost any evening riding his

bike up and down the main stem. HWT has returned to duty after a 30-day leave. George Hulse, formerly of American Radio, Trenton, was in active service in Africa, Sicily, Salerno and Italy, and is now in Southern France, where he says the girls are much prettier than in Italy. The regular Sept. meeting of the Delaware Valley Radio Assn. was held on Wed. evening in the Pine Room of the Bromley Inn, on Route 33. Several postwar plans were discussed, including the rebuilding of the 1-kw. club transmitter, and expansion of the *DVRA News*, which is being received by servicemen in all parts of the world as a free service by the DVRA to men in service. 73, *Ray.*

WESTERN NEW YORK — SCM, William Bellor, W8MC — Thanks to BHK, we have news of a lot of the gang about whom we have been asked. Hamilton recently returned from Hawaii, having spent 2½ years there working for the Radio Intelligence Division of FCC. FAL has been in the Air Corps for over 2 years doing radio work all over the northwestern part of the U.S.A. and in Greenland. He has been at his home in Bath on a short furlough. NYA is now located in Elmira in charge of the electronics maintenance department of Bendix. Willis Oldfield (LSPH) is teaching chemistry and physics in Bath High School. Jones of Avoca, N. Y. (we can't remember the call), is working for Colonial in Buffalo in a highly technical capacity. QUQ tells us that he and 9TTP bunk together at radio school at Truax Field. He wants us to tell his friends his address is Pvt. Norman Miller, 3503 AAF BO., Sec. I, Bks. 1160, Truax Field, Wis. One of the nicest letters we have received comes from QMW. Carl is aboard a "tin can," as he lovingly calls it; his "chief" is 9ZMP. He has been all over the Pacific and while in ZL-land met ZL2FC and 2AF. Carl says the bars down there close at 6 P.M. PCE is deep in the study of medicine and about ready for internship. All the boys from the Rochester N.R. station, NDF, will be interested to learn that their old location (and feeders) are being used by unit No. 13 of WHNH, Monroe County WERS. Capt. Leon Lustyk is now over in jolly ole England, or as we knew him, OQC. We have been asked for dope on NVK but can't seem to locate him. DFN has moved close to the war plant where he works and now patriotically walks and saves gasoline. We learn with regret of the passing of PTB of the Air Corps, who was killed in action. His mother learned of his death after he had been reported missing for over six months. 73, *Bill.*

CENTRAL DIVISION

ILLINOIS — SCM, David E. Blake, II, W9NUX — REA is home for a 30-day leave and is doing a lot of visiting. KPC of Joliet left for the Navy Sept. 27th; he has been signed up in the Ship Repair Unit. OVU of Lombard is in the So. Pacific with the Seabees. NST has returned from England. WC is doing radar work on the West Coast for Western Electric. QDA spent a week on the East Coast. FXB is in California. CD-WERS: ODT reports that testing is still going on when enough of the gang can get together to do some operating. The WHHI network of the Chicago area is again on the upgrade. WKMR is operating. CAP-WERS: TLQ, CAP captain, reports that his WAFH network is having some very successful tests. Activities in the Chi area clubs are much better and much interest is being shown. The Hamfesters picnic was a great success. Let's hear from you boys in the services — show the boys at home you can do a better job of reporting. Anyway we would like to know where you are and what you are doing. 73, *Dave.*

INDIANA — SCM, Herbert S. Brier, W9EGQ — WDV is now a captain. He dreams of line-of-sight transmissions between Indian mountains and Indiana on u.h.f. SVJ is located where the automobiles drive on the wrong side of the street and most freight is hauled by ox-drawn carts. AB reports Mishawaka WERS had a weiner-roast by a trout stream. No one thought to bring a fly rod. BJT died recently after a short illness. He was very active in WERS work. He had just turned 18 and was preparing to leave for the Army when he became ill. DUT has a 1st-class 'phone ticket, and is experimenting with a PP 807 oscillator-tripler for 112. NXU, a captain in the Air Corps, runs an instrument flying training squadron, and has quite a bit of contact with aeronautical radio. HUV accuses me of libel even when I quote him. WKN reports that when the word "platter" is used MVZ thinks of food and PLW of phonograph records. IUM spends most of his time on horseback. EHT got up at 6:00 A.M. to say that he always likes to read about his old friends. IIL had to keep all the schedules for his outfit one Sunday. He was surprised to learn that he could still copy code. Ex-4EXB/9-9POD is lt.(jg) USNR, and is married. KMY is special services officer for his outfit and reports that they can't get too much to read. EBB is studying Russian. FDS is a sgt. and has been trying to arrange a meeting with his old friend, EHT. Gary WERS, WKMR, had an informal picnic, Sept. 10th. JZA, WKN, MTL, MVZ, EGQ and four operators without calls received OCD citations for their WERS work. EBQ had his first vacation in five years. His ambition of playing 72 holes of golf in one day was foiled when his partners gave up after 45 holes. MBM is starting to work again on the transmitter which he was completing on Dec. 7, 1941. DHJ reports no traffic handled last month. KHB was at the Gary picnic. YWE is back in Knox temporarily. LPQ is working for Delco Radio Division at Terre Haute. Lt. OUQ recently was wounded for the second time. In his 18 months or more of overseas duty, he has received the Purple Heart and two commendations from his superior officers. S/Sgt. UCT has spent two years in Kentucky for the Signal Corps and thinks that is about as long as any Indiana ham should be required to stay in a foreign land. DEE is finishing a communications officer course at Yale. BQH is studying to be a radio instructor — overseas duty. WFO, a friend of AKJ, was one of DEE's instructors. UKN has been away from Evansville for over three years and says, "Believe me, I am ready to go back." He wants information on VIA, KVE, GZB and VMW. He is a BOQ, USN. HKP is a sgt. at Camp Rucker, Ala. He was radio instructor for two years and is now a technician. He wishes information on HJW. DNQ was the only Indiana ham at a Camp Crowder hamfest. SVH thinks we all need a few evenings on the air to pep us up. 73, *Herb.*

KENTUCKY — SCM, Darrell A. Downard, W9ARU — I used to say that it would take a war to make the ORS in Kentucky report to the SCM. Well, we have *that* and still I can't get anything out of the fellows who are not in the services. If the gang in England, Germany, France and the Pacific islands find time to drop the SCM a line, you guys here in the States certainly can find time to give me a report on something that the boys would like to hear about. Asa Magruder wrote an interesting letter from the Pacific. He mentioned names instead of calls — thought the censor might think he was trying to put something over. Roy Kolo — the same location — says by V-mail that he sure would enjoy being on the "YL observation committee" at ARTS right now. We are informed that the stork made a direct hit on NBD's house. It's a boy. The Louisville WERS put in a full day on the paper drive and handled plenty of traffic. Eats were on the Red Cross. CNE was heard eating lunch over the entire 112-Mc. band. URG, in England, says that temperature over 60 degrees is a heat wave and a drought is two consecutive days without rain. Ed Wallace built an "ARU antenna coupler" that is the last word. DFW's latest invention is a 112-Mc. crystal receiver. Best DX so far is 3 ft. 4 in. from the transmitter. Colvin is using Iroquois Hill to test his new portable. R8 at 7 miles is not bad. SFD got his picture in the paper during the paper drive. A game at ARTS meetings makes dinner interesting if not filling — it is called "Find the Meat."

MICHIGAN — SCM, Harold C. Bird, W8DPE — 9YNY reports that he has been in the Signal Corps for two years and is now pounding brass for an aircraft warning outfit. He also reports doing a lot of experimenting with beam antennas and says they sure suck in the signals from the States. The V-beam, which they use for receiving press signals, works the best there. His address is: Sgt. Wilbur Kuure, APO 322, c/o Postmaster, San Francisco, Calif. He would be glad to hear from you. 9BRD is with him. Louis Gerbert writes that he is rather lonesome in his spot and would appreciate hearing from any of the old gang. His address is: Louis Gerbert, RMlc (T), USN c/o Fleet Post Office, New York, N. Y. Write to him, fellows. Radio Aide Paul Bauerle, of Lansing, reports that WERS practice drills are held on schedule. On one of their drills they had a hidden transmitter hunt. Unit 6 was "it" with a keyed audio tone sending the call. It gave the mobile units a good work-out. This winter they expect to improve their antennas. 8GP, who was stricken with a light case of infantile paralysis, is very much improved and is now resting at his own home. The next DARA meeting will be held at his home. The last meeting was held at Mike Stalmach's home. After the meeting Mike showed moving pictures which were taken while he was on a trip west before the emergency. Rus Sakkers writes again and would like to hear from the gang.

He wishes to pass his regards along to all the boys. Sgt. Francis X. Martin also writes us that he has mailed a letter to ARRL complimenting them on their good work there. He would like to pass his very best to the Michigan gang, and also C. E. Wood and J. D. Tigg, associate members of the ARRL. He wishes also to extend best wishes to WERS and all of the active members. Keep up the good work in WERS. It is a potential school for future radio operators and we will need all the support when "that day" arrives. The WERS gang at Centerline is still carrying on drill schedules and reports everything going very nicely. Radio Aide Ray Devore is doing everything to keep up interest. The Pontiac WERS unit is still carrying on. They have added three stations to their growing network and have been having some very interesting and educational drills. The locating of dead spots has been one of the things that have been developed. Also they find that the height of the antenna has very much to do with the low-powered stations working distances. At recent meetings the DARA has begun to take up problems of postwar planning with the idea in mind of trying to help the fellows who are not able to sit in and voice their opinions. It would be a good thing for former members of the QMN Net and the Michigan gang who are receiving *QST* regularly to write their ideas on what they would like to do in the matter of postwar planning. Your SCM would be delighted to get this information so that it could be talked over at these meetings. Remember, we are planning for you and your ideas in this matter are very important. If you were able to attend these meetings I am sure you would have an idea to put forth. 73 to all the gang, *Hal.*

OHIO — SCM, Carl F. Wiehe, W8MFP — I am very sorry to say that because of a lack of material I have been unable to assemble my SCM report this month. I hope to do better next month.

WISCONSIN — SCM, Emil R. Felber, jr., W9RH — RT1c OUT, of Kaukauna, has received his traveling orders after two years of schooling. We would like to hear more news of the hams in the Fox River Valley. T/Sgt. OEB reports while sitting in a little country pub (tavern). He got the urge for a little brasspounding, so tapped out a CQ with a shilling on the pint glass and, lo and behold, received a reply from a BRS licensee who turned out to be an operator of G5RU. 8WHB, formerly of Cincinnati, is with American Airlines, Inc., in Washington, D. C., and noticed his name is the same as IZO. He wants to swap letters. Capt. JWT, USMCR, V-mailed that while he was on an aircraft carrier in the Southwest Pacific he met Comdr. "Doc" Wyman in his official capacity. Many hamfests of their own followed. SYT has been transferred from the Navy section of RCA to the Signal Corps section. ESO is the father of a jr. operator. T/Sgt. FQO is in New York. Ray Charney, RT3c, is in Australia. Cpl. Gilbert Rink is somewhere in France. 1st Lt. Sid Rose, Air Transport Command, writes regularly from India. Don Merten is in England as an expert consultant to a major general in the ETO. Lt. (jg) ANA, USNR, is somewhere in the Admiralty Islands. JPS, ACRM, has been assigned to an aircraft carrier. Capt. FY has a new address in the same war area. Lt. Comdr. SO, USNR, is back in California after 2½ years in Newfoundland, Greenland, Iceland and England. Sgt. Bernard Kellner wrote from Texas and would like to hear from SYT. AFW, ART1c, is stationed in Florida. Comdr. DTK, USNR, writes from Alaska that they have some wonderful fur parkas up there for ladies at $250 to $500 plus 20 per cent tax. ANK, T4, is back in England and is studying French. ZIE, RT2c, has been transferred to a USN repair base in California. T/Sgt. Eugene Berens is now stationed in Nebraska after a long stretch of service in the South Seas and said he's disqualified for another tour of overseas duty. The Milwaukee Radio Amateurs Club is again holding weekly meetings every Thurs. at 8:00 P.M. in the Conference Room of the Milwaukee Public Library at 818 W. Wisconsin Ave. Visitors always welcome. The Milwaukee WERS report of WMFI: Unit No. 21 took to the air from the City Hall on Aug. 30th. No. 14, located at the West Milwaukee police station, is ready. No. 16 is waiting for the antenna installation. Units 11 and 15 are being built and should be ready for operation by Oct. Ninety per cent of the 30 stations are in operation every drill night (Wed.) The roll is called at 9:00 P.M. and message handling is practiced. New operators are being instructed and more are wanted. If interested get in touch with Radio Aide NY at the police radio station or come to any one of the club meetings where applications may be had. 73, *Emil.*

DAKOTA DIVISION

SOUTH DAKOTA — SCM, P. H. Schultz, W9QVY — TXK, a cousin of our faithful correspondent, ZBU, was wounded during the invasion of France after serving in the African and Sicilian campaigns. He is now in the hospital at Topeka, Kans. SBF says he is getting his *QST* in France and it is a very welcome piece of mail. He has constructed a "Dukes Mixture" receiver and says it is OK except that the Jerry equipment just doesn't operate up to his standards. More news please, OMs. 73, *Phil.*

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — This SCM has often said that there's nothing so good as being back home again. In making a trip around the globe one becomes impressed with the fact that there are quite a few countries one would not care to live in, and home and the U. S. looks better than ever. It's fortunate that some of the fellows like BHY, who never run away from work, stay put to keep the column alive. Sometime I shall try writing a bit about the hams one contacts while out. Several wish to be remembered to the Dakota Division gang, including K6OD, VK6JJ, VK6NE, G6OS, 4ICQ and 6TDO. ARRL wishes to have a record of the service performed by all amateurs in furtherance of the war effort. It should be obvious now that you cannot take too much time in getting this in to them as they wish to weld it all together into a solid band of conclusive reasons why we should have our full prewar privileges back again. OOK, s/sgt. with a signal repair company, has been taking a special course at Ft. Monmouth. EHM, with the U. S. Immigration Service, has a new home at 88 N. Spring Garden Ave., Nutley, N. J. ICU, still in defense work at Ft. Monmouth, resides at 112 Monmouth St., Red Bank, N. J. Wally Lamb (operator license) left for active Navy duty. DOY breaks forth with a newsy letter from 3816 "Q," Galveston, Texas. Any of you old saltwater B-Ps that remember Don will find him readily if you ship in there for he is apt to have his leg over the rail before you have docked. WLK is doing laboratory work in New York, developing some special radio gear. TEF is RM3c and can be reached c/o Fleet Post Office, San Francisco. DYH has made ART1c and is now with a fighter squadron. BRC is RT1c at a radar center. GRH works for N.A. Aviation and lives at 1134 West Blvd., Los Angeles 6. QZK is with the U. S. Marines near the Marshall Islands. KET acquired a YF in June; he is now at sea on a new C2. KFF cut short his leave to sail on a tanker. His mailing address is c/o Fleet Postmaster, San Francisco. Ex-PTU, Air Corps major, is now stationed at Kissimmee, Fla., and he and the XYL became proud parents of a baby boy on May 24th. Before this report reaches print FUZ will be out again and can be reached through the same fleet postmaster, or at the Los Angeles address. Don't forget these two requests, fellows: more news and send in the dope on your war job or service record. 73, *Army.*

HUDSON DIVISION

NORTHERN NEW JERSEY — SCM, Winfield G. Beck, W2CQD — Here's hopin' all you fellows will send me your report of WERS activities during the hurricane. The WERS gang of the Borough of Roselle, including EUI, CSL, Bill Alzenauer, CQV and CQD, really swung into action, putting two base stations and the mobile units into service about 7 P.M. As the telephone and power lines came down, WERS took over communications between Borough Hall and the firehouse where the base stations are located. The mobile units reported fallen-tree road blocks, "hot" wires and generally acted as liaison between the various defense units in operation. All of which proves that the weekly WERS drills have really been valuable. The gang took to this emergency like ducks to water — and did we take to water! And here's a big bunch of roses to Bill Alzenauer who got out of a sick bed to put his mobile unit on the air and do a swell job. HFP and EUI (now the Roselle Radio & Television Service) are going full swing after 7 P.M. beside working a full shift at Eastern Aircraft. Haven't received a single letter from you guys so, gang, drop me a line and give me sumthin' to talk about in next month's column. 73, *Win.*

MIDWEST DIVISION

KANSAS — SCM, Alvin B. Unruh, W9AWP — TVF writes from overseas, c/o Postmaster, San Francisco to reminisce over the bygone wars fought while in the Kans., National Guard encampment with LFB, chief at KGPZ

AWP, your humble SCM, and a flock of other hams "under 38" and now overseas. It was a nice tea party. JTN, HCU and RMJ are flight-checking radar on Boeing superforts. The ground radar check and trouble-shooting crew includes QQI, BCZ, AWP, 5HHF and others. Inspectors include FYD for Boeing and KNQ for the AAF. DMF is attending "future radar" school for Boeing-Wichita Engineering Department. LFB took a trip to police radio stations in Kansas and surrounding states for KGPZ, Wichita police. ICV, chief at KGZC in Topeka, reports the new c.w. rig is in service. Several of the Kansas gang are building v.h.f. receivers and converters to monitor the v.h.f. aeronautical frequencies and report distances that would make the old 2½-meter boys go into hysterics. Interest in wired wireless is also reviving. NOTE: If you are tired of reading about the SCM and his buddies, patronize the U. S. mail. 73, *Abie.*

MISSOURI — SCM, Mrs. Letha A. Dangerfield, W9OUD — TTP of St. Louis sends a letter saying that he is attending radio school at Uncle Sam's request, and he and 8QUQ, of Buffalo, N. Y., are putting together an all-wave receiver for use in the barracks. ZXX is attending the Navy radio school down in Clarksville, Ark. Wes says the course is really stiff. GHD says 5KAD and 6OMO are with him up in the Aleutians now, and he has heard from 2DXL who has been shipped out. Dave says the fog lifts sufficiently about once a week for a mail plane to come in, and he appreciates some letters when that happens. TGN wrote again, but added nothing in the way of news to last month's report that he has changed oceans; he is now in the Atlantic. BMS has built a small trailer, dreaming of the time when he will have a boat again and gas to take it down to the lake. OUD still does some monitoring and listens to press schedules occasionally to keep up the code speed. How about some news, or at least some letters? Best regards and lots of luck to you all.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — 9ANK, formerly from Wis., recently visited LZH while in New London. TD reports a visit from 5BXY of Abilene, Texas, a lt. in the AAC stationed at Yale University. KKS sends 73 to the gang from Calif., where he is still with the FCC. Bill has been advanced to principal radio operator and says he is in the market for some No. 620 film if any of the boys can obtain same for him. WERS news: WKWG, Waterbury — EEM, district radio aide, writes that meetings are held the 1st and 3rd Thurs. of each month at the QTH of WKWG-70. A new coax. has been installed at WKWG-2 and is operating very satisfactorily. WKWG-70 is planning to erect a new 40-foot tower. WKOB, New London — NEK, district radio aide, reports that quite a few of the operators meet every Tues. in the City Garage to work on new units. Several transmitters and receivers for 224 Mc. are under construction. WKJA, Torrington — BIH, EC, reports for KXB and Eddie Toleski, district radio aide and deputy respectively, that 7 mobile units are now in operation, including one in Winsted with fixed units for the main control and for out-of-district relay station. With the latter WKJA works the Hartford and Waterbury relay units consistently on the Mon. night inter-district test periods. All units stood by during the hurricane but their services were not required. BIH and KXB are contemplating the rebuilding of their amateur rigs for the future. WKNQ, Middletown — DBM, district radio aide, informs us that the WERS group were well represented during an exhibit held in the war council booth at Middletown Victory Garden Fair Sept. 9th, with a typical WERS station plus a walkie-talkie and a portable on display. Pictures of other units were posted on the walls drawing very favorable comment from the Governor and other state and municipal officials. WJLH, New Haven — An outing of WERS operators and guests was held Sept. 17th in Mt. Carmel. Howard Dickerman, Hamden assistant radio aide, was chairman and did a very nice job with the arrangements. JQD operated the hidden transmitter, which was located by Taber, WJLH-11, after some difficulty. WJLH-25 and WKWG-43 were next in order to locate it. Both sides of the conversation between portable-mobiles and the hidden transmitter were picked up on the grounds and amplified over a p.a. system so all present could hear what was going on. EAO, state radio aide, and Martin Cattaneo, state communication officer, were present along with WMHC-33 from Hartford, WKWG-70 from Prospect, WKWG-62 from Cheshire and WKWG-43 from Southington. An indoor baseball game between the male and female operators was won by the former after some difficulty. EAO umpired the contest. Club news: Radio Aide Tuttle and Galor of Cheshire and Saunders, Southington radio aide, all in the WKWG district, attended a recent meeting at GB in which postwar amateur activities were discussed at length. Although we have not a complete story on the activities of WERS units during the hurricane, it is known that the WKWG, WKNQ, WKAO, WJQA, WJLH and WKOB units were in operation. Field Day acquaintances were confirmed personally at GB on Sept. 22nd when 9EYK, a lt. in the AAC stationed at Yale, and a member of the St. Paul, Minn., Radio Club, dropped in for a visit. 73, *Ed.*

MAINE — SCM, G. C. Brown, W1AQL — JSY writes in that he is the only ham left in Ft. Fairfield; he also states that he has an emergency rig under construction. IMC recently spent a vacation in Bangor and vicinity. IBR is back with the Customs Service at Coburn Gore after having been engaged in defense work in Burbank, Calif., and Bath, Me. AUC is still in the State of Washington. LYK says that only 5 of the gang are left in the Lewiston-Auburn area. LSK, IJX and Don Mason are in the merchant marine. INW is still with the FCC, but has moved his family back to Lewiston. LOZ is a lt. col. in Europe. HMS is with the CAP. IGW, HUT and LYK have purchased new homes and each has picked out a radio room for the postwar days. LEF is a Navy operator somewhere in the Pacific. LIZ is in the civil service at Colorado Springs. DEG is still at the Harvard Laboratory and the Mrs. is expecting a call from the stork soon. Ex-BKU is the proud father of twin girls. CBV is interested in carrier-current; he has one rig completed and is working on the second. Anyone interested should contact "Mac" at Dow Field. Your SCM has been appointed assistant director to cover the Maine section and will report directly to ARRL Director, Percy Noble. If any of the gang has any ideas or suggestions relative to frequency, power, etc., for a postwar set-up, your letters will be very welcome and your wishes will be sent along for consideration. Thanks a million for the fine letters received from AUC, JSY, LYK and IBR. 73, "G. C."

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — WERS news: On Sept. 10th a state net test was called by GAG, director of radio communications, to see the strength and effective coverage of the state by WERS on 2½ meters. A few heard here in Quincy were: HPC at WJQH-4 in Newton; EAU at WJYM-1; ALP, LZW at WJYM-6 in Quincy; GAG at WJPY-5, and GDY at WJPY-3 in Boston. BB, BDU, DJ's XYL and DRO were on WKXH in Winthrop. Salem was heard and we hear that Lincoln, Lawrence and Weston were on. To all of you radio aides, how about a report on any of these tests? This test was just about cooling off when we were warned by radio and the press that a hurricane was headed this way. On Thurs. night, Sept. 14th, it started. All WERS stations were told to activate by the headquarters of the Mass. Public Safety Committee in Boston. KTG was on at WJQZ in Cambridge. DJ and XYL, DRO, GGP, BDU, NMX and BB were on in Winthrop and handled one fire alarm incident. EAU and ALP were on at WJYM-1 and 6 in Quincy. NBC was ready in Weymouth. L. Russell in Needham had three units ready with battery supplies for all stations in case the power failed, but very little traffic was handled because of the light damage caused. He heard Newton, Belmont, Walpole and Wellesley operating. Several stations in Boston were on just in case help might be needed. AHP, radio aide for WJSU in Fall River, sent in a report on the WERS work during the storm. They were ready to go if needed. AHP wishes to give credit to the following persons who were on the job: GDJ, assistant radio aide; James E. Ryan and Mrs. Madeline Bridge, assistant radio aide for Somerset; CRN, assistant radio aide; Franklin Wood, monitoring officer, and Gibert Garnett, radio operator in Swansea. MXG, 2nd radio operator on a ship, writes at sea. JOH is now on a Liberty ship in the merchant marine. MQB is at Navy radio school at the U. of Wis. MSW has bought a new house in Hanson, Mass., and sends in a list of hams working at Hingham Shipyard: MSW, ex-AIF, GLP, DUP, HVV, ex-CEZ. 2MHG is now in Washington, D. C. Ex-8CDL has been in Cambridge for awhile. More hams at M.I.T. are: Ex-DQG, AME. LVV has gone into the Army. MLL is working at Harvard. MOR says he has his Class A ham and 1st-class radiotelephone licenses. MTQ is working at WMEX in Quincy and he has 1st-class 'phone and 2nd-class telegraph licenses now. LVD has his 1st-class 'phone license. EPE is still with FCC. EYY is a sgt. in the Army doing radio work at Camp Shelby, Miss. LQB is now

CRM in the Navy. MBG is still in the Coast Guard Temp. Reserve and says things are quiet in his town. COX is now working in Boston. Sgt. MQV is a radio man at Castle Island. BPH is now living in Tewksbury. Arline Berry, secretary of the Waltham Amateur Radio Assn., says they held a meeting on Sept. 15th at her QTH with the following present: Sgt. JCI and John Claffey, both home on leave, KLY, DMG, LHV, LUW and XYL, LUG, LSD, KXV, MLN and Don Berry. LSD has a new son. JCI met KCQ in San Francisco. KCQ is now in Pearl Harbor. JFS had a visit from LTR and LTS and says he gets many letters from MQE in the Pacific. ADE is living in Danvers and working for the B&M in Boston. JNK was home for ten days in July. KTY is living in Danvers. ZZC is in England. JZV is a t/sgt. in the Signal Corps and is going to school at Press Wireless, N. Y. JFS sends 73 to all the hams in the services and would like to hear from any of them. NKW says he has an NC-45 for sale. ALP held a test at WJYM-1 with LZW at WJYM-6 and HHU and Jack Donnelly at WJYM-7. To anyone who is willing to help out in WERS in this section, here is a list of the cities and radio aides: Belmont, AJW; Boston, KDF; Brockton, IWG; Brookline, LAD; Cambridge, KTG; Dedham, KCT; Easton, MTQ; Fairhaven, D. H. Sleeper; Fall River, AHP; Haverhill, KBQ; Lawrence, ACM; Lexington, KOR; Lincoln, IMI; Lowell, MKX; Malden, GAG; Needham, L. Russell; Newton, W. W. Hartford; Norwood, HSB; Provincetown, LRO; Quincy, EAU; Salem, MF; Somerville, C. A. McElroy, jr.; Walpole, IXI; Watertown, HGU; Wellesley, MP; Weston, NPZ; Winchester, HUV. In a great many cases other cities are included under the license of the above cities under the regional plan of the Mass. Comm. on Public Safety. 73 till next time, *Frank*.

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — Will have to rely on the grapevine for news this month. JAH visited BVR recently, and while there went out with Perce and WKHF-55. Heard a swell WERS drill, with a good percentage of the hundred or more units of WKHF in action. During the recent state-wide WERS test, WJPG-1 was stationed on Mt. Greylock, with WKHW-16 on Windsor Mt., to give two possible routes east to WKKW, Northampton or WKHF, Springfield. It worked out fine, since WJPG-1 developed transmitter trouble, and the alternate route via Pittsfield and WKHF-16 was a lifesaver. From Mt. Greylock the WERS nets in Pittsfield, Springfield and Northampton, Mass., and Greene County, N. Y., are like locals. Pittsfield net drills on Mon. nights are a pleasure to listen in on; short, snappy and to the point. Had a nice visit from Walt Barrows of WKKW-2, and tried to work out best set-up for statewide tie-in. Units of WKHF and WJPG were out and rarin' to go the night of the hurricane, but fortunately the Berkshires were out of the path of the storm. No reports have been heard as yet from other WERS units. How about some news, gang? 73.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — Mail from the boys has been among the missing. However, here's the little that I have been able to dig up: APK expected to go to Washington to be in on a postwar radio conference. JBA is the proud father of a baby daughter. MZV has been made chief, and has been transferred to the West Coast. JCA was home on a short leave recently, and now has a new QTH. ILN sent us a V-mail and told us that he ran into two hams in his outfit — one an American chaplain and the other an RAF officer. KKQ writes that she has been seeing Miami from the seat of a bicycle! AVJ and family are back home again from summer vacation. HFO dropped in on the SCM recently. Seems good to see visitors in these gas-less (practically) days. LVG keeps us informed of his doings and says that he has been trying to get a radio built, but can't get enough of the right parts. BFT is home on a 15-day furlough, so guess that this winds up the report from the SCM at this time. 73 to all, and *please write me some news*.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — Norm Gertz is now a lt. in the U. S. Marines. He has left Tinian and says where he is now they need a record player as they have heaps of recordings but nothing on which to play them. He will send the "dough right pronto" if somebody will just tell him where there is one to be had. Write to the SCM for his complete address if you can fix him up. Win Armstrong got married and is stationed at Marshfield. He has taken the 2nd-class commercial exam and has received a temporary license. We had a call from Roy Glodell, ex-BFV, recently. It's Major Glodell now and he is on his way to Bolivia to do communications work. He showed us his dress blues, etc., and some mighty fine pictures of the new volcano in Mexico. He has conquered Portuguese as well as Spanish. We did a little trading in junk before he left. JXA has invented a wind-gauge and weather-vane combination that records wind direction and speed on a set of dial-lights inside the house which is something worth watching. JP has been quite successful recharging flashlight cells. He says the rechargers last longer than the new ones. EX is back in town. Now that Al Hyde is elsewhere Herb is holding down the territory that Al used to cover. The hurricane nipped up an awning for me and I'm hoping to be off on a vacation next week. Got a mountain to climb. 73.

VERMONT — SCM, Burtis W. Dean, W1NLO — CGV is stationed at Treasure Island and is enjoying the California sunshine. A letter was received from MZO, who is taking his boot training at Sampson, N. Y. Before going into the Navy he was at Tufts for 2½ years taking E.E. Larry reports that NAG is in the Navy at the Great Lakes Naval Training Station after graduating from Northeastern in E.E. Norma Remily (LSPH) and Dolores Staab (LSPH) have their 2nd-class telegraph tickets. JLF is living at 127 Chicomansett Village, Willimansett, Mass. JRU's QTH is 41 Mapleton Ave., Suffield, Conn. AVP visited GAN and family. NHJ is studying radio in the Army and is stationed at Camp Crowder, Mo. Cpl. Evans (LSPH) was home for a 10-day furlough. NLO has acquired an Abbott MRT-3. At the annual meeting of the BARC the following officers were reëlected for another year: LWN, pres.; Ray Fields, vice-pres.; NLO, secy. and treas. BD, KJG and Professors McKee and Buchanan of UVM were elected honorary members. The club is giving a course in code and theory at the Burlington High School Evening School. Thanks, gang, for those FB letters and cards. 73, *Burt*.

NORTHWESTERN DIVISION

MONTANA — SCM, Rex Roberts, W7CPY — FGZ has moved to Libby. BMX is back from England. A nice letter was received from BBS. He is carrying on FB at Anchorage, Alaska. IBI is also there. XYL of FL, please mail me FL's and your address. Butte Club notes: The annual hamfest was held July 16th at Basin and was a huge success. Fifty-one were present, including 9CUC of Ironwood, Mich. Code classes are being held again at the home of EQM. They report four more new members. Harry Baker, S1c, was home. Another hamfest was held on Aug. 27th, and although the attendance was not quite so large (35) it was a fine get-together. HDM reports from Camp Stewart, Ga. I am sorry some of these notes are late, but the SCM was on vacation last month. 73.

OREGON — SCM, Carl Austin, W7GNJ — HWY, formerly of Seattle, is now a resident of Klamath Falls. He is a radio electrician with CAA. A report from HLF says he has taken over the job of radio aide for Medford WERS. A wind storm took their No. 1 antenna down, and they are having difficulty getting guy wire. GUP and HWH are on the active list, the latter tuning up a composite job. FAL is still pecking away at the new ranch, working from dawn until dusk. He lost 35 lbs. during the hot weather, but still tops 175. CZJ picked up a Utah jr. transmitter, and is rebuilding it for 40 and 80, using a 6F6 and a 6L6. Pop is also touching up the big rig for postwar activity. HCW is in Seattle attending precommissioning school and, from his picture, looks happy, hale and hearty. GNJ runs a bike shop, but when he moved to a new business location he found he had more radio junk than bike stuff. IHJ is back in the States from Italy, and is headed for Ft. Lewis. IHK, his XYL, was up from Los Angeles, visiting in Oregon and Washington. GTW tried to fly a 60-m.p.h. plane against a 60-m.p.h. headwind and was two days late getting home. It is rumored that FHX, "ole Dan'l Boone," is oiling up his trusty deer shooter. DXF has some very unusual experiences with his CAA mobile rig, the signal being rather unpredictable at times. 73, *Carl*.

WASHINGTON — SCM, O. U. Tatro, W7FWD — I regret to report the death of HXU of Seattle. Mabel was very active on 160-meter 'phone. GP is still with Boeing at Seattle and says that he listens in and copies c.w. to keep his hand in. CWY and family were recent visitors. HGT has moved to Olympia from Oregon and is relieving SA as operator for state patrol for radio maintenance work. CMX reports that AUP is trying to run a radio shop at Yakima without any equipment. CMX says he received a V-mail letter from FAQ in India stating that it is hotter than in Florida. He is in radio in the merchant marine. HML, who is

now teaching about antennas at Treasure Island, was home recently on furlough. IKG is operating in the merchant marine on a run to So. America. HNS is now a 1st lt. and is stationed in Texas. IHJ dropped in the other day from Rome. The major has had over two years overseas service, having served in the campaigns at Casablanca, Tunisia, Sicily, Anzio Beachhead and in the advance on Rome. He says men cried when the Red Cross ladies at New York served them milk. EKW was on furlough after 18 months service in the Aleutians, but has now returned. He said that it was the only place he knew of where it snowed uphill and where you could stand in mud up to your knees while dust was blowing in your face. JCS, now at Washington, D. C., says he is out of the technical field and is working on a gadget to gather fishworms. All accumulated information has been reported and this is likely to be the last report of this SCM unless more news is received. 73.

PACIFIC DIVISION

NEVADA — SCM, N. Arthur Sowle, W6CW — Ass t SCM, Carroll Short, jr., W6BVZ — TNP is stationed in San Luis Obispo, Calif. TJE, recently in Reno on leave, is a 1st "looey" stationed at Camp Pickett, Va. PST is again greeting the boys with his old cheerful broad smile; new Lucite u.h.f. food grinders, hi! This is our third report since I became your SCM and you will note it is very short. The reason is that we have exhausted our personal supply of news and have received none from you. Please realize this is *your* report and can be no better than your reporting, plus our humble efforts of assembling what you submit. Now, altogether gang, make with the pencil wherever you are, at home or abroad, and keep them coming. Pardon the lecture, boys and gals, but we dropped the crystal ball and smashed it all to pieces, so now there is no other way left to get news except from your cards. 73, *Art.*

EAST BAY — SCM, Horace R. Greer, W6TI — EC, QDE; EC u.h.f., FKQ; Asst. EC u.h.f., OJU; OO u.h.f., ZM. A nice letter was received from LJC and Andy reports everything is still under control. He got married on June 29th while in New York between trips on the Atlantic. He is a staff officer on a transport. Drop him a line: A. B. Wilson, Room 717, RCA Bldg., New York 20, N. Y. TI has returned from a few days vacation in Los Angeles. Oakland WERS had its regular meeting Sept. 21st at the City Hall, according to Radio Aide EE. How about you boys in the services dropping me a few lines so I can pass the dope along to the gang? EY is on his summer vacation in No. Calif. ZX is a proud pop with a brand-new girl in the family. GPY is with W. E. Co., New York. CBX is on duty in the Pacific. Another day closer to victory. *TI.*

SAN FRANCISCO — SCM, William A. Ladley, W6RBQ — EC, 6DOT. FBM, a court reporter from San Bernardino, visited relatives here recently. MZ has completed a new radio room and all is in readiness for the big day. NRP, of Arizona traffic fame, visited PGB and a real session followed. 9QWM is now at T. I. and visited RBQ. 9ILH and 9ICN will soon leave for a visit home before moving to San Diego, Calif. A letter from HLP arrived from the Marshall Islands, where Art says all goes well. The following news was received from SFW, whose address is A. J. Sadler, c/o Postmaster, San Francisco, Calif., "Lee Beardsley was operator on the first Victory ship to pass through the Panama Canal. RZC is operator on a C-2 type ship in the So. Pacific. ROO is in New Guinea and was married while on furlough recently. RMN, who is operator for the merchant marine, met K6RVG, a plantation manager in the Islands, and visited a sugar refinery. Would like to hear from SOM, OIZ, POW, TQT and STK, all in the Navy." 7IBC visited RBQ. Bert, whose home is near Spokane, is RM1c, and is standing by for a new sea duty assignment. Visitors at RBQ this month were 9WWB, Pueblo, Colo., now living in the San Francisco section, and two of his friends, CRM 5IXT of Houston, Tex., and RM1c 9UXN of Pueblo, Colo. Both of these hams have served throughout the So. Pacific, Guadalcanal, Saipan and all the big battle areas. This is their first sight of the U. S. A. in many months. Lt. T. J. (Pinky) DeLasaux of the San Rafael Radio Club, returned from the So. Pacific, but will return to sea duty soon. PPO, now 7JEA, is here from Seattle. Wally now has his master's papers and will sail his own ship for Army transport service. According to latest reports the first hearings on radio frequencies will be held in Washington on or about Sept. 28th. The League will be well represented, according to information received from Director McCargar. Now is the time, fellow amateurs, when we should all make it our business to line up as many new League memberships as possible. We are going to need all the help we can muster both numerically and in dollars to make the return of our frequencies an actuality. It's the duty of each of us here at home to make the fight for those of our fraternity on the battle fronts. Let's do something about it now. Eimac celebrated their tenth anniversary on Sept. 9th. Employees' families were invited to inspect the plant and become acquainted with the conditions under which their relatives work. Here is a firm of hams who have not only done a commendable job in behalf of the war effort but they have unselfishly turned thousands of dollars back into making their employees a most contented group. RBM, USNR, is ill and would like to hear from any of the old gang. Address: Jim Fakkema, RT1c, U. S. Naval Hospital, Ward 7, Mare Island, Calif. Jim's father has taken out a ham ticket and is also active in WERS. IPH is still in Corsica. CIS met with an accident recently in the Admiralty Islands. Ken fell and injured his knee, which required several stitches. RAH will soon be a resident of San Francisco where he will carry on for Raytheon. More cards will be appreciated. 73, *Bill.*

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, H. F. Hekel, W9VGC — Acting SCM, Howard R. Markwell, W9TFP — VGC is now home and doing fine, but will not be able to do much for a couple of months. He says he will be back on WERS as soon as the doo and Mabel are willing. A wind storm took down a large limb from the tree next door, which tangled up with Heck's antenna systems. ZYN is working as a radio mechanic with the Air Transport Command at Long Beach. He says hello to the gang and would be pleased to hear from them. His address is 1928 Lewis Ave., Long Beach 6, Calif. I expect that by the time you read this there will be an XYL there. OLL was here for a couple of weeks during the latter part of August, working on a radio project at Buckley Field. He is now back at Hill Field. TLM (Denver's tiny little man) is swamped with work. He is a traveling auditor with the state auditor's office, and because of the man power situation, can't get any help, so is trying to do three men's work. EHC says hello to the gang, from the Pentagon in Washington. He says that about one-half of the officers there are hams. They now have quarters at 326 Raymond Ave., Alexandria, Va. PDA is back teaching radio after a summer refresher course at State Teacher's College. CAA is working on a new WERS transmitter-receiver job and of course with the usual "CAA connections" he is having a bit of fun, headaches, etc. CNL is getting ready to finish his WERS job after returning to Denver from Calif. ESA is also working on his WERS job. He has his transmitter ready and is working on the power and antenna now. EZL is still in Hawaii, but has been moved back into the hills where he says it would be a ham's paradise; he has met several K6s, including K6THR, who worked on 10- and 20-meter 'phone. He also reports that OMZ is somewhere in Italy with the Army. FNL is now a 1st lt., in Normandy with his brother. ZMI is a t/sgt. somewhere in the States. HPA is learning to be a telephone repeater man at Ft. Monmouth, N. J. WQO is with an airborne signal outfit in Tenn. BQO now has a TR-4 on WERS and is putting a fine signal into town. MGX and Erickson are hauling peaches and other material from Grand Junction to Denver and vice versa, via railroad. Don Wells, WERS-27, has just finished a new antenna system, which appears to be about the best in Denver. He is also planning a 2½-meter super. ACB and TFP, a couple of would-be deer hunters, went deer hunting the week of Oct. 8th. 3JIN has been made an inspector with his radio job at Lowry Field. WYX is still a very busy man taking care of the police state patrol forestry service and several other small jobs. ACA is operating WERS-20. QYT is planning a new transmitter and a super for WERS. WERS-4, Bob Hawley, tried a reflector on his 2½-meter antenna a few Sundays ago but soon decided in favor of the old system. Radio Aide BQO held a WERS meeting Sept. 15th. After motion pictures a fine discussion followed. Don Spaulding, WERS-3, furnished several fine shorts. The JCRS Hospital donated the auditorium and an operator. The gang expressed their appreciation to Mr. Freedman of the hospital, Mr. Rubenstein, the operator and Don Spaulding. Those attending were KFND-30, 8, 9, 22, 4, 18, 14, 2, 24 19, 31, 28, 16, 3, 17, CNL, Lindsey, Anderson, Hall, Jobe and Wilson. I hope that I haven't missed anyone. 73.

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A LITTLE over a year ago, we used this page to discuss the general awkwardness and confusion resulting from conflicting symbols in electrical wiring diagrams. The symbol for a fixed condenser in radio diagrams was the same as a contact in a power circuit diagram. A radio resistor was shown the same as a power coil.

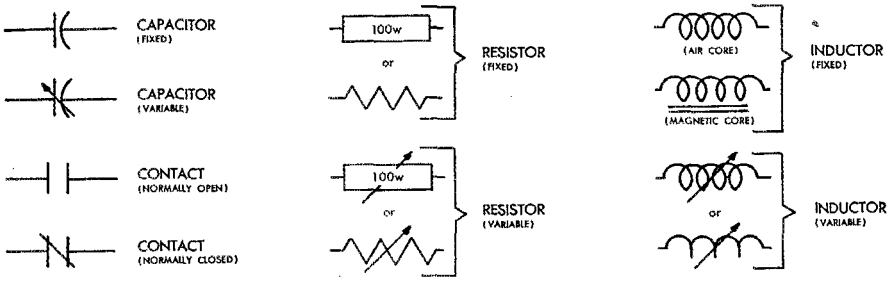
There was a time when this conflict made very little difference because communications, power, control, and measurement were pretty much separate industries, and the fact that they did not all use the same written language was not very serious. Principally due to the expanding use of electronic tubes, these fields have begun to overlap and the confusion has become serious for the industries affected.

Since writing our page a year ago, real efforts have been made to coordinate symbols, and the work is still going on. We would like to think that our page helped bring matters to a head. That is something we will never know. At all events, revision of graphical symbols was begun in January of this year at a conference of interested parties held under the auspices of the American Standards Association. By March, agreement was reached on a series of coordinated symbols, and these were published as a War Standard. A complete booklet entitled "American Standards for Telephone, Telegraph and Radio Use" will be available about the time this issue of *QST* reaches your hands. It may be obtained at nominal cost from the American Standards Association, 33 West 39th Street, New York.

We are listing a few of the more important radio symbols below. However, we urge all those who make extensive use of wiring diagrams to obtain a copy of the standards.

We think the men who worked out the new symbols and won acceptance for them by industry and by the engineering societies, have accomplished a miracle of compromise. They deserve the thanks of the whole electrical industry. We, for one, think they have done a magnificent job.

DANA BACON



Amateur Activities

(Continued from page 66)

SOUTHEASTERN DIVISION

EASTERN FLORIDA — SCM, Robert B. Murphy W4IP — BYF comes through with a nice snap of the local WERS station. Longfield-Smith and Browne are recent converts with mobile rigs. Mc claims a total of 5 mobile rigs and 30 stations on the air at various times. They were all alerted and on their toes during the recent hurricane scare. ES has left for Chicago and N. Y. EYI comes through with the following report: "EWS has been transferred from DE and has gone to N. Y. for reassignment. DWU was married and, according to a clipping, the bride is a real Georgia peach. GAC and CSJ are sure doing a nice job at WTSP." K4DDH passed through Miami while on a business trip to Washington and N. Y. Dr. Kendrick is a professor at the U. of Puerto Rico. ES and IP enjoyed their 39th and 43rd birthdays recently. 9EEY is a crew chief radio with PAA, Miami. JH was last heard of in Bremerton but probably is now in the middle of it somewhere in the So. Pacific. Bill is a lt. comdr., USNR, radio materiel officer. The following PAA operators from Brownsville are attending the local PAA radio school under the guiding hand of CNZ: 8IP, 5FIP, 6RJN and 5JKL. Bill Hazelton comes through with the following report: "FVJ is chief operator at WTAL and is planning to go over to f.m. at an early date. He has been a very active member of the State Guard. McMasters and Brundage, of the state highway patrol, have resigned in favor of the Army Signal Corps appointments they have received as special service men. Barnett, a member of the Signal Co. State Guard, is brushing up for a ham ticket, and is moving to California, where he will go into technicolor movies as a color expert." Bill is getting some new equipment from the Army. According to the State Guard "OWL" (apologies to Pop Jones), I see a lot of my old friends, including ACZ, Hollister of Jax and Norton of Miami. Tony seems to be having a fine time catching up with his dancing. A nice letter from CFP says that he is a chief yeoman at Jax. HXL (9GXG) is a pvt. in the AAF at Coffeyville, Kans., and is a proud papa again. CCR has returned to the States for reassignment after three years in the Caribbean area. CUZ, chief engineer with Sarasota Bcl, obtained duration leave to work with Westinghouse. CFP, chief yeoman, USNR, just transferred from Camp Peary, Va., to NAS, Jax. DUI returned to linotype after serving with the Signal Corps as radio technician. The State Guard unit is still functioning in Sarasota. Recently the power company set a 60-ft. pole for WERS work. Higson, an old 20-meter 'phone man, is doing defense work in Connecticut. Ex-CGA is a new State Guard signal unit recruit. DJO was back in the States after a tour of duty in England as AAF communications officer. 1P's jr. operator just returned from one of his world hops in five days; he is flying with ATC as a flight radio officer. Get your letters in. The gang wants to hear what you are doing. 73, *Merf.*

WESTERN FLORIDA — SCM, Oscar Cederstrom, W4AXP — 5IAO has taken unto himself a wife and is also a newly-made CPO in the Navy. He is stationed at one of the outlying fields here at NAS. One of our well-known hams, CQF, CPO, U. S. Navy, who is now stationed at Little Creek, Va., was home for a visit here with his family and friends. Jimmie was one of the old NCR gang. Denise, the daughter of Mr. and Mrs. George Wall, celebrated her first birthday Sept. 22nd. George is one of our code instructors at Bronson Field. Mrs. Sally (Walker) Dawson is now an ex-WAVE and one of the newest additions to our radio instructors' gang at NAS. Herbert Crowson, ex-RK and BFT, has moved to his own home on Navy Point. It is just a nice walk from where the OM lives, so he paid a call recently and a radio rag-chew ensued. He is a code instructor at Bronson Field. Bill Shedd has been under the weather but is around again looking as chipper as ever. DAO is kept very busy these days at the fish house doing two men's work. Leonard Pawley, one of the Navy operators at NAS, is the daddy of a 5½-lb. girl. Bill Langford is taking Class C exams this week. The OM is on the job now feeling fine and wishing he was back on the air again. A. P. Ludwig, Lt.(jg), has devised a new code training table for mass training of sending which is really the berries. Sally, our WAVE, has been on leave but is now back on the job. Joe Schuler and Bolton are assistants to the OM in the comm. training shop and are doing a swell job of it. 73 to all from the *Old Maestro.*

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GEORGIA — SCM, Ernest L. Morgan, W4FDJ — FAH, of Ailey, and later Butler, passed away at Crawford W. Long Hospital in Atlanta. We shall all miss "Dunc." DIZ, now a 1st lt. in the Marines, took unto himself a wife. We are sorry to hear that IS at Statesboro has not been so well. GFF landed in the Navy. BBE is somewhere in the Pacific area. His XYL competently carries on at Columbus. FCW's location is unknown. DDU attended a hamfest in Italy at which there were a hundred from all over the world in attendance. ERS and his XYL enjoyed seeing their "Junior," who was on furlough after a long tour in the Pacific. Indirectly we heard that VX is still busy at Columbus. EGT has returned to duty and found on his return that he was a full-fledged lt. Youse guys please note — when you send me the dope it gets printed. 73, *Pop.*

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, H. F. Wood, W6QVV — The lack of news from those on our fighting fronts is very understandable but I still don't see why we can't get more news from those at home. I have waited 'til the last bell, hoping that each day would bring some reports, but outside of "Old Faithful" AM and Inglewood's MSO, there just ain't nuthin'. Don Wallace writes that KGWE stations are now working up to 100 miles in their drill practice periods and that the crystal-controlled frequency meter at his place is working FB. Inglewood says that during the past two months or more the KGIC net has been quite active and that a portion of each of the regular weekly drills is devoted to handling simulated incidents and emergency reports. They are badly in need of additional operators. We hope that their recent examination for WERS operator licenses was a success and that a large percentage made the grade. Keep up the good work. Regular drills are held by the various KGLV units in their respective areas. Los Angeles City net and the whole network is operating quite efficiently. We still need operators who can spare the time so that each of the areas will be fully manned at each period. Regular monthly meetings are held by the aides and their assistants and plans are made for much more interesting drill periods than those necessarily held while rigs were being placed on frequency and antennas "pruned," etc. Don't let your interest lag for one minute in this most important job that we have been given an opportunity to do. We may be needed and needed badly, so keep up your equipment and your contacts. Be sure to notify us of any change of address or telephone number so the emergency lists can be kept up to date. SSU dropped in to town recently and reports that he is still "hopping around." He has been flying over the ocean so much that now he has a "hankerin'" to pound some brass on it. UQL writes that he has landed and his APO number has been changed to 980, Seattle. He is mighty anxious to get mail, even if he is a major. Still no word direct from MFJ. His XYL reports that all's well with him and he's still going strong, though, so that will have to be enough 'til he finds time to contact us. 73, *Ted.*

ARIZONA — SCM, Douglas Aitken, W6RWW — GC reports the continuing activities of the Tucson Short Wave Assn., with a new class under way. OZM and his XYL staged an enjoyable "foam" party with SGF, TXM, OZM, GS, IGC, OWX and their XYLs in attendance. Much discussion of future ham activities and future rigs, antennas, etc., held sway. Had a very nice and informative letter from OVK, who is still doing his bit for the war in Boston and vicinity. He says that SNT, RM1c, and SNU, ART2c, called on him and they had an FB rag-chew. He also says that EJN, former owner of KTUC, is in the same organization as himself. He tells of Curt Huff being ART1c in South America. We lose another FB Arizona ham when BUX moves to California. ROP is up and around again and we all hope it's permanent. NGJ has been giving 3rd-class exams to WERS hopefuls. JFO, DCQ and OAS had to take out state tax licenses because of their activity in repairing BCL boxes of their friends, as the regular shops kicked. Ask MAE about blowing up tubes in his WERS outfit — he did a wholesale job. ANO is reported to have trod that path to holy matrimony. NRP writes that he's all through with the fun at boot camp and is now at the personnel depot expecting a transfer to active duty. TCQ still raises cows down Willcox way, and is planning on a real rig when the shooting is done. He had a tough go with appendicitis, but is OK again. UKB is still in the Pacific and saw some of the Saipan scrap. RJN has been transferred to the Miami, Fla. district of PAA and will be on new Caribbean and S. A. runs. OAS is to be congratulated on

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the FB job he did in getting new ARRL members. Hope this finds the whole gang "tops" in every way. 73, *Doug.*

SAN DIEGO — SCM, Ralph H. Culbertson, W6CHV — Asst. SCM, Gordon W. Brown, W6APG — MEB was home for a short vacation. He is flight radio man for ConVair Ways and has just completed 32 round trips to Australia. NDF is CRM USNR. CDQ is s/sgt. at Williams Field, Ariz. OIN has returned to San Diego after six months with Raytheon and has joined ConVair as radio man, transporting planes to the East Coast. QKI is still a motion picture operator and has just acquired a new QTH which will make an FB radio location. OIN and QKI are interested and trying to start some activity in WERS. How about the rest of the San Diego gang giving them a hand? GOG is now civilian R.E. and is located at Crown Point. We have just received the sad news that MQH passed away Sept. 19th. 73, *Ralph.*

WEST GULF DIVISION

OKLAHOMA — SCM, Ed Oldfield, W5AYL — Business is picking up as a few letters came in this month. GZK assisted ESMWT at Ada in his old profession as teacher. HXB paid off with a telephone call recently giving an account of himself. He is a lt. in the Signal Corps and attended Harvard during training. ERF, formerly of Seminole, is a refinery engineer at Oildale, Calif., and is doing fine. GCC is now in the Navy. GKG was last reported in the Pacific theater helping to run out the Japs. ESB has obtained a 1st-class tel. license, which he uses occasionally at KGFF. The oil game is still his job, though. Thanks for the information, Bill. FFK went north to Fredonia, Kans., to work for the Mo. and Kans. Tel. Co. JMT, who monitored the bands at Oklahoma City for the FCC, has moved to Portland, Ore., by way of Aberdeen, Wash., and Salt Lake City, Utah. He is now principal radio operator. Lyle says he surely likes Oklahoma people and hopes to get back some day. Regards.

NEW MEXICO — SCM, J. G. Hancock, W5HJF — IOA is back in Albuquerque after two years' service with the RID of FCC. JWA is working hard between watches and battles on his RM1c examination. HDN is still sailing the high seas with the merchant marine, and would like to hear from some of the old gang such as CSR, GXL, DYV, CGJ, etc. Censorship will not permit publication of George's address, but I will be glad to give it to any of you fellows who care to write him. KCW was down to see the SCM recently, but the SCM was warned in time to make a get-away. Sure sorry, Coly. 73, *Jake.*

BRIEFS

Our hats are off to Lt. Charles D. Houchin, W9OUQ, who has received the Purple Heart after being twice wounded in action in the Mediterranean theater. He received his first commendation from his commanding officer after receiving wounds in the battle for Tunisia. Recently, while serving on an Italian battle front, he was wounded again, and received, in addition to the Purple Heart, a commendation by the commanding general of the Third Air Force. Lt. Houchin, who has been in service for more than three years and overseas for eighteen months, has served in North Africa, Sicily and now in Italy.

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It sounds like Camp Crowder, Mo., is the place to head for if you are an Army ham! We were recently notified that in response to an announcement, 61 members of the amateur fraternity registered to become members of the post amateur radio club. They were: W1APA, BKO, KBK, MMN; W2IHU, JYW, KXG, LOP, OHP, OLI; W3CGG, EUC, GHM, HFW, MW; W4AKV, GNO, HEK, ZZ; W5ESY, GCX; W6BAM, JQX, TPO; W7BW, ITN; W8APC, BYG, DBL, FIF, LJS, OJR, OOT, PLZ, QIQ, RBR, RPS, RUE, SKC, UMH, UMI, VVW, VHF, WIL; W9ARP, CCS, DNQ, DYG/1, EDO, EIS, FZW, MFY, RNI, UUI, UUQ, UXR, VDI, VPK, XP, YAW and KA1BB. At the first meeting of the group, activities were planned for the future. These include an "old fashioned hamfest" and a trip to view the Signal Corps transmitting equipment on the post.

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The amateurs of Tucson, Ariz., report that their club, the Tucson Short Wave Association, has not missed a single month of code class instruction for cadets, men in the services and civilians, since Pearl Harbor. An excellent record, we agree!

THERE IS NOTHING TO DO ABOUT A WAR EXCEPT WIN IT!

The purpose of this advertisement is NOT to brag about Thordarson's part in the war effort. While patriotism in a person or company may be something to be proud of, our own feeling is that it should not be exploited. Expressing patriotism in America is not even a duty; rather, it is a privilege . . . happily one that is understood and appreciated by the majority.

That is why, for nearly 3 years, Thordarson has talked little about the war and war production . . . except to make the bare statement that we were busy supplying materials for the armed forces.

Regardless of all this, we do think the time is now propitious to give a few more details as to what we are thinking and doing.

When war came, we were one of the first companies to be chosen for front-line production duty. The need was urgent . . . the demands were great. As Americans, we were glad wholeheartedly to tackle the job assigned to us.

Early and late . . . day and night . . . Sundays and holidays, we have continued to devote all of our efforts, 100% to winning the war. We have kept "eyes front" on this one task. We have had to forget, for the moment, personal considerations of "good business" . . . on occasion we have even had to turn down old and good friends who needed this or that which, under ordinary conditions, we would have been tickled to death to supply.

The time will come . . . it's coming shortly, we feel . . . when we again can think first and foremost of supplying civilian needs. That will be a far happier day for us than it could possibly be for you, no matter how much you have needed material you were unable to secure.

But meantime, the war goes on . . . and we, in our small way, must continue to stand guard at our appointed post until the "at ease" command is given. As we said in the beginning: THERE IS NOTHING TO DO ABOUT A WAR EXCEPT *WIN* IT!

ARMY E NAVY

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The Month in Canada

QUEBEC—VE2

From Lt. L. G. Morris, VE2CO:

With deepest regret we record the passing of R. M. T. Larin, 2HT, of Montreal. A keen friendly amateur, Ralph stoicly endured a lingering illness for many years. His fine spirit won the admiration of his many friends.

Stan Comach, 2EE, former SCM, and Jim Carlyle, ex-2BH, have been promoted to the rank of commander, RCNVR. Others receiving Navy promotions are Bill Lore, 2NQ, and Bruce McKimmie, 2LU, who are now lieutenants. Albert Laumallier, 2CG, is back in Canada, having been in England since December, 1939. His wife and a junior op are still over there at present. Lt. Gordon Yull, 2GE, has returned to foreign duty overseas, after several months stay on this side.

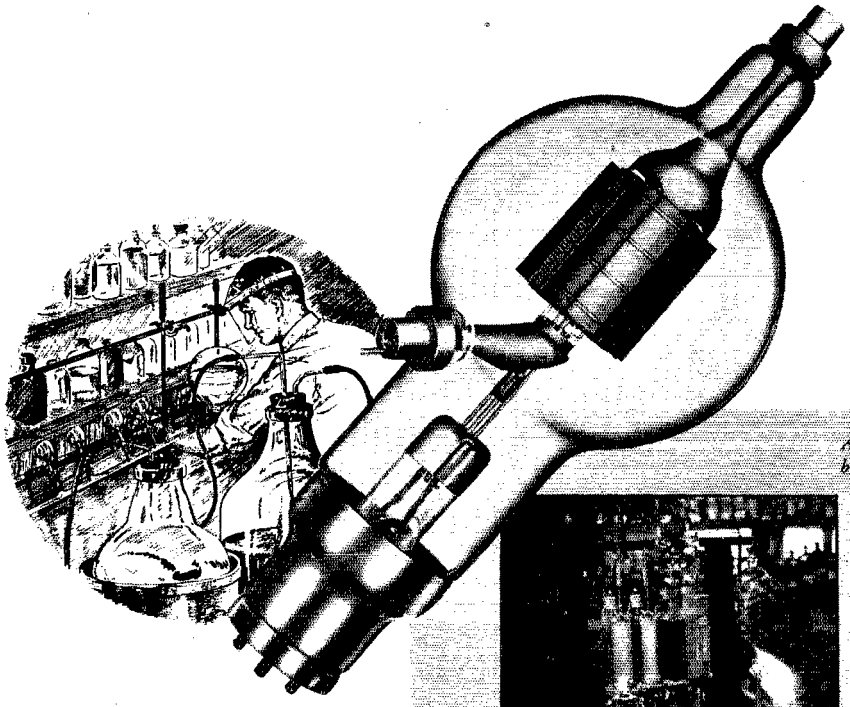
ALBERTA—VE4

From W. W. Butchart, VE4LQ:

From Barons we get a report on ham activities from 4ZI, Elwood Irwin. He tells us that 4ARC, Aylmer Gloer, of Barons, is celebrating the birth of a 2nd son. 4AQP, Milson Hodgson, of Barons, is busy pouring concrete on the foundations of a new house, but will have to lay off now and do a spot of grain-buying, as the new combined wheat is beginning to come in. 4ADY, Laverne House, of Barons, has been kept busy on tractor repairs. 4WZ, John Row, of Barons, keeps out of sight pretty much these days — guess his work must be keeping him too busy. Had a QSO with 4VJ, Ken Angus, of Edmonton, a few days ago which lasted for all of an hour. Ken notes that our ham circle in Edmonton is growing smaller all the time, and that the departure of AKK, Bob Lamb, and NU, Gordie Sadler, makes an appreciable difference. 4AH, Frank Makepeace, of Edmonton, attended the Convention of the Canadian Association of Broadcasters, held at Banff recently, and had an enjoyable week of it. While in Calgary, Frank saw AKK, Bob Lamb, who is now studio technician at CFCN, Calgary. Frank notes that Bob has made several very necessary improvements already, and that all in all, Calgary is far behind Edmonton as far as up-to-date broadcasting equipment is concerned.

By the way, boys, I'm about three months late with this news item: VJ, Ken Angus, had to have several buttons sewn on his shirt and vest after becoming a proud uncle. 4EY, Bill Careless, of Edmonton, is holidaying out of town, and VJ says that Bill is visiting a namesake (also a ham), whose present QTH we do not know, but who used to be at Byemoor, Alberta. 4WH, Hilda Hughes, of Edmonton, is out of town on holidays but is expected back very shortly. 4NU, Gordie Sadler, of Edmonton and Grande Prairie, had the misfortune of losing an operator up at CFGP, which leaves him shouldered with the responsibility of keeping the station on the air, so that his time is pretty well all taken up. VJ and AH are having the time of their lives building a new stand-by transmitter for CFRN. Parts ordered long since have finally arrived, and Ken reports that work is progressing satisfactorily, and that they are keeping their hands in as far as design is concerned. The rig, by the way is a 250-watt job, with an 833-A final, modulated with a pair of 828s. 4EA, Roy Usher, of Edmonton, ran into a bit of trouble out at CKUA's transmitter the other evening, when a fixed tank capacity "gave up the ghost," leaving CKUA dead. Luckily, a replacement was rounded up from the U. of A. laboratory, and the rig is perking again. 4BW, Ted Sacker, of Edmonton, was out at Pigeon Lake for a week or two on holidays. Ted's stock, by the way, is right up to snuff, and though he is short on some items, you can get most everything you need for receivers, amplifiers, etc., and conditions in the stock line are improving all the time. 4BV, Reg. Mainwood, of Edmonton, is "batching it" these days, as his wife had to have her appendix removed recently. By the way, Reg. is extremely busy in his spare time building a reflecting telescope.

The NARC weiner roast at Whitemud Creek turned out very successfully. Those attending, though on the scant side, were enthusiastic and you may rest assured that talk about "getting back on the air" was predominant. Among those present were: EA, Roy Usher; 4BW, Ted Sacker; 4YX, Cec. Cable; 4WH, Hilda Hughes; 4ART, Clare Carlson; 4VJ, Ken Angus; 4XF, Pat Sullivan; 4HJ, Bert Stollery; 4ATH, Stan Mitchell, and LQ, Bill Butchart, with a goodly scattering of YLs, XYLs, etc. Ted Sacker is probably the



the *Science* behind the science of electronics

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The resources and resourcefulness of Eimac laboratories have accounted for many outstanding contributions to the science of Electronics. A fact which is attested to by the leadership which Eimac tubes enjoy throughout the world. These comprehensive facilities are continuously being utilized to achieve better and better results for the users of Eimac tubes.

Eimac Engineering is devoted solely to the development and production of electron vacuum tubes. However, since the electron vacuum tube is the heart of all electronic devices it is advisable for users and prospective users of electronics to look first to the vacuum tubes required. A note outlining your problem will bring advice and assistance without cost or obligation.

• • •

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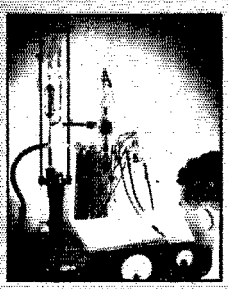

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(*Continued from page 74*)

most hopeful individual in the 4th District, and his enthusiasm must be catching, as there are rumors around that the odd new receiver is being planned, or is under construction! Seems like a good idea though to have a receiver ready, and speaking of receivers, boys, how's your copying these days — 10, 15, or 25 w.p.m.? And getting back to the weiner roast, again — credit for organizing the outing goes to WH and VJ. 4HJ was heard to remark that a weiner never tastes very good until it's been dropped into the fire a couple of times! A business meeting of NARC is being called in the near future with a view to plotting future development of the club. Postwar reorganization will be the main topic.

I saw 4AES, Père McGrane, of Lac La Biche, in the C. N. station, Edmonton recently, attired in the uniform of a Lt. in the Canadian Navy. As noted earlier this year, Père has been taking a very active part in training Sea Cadets at Lac La Biche, and it would possibly not be an over-statement that Lac La Biche is rapidly becoming a fertile field for prospective Navy recruits, thanks to the activities of 4AES.

Had the pleasure of a visit from 4IN, Bill Lawrie, of Kirkcaldy, High River, and Vancouver, recently. Bill is an F/S in the RCAF and was on his way north to make antenna installations at several of the RCAF stations in the north. I found out from Bill that 4LA, Bill Harwood, of Strathmore, is still farming in that locality, and is patiently waiting for the day he can crank up the old rig on 75 'phone and renew acquaintances. 4PB, Elmer Nelson, of Vulcan, is still with the Dept. of Transport on radio installation work, and when last heard of was in Whitecourt, Alberta. His brother, 4NN, Lawrence Nelson, of Vulcan, is operating for the D. of T. up in Whitehorse, in the Yukon. 4AEV, Norm Lockhart, is working in the RCAF canteen at Currie Field, Calgary. 4ACF, Colin Heseltine, sr., of High River, has gone in for photography, and was very fortunate in picking up a good 35 mm. camera up at Banff. Colin, jr. (whose call has slipped my memory) is in the RCN.

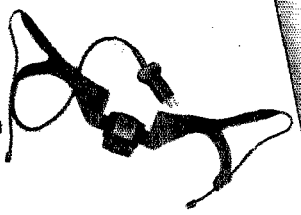
We managed to get a rise out of 4AOZ, Slim Marsden, of Milo, via this column, and one of Slim's newsy letters came along right away. He has been very busy around his service station and shop, and as he is the only one there his radio service work has reached proportions such as to warrant a long waiting list! Slim has worked up enough enthusiasm to get out on the roof of his joint and hang up a new 40-meter doublet, and says that the Meissner Traffic Master that AEV "gypped" him on last winter works marvellously when tied to the end of it! Slim makes a revelation in his letter, too. He tells me that he does a spot of writing now and again, and sells the stories to such magazines as the *Canadian Cattleman, Western Stock Growers Association Magazine*, etc. Nice work, Slim! He wrote an article some time ago on the Revolution in old Mexico, an affair in which he himself managed to get mixed up! And he remarks that he came out of that with nothing more than a 45 slug in his hind leg! Slim corresponds with 5DO, Provincial Police officer of Port Alice, B. C. DO's mother is nearly 60 years old, a grandmother, and to top it all holds her own ham ticket with the call of 5TH. She lives in Vancouver and works at the Boeing plant there. She got her ham ticket when her two sons were commercial ops up at Great Bear Lake, N.W.T., and used to QSO them regularly over the rig 5DO left at home. Can any of you guys tie that for an interesting bit of news?

MAILBAG

DANNY WELCH, VE3FT, noting that the VE3 column seems to be on the short side, contributed these items:

"For the boys in the service I have some news of hams across the continent of ours. Up here in Rupert, better known as 'The Land of Liquid Sunshine,' we have with the RCN: WO 'Hammy' Wilkinson, better known as 5AIX, who is in the Radio Artificer branch; Alex Young, former 4ADS, chief petty officer in the RA branch; Petty Officer Jack McClelland, 4AEK, also of the RA division. His bosom companion is Petty Officer Roger Curtis, formerly 4SZ, likewise of the RA division. Then we have Petty Officer Danny Welch, 3FT, of the Electrical Artificer branch. In Glace Bay, Nova Scotia, pitching for the RCAF there is LAC Bert Viney, 3AZX, who is a radar mechanic. Up in Gaspé, Quebec, there is a pilot officer of the RCAF, flying in the coastal command, who signed the call 3AYE in prewar days. His name is Earl Chiswell. LAC Len Thibadeau, 3ABW, is a wireless mechanic with the RCAF at Bagotville, Quebec. At the U. S. Naval Air Station at Norfolk, Va., Petty Officer 3rd Class, USN, is Sydney Chiswell, who be-

This is the now-famous Electro-Voice "Lip Mike" which began a new era in transmission of voice and the cancellation of ambient noises.



. . . and this marks the second step in the development of a full line of Electro-Voice Differential (noise-cancelling) Microphones.

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NEW MODEL 205-S

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- Provides extremely high intelligibility, even under intense surrounding noises
- A most efficient microphone for aircraft, factories, railroads, police and emergency services
- May be used in all temperatures from —40 to +185 degrees, and is interchangeable with conventional carbon microphones
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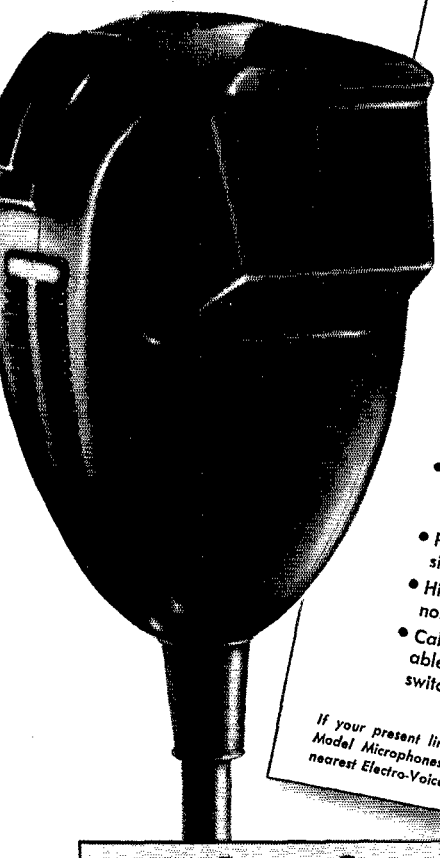
- Frequency response substantially flat from 100-5000 c.p.s.; high output level: —20 DB (0 DB = 1 volt/dyne/cm^2); internal noise level below .001 volt.
- Press-to-talk switch opens microphone and closes relay simultaneously, if desired
- High impact phenolic case, 4" x 2-5/16"; Fiberglas wind noise filter; weighs less than 8 ounces
- Cable length, 5 ft.; panel mounting on the back; available in two models: Model 205-S, and 205-SL with switch lock.

If your present limited quantity needs can be filled by any of our Standard Model Microphones, with or without minor modifications, please contact your nearest Electro-Voice distributor.



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(*Continued from page 76*)

fore the war signed the call VE3AYD. From now on he will be signing a W call. Likewise in the U. S. Navy at Almeda, Calif., we have Petty Officer 1st Class, Philip Smrcek, perhaps more widely known as W8SIV. W8SIV's brother-in-law in the U. S. Army Air Corps, at present in the South Pacific, is Bruce Born who signs himself W8SSJ.

"Passing through Ruppert a short while ago, 3FT found himself having dinner near W2ECA, a visitor at the P. O.'s mess. Needless to say, a QSO soon followed. Daily, 3FT, tours the world with his Sky Challenger. I have heard all continents except Africa. DX can't be too bad. I might add that I keep in touch with VE3AUR, 3ABW, 3AZX, 3AYE, 3AYD, W8SIV and W8SSJ. We hams are scattered near and far, but we still keep in touch with each other."

Silent Keys

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

W1AFQ, Lawrence B. Robbins, Harwich, Mass.
W2HQA, Joseph A. O'Haus, Garfield, N. J.
W2KCD, Louis Bigotto, Corona, L. I., N. Y.
W4FAH, Orland H. Duncan, Eastman, Ga.
W5BJT, Charles D. Hahn, Dallas, Texas
W6MQH, Walter N. Hom, San Diego, Calif.
W7EDV, Lt. Irving H. Hoyt, USA, Portland, Ore.
W7HXU, Mabel Beebe, Seattle, Wash.
W8RBV, Carlisle C. Jinks, Trenton, Mich.
W9BJT, Albert Minne, Mishawaka, Ind.
Ex-W9KV, Lt. Col. R. R. Brunner, AC, New York, N. Y.
W9LVE, T/Sgt. William F. Hazelrigg, East Alton, Ill.
W9QHK, Edward J. Halleman, Glen Ellyn, Ill.
Lt. Wesley Robinson, III, AC, Jacksonville, Fla.
VE2HT, R. M. T. Larin, Montreal, Que., Canada
VE4AQB, Peter C. E. Lay, RCAF, Regina, Sask., Canada
VE5NV, Lt. Guy Hobson, RCCS, Vancouver, B. C., Canada
G2KY, George Curran, Manchester, England

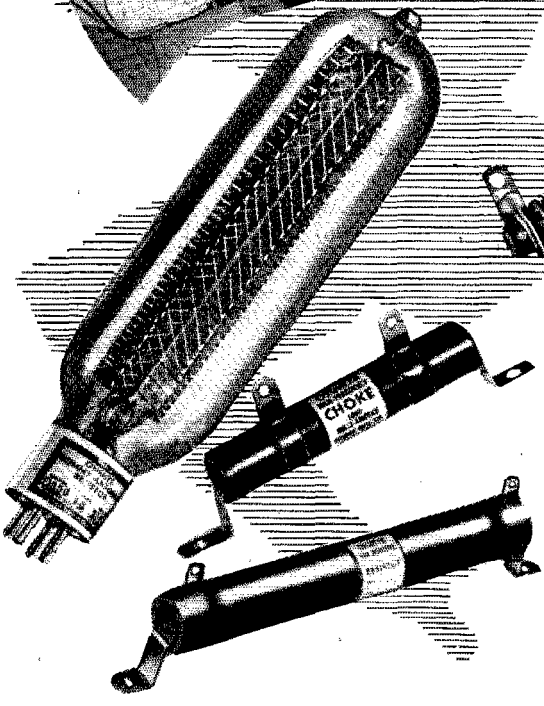
Strays

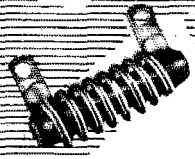
T/Sgt. Paul Swearingen, W9PJF, who was first reported to have been killed in action and later was declared a Rumanian prisoner of war, was liberated following Rumania's break with Germany. Before starting on his way home, W9PJF and several fellow prisoners helped restore communications in Bucharest by repairing one of the few remaining radio sets after the Germans had destroyed most of the communications equipment in that city.

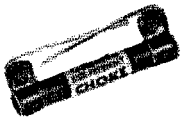
OHMITE

RESISTORS and CHOKES

for Radio Frequency Applications





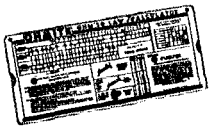


Ohmite Dummy Antenna Used in Testing Critical Transmitting Equipment

Here's what *COLLINS RADIO CO.*, well-known transmitter manufacturer, says: *"Within its power range . . . the most convenient to use, the most stable and the most accurate Dummy Antenna we have encountered . . . Used successfully for testing and measuring power output . . . Gives long life without detectable deterioration."*

Proved by use before war came . . . Ohmite R.F. Units today are performing vital functions in the production and operation of vital war equipment. An interesting example is the use of Ohmite hermetically-sealed, glass-enclosed gas-filled dummy antenna resistors by Collins Radio Company, and other well-known manufacturers for testing and measuring power output.

Other Ohmite Units doing specialized jobs in radio frequency applications are Vitreous Enameled Non-Inductive Power-Size Resistors, Parasitic Suppressor and R.F. Plate Chokes.



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WWV Schedules

STANDARD-FREQUENCY transmissions are made available as a public service by the National Bureau of Standards over its standard-frequency station, WWV, on the following schedules and frequencies:

2.5 Mc. — 7:00 P.M. to 9:00 A.M. EWT (2300 to 1300 GMT).

5.0 Mc. — Continuously, day and night.

10.0 Mc. — Continuously, day and night.

15.0 Mc. — 7:00 A.M. to 7:00 P.M. EWT (1100 to 2300 GMT).

Each of these radio frequencies is modulated simultaneously at accurate audio frequencies of 440 cycles and 4000 cycles, excepting 2.5 Mc. which carries only the 440-cycle modulation. In addition, there is a 0.005-second pulse, heard as a faint tick, every second, except the 59th second of each minute. These pulses may be used for accurate time signals, and their one-second spacing provides an accurate time interval for physical measurements.

The audio frequencies are interrupted precisely on the hour and each five minutes thereafter, resuming after an interval of precisely one minute. This one-minute interval is provided to give the station announcement and to afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. The announcement is the station call (WWV) sent in code, except at the hour and half hour, when it is given by voice.

The accuracy of all the frequencies, radio and audio, as transmitted, is better than a part in 10,000,000. Transmission effects in the medium may result in slight fluctuations in the audio frequencies as received at a particular place; the average frequency received, however, is as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.00001 second. The 1-minute, 4-minute and 5-minute intervals, synchronized with the second pulses and marked by the beginning and ending of the periods when the audio frequencies are off, are accurate to a part in 10,000,000. The beginnings of the periods when the audio frequencies are off 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.

Of the frequencies mentioned above, the lowest provides service to short distances and the highest to great distances. In general, reliable reception is possible at all times throughout the United States and the North Atlantic Ocean, and fair reception over most of the world.

Information on how to receive and utilize the service is given in the Bureau's Letter Circular, "*Methods of Using Standard Frequencies Broadcast by Radio*," obtainable on request. The Bureau welcomes reports of difficulties, methods of use, or special applications of the service. Correspondence should be addressed to the Director, National Bureau of Standards, Washington, D. C.

Standard on the "Route of the Flagships"

In 1939, American Airlines adopted the Collins 17F Autotune* aircraft transmitter as standard equipment for its entire fleet.

Previous experience on a lesser scale had indicated the wisdom of this step. Succeeding experience has confirmed it.

Compared with previous equipment, the 17F's doubled the power output (to 100 watts) with slight increase in weight, and the Autotune* provided thirteen quickly available operating frequencies instead of three.

Daily through the years, these rugged, uniquely efficient airborne 17F's and powerful Collins ground transmitters have given trustworthy support to a superb Operating Department in maintaining the great American Airlines tradition of safety and dependability.

After the war, Collins will again specialize in the development and production of advanced types of communication equipment for commercial aviation.

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*The Collins Autotune is a repositioning mechanism which quick-shifts all transmitter or receiver controls simultaneously and with extreme precision to any one of a number of pre-determined frequencies. U. S. Patents issued and pending.

COLLINS

ARMY E NAVY

Correspondence

(Continued from page 58)

Of the 20 survivors, 7 were rescued by a Coast Guard buoy tender, and the bodies of 12 other British seamen were recovered by the crew of a Coast Guard cutter of the 94-foot class.

Throughout the two days of rescue operations the boys at NMF kept 500 kc. open for traffic from the wrecked ship and used other frequencies to assist whenever and wherever possible. W2NAK talked with the *Knight* a great deal and the ship's op sent all the boys at NMF and WSL a very nice letter of appreciation.

Ham training was the thing we relied upon. Wish we could have done even better. . . .

— *RM1c F. A. Munro, USCGR, W8WRK*

BETTER AND WISER

APO 920, c/o Postmaster, San Francisco, Calif.
Editor, *QST:*

. . . My radio activities since joining the armed forces have been more or less varied, first as a radio operator on B-17s, then as a ground operator and maintenance man, and now in radar. To describe these activities as interesting and educational is putting it mildly, for they have meant a lot more to me. My only hope now is that all of us will return as better assets to ham radio and with the full realization of the freedom which no other ham in the world enjoys. It took a war to make us fully appreciate this, and the end of the war will see us back much the wiser.

Until the time the war started I had always maintained that my biggest thrill had been that first contact in ham radio, but as I look back I know now that my biggest thrill is still in store for me — that will be when I'll be able to crank up the old rig again and sing out with that old familiar CQ. It won't be an artificial thrill then as it was on my first contact, but of something preserved that we all came so close to losing forever. . . .

— *T/Sgt. George Colafati, W1CEM*

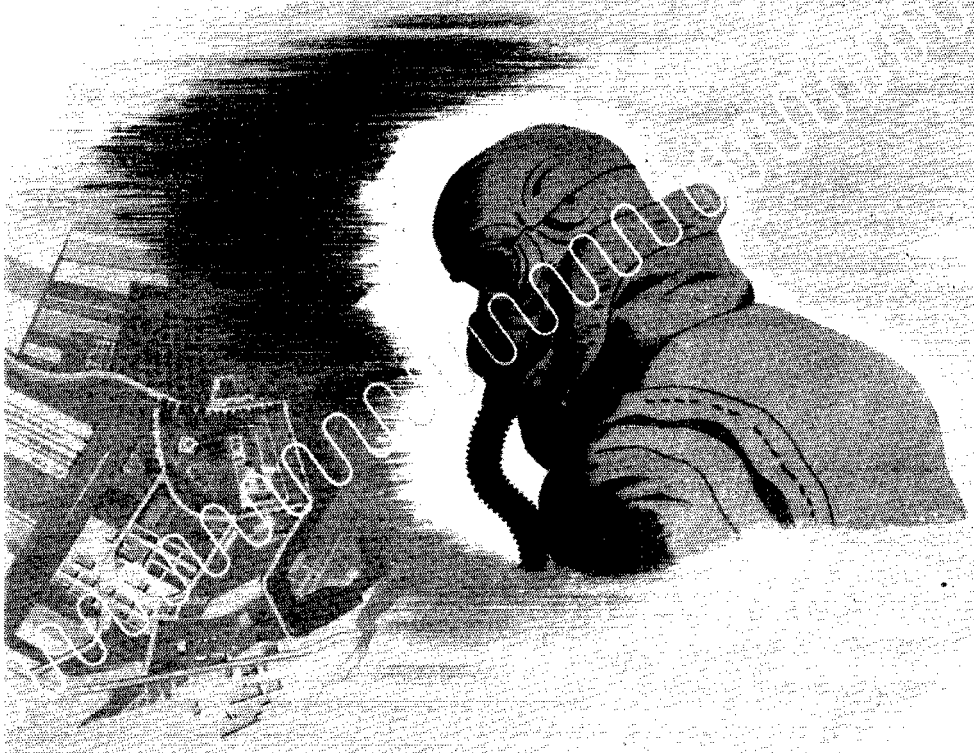
AS OTHERS SEE US

952 East 19th St., Brooklyn 30, N. Y.
Editor, *QST:*

I sometimes wonder if amateurs would enjoy knowing how they look to some of us folks on the outside who, through the exigencies of the war, got mixed up with amateur radio.

When the war broke out I had been away from actual land telegraphy for more than fifteen years, but recalling that during the first World War the Army rated me as a radio operator (which I wasn't, except that I knew how to recite the dots and dashes of the Continental code), I thought I might be useful somewhere in teaching the horde of youngsters eager to learn the code. An offer to assist on an evening volunteer basis at the First Army Signal Corps School in the World Building, N. Y., met with no success; volunteers were not welcome. The New York Board of Education then offered me a teacher's job

Delco Radio Products *Mean Dependability*



All over the world Delco Radio products are in useful service. They prove daily that the name Delco Radio means dependability . . . dependable designs developed with care and imagination; dependable products built with craftsmanship and skill. In radio and electronic equipment, the name Delco Radio stands for engineering vision—manufacturing precision.

MAKE YOUR DOLLARS FIGHT—BUY MORE WAR BONDS

Delco Radio
DIVISION OF
GENERAL MOTORS

(Continued from page 82)

nights, but I was unable to tack an additional 48 hours of work onto my normal stint each week and had to pass this up.

Finally I landed at the American Women's Voluntary Services in Brooklyn, and with Jack DuBois and another old-timer, Freteluco, who was a former Navy operator, launched a class of 105 young women, which in six months dwindled to 25. Some of them learned enough code to pass the Class B amateur exam, after having memorized sufficient theory to get by.

From Brooklyn I graduated to the AWVS radio school in Manhattan. Here half a dozen classes were going night and day under the excellent direction of Mrs. Lenore Conn and her colleagues, assisted by volunteer teachers. Later the department was directed by Mrs. Frances Mayer.

It is not easy for a land-Morse man to suddenly forget his own code and procedure, and take over International Morse, with a different procedure. The ideal teacher of International Morse, I soon learned, had to know something about the theory of radio. In landline Morse that all devolved upon wire chiefs who, in the main commercial or press offices especially, always stand ready to line up and service the circuits.

International Morse is of course a slower medium of transmission than land Morse, so that one has to learn to restrain himself in the matter of speed. Your letters and figures contain more dots and dashes, you don't abbreviate as we constantly do in landline Morse, and on press circuits your fastest manual pace in International Morse would put an experienced landline press telegrapher to sleep. The few Q signals you use are nothing compared with the widely used and elaborate Philips' code used on land-press circuits. You don't use much punctuation even on press circuits, where you usually spell words out. Landline Morse for press uses about everything known in punctuation, which makes the editors' job at the receiving end easier in preparing copy for the linotype machines.

On the other hand, when it comes to knowing all about your equipment and how to fix it when it goes blah, you have it all over the landline Morse men. They know little beyond the rudiments of an electrical circuit — they never had to know much. The score is balanced by the abysmal ignorance of the land telegrapher.

So, for eighteen months this land-Morse operator was teaching International Morse to young women (sneaking into ARRL as an associate member and enjoying as much of *QST* as he could understand). At the same time he was learning as much as he taught, if not more — and liked it all the time.

One thing worries me. Some day an amateur is going to make an exclamatory remark and when he hunts for the necessary concluding exclamation point, he isn't going to find the code equivalent for it; because officially there isn't one. Please get one. And how about dah-dah-dah-dit for it? And also please get settled on

(Continued on page 86)

(Continued from page 84)

just what the code symbol for the dollar sign is. ARRL says it is SX (or VU) or BD.

Finally, the greatest marvel to a landline Morse operator is the loose way in which you toss around the word "ham." Among actors and on any land wire that word is a fighting word. A "ham" is a "lid," and a lid gets lifted from the wire because he's not "heavy enough" to hold it down. — *Jos. B. Milgram*

MAY THE GANG REMEMBER

Second Signal Service Bn., Washington, D. C.

Editor, *QST:*

The other evening while rummaging through a stack of magazines in the day-room, I came across a recent copy of a magazine which, prior to Pearl Harbor, was very well known to the amateur fraternity, although its editorial policy was anti-ARRL. Imagine my surprise when leafing through it failed to turn up even one article written for hams, or even remotely connected with ham radio. If ever I had a convincer this is it. Apparently, when the profit goes out of ham radio so do the good-time-Charleys. When this mess is over I hope the gang remembers who stuck around when the going got rough.

— *S/Sgt. D. T. Brosnan, jr.*

JUST WHAT HE WANTED

At Sea

Editor, *QST:*

Here is the story of just another "ham in the service" — but I am one soldier who actually got what he wanted in the Army!

From the very start my ham ticket served me well. Upon my entry into the Army in March, 1943, I was sent to Camp Crowder, Mo., for radio training. It kind of burned me up when they stuck me in basic radio on five words per with a stick, but it wasn't long before I was moved up to thirty-five on the mill.

I always had an ambition to be a sea-going radio operator, but I never expected it to come while I was in the Army! My lucky break came when I was sent to San Francisco, to be given special training in commercial procedure, operation, etc. Finally I was placed on an Army transport as second op. Then my adventures began! . . . It would not do to mention our ports of call on my first voyage. I can say, however, that to date I have been to just about every group of islands of any size in the South and Southwest Pacific.

On this trip I am sailing as chief operator. I can thank nothing else but my amateur experience for being given this responsible job in such a short length of time. So far as I have been able to learn, I am, at the age of nineteen, the youngest chief operator sailing out of San Francisco. To me this is quite an honor. . . .

— *Al B. Hayes, W5JQU*

(Continued on page 88)

MOISTURE

the enemy of radio insulators

CAN'T PENETRATE STEATITE

Moisture in hot steaming jungles and in cold foggy climates is a life-shortening enemy of radio equipment.

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GENERAL

KEASBEY
NEW JERSEY

A WORD ABOUT THE ARMED GUARDS

EE & RM Class 6–44 Sec. A,
College of the Ozarks, Clarksville, Ark.

Editor, *QST:*

There's some doubt in my mind as to how much our fellow hams and friends know about the U. S. Armed Guards. . . .

I was formerly a proud member of this branch of the Navy. Most people have a misconception of the AGs. They never seem to realize that a Navy operator stands watch in the radio shack on our merchantmen. The number of ops on each ship depends upon the type of ship. These Naval operators are known as "Compool" men, derived from the term "communication pool." Most of these men have volunteered for duty on tankers, cargo ships and Liberty ships, in addition to troop ships. Their jobs take them to every corner of the globe and from New York to Russia and from Alaska to Africa. To name the places they visit and the battles they go through would fill many a volume.

Our work aboard ship was to man all radio gear, work in step with the ship's op, check radio equipment and the battery room, operate the d/f gear, and do about everything in connection with communications. These ops also have to be reliable signalmen, in that they must know how to communicate by international flag hoists, blinker lights, colored lights and semaphore.

It was my good fortune to meet many hams in this work. The commercial operator was usually a ham, and that was the start of a good rag-chew. Once in a while we came across a ham we worked in prewar days. Although slight friction existed between the ship's "Sparks" and the Navy op, the two ops got along pretty well. . . .

If any of you hams on the tankers and cargo ships read this, let's have a QSO by mail.*

— *R. A. Le Blanc, RM3/c, W1NMB*

IT IS HIS BIBLE

Johannesburg, S. Africa

Editor, *QST:*

I have yet to go into a radio section out here in the South African Air Force and not see a copy of the *Radio Amateur's Handbook.* Yes sir, for the man in the service it is his Bible these days, and the arguments it settles are legion.

I also would like to say how much we all look forward to receiving *QST.*

— *J. M. Ross, ZS6BG*

"COMING ALONG SWELL"

New Guinea

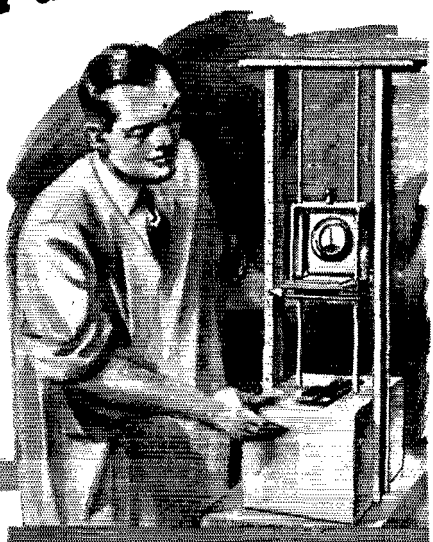
Editor, *QST:*

. . . *QST* has been coming along swell here; somewhat in a battered condition but, nevertheless, it surely is good reading. Every issue has a waiting line to read it. . . .

— *Carl Bogart, W2DRM*

* Address mail c/o ARRL Hq. for forwarding.

Shocking Treatment for an Instrument



Simpson Shock Test — Instrument is mounted in sliding carriage, and dropped against bottom plate. Vertical scale permits computing impact shock in multiples of g, the acceleration of gravity.

WHILE electrical instruments are delicate by their very nature, the conditions under which they must serve are seldom ideal—these days especially. Before entrusting them with vital responsibilities, it frequently becomes necessary to learn just how much abuse they can withstand.

With Simpson Instruments performance can be proved beforehand right in the Simpson laboratories. Complete facilities are provided to simulate practically any operating conditions, and to make an instrument live many, many years in a day.

Important innovations in design and construction have resulted. Exhaustive breakdown tests show that the Simpson Instruments of today are far more rugged than would have been thought possible just a few years ago.

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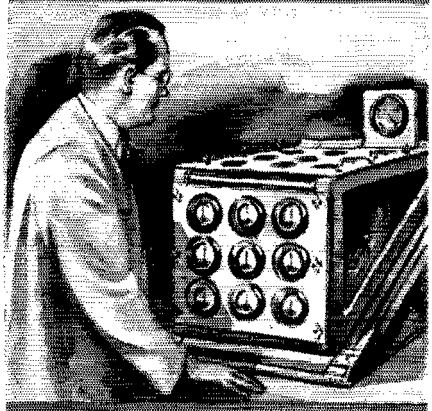

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Buy War Bonds and Stamps for Victory

Practical Math

(Continued from page 41)

lines which sets off equal plate voltages on either side of the operating plate voltage. This position locates points *3* and *4*.

4) Continue to take equal increments of grid voltage until the curve is completed.

The installment to follow on Class-B amplifiers and modulators will cover the design of the push-pull input current when the grids draw current, exact method of calculating the plate dissipation, and the distortion present in push-pull circuits.

Wright Field's Ham-Built Direction Finder

(Continued from page 43)

nearer, more accurate bearings are possible and the pilot instructed to correct his heading. Tests have shown that it is possible to bring an airplane in directly over the radio station. Actually, all that is necessary is to bring the plane over the airport.

The value of this simple homing device was proved dramatically in early May of this year when out of the heavy rain one dark day came a call for help. The pilot of a P-38, with only 60 gallons of gas left, had become lost and was trying to locate Wright Field. If he were forced to land in a pasture it would mean thousands of dollars in damage to his plane and possible injury to himself.

The operators picked up the call and at once set their bearing indicator into operation. Within twenty minutes the lost plane was over the field and receiving landing instructions from the control tower. Authorities realized that the saving of that one plane alone amply paid for the cost of developing the antenna.

Refinements and different designs of antennas now are being worked on in an attempt to produce a device which will be even more directional and accurate.

—*D. H. M.*

Strays

One million "Type X" crystals, for installation in Army Signal Corps equipment, have been completed in record time by RCA Victor's crystal manufacturing department. The millionth crystal, in a gold-plated container, was presented to Col. E. V. Elder, commanding officer of the Philadelphia Signal Corps Procurement District.

—•••—

Electronic tube production at the Westinghouse Lamp Division has expanded to 30 times the dollar value of tube production in 1939, according to a recent announcement. Ninety-eight per cent of these tubes go to war use.

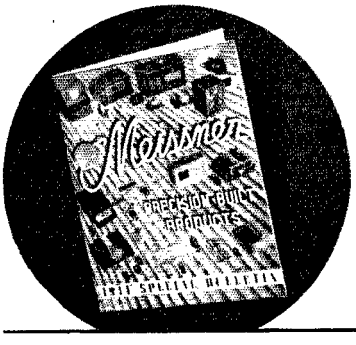
MEISSNER OF MT. CARMEL

Beauty—and Accuracy! Top-grade personnel, brought up in a community where electronics skill has become a heritage, give Meissner products their far-famed quality. There are hundreds doing similar work.

Why all eyes in the Electronics Industry are on this little city in Illinois

Precision-el — that's the name earned by Meissner personnel because of their skill at all types of precision work. Here is one of many Meissner veterans.

Close Co-operation! This is a factory conference at Meissner's Mt. Carmel plant. Here production plans are worked out for maximum harmony, top efficiency.



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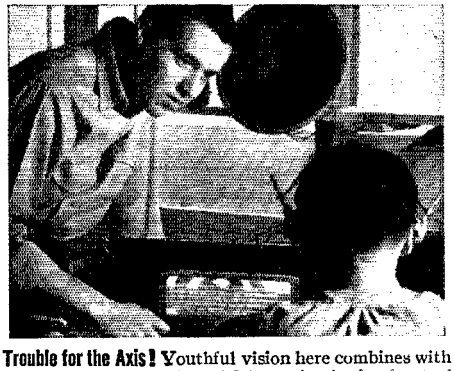
— showing radio parts in Meissner's 1944 line. Contains complete descriptive matter, with pictures. Now, more than ever, you need to know what the market offers. Send for your copy today. The supply is limited. It's free. Write to address below.



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MEISSNER

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ADVANCED ELECTRONIC RESEARCH AND MANUFACTURE

Hints and Kinks

(Continued from page 53)

and solve this equation for frequencies of 1000 and 10,000 kilocycles:

$$LC\ (1\ \text{Mc.}) = \frac{1}{39.5 \times 10^6} \times 10^{12} = 0.0253 \times 10^6 = 25300$$

$$LC\ (10\ \text{Mc.}) = \frac{1}{39.5 \times 10^8} \times 10^{12} = 0.0253 \times 10^4 = 253$$

Notice that as the frequency was multiplied by 10 the *LC* product varied inversely as the square of 10. This provides us with a definite ratio on which to base the method. Just to further fix this ratio in mind some quick figuring will show that halving the frequency will quadruple the *LC* value or dividing the frequency by three will multiply the *LC* value by nine.

Now we have all the necessary workings of the method, so let's apply it to the slide rule. Let the C scale represent frequencies from 1000 to 10,000 kilocycles. The *LC* product for 10,000 kilocycles is 253, so all we have to do is determine the ratio between the frequency for which we are going to find the *LC* product and 10,000 kilocycles, square the ratio and multiply it by 253 (using only frequencies between 1000 and 10,000 kilocycles). For an example take 7300 kilocycles. Set 7.3 on C scale over the right index on scale D. Under the left index of scale C is the ratio of 7300 to 10,000 or 1.37 on the scale D. Also the left-hand index should indicate the square of this ratio on scale A, which should read 1.88. Now, if your rule has a B scale, adjust the indicator to 2.53 and read 4.75 under the indicator on A. By inspection we find the actual *LC* product to be 475 since we were multiplying by 253. Our *LC* product then is 475 for 7300 kcs.

To find the frequency for a given *LC* product just reverse the outlined procedure. Keeping the decimal point in the proper place and selecting the correct section of the A and B scales can be performed mentally with a little practice.

To extend the range below 1000 kilocycles and above 10,000 kilocycles it is necessary only to make scale C represent 100 to 1000 kilocycles and use 25,300 for a multiplier in lieu of 253 or if scale C is to represent 10 Mc. to 100 Mc. our multiplier becomes 2.53.

With a fine-point pen and India ink it should be quite easy to put an *LC* scale right on the rule as most rules have an unused edge.

— S. C. Hoeper, W3CCU.

Strays

Ham: "I saw a Spitfire shoot down two doodlebugs this morning."

Spam: "Good. That reduces V-1 by another 2 db."

— G6LJ in R.S.G.B. Bulletin

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This booklet is designed to train students to handle code skillfully and with precision. Employing a novel system of code-learning based on the accepted method of *sound* conception, it is particularly excellent for the student who does not have the continuous help of an experienced operator or access to a code machine. It is similarly helpful home-study material for members of code classes. Adequate practice material is included for classwork as well as for home-study. There are also helpful data on high-speed operation, typewriter copy, general operating information—and an entire chapter on tone sources for code practice, including the description of a complete code instruction table with practice oscillator. Price **25c**

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A comprehensive manual of antenna design and construction. Sixteen chapters, profusely illustrated. Both the theory and the practice of all types of antennas used by the amateur, from simple doublets to multi-element rotaries, including long wires, rhomboids, vees, phased systems, u.h.f. systems, etc. Feed systems and their adjustment. Construction of masts, lines and rotating mechanisms. The most comprehensive and reliable information ever published on the subject. Over 100 pages. Price **50c**

AMERICAN RADIO RELAY LEAGUE, INC., West Hartford 7, Conn., U.S.A.

Compact Gear for 224-M.C. WERS

(Continued from page 11)

success are given in Fig. 3. A coaxial antenna is shown at A. Flexible coaxial line is fed up through the 12-inch length of ½-inch copper tube which forms the lower half of the antenna. The upper half of the doublet is a 12-inch piece of ¼-inch copper tubing. Beaded polystyrene concentric cable is recommended for the line. A special insulator is provided at the joint between the two copper tubes. It is made of polystyrene turned down at one end to fit into the half-inch tube and bored with a ¼-inch hole at the other end to take the smaller-diameter upper antenna section, as shown in Fig. 3-A. This hole extends the entire length of the insulator to provide a means of connecting the center conductor of the line to the bottom of the upper antenna section. Brackets are then strapped around the ½-inch tube and fastened to a wood base to form a complete unit.

The antenna shown at B in Fig. 3 is essentially a "J" type. Proper matching to the feed line, however, is made by connecting directly to the bottom of both the main radiator and quarter-wave stub, instead of shorting the stub and radiator at this point, as is the case of a higher-impedance line. Quarter-inch copper tubing is used throughout this unit, except for the flexible 72-ohm coaxial line from the base. Both sections are made of quarter-inch copper tubing, are light in weight, and therefore do not place undue mechanical strain on the stand-off insulators on which they are mounted.

Either antenna may be used for the transmitter or receiver.

Power Supply

Any convenient type of power supply which will provide approximately 80 ma. at 300 volts d.c. for the plate circuit of the WE 316-A tube is satisfactory. Since approximately four amperes are required for the filament, an a.c.-operated power supply is desirable if fairly long periods of operation are contemplated. However, two volts from a storage battery can be used for filament supply, along with a vibrator or generator pack for the plate. The use of "B" batteries is not recommended because of the heavy plate current required for the WE 316-A tube.

Results and Acknowledgment

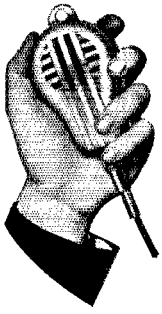
Preliminary results have shown that 224 Mc. can be used to good advantage in many spots. Work on this band has taken the "drag" off the regular channel, and inspiration already is provided for some interesting experimental tests in connection with WERS. These should be all the more interesting because of the rather cut-and-dried pattern into which work on 112 Mc. has settled.

The author expresses appreciation to Robert Cobaugh of Bayside, N. Y., for the photographs of this gear and to Athan Cosmas of Forest Hills, L. I., N. Y., for the valuable assistance in connection with the design and building of the rig.

TOP PERFORMANCE for that "RIG" You've got planned!

TURNER MICROPHONES

Pioneers in the communications field



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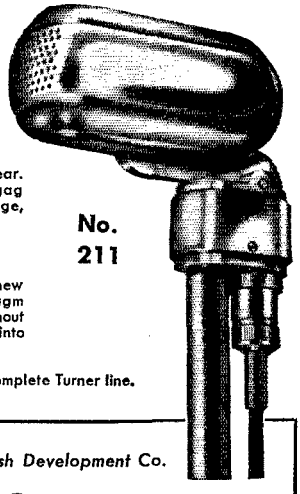
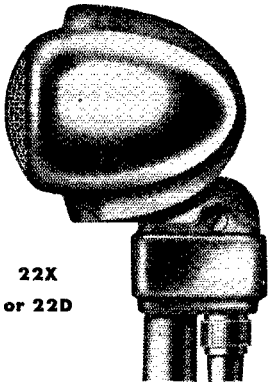


No. 211

22X or 22D — *Crystal or Dynamic*

Both engineered to cut feedback to reproduce sharp and clear. 22X has crystal impregnated against moisture; built-in wind gag permits outdoor operation. 22D has high level dynamic cartridge, reproduces smoothly at all frequencies. Works indoors or out.



22X or 22D

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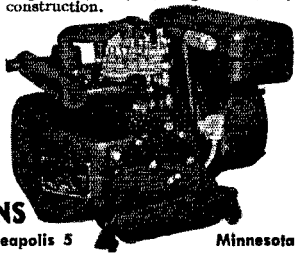

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Splatter

(Continued from page 8)

marine. His "have done" sketch is brief and to the point: "The age has recently changed to 23. Have a neat YF and a five-month-old future ham op. Interest in shipping out dates back to November, 1942, when I decided to attend Gallups Island (thanks to *QST*) to learn the code and shipboard operating procedure. After graduating, the General Electric repair shop in Pittsburgh, Pa., was home for a couple of months as they needed an electric balancing machine for aircraft generator armatures. This worked out nicely as I was on the tail end of a long beach list of ops. Came the day to ship and I signed on the S.S. *Hadnot* (vintage 1919, but did not improve with age as does most other vintage), as chief radio operator. At present am chief radio operator on the S.S. ——— ———. Formerly graduated from Bliss Electrical School and Capitol Radio Engineering Institute, after which I spent three months in the radar test section of Westinghouse in Baltimore. Hold Class A amateur, first-class 'phone and second-class telegraph licenses."

Our in-the-services roster of authors this month also includes a member of the Army Air Forces — none other than ARRL'S former acting communications manager, **Cpl. George Hart, W1NJM.** George, of course, is no newcomer to *QST*'s pages and we are glad to welcome him back. His article appearing on p. 12 was written before he left AACS Hq. in Asheville, N. C., to attend officer candidate school in Texas to prepare for more responsible work in the Army Airways Communications System.

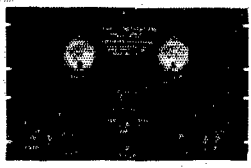
Completing our list of guest authors this month are two "repeaters" who, while not in uniform, are contributing to the war effort on the home front, both through their work and their hobby of ham radio. On p. 39 we present **Edward M. Noll, ex-W3FQJ** (Splatter, October, 1943, p. 8), and on p. 33, **Philip Rand, W1DBM** (Splatter, November, 1942, p. 12).

Strays

On a recent trip home a buddy of mine, Sgt. Floyd O. Duell, and a ham of about one year's standing, happened into the Chicago Service Center and noticed the start of remodeling in the wash room. Stopping again ten days later, he found the ceiling and walls clad in a nice shiny new coat of paint, with the exception of one corner, which held the added decoration of 23 neatly printed ham calls: W9NIL, W8UMC, W1CNP, W4FHC, W9NUG, W8RPF, W6QQL, W9BWI, W9QPT, W6TEV, W9JXD, W4QTX, W4RT, W8TWX, W7DCV, W2CMH, W3GYS, K7GN, W9BBQ, W2EMH, W3IZD, W8GO and W2KXR. He was quite amazed that his first ham contact should be made in such a manner and place. It just goes to show you, like 10-meter DX, you never know when or where. — *W3EVH*

Harvey 106 PA
200 to 300 volts

New
Harvey 206 PA
500 to 1000 volts



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OF CAMBRIDGE

for REGULATED POWER SUPPLY

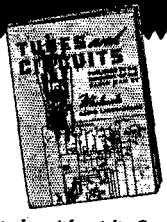
If you're looking for a dependable, controllable source of laboratory D.C. power, it will pay you to get in touch with Harvey of Cambridge.

The Harvey Regulated Power Supply 106 PA will meet your every requirement in the lower voltages. It has a D.C. output variable from between 200 to 300 volts that is regulated to *within one per cent.*

The new Harvey Regulated Power Supply 206 PA is for higher voltages. This latest Harvey development operates in two ranges 500–700 at ¼ of an ampere and 700 to 1000 at .2 of an ampere. Both ranges have accurate regulation to one per cent or better.

HARVEY RADIO LABORATORIES, INC.
451 CONCORD AVENUE CAMBRIDGE 38, MASS.

Send Only 10c
For This Handy
TUBE AND CIRCUIT REFERENCE BOOK



OUR NEWEST GET-ACQUAINTED OFFER

Here's a handy reference book that meets the demand for simple, easy-to-understand data on substitution of radio tubes. Contains a special section devoted to valuable technical information on tubes and circuits. It's a guide you'll refer to time and again. You can't afford to be without it. *Send for your copy today! Only 10c postpaid.*

HALLICRAFTERS

For many years we have been one of the country's largest distributors of Hallicrafter equipment. We have Hallicrafters available for immediate delivery on priority. *For full particulars, write*

SEND FOR MY LATEST FLYER ON HARD-TO-GET RADIO PARTS

LEO-W9GFQ
WHOLESALE RADIO LABORATORIES
744 W. Broadway, Dept. Q-11, Council Bluffs, Iowa

Radio Engineer
Physicist • Executive

Exceptional opportunity; wide-open salary and future but requiring much-better-than-average qualifications and experience for direction of laboratory and field staff of engineers and technicians of 18-year-old, nationally-known, professional organization located in New York metropolitan area and working in Communications, Broadcasting, Television and Applied Electronics.

Correspondence held confidential and returned upon request.

Give detailed background, education, experience, past connections, present status, photo, salary requirements. Interview can be arranged.

Extraordinarily fine opening with unlimited future for properly equipped man with energy, imagination, ingenuity, and executive ability.

BOX No. 105 • *QST*

LEARN RADIO

Pre-Military training for beginners. Catalog on request. We teach all technical branches of radio. Lic. by the Comm. of Mass. Dept. of Education.

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MRI

RADIO—ELECTRONICS

Co-educational training in Airline, Merchant Marine, Press Communications, Electronics, Television. FREE catalogue. Address Registrar. Gov't sponsored training available to veterans.

"The Radio School managed by radio men."

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MELVILLE RADIO INSTITUTE

MASTER COURSE IN RADIO COMMUNICATION

An *approved* home-study course — prepares you for radio operator's license and job or advancement in Broadcasting, Marine, Aviation, or Police radio. Our graduates can and do hold good radio jobs. *Ask for FREE circular 3-Q.*

See also our HAM-AD.

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RCA

RCA Institute offers an intensive two-year course of high standard embracing all phases of Radio and Television. *Practical training with modern equipment.* Also shorter specialized courses in Commercial Radio Operating, Radio and Television Servicing, and Aviation Communications.

For Free Catalog write Dept. ST-44

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A Radio Corporation of America Service
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RADIO-TELEVISION-ELECTRONICS

Prepare now for ever-increasing post-war opportunities. **Day and Eve. Sessions. Enroll now for new classes. Consideration given to Veterans eligible for training under the G. I. Bill.**

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480 Lexington Avenue, New York 17 (46th Street)
PLaza 3-4585 Licensed by New York State

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 arrangements, 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 30c 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 7c 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 7c 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 30c 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.

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

WHY NOT turn your unused equipment into ready cash which may be applied towards new and better equipment after the war? Leo, W9GFQ, offers you the best cash prices for communications receivers and test equipment. Write today for large illustrated catalog. Wholesale Radio Laboratories, 744 W. Broadway, Council Bluffs, Iowa.

CRYSTALS available — all types, including 100 kc., 465 kc. and 100 kc. Broadcast and Aircraft given prompt attention. Scientific Radio Products, Council Bluffs, Iowa.

PROMPT Repair Service on Meters and Electronic instruments. Braden Engineering Company, 3317 Kenmore Ave., Dayton 10, Ohio.

WANT *QST's*, February and July, 1916, and old Government Call Books. F. E. Norwine, 7405 Hiawatha, Richmond Heights 17, Missouri.

RADIO TESTS — Pre-examination Tests for Radio Operators. Tests your knowledge before you appear for commercial radio operator license examinations. Avoids failures. Guides your preparation. Saves your time. Worth investigating at once. Also books for home study. Write for free circulars 5Q. Nilson Radio School, 51 E. 42 St., New York 17, N. Y.

TUBES at OPA prices. Abbott, 2101 Grand Concourse, New York City 53.

PREPARE NOW for tremendous opportunities in new fields of radio after the war. Training for Federal licenses. Write for particulars. Radio code classes, all speeds. American Radio Institute, 44 East 23rd Street, New York 10, N. Y.

WANTED: Home recorder, any make with, or without microphone. Gerald Wood, W1LRQ, Franklin Park, Mass.

IMMEDIATE SHIPMENT on priority: New SX-28As. $223.00. SX-25s, $94.50; PM-23s, $15.00. In stock without priority: Trimm No. 65 Dependable head-sets, $2.28. No. 100 Featherweight $6.00, meter rectifiers, $1.95, coils, transformers, panels, chassis, radio supplies of all sorts. Your inquiries and orders invited. Henry Radio Shop, Butler, Mo.

HIGHEST prices paid for used receivers, test equipment, bugs, oscillators. What have you? W9ARA, Butler, Mo.

METERS: Panel instruments 3½" size, microammeters, voltmeters, ammeters, R.F. meters, milliammeters. Large variety. Multi-range small portables. Prompt deliveries. Advise what you want for quotation. Hallicrafters SX-28, 25. Hatry & Young, 203 Ann St., Hartford 3, Conn.

WANTED: Pay top price for one recorder in perfect shape. Floyd Howard, Hodge, Louisiana.

WANTED: *QST's* 1915–1924: March, July, 1925. QRU? E.D.C., 38 LaSalle Road, West Hartford 7, Conn.

WANTED: 350 ma. or higher, 12 henry smoothing choke. Joe Reinhardt, Jr. 18 South Church St., West Chester, Pa.

HAMMARLUND Comet-Pro for sale. 10, 20, 40, 80 meter coils. Continuous coverage. Best offer. G. F. Hundertmark, 138 Summit Avenue, West Trenton, New Jersey.

URGENTLY Needed: Hickok 188X or 177X, RCA 161 *Signalyst, or Triplett 1632 RF-IF signal generator.* Hewlett-Packard 205AG or Jackson 652 audio signal generator. Hickok 530 or Precision 915 tube-tester. Precision EV-10 with RF-10 u.h.f. probe or RCP 662 electronic multitester. Sprague deluxe Tel-ohmike or Jackson 650A condenser tester. RCA Rider chanalyst Converter. Instruments of equal quality considered. Will pay top price for instruments in A-1 condition. All replies answered. Ralph E. Beck, R.D. 1. Box 144, Jeannette, Pa.

WANTED: Radio operators for merchant marine. Commercial license. Must join union. Wages, $310 monthly. Radio Officers Union, 265 West 14th Street, New York City.

FOR SALE: Three Superior instruments and inventoried stock of amateur gear, over 680 items, $1,275.00. Write for list. Walter S. Kalisty, W2MSL, 20 John St., Poughkeepsie, N. Y.

G.I. Recorder, two speed in portable case, X29 Astatic crystal cutter. 500 ohm to crystal transformer. Best made, including new sapphire cutter. Astatic LP23 pick-up. $75.00 f.o.b. W3OE, 3009 Magee Avenue, Philadelphia 24, Pa.

SALE: Record player with crystal pick-up, quiet motor, beautiful cabinet. Jarden, 7149 Ardleigh St., Philadelphia, Pa.

FOR SALE: Portable Triplett Volt-Ohm Meter with signal generator, $23.50. One tube checker, checks most tubes, $10.00; One DC-SW-3 Rcvr with 40-80 coils, $10; One 3 heat Supreme soldering iron, $3.00. T. C. Willis, W4CLA, P.O. Box 101, Blakely, Georgia.

WANTED: Broadcast coils for HRO. Hoover, Dysart, Iowa.

WANTED: Westinghouse 0-2.5 Ampere BX radiation ammeter; DeForest OT3 or parts therefor. G. E., Westinghouse, RCA and DeForest crystal receivers. Radiolas 1, 2, 4 and subsequent models prior to 1935. Paragon RA6, DeForest audion control boxes and panels, DeForest, Grebe and Paragon transmitters. Early 204 and other tubes prior to 1930. Also early radio publications such as Marconigraphs, Modern Electrics, Wireless Age, etc., Franklin Wingard, Rock Island, Ill.

STANDARD heavy duty relay rack, 69" high, 19" panels. Commercial duty Thordarson 1250 volt, 280 mil power supply. Fixed bias supply 0–300 volts; 450 watt r.f. amplifier; three high grade meters. All completely mounted on above rack. Sell separately or as complete unit. W1HYV.

FOR SALE: Hallicrafters S-29, good condition, with batteries. Best offer takes it. M. Silberberg, ART1/C, W6OFF, Radio Technical Labs, N.A.S., Lakehurst, N. J.

WANTED: Cash or .22 revolver. Have audio amplifier, code oscillator, bug, hand key, hi-fi Jensen Speaker, tubes, parts. Trautwein, 4025 206 St., Bayside, L. I., N. Y.

WILL exchange only: New Stancor 10-P transmitter, all coils, and Sky Buddy receiver, very good condition for better model receiver. Specify make and model. F. Hill, W2OAV, 678 Willow Grove Road, Westfield, N. J.

WANTED: Par-Metal 72" relay rack. Mims Deluxe rotator, 20 m. William I. Taylor, Okla. No. 6, Beverly Park, Alexandria, Va.

WANTED to purchase or borrow, circuit diagram for Collins radio transmitter 30 FXC. Sam Macy, 1219 Linden St., S.E., Roanoke, Va.

WANTED: 6 volt "Pony" relays. W1BB.

SELL: Deluxe Supreme 89 analyzer and tube-tester, remodernized. Owner overseas. Make offer. E. Hitchon, 24 Victoria Ave., Belleville, Ontario.

ONE Hallicrafters SX-28 including PM23 speaker, brand new in original carton, $238. (Present ceiling price.) Immediate shipment. No priority necessary. A. den Breems, 14 Sutton Place South, New York, N. Y.

FOR SALE: Hallicrafters SX9 receiver, in excellent condition. D. E. Illian, 142 Alger Rd., Oak Ridge, Tenn.

WANTED: Mims ten or ten and twenty meter kit complete. Give description and state price. W8AXN, A. R. Dean, Portland, N. Y.

WANTED: Hallicrafters Model S-19R, Sky Buddy communications receiver, Morton Bardfield, Brinsley Street, Dorchester, Mass.

RECTIFIERS, New RCA 1616 — 5000 volt, 800 ma. high vacuum, special, $1.50. G.E. Pyranol condensers, 14 mfd., 2000 volt $9.00 value — $3.95 (packed 6 to case). Aerovox 1 mfd. 1500 volt oil condenser, $1.25. Van Sickle Radio, Indianapolis 6, Ind.

WANTED to buy, 400 watt or larger, amateur phone transmitter. Send full information and price to B. Farmer, P.O. Box 11, Quincy, Ill.

SELL: RCA ACR-77 communications receiver, 110–220 volt ac operation. Best offer. W2HHK.

CRYSTALS: Prompt delivery of those dependable time-proven Eidson crystals in the 100–10,000 kc. range. New units available for Police, Aircraft, Marine, Geophysical and other services; also repair and regrinding service. Send for free folder L-5, mentioning needs. "Eidson's," Temple, Texas.

FOR SALE: Breting 9 receiver, perfect working condition. Best offer, over $60. W9NKT, 1608 Hoyt St., Madison, Wis.

"HOGARTH HAS ALREADY OCCUPIED THIS ISLAND—ALL SHE CAN SAY IN ENGLISH IS ECHOPHONE EC-1"

ECHOPHONE MODEL EC-1

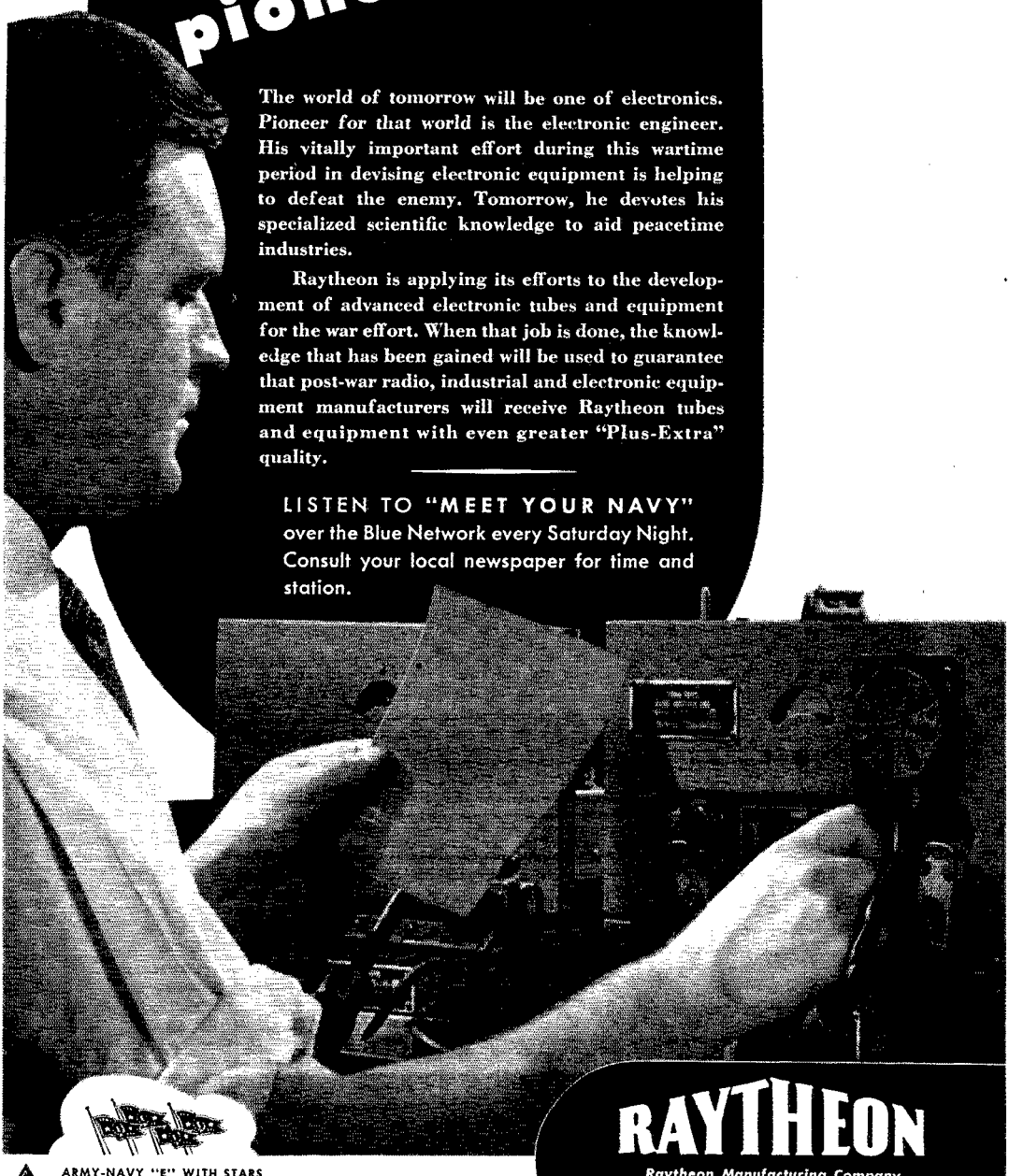
(Illustrated) a compact communications receiver with every necessary feature for good reception. Covers from 550 kc. to 30 mc. on 3 bands. Electrical bandspread on all bands. Six tubes. Self-contained speaker. 115-125 volts AC or DC.

ECHOPHONE RADIO CO., 540 NORTH MICHIGAN AVE., CHICAGO 11, ILLINOIS

Index to Advertisers

All of the above advertisers are coöperating with the A.R.R.L. to permit publication of an editorially adequate *QST* during this period of war-rationing of paper. Using less advertising space but at higher rates, they continue their customary support of *QST*. Some are using smaller space in each issue and some are using space only every second or third issue. Of the latter, those whose advertising does not appear in this particular issue are indicated by the ** above.

pioneer for tomorrow



The world of tomorrow will be one of electronics. *Pioneer* for that world is the electronic engineer. His vitally important effort during this wartime period in devising electronic equipment is helping to defeat the enemy. Tomorrow, he devotes his specialized scientific knowledge to aid peacetime industries.

Raytheon is applying its efforts to the development of advanced electronic tubes and equipment for the war effort. When that job is done, the knowledge that has been gained will be used to guarantee that post-war radio, industrial and electronic equipment manufacturers will receive Raytheon tubes and equipment with even greater "Plus-Extra" quality.

LISTEN TO "MEET YOUR NAVY" over the Blue Network every Saturday Night. Consult your local newspaper for time and station.

ARMY-NAVY "E" WITH STARS
Awarded All Four Divisions of Raytheon for Continued Excellence in Production

RAYTHEON

Raytheon Manufacturing Company
Waltham and Newton, Massachusetts

DEVOTED TO RESEARCH AND THE MANUFACTURE OF TUBES AND EQUIPMENT FOR THE NEW ERA OF ELECTRONICS

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NATIONAL RECEIVERS ARE IN SERVICE THROUGHOUT THE WORLD

All MINIATURES

All ON THE ARMY-NAVY PREFERRED LIST

AND All DEVELOPED BY RCA!

The 17 RCA Miniatures shown on this page — all of them on today's Army-Navy Preferred List of Vacuum Tubes — are:

1A3—H-F diode
1L4—R-F amplifier pentode
1R5—pentagrid converter
1S5—diode-pentode
1T4—R-F amplifier pentode
3A4—power amplifier pentode
3A5—H-F twin triode
3S4—power amplifier pentode
6AG5—R-F amplifier pentode
6AL5—twin diode
6AQ6—Duplex-diode High-Mu triode
6C4—H-F power triode
6J4—U-H-F amplifier triode
6J6—twin triode
9001—Sharp cut-off U-H-F pentode
9002—U-H-F triode
9003—Super-control U-H-F pentode

TINY tubes like these—*every single one of them developed by RCA*—were destined for the spotlight—thanks to your recognition of their possibilities.

The spotlight picked them up first in June, 1940, when the "Personal Radio" was announced—the history-making portable designed around RCA's staunch little quartet, Miniatures 1R5, 1S4, 1S5, and 1T4.

War found Miniatures instantly available for overseas service—for example, in such equipment as the paratrooper's air-borne "Handie-Talkie."

Once Victory is won, it will be our privilege to work with you designers so that, together, we may play our continuing parts in miniature tube type development and use for peacetime purposes. We look forward to that day. And we will gladly advise you now which tubes — Miniatures, and others — will most likely be on RCA's post-war list of "Preferred Tube Types," if you will write to RCA Commercial Engineering Section, 62-10A South 5th Street, Harrison, New Jersey.

The Magic Brain of all electronic equipment is a Tube and the fountain-head of modern Tube development is RCA.

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